

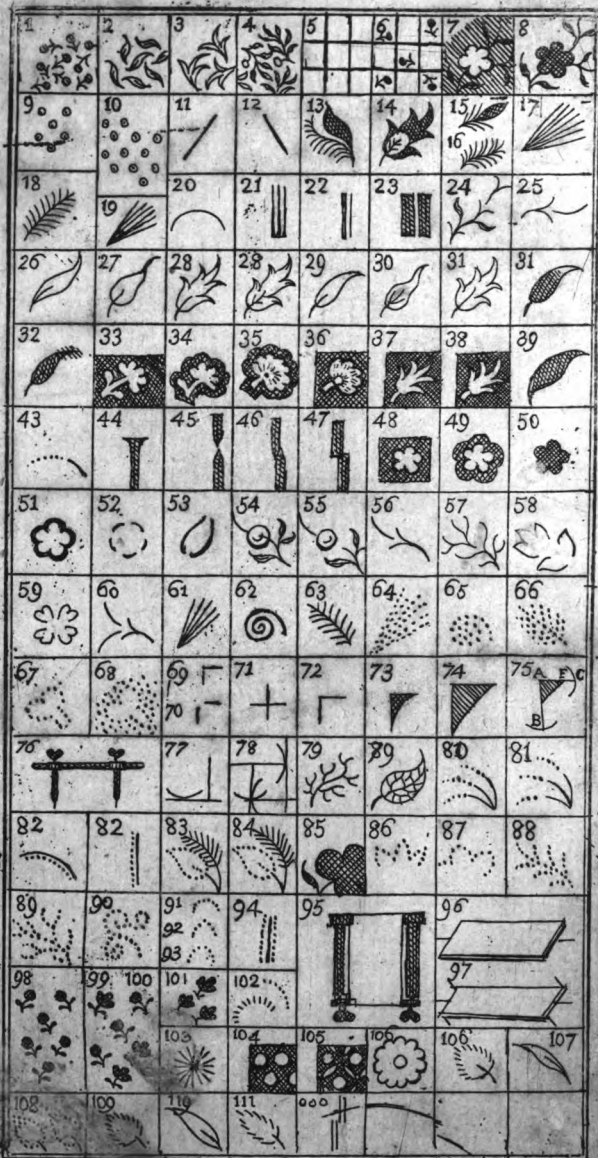


1785. £. 50.



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Saml. Procter



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O N
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PHILOSOPHICAL DISCOVERIES
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Expedition without precipitancy.*

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INTRODUCTION.

THE following rules and observations being particularly addressed to Artificers or Workmen in the Callico-Printing business, it is therefore deemed necessary to retain many technical words and phrases in use among them, however awkward they may appear, or however remote they may be from critical propriety,—such as *boundage*,—*putting on*,—*cutting a curf line*, &c. which will however be explained in another place.

To many persons such an intimation is unnecessary, and probably it would not have been given (for nothing can prevent caviling and ill-natured constructions) but that one or two to whom the manuscript was shewn, although they were Callico-Printers, began

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to consider it more like critics ; consequently their further perusal of it was dispensed with, and the copy referred to a friend or two, of discernment enough to consider the critical quality, in this case, only as a secondary one ; and that the end of the publication would be answered, if the contents were rendered intelligible to those for whose use they were intended.

It is likewise suggested, that as this is the first publication of the kind, and indeed the first ever offered concerning Callico-Printing,* the writer had nothing but his
own

* The writer has heard of something of this nature in France, but he understands it to be more a description of the business than on the plan of this publication, and if there was any, he is informed by the principal Booksellers there it is now out of print.—He however, will not insist that his is the only one ; he may possibly be mistaken, although he has closely enquired concerning it.

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own ideas to adopt and arrange; it therefore followed that it was proportionably laborious; and, however lightly some may think of the assertion, laborious it certainly was; hence he, with some confidence, conceives that any person, unless pre-determined to view every thing unfavourably, will make the necessary allowance for whatever may not be so clearly expressed, or so methodically arranged as it might be, and with equal indulgence, excuse the insertion of what may appear of too little consequence to have been remarked, or that may be perhaps repeatedly spoken of, as well as the omission of what might have been inserted, either through inadvertency, or as not having come within the scope of his observations.

It may be needful to intimate, that what may be advanced in different parts of this
work,

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work, as hints, free remarks, or advice*, will, probably not be very agreeable to some certain principals, as well as to certain classes of subordinates; but as many of those observations naturally spring from the subject, and (if it be allowed to say it) as the writer wishes to blend precept with practice, and advice with instruction, he may have some claim to being *forgiven*;—and probably he may have a further claim when he intimates that he occasionally shall make very free with himself.

To inveigh against principals, ever so illiberally, he is certain would recommend
him

* Respecting the remarks interspersed in the Rules, the writer owns he doubts the propriety of it; but those whom he consulted being divided in opinion, he took his own, for reasons advanced above.

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him to many of the subordinate classes ; and some masters would perhaps wish for a knowledge of all the little deceptive or collusive practices common enough among workmen ; but of what service such a display would be, it will not be here discussed, as something on that head will be said in another place.— He however begs leave to say here, that what he does offer as advice, or where he touches or expatiates on improprieties in any shape, he wishes it not to be thought as proceeding from arrogance, or ostentation (for he has his own faults in common with others) in short, to close this apology, he plainly begs neither master nor man to be offended with the freedom he necessarily takes ; the subject requiring it, often irresistably impelled him to it ; but, at any rate, he would not be thought forward to subvert that dignity which a principal ought to maintain, nor recommend to a subordinate
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the usurpation of a consequence, or refractoriness incompatible with his situation; though at the same time that dignity should not think the comfort or convenience of subordinates, below its consideration.

Respecting the rules, given for the performance of the mechanical or operative parts, which this treatise exhibits, it may be premised, that however systematically or clearly any subject may, to some persons, appear to be treated, yet others, from various causes, may not see it so clearly, nor conceive it very readily, and in consequence are not very forward to adopt it in any particular; for, to say nothing of the unwillingness of persons in general to be taught, and the natural propensity of every one to seek for faults, or distort what they cannot controvert, there is often a fashion in being wrong, a kind of prejudice for old customs,

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toms; and of course an antipathy to any thing offered for improvement. As for those who, from narrow and illiberal motives, are in the habit of depreciating or condemning any thing; their animadversions are of little consideration with the writer.* But respecting others, who think they need information or assistance, and are not above receiving it; to them, and them only, they are

* The writer has observed, that nothing can prevent cavilling and ill-natured constructions, and is pretty sure of this publication being often the subject of very *curious* animadversion; and probably from the very circumstance that ought to plead in its favour, that of being a subject never before treated of, and of course the more earnestly fought after, and commented on; indeed (to be pleasant about the matter) he has received some amusement from the variety of
opinions

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are cheerfully offered, as the result of some observation and experience ; digested into a set of practical rules, in order that they may be the easier retained in memory, or reverted to as circumstances occur ; or at least such persons may view them as mere hints, on which their own judgments may improve, and their occasional observations in the course of their practice further illustrate ;
for

opinions of which he has heard, before its publication ; liberal observations or objections concerning the whole, or any part, he will however thank any one for communicating to him, as it is more than probable he may be mistaken in some points, especially in matters of mere opinion. or his meaning may be really misconceived by others ; and with those who chuse to be facetious about any part, he will join in the laugh, but he must really beg to be excused (as above said) bestowing attention to the effusions of self-sufficiency, ill-nature, or downright ignorance.

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for (to be more diffusive on this point) notwithstanding several persons may agree in what an intended effect should be, and even in the mode of producing that effect ; yet, as there are many circumstances in the operative parts of every profession, that cannot by any means be clearly expressed, (as we often get our ideas from practice only) it unfortunately follows that if the manner of laying down rules for the performance of any thing by one person, does not in some measure coincide with another's idea of that manner, he cannot see the usefulness of those rules, nor, of course, the needfulness of following them : but waving this quaint discussion of the matter, and adverting to what is offered as rules, or directions, chiefly as relating to the operative processes, and as he has displayed them with a view to be of
service,

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service, the writer with truth can say, he has found them of use to himself, * and has rendered them so to others; and therefore this is certain, that if offered and considered as hints only, (as before-mentioned) that person must be very dull or very indolent indeed, who cannot raise from them some kind of plan more congenial to his own ideas, and consequently more conducive to his convenience and emolument.

But

*The writer's situation having required a general attention to various departments in Callico-Printing, induced him to form a plan for his own use, from which circumstance the idea originated of publishing this work, and which on consulting with a friend or two of some respectability and judgment as Callico-Printers, it was determined on, and accordingly put in practice.

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But, previous to the consideration of those rules, as applied to the different departments, it may be observed, that in laying down many of them, it unavoidably happened, that speaking of one branch, something respecting others occurred, which with propriety could only be introduced in those places :* where it could be done otherwise,
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* This, as it shews how connected with, and dependant on each other, the different departments are, it is here advised, (and is repeated further on) that as no one can be a master of one without a certain acquaintance with the rest, that every one who wishes for information, get rid of that narrow, though natural principle, of looking only at what concerns his immediate branch ; masters particularly, for reasons which will be enlarged on in the course of this work, are requested to keep the motto in the title page always in view.

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it certainly was endeavoured, where the writer has been in suspension, he may probably have misplaced them; and in such cases, he must bow to correction; but in few words, and once for all, it is begged to be observed, and this may serve as an answer to all, who in particular departments, look for more than they may meet with; that the number of articles treated of, required conciseness; as for those who need no assistance, or think they need none, they are desired not to proceed, unless they consider it in the light of an attempt more to enforce a remembrance of what is already known, than as a work superabounding with improvements, or disclosing any very great secrets, either in the theory or practice of the business to which it is announced to be an Assistant;

For reasons which will afterwards appear, this Work is not paged;—and every Section or Branch of the Business treated of, is begun on this Side.

Of Pattern - Drawing.

AS designing or drawing Patterns is the obvious source of the business on which this tract is written, it may be expected that something will be said on it by way of instruction or advice; but, as Pattern-Drawing depends so much on what every one understands by genius, and is so much governed by fancy, little can be said on it to any advantage; however, as bearing some affinity with it, it will be considered in what the excellency of a Pattern-Drawer consists, and what some of the helps are, which genius may possibly receive from that experience which forms the basis of professional judgment.

By a good Pattern-Drawer should be understood one, who possesses a fertility of invention, with judgment to adapt that fertility to the best purpose

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purpose, as it regards taste, effect, execution and expence; or at least, one who can improve on what is doing by others, or can readily catch the reigning style, and by adopting it, form his designs accordingly.

He should likewise have a knowledge of the business in every stage of its process, and consequently be enabled to answer, in some degree, how every intended effect may be obtained previous to the executive part being put into operation.

Hence the Writer ventures to say, that however excellently a Drawer can copy nature, or combine a number of colours, yet, if that be all, his utility is very limited, when compared with him, who without great neatness of drawing or brilliancy of colouring, can produce that variety which gives a spring to a business, ever dependant on the capriciousness of taste, and the fickleness of fancy.

It may nevertheless be observed (making a transition from Pattern-Drawing to the Patterns themselves) that it is difficult to say, what really constitutes a good pattern, as decisions on that subject are formed by different persons from very different motives; for instance, a Draper's determination

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mination of one is biased by what will best suit his line of trade; a Printer's, that which is adapted to produce the desired effect at the least expence; while a buyer's opinion is guided by what is most generally exhibited in the shops; and many patterns acquire the character of being good ones, merely from a Draper having it in his power to command a general display of them, under every advantage; for the most fanciful and best executed pattern would have little chance of selling well, if seen but in a few places, or the sale not otherwise forwarded; as it then would not have the appearance of a generally approved one, and consequently it would be disregarded in a proportionate degree. But, as this will be occasionally considered in other places, a few sentiments respecting Genius, Fancy, and Invention, as more immediately the subject of this section, will be now offered; as well as what those helps are, of which genius may avail itself, toward directing its progress; with the needfulness and means of restraining its impetuosity, or preventing its eccentricity: some other thoughts will likewise be advanced, rather more remote to the immediate subject, but still having so much affinity with it, as to come under the

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cognizance of a Designer, or those who have, or desire to have, any concern in that department. But, it may be necessary to observe, that as the subject gives rise to several observations, not sufficiently close to be interwoven with it, therefore, for the sake of being as methodical as possible, and the keeping together what is more immediately to the point, they will be reserved for the Essay further on.——

Previous likewise to what will be said in this, and the following section, relative to putting-on the block, the writer intimates, that, to avoid confusion of terms, when speaking of Pattern-Drawers, he shall most frequently call them Designers; patterns he shall call designs; Putters-on the Block he shall call Drawers; and their performances putting-on; but, in displaying the tales, such distinction will not be affected, as he shall use them indifferently as best suits the immediate purpose. As for the terms Genius, Invention, and Fancy, though distinct ones, Fancy will be most likely adopted to serve for either, as being most applicable to designing for Callico-printing.

IN

Of Pattern Drawing.

IN the beginning of this section, it being said a deal depends on Genius in regard to the subject now in view, it may be expected, that, preparatory to what will be exhibited as mechanical helps to it, something will be said wherein it consists, how it is to be improved, what are its indications, and the like; it will therefore be attempted, not as aspiring to any thing doctrinal, specifically descriptive, or as seeking controversy, but only as it seems to hold a connection with the subject treated of; for, till terms are explained, understood, and universally received in one unequivocal sense, we animadvert in the dark, hence to ask what Genius is, how it originates, how it performs, or where is it seated? leads into such metaphysical obscurity or perplexity, that the most intelligent are at a loss how to satisfy such inquiries; for knowing little of the elementary principles of things, as the sources are so remote, how can positive or clear consequences be educed? therefore we sit down at last with simply calling it a faculty of the mind, and to express its operations, say something like what is ventured to be offered further on, taking certain positions as principles or maxims, and accordingly draw our deductions and argue from them.

Of Pattern Drawing,

As for the display or productions of genius or fancy, enough is visible in every station, and therefore though only treating of pattern-drawing, an occupation of little worth or merit in the eyes of those who hold a high rank in the scale of artists, as if requiring little strength of intellect, compass of invention, or accuracy in execution; yet, in its proper sphere, taken in all circumstances, it is with those whom it immediately concerns, of as much importance, and as difficult to attain, as many arts or sciences that are universally dignified.

Genius in any shape, it is observed, is not satisfied unless exploring unbeaten tracks, or rendering that perfect which cannot be rendered so by the efforts of mediocrity; to constitute which and to empower it so to act, there must be fancy, judgment and taste: by fancy, various ideas seem to be carried to the mental repository and there stored up to be occasionally made use of; but then fancy should be restrained or governed by judgment, or its emanations will be eccentric or extravagant; and this faculty of judgment seems to be properly employed in going through its collection of ideas, to separate or arrange them as may be required; or in other words, judgment is

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A kind of counterbalance to the eccentricity of fancy, curbing it (as before intimated) when impetuous, and guiding it when prone to deviate.

Further, As judgment is chiefly understood to keep the fancy within proper bounds, so that nothing be unnatural or distortive; another power is requisite to render whatever is produced, not merely free from fault, but to give it a beauty, and an elegant and highly polished finish; which power is generally expressed by the term taste; of which much has been written to define, and to bring under certain rules, but with little effect, being a faculty more acquired by accident than by nature, and partly depending upon circumstances not always regulated by strict propriety; but as it takes in the consideration or knowledge of what is generally, and (in some cases) universally, allowed to give a finish to the works of art; it is therefore able to form a decision, either as applicable to the performance under the designers hands, or in determining on the works of others: Taste, however, according as it is employed, is either superior, or subordinate to judgment; as the arbitrator of ornament, it is despotic; but in following nature, it must be subjective; hence, according as the fancy or judgment is likely to be

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be employed, let the designer attend to this distinction, as, in the instance of pattern-drawing, taste is to be understood as the uppermost quality to be acquired, nature being no way in that business likely to be very closely imitated; but in other situations where the performance consists in its resemblance of nature, and that resemblance is required, there, judgment (with taste however at its call) must claim the precedency or first notice.

Again, Either of these three qualities is of little service without the assistance of the others, fancy alone being very inadequate to produce what is requisite (even when required to be wild or grotesque) for though its productions may please, it can be but for a moment; but, when regulated by judgment and adorned by taste, it strikes almost universally; the decorative part pleasing those who know but little, or overlook that of the natural; and those who look for propriety, find it, with the addition of that heightening or vivification which true taste imparts; for when these are united, they of course strengthen and add to each others power and effect, exhibiting something novel, expressed with propriety, and embellished with elegance; genius, which is the
vivifying

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vivifying spark, giving a spring and spirit to the whole; and without which, the most elaborate works of judgment will never give much pleasure to any one of a refined and comprehensive turn, though for a while they may please a frigid observer.

It is not the business of this little effusion to particularize the indications of genius further than as immediately applicable to the mechanical operations displayed further on; the writer however will just mention that many have been deceived by an early indication of such a gift, forming great expectations that when ripened, it would acquire much celebrity; but, it is not easy in juvenile objects to say into what road it may hereafter strike, for until their productions may be supposed to be regulated by that degree of discernment, which requires some maturity of years, there can be little of what is termed judgment: hence many youths have been put to designing though it has afterwards appeared their talents have been much over-rated; and in deciding on such indications, a caution should be observed, for though genius may seem to improve as maturity approaches; yet ere that epocha commences, it may have passed its meridian; which is seen frequently

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frequently to be the case, whenever a remarkable early display of genius has been visible : besides, people who thus hastily decide, are not aware, that while they do not expect a perfect performance, and look but for an attempt, they only commend its proximity to perfection ; but when the time comes that something masterly should be produced, the performer may shew that his genius was not of the kind to arrive at that height ; and then, those who predicted great effects, are proportionably disappointed and mortified.

It is impossible to specify all the impediments to a lad's improvement, or the helps he may receive, a deal depends on either ; for instance, a youth with strong indications of genius may be placed where there is no one proper to cultivate it, the situation* or course of work may not be congenial

* This may be alluded to as particularly applicable to lads being put out to Pattern-drawers who work at home (and it holds good respecting Cutters and Engravers) though this is an error in those who put them out ; for when out of their times they have in effect another term to serve before they know any thing beyond the use of the pencil, the knife, or graver, otherwise than by mere precept ; and, of course, can be but of proportionate service at a manufactory.

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congenial to his natural aptitude, or he may be precluded those circumstances which are necessary to give him confidence, and improve his understanding in general matters; these are points (lamentably for the youth) too often totally disregarded,—and from these and other reasons, it may be advanced, that there are so very few good pattern drawers, (according to the definition just given) though such numbers have served as apprentices, or been pupils to pattern drawing, and this leads to say, thinking how forward many are, to take pupils or apprentices to drawing (leaving the *weighty* consideration of premiums out of the question) that those who have youths to put out, and those who are inclined to take them, should not be very prompt either way, from the considerations mentioned above, as well as what follows; for it is of little signification to say, that such a lad shews a great genius or taste for drawing, or any business depending on fancy, unless there is some indication of an understanding equally acute and comprehensive in general matters, with other concomitants of vivacity, good disposition, and a plastic temper; as then, and then only, there seems hopes of his genius, whatever bent it may take, furnishing itself in its approaches to maturity, as circumstances offer, with every requisite towards improving

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improving it, and that without the formal imposition of precept, rule, and frigid advice; consequently when arrived at that age, in which something beyond a mere effort is expected, his own hopes and views, as well as those of others, will not be disappointed.

It is begged that what is above advanced be not understood as giving into the common mode of inveighing against taking apprentices, from the probability of lessening the value or scarcity of designers, who have passed their noviciate (as may likewise be said of other branches) what has been said, is more directed to parents, who are prejudiced in favor of their children's talents, or through fondness mistake their inclination for genius, for unless a lad is likely to shew those faculties which will get him through life with credit and ease as an artist (in which class designers may be included) he had better be put to any common mechanical employment, as certainly nothing can be a greater misery to a man, than to think his living depends upon the productions of fancy, and he is unfortunate enough not to possess a single ray of it, and that, consequently, his utmost exertions are despicable, and of course not worth exhibiting.

The

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The writer will now endeavour, perhaps not over methodically, to throw in such documents as seem to him most likely to assist the fancy in its exertions, and with such remarks as occasionally arise, either as more or less applicable to the designer or his employer; and before he speaks of the mechanical parts of designing, he will dwell a little on some circumstances not totally irrelevant to such employment, and probably not absolutely unworthy the notice of either party; for, though the aim may be missed, the intention is to render the performance more easy to one party, and consequently more advantageous to the other.

In the first place, it is suggested, a Designer ought not, by any means, to be considered in so mechanical a light, as if fancy or invention were of such a nature, that he can at all times command a successful operation*; similar to a person

3 Those are particularly alluded to here, who are engaged as Designers to work a stated number of hours in a day. But to treat Designers with proper address is what few Principals are competent to.—See something to this effect in the Note at the end of Pinning.

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person performing a merely mechanical piece of work, in which little more than utensils are needful, and the subject to be acted on is immediately and conveniently at hand. To illustrate which, it may be observed, that Principals themselves, at times, affect to say, Designers should only work when so disposed, yet many of them, inconsistently with such a position, think nothing done unless they see something on paper; making hardly any account of what the invention is at work upon; but, contrary to this practice, it is here said, that the designer should not be asked, except on singular occasions, how he means to do such a part? what will be put in this or that place? what will be the colour of this object? and so on; but that a proper mode is, (when not left entirely to work from his own fancy) for him to be told what sort of patterns is wanted; on which, he accordingly draws a number slightly, or perhaps nearly perfect, agreeable to the nature of them; from these a selection is made as having the best effect; afterwards another is made, including that quality, with their adaptation for working; and even from these it may be needful to make a selection as proper to shew, or to be put into execution.

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All this is however offered as matter of opinion, or only to be put in practice where and when it can be done conveniently, as at all times and in all places it cannot, neither is it always necessary ; but this is however insisted on, that a Designer can do little with pleasure to himself at a Printing-ground, if under restraint, or subject to that kind of controul, or enquiry, which has been expressed above ; or if his employer be of that cast, who consider all under them as but mere machines to procure themselves profit, and that as such, they have nothing to do but to spur every one on by any method, however coarse and unfeeling.

Respecting this operation, and indeed any other, it may likewise be noted, that one person only is proper to give orders (no matter how many have been previously advised with) for rarely do two or more agree in opinion ; and for a designer or any other to receive orders from several, and those orders different, or countermanding, no one need be informed, is productive of much embarrassment, and often subversive of what each party desires.

But turning now to the immediate subject of this section, and in particular alluding to fancy,
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it is suggested that every one is prejudiced in favor of his own ideas, or what he concludes or wishes to be understood as such, Principals are particularly prone to be much in love with such apparently new ideas, and not being always under the necessity of consulting any one, they often adopt and put in execution, too precipitately, what has struck them as valuable; not discovering how they have deceived themselves, till they find no other person seems struck by its appearance when displayed, as they were by it in idea; for if they first speak of such an idea to their subordinates as very striking, they not being always at liberty to pass sentence, or even give their opinions with that freedom which the principal can and will on what they might offer, the infatuation does not go off so soon, nor is it seen as such till too late.

Drapers likewise frequently getting hold of an idea, adopt it as a good one, and endeavour to communicate it (perhaps with a friendly intention) but are often greatly disappointed when what is drawn in consequence of such communication

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cation does not give the effect they want*. A great deal of time, trouble, and other inconvenience would however certainly be prevented, by letting those *wonderfully striking* ideas rest a little till thought of more coolly; and then, if no diminution happens in their apparent value,

or

* The above suggestions lead the Writer to observe that some will say 'if they could but use the pencil, they are sure they could produce something wonderful new, and striking in effect!—to combat unthoughtful prepossessions of such a kind the writer knows would be to little purpose; he will only say of this, that he who advances such a notion, can know nothing of the operation of the inventive faculty in such a case, and of course does not distinguish between a certain end or point represented to him by the liveliness of imagination, divested of all obstructions to its appearing so forcible in novelty and effect, and the operation necessary to produce or display it on paper by a mechanical or manual process, with the usual interruptions of objections, impediments, revisions, dissatisfactions, &c.

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or ideal effect, there is the greater probability of their succeeding and striking more universally.*

It often happens too, that many (Drapers particularly) are violent in requiring something
new,

* Speaking of this infatuation in favour of self-created ideas, the following little anecdote is offered, and which shews at the same time how with a little finesse, a weak side may be played with: A person having to shew a number of patterns, as townsman (when it was the custom to take a quantity of patterns only at stated times, and after shewing them, to make them general) having displayed them before a Draper, He, after praising some, and rejecting others, said of one, that if altered in such a manner it would be much better; the person who shewed the patterns, willing to temporize, told him his observation was judicious, and added, to heighten the flattery, that several others had made exactly the same observation; this so pleased the Draper, that he set about altering every one of the patterns in the same *judicious* stile, and took such pleasure in his employment, and retained the other so long, that he had little time to go elsewhere that day, resolving to take care for the future, how he commended the alterations suggested by the same person again.

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new, or totally different from what has ever been seen; all this has a busy sound, and in idea promises great deal, or at least implies the hope of a great deal; but could it be procured, the expectation might not be answered, as it generally seems that when any thing happens to be produced, very different from the common run or appearance of work, or what may be called the reigning style; it has not the chance of getting into vogue, for reasons already given, except when a Draper of eminence, who holds his connections as it were by a *bridle*, is determined to push what is a favourite of his; though even that will not always succeed; for somehow or other capital blunders are now and then made by the most experienced, in the chusing of patterns. Cautious Drapers however are not very forward in this respect; they know, indeed all must, that though at all times there are certain classes of patterns that ensure sale, yet a continuation of one file, will tire in time; and the utmost efforts to continue it, will not always be propitious; * for innovations

* This may be illustrated by a capital connection in town, fruitlessly attempting

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tions in style, rarely happen abruptly ; they are brought about by slow degrees, or in fact more by accident than design, and oftentimes in a manner contrary to what any one might conceive. Much, to be sure, is sometimes said of the fickleness and whimsicalness of Drapers and others, but there surely is little cause, it being natural to be tired of any thing ever so excellent when very familiar, and of course novel or different appearances are sought after ; but when interested views are annexed, and those variations cannot be sufficiently obtained, it is just as natural to repine.

There was a time when no one thought grounding off the table could be performed as it now is ; the writer well remembers when it was in agitation, to print two reds and two olives at the house where first executed*. All the Printers exclaimed that the two after-colours could never be put in according to the designs ;
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attemping for two or three seasons to force stripes into vogue ; but though the work was generally good, the effort subsided under the prevalency of a different style.

* This was at West-Ham, Essex.

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it was however attempted, and it succeeded, and nothing but that course of work was done there that season. The next season, indeed shortly after, it was attempted at other places; and now little difficulty (comparatively speaking) is experienced in it.

It may likewise be said of black, dove, and yellow patterns; at first the grand objection to executing them was that a black could not be procured; hence when dove was introduced, it was done off the table, by those, who wedded to the old system, execrated an innovation, which then, for the honour of a good black, appeared discreditable; but others, who were less tenacious of such honour, as well as for other sufficient reasons, soon brought that course of work into vogue; and now, or at least very lately, what course was more general? it may be said too, in speaking of black, that formerly it was a maxim no pattern with a mixture of colours would do without it; but it is not thought so now.

What the writer has now to advance, as rules or documents respecting designing, would follow here properly enough, but having little to advance, and that little not satisfactory even
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to himself, he will defer it to the end of the section; observing however, as leading to what he means to say about Genius, Fancy, Invention, and drawing, that more might very probably be said or advanced as Rules, but Genius or Fancy cannot be dictated to; Fancy must, in many cases, be left almost intirely to itself, as not coming under a mechanical description, or analysis: much to be sure may be said, and pretty disquisitions have been given, (perhaps these in this article are of the number) about judgment presiding with coolness, while fancy is wandering here and there; then taste is ushered in to the assistance of judgment, and so on; but he is induced to think, that in genius is comprized that faculty which soon avails itself, whenever opportunities happen, of what is necessary to render its emanations effective; in fact, Rules imposed on a natural genius, too often shackle it, and it is almost proverbial, that true genius soars above all precept, and looks with a becoming disdain at the formality of rule; often producing what never would have appeared, if rules authoritatively given, had been closely adhered to; and it may be said, when Fancy suffers itself to be pinned down to Rule, it is to be suspected there is not a great deal of genius, and that those who can produce little without certain rules to lead

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lead them, are not much better than copyists or imitators ; but turning to the point in view, which is the province of fancy, namely, designing, it is only at certain times that it is alive,* and then it despises fetters ; when it is not free, like every thing else in distress, it catches at any assistance, and is thankful for any help that offers itself.

Fancy notwithstanding, should be (as before said) at all events, free from certain impediments or restraints ; which applying to a Designer's performance at a Printing-ground, can hardly be done; from the mind being confused with various considerations, that obstruct or divert its efforts, such as receiving orders from several, murmurings at not always succeeding, being forced to do duty at all times, and the like; †
but

* What is a man's genius or fancy worth, when distressed, brow-beaten, or otherwise illiberally treated ? and how little do many think of what are often the real causes of the great difference which at times appear in the works of men of genius ?

† These may seem to many but trivial observations, the writer however, from experience, knows the contrary ; and he is certain some others in the most eligible situation as engaged Designers, know the same ; indeed an engaged Designer at a Printing-Ground is now little more than a Compiler.

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but chiefly too much (it is again hinted) from many Principals incessantly desiring to be occularly convinced he has not been idle; for it is here asserted, that the first Designer in the Printing business (however the assertion may wound his pride) would be ashamed to have it seen how dissatisfied he is sometimes with what he most endeavours to render perfect, the repetitions which he makes, the doubts he is in about rejecting this or that idea, the difficulty of fixing his attention, &c. and it is thence as confidently said, that those patterns which for several seasons have been allowed the first place, would probably never have been produced, if the Designer had been shackled by the direction of others, or been in that controuled or subordinate state, where his own inclination must have given way to the frigid direction of those, who, more alive to gain than reputation, find no impulse to ascend beyond a certain height, or stretch out beyond a certain distance from the beaten path.

As for invention, strictly speaking, it is not here offered to say what it is, much less how to describe it; there is a mutation of stile or taste, to be sure, but nothing new; for novelty is only a name for an old effect or appearance revived with a little alteration

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alteration, and (making a metaphysical excursion) if the question were asked, what is original? an answer could not be easily obtained sufficient to satisfy some enquirers; the term having no precise meaning, till it is agreed on all sides, how ideas are acquired, whether intuitively or by sensation, or, in other words, whether productions termed original, are or are not but mere copies of certain archetypes, conveyed to the mind by its attendant faculties: and if the proudest designer in the printing or any other business, would be candid, he would confess there is not near so much of invention in what he produces, as he desires the world to give him credit for; since if traced to the source it will generally appear that the mind received a hint, if not something more expressive, from some visible object or other; and it may further be said, that the greatest genius would be ashamed to be discovered at the little shifts he often makes to attain a certain end, by searching into nooks and corners, as it were, for objects to strike out something from, or at the quantity or collection of subjects he secretly heaps up to supply himself with thoughts and hints, and the methods he takes to disfigure the ideas he thus more or less surreptitiously purloins, to make them appear novel; and too glaring

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glaring it is, how a reputed genius will contend about his claim to what is palpably plagiarism; and which among Designers in the Callic-printing business, is certainly as frequent as among other classes: Besides, if it be considered what a number of Designers are always at work, and how many thousand patterns are produced in a year; but how few of them remarkable for novelty, it must seem still more clearly there is very little of striking out of the beaten path, and much less of originality than might be expected.

In some cases it is more difficult to imitate than invent; for the quality generally demanded in an imitation, is to excel the original; but unhappily that word excel, in this case, is very vague; it may very likely be altered for the better, if alluding to its being rendered easier to work; but almost every different person will have a different idea about its appearing better, or having a better effect, at least as far as they chuse to speak, or are at liberty so to do.

As

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It is full as bad, and under some circumstances, much worse, to put on work with a fine face on a beachy block; as in printing, or even under a Cutter's hands, the surface will crumble away.

Other circumstances may spring up which cannot be precisely ascertained, but by attending to the above particulars, many of them may be obviated with very little trouble.

2. Take notice, or discover in what particular the pattern consists, whether in respect to the colouring of it, or the size, quantity, or disposition of the commanding objects; or, if a trail, whether it be upright or meandering, close or open, and the like;---which having ascertained, consider how to preserve or produce that effect on the cloth, against the chance of indifferent cutting, printing or colour; at the same time consider where it may well be altered, or what may be left out in the cutting, † or eased in the penciling; or, in other words, how it may be executed with the greatest ease and least expence.

† This may not please some cutters, but the Writer makes equally free with masters, as will appear.

IF

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3. If the pattern be on so large a scale as to require it, be informed of what width the cloth is for which it is intended, or on what it is most likely to be worked, on account of the joining of the selvages; making some allowance for the variation that will happen in respect to the width of cloth of the same kind.

Small patterns, it may be observed, cannot be affected in their appearance by the joining of the selvages when made up: the rule particularly alludes to furnitures, whether trails, sprigs or stripes; for if this circumstance be not attended to, much of the cloth will be cut to waste, or the joinings of the selvages will have a very awkward appearance; and it is not every Upholsterer or Mantua-maker that is very ready at joining a Pattern by the selvages, even if contrived in the best manner for that very purpose.

It is likewise necessary to attend to the above rule, in regulating the width of the Print, on account of the off-edge printing; as printing an edging with a fine print does it considerable injury; besides, if the edging be printed as the piece goes on, the colour gathers on the off-side of the print, and causes an, otherwise, unnecessary
brushing

Rules, &c. for putting on.

brushing of it, or a very bad impression at the beginning of the next table; and if the edgings are left till the whole piece is printed, the edging is frequently fuller or barer than the rest of the work.

The observations on Squaring a Block comes in here properly, but being made a section of itself, it is considered further on.

4. If you have to make out the pattern, as it often happens, from a small part; and you mean to copy exactly that small part, * take care that the repetition be not visible, and that one part does not appear heavier than the rest, and therefore, if it be a trail with objects on it or about it, observe whether the objects, the trail in general, or any particular part of it soonest catches the eye; if it be the objects that are most striking, they must be properly disposed first, or at least their intended situations marked out, and the stalk or trail then drawn to them, taking care at the same time to balance and uniformly mix it: If it be the trail only, or any part of it that strikes most, that, by the same rule, should be marked out first, for these most essential parts being judiciously or advantageously

* The repetition of a small part is, however, very hazardous, for though not visible on the block it may be so in the piece, as it hangs on the rolls.

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vantageously disposed, it must consequently follow that the remaining subordinate parts may be made to compleat the uniform appearance of the whole, with proportionably less trouble.

In order to be certain of the joinings exhibiting as even an appearance as any other part of the face, let your joining (if possible) be taken from about the middle of your sketch when made complete.

5. If the pattern you have to put on, be composed entirely of objects, or in which the objects are the commanding part, that stand promiscuous, as fig. 1, whether close or wide apart, be careful that one part be not more crowded, or the objects larger than in another; for nothing is of greater consequence to guard against, as it is obvious to any person, when the aspect of a Pattern is unequal on a piece, or even when made up.

As it is very difficult by the eye to keep objects promiscuously situated, and at the same time preserve an even face, the following expedient is offered to accomplish it, when the objects are not very close to each other, or not of a long or straggling shape, as fig. 2, 3, and 4, as then it is best to set them at equal distances, and vary the face by turning the objects about in as many different directions as you can, or that the nature of the pattern will allow.

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Rule a number of lines, as you can best make out, from the pattern, according to the distance the objects stand from each other, as Fig. 5, which done, place an object in every other square, as fig. 6, that is, one at the top of a square, another near the middle, another near the side, and so on, thus will you be certain of the objects having a regular appearance in the general disposition of them, and at the same time standing promiscuously.

6. In order to ascertain on the paper on which you make your sketch or tracing, the joinings of trails as well as of sprigs that are irregularly disposed whether closely or widely situated, make use of this method.

After you have made your sketch or tracing, repeat, either on separate papers, or on one large enough for the purpose, as much as is necessary to shew the joinings at the head and sides, in order to supply that which is defective or remove whatever may be improper; having done this, hold it slopingly from your sight, and look at the whole from top to bottom, from side to side, and from corner to corner, to see that no lights nor heavy lines nor bodies of objects appear, and as there is generally in trails what may be called the main stalk, see that it branches out regularly from side to side, so that one side balances the

Rules, &c. for putting on.

other, and that the branchings so run into each other that it may seem to flow regularly all over, and to be still more certain of its even disposition, hold it with the back towards you betwixt yourself and the light, that by seeing it reversed you may know if it lean more to one side than the other.

7. In small patterns it cannot be amiss to put on the halves or quarters exactly alike, according to the nature of the pattern, || taking care that the halves or quarters are not to be distinguished, in the repetition of them, for the conveniency of one block answering for the grounding of each part after it comes off the grays whether the pattern was intended to be so grounded or not; for which purpose, as rubbing off is the least certain method, an oiled paper, or a drawing from a stensil is to be preferred, and a stensil seems best, because, as it is only a part of the pattern that is affected by the grays grounds: except when composed only of plain set objects. If openings are cut in the stensil to fit the places that are either to be covered by the grounds as fig. 7, or left open by them, as fig. 8, their situ-

|| Meaning that unless it is on a small scale, it is unadvisable to do so, from the great difficulty of preventing a repetition being seen.

ations.

Rules, &c. for putting on.

ations may be easily ascertained by marking thro' these openings with a tracer or pencil, and then the other parts of the pattern may be added in whatsoever manner the drawer most approves.

8. Endeavour to keep all sprigs, or bunches of flowers, or even single flowers, whole on the piece, and likewise the main stalk of a trail, if you know what will be the width of the cloth: as it will be of some importance in the sale of a piece and the making of it up.

This leads to the observation that a Printer should not let a sprig, or principal flower, or other object get off the edge one side or the other; for in the case of sprigs, &c. standing wide apart, he may try, at least, on cloth of any width, if he can preserve them whole without leaving too broad an edging on either side.

9. A pattern with six sprigs or commanding objects standing as fig. 9, cannot join whole or in halves, but must drop or rise one third as fig. 10, or the objects will not be at proper distances in the joinings, but then, of course, the pitches must be made to answer in the same manner.

In

Rules, &c. for putting on.

10. In transverse patterns, that is, in patterns in which the trail lines or objects run across from corner to corner, the way as represented by fig. 11, whether in stripes or all over, let the transverse disposition appear on the cloth the way as shewn fig. 12. as it will thwart the right hand disposition of the parts of a pattern generally observed in drawing, and the aptitude we usually have to look from the left to the right; as the light is from the left, and the hand in drawing naturally tends that way, otherwise we should be always incommoded by the shade of it.

11. The straiter the work is of the side or near the edge, the better it is, as there will be the fewer gaps, and the necessity will be obviated of having (what the Printers call) a list to make up the deficiency, and less will be cut to waste in the making of it up.

This rule, however, should not be so strictly adhered to as to make the joinings too nice, by cutting straight through every thing, or particularly through a number of objects; for the more they can be preserved intire, the less injury is done to the pattern, as the print being pitched

too

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too high or too low, or too close or slack, renders them all unshapeable; it is likewise better to keep them whole on account of the grounds, especially the grass ones, as they by being disjointed must add to the bad shape of the objects; but, as it may happen that the breaking of the objects is of little consequence from their shape or situation, or that the ground-work may be of more consequence to preserve; the above observation must be regulated by attending to what are the characteristic parts of the pattern, or what first catches the sight, and these must suffer the least possible injury, whatever may be the fate of the subordinate parts.

12. If some part of the pattern be coarse or have a body, it will not allow the fine parts to be so close or so fine as they otherwise might be, as the quantity of colour requisite to supply the solid parts will choak up those that are close, or cause those to work coarsely that are fine; and here it may again be observed, that though neat drawing on is to be commended, yet, if not drawn sufficiently open or clear, where for instance, there may be shades or shapes as fig. 13, 14, and 15; though cut by the best cutter, and may appear tolerably

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tolerably open and fair on the block, they will not appear so in the impression, to say nothing how they may suffer from a bad cutter or printer, or from being printed on coarse cloth, or when half worked out; for a print should be calculated to work decently when a certain quantity of work generally expected to be executed by one is nearly compleated, and therefore (to give some instances) in drawing or cutting shades as fig. 16, 17, it is not adviseable to put them on in that manner, however graceful they may appear on the block or even in the cutting, because the colour will hang in the corners and give the work a clumsy appearance, hence to cut them with less of a curve as fig. 18, 19, they will, by working clearer and neater, amply compensate for such a deviation.

13. Avoid, if you can, having any part of a close trail as in fig. 20, at the head of a print, as the pressure from the pitching of the print will render it coarser than any other part of the trail: the pressure however may possibly be prevented by the pitch pins standing out farther than common from the work: for which preventative see the rules for making pitches.

When

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14. When you have shades, as fig. 21, or particularly lights standing or running with the grain as fig. 22, 23, be careful to have them cut sufficiently open, otherwise you will be deceived by their working closer than intended; for when a print gets moist, the opening closes considerably, and what may have appeared open in putting on, or when cut, will be choaked up in the printing, especially if cut with a thick knife, or if not sufficiently cleared at the bottom and sides.--- See more respecting this article in Rule 6, for cutting.

15. In joinings either at the head or side, the more a stalk or trail joins in this upright direction fig. 24, the better it is for working, instead of joining fig. 25, as the best Printer cannot at all times, on account of the varying of the cloth, keep the joinings so well in command at the side as he can at the head.

16. In drawing leaves or sharp-angled objects that are to be pencilled, it is recommended to terminate them as fig. 26, 27, or fig. 28, instead of fig. 29, 30, 31, as such a finish will keep the penciling, particularly the blue colour, on account of its thickness, from being run into
C the

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the white, or the ground; for without such a filling up of the ends, the pencillers will either leave a light at the corners, as fig. 31, or, in endeavouring to fill them up, they will be apt, from the largeness of their pencils, to come over the line, as fig. 32, and the same observation will hold good respecting every other place where the pencilling goes into corners or angles.*

Note. In calculating the expence of pencilling, and thereby fixing what quantity should be in a Pattern, a certain number of strokes or dashes, which a Penciller is supposed to make in a stated time, is worth a certain price.

17. In putting on the block, nothing is more deceptive than having to leave lights in dark grounds; for if any shape is drawn fig. 33, you may be deceived when the ground is filled up, as it takes in the line you have drawn, and makes the light within-side appear less; it is still more deceiving if you have to draw the boundage as fig. 34, as its thickness gives the whole object a larger appearance than it really has. Here it may be noticed (though touched on before) in putting
on

* An imperfection of this kind runs nearly all through the work of one of the first Printers about town.---This, with similar observations will be enlarged on, in the progress of this work.

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on a print that is to have a thick boundage, see fig. 35, particularly if it is to be a dopy, that the shades and other work within side see fig. 36, must be kept sufficiently clear and open; or the weight of colour requisite to furnish the boundage, or dopy, will be too much for such close shades or fine work. Observe likewise if there be lights as fig. 37, to give intimation to the Cutter to strike the ends with a small gouge, as fig. 38, which will prevent the colour from hanging in those otherwise sharp ends.

18. In drawing on grounds that have large bodies as fig. 39, that are to work in thin colour, especially if they stand wide apart, remember that they will in the working, from the sinking or spreading of the colour, and its adherence to the sides, make larger impressions than the surface of the cutting otherwise would; hence^d they should be proportioned to that circumstance, and put on perhaps smaller than they are in the pattern. And as the pale colours worked with such solids, will be lost, or appear much paler when impressed from fine lines or pins if on the same block; therefore in such cases separate

C 2

grounds

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grounds should be had, for the fine parts or for the pins.

Under this head would be considered the drawing on blotch grounds, and the other grounds that fall into boundages, but as the cutting farther or less into the boundage is partly regulated by the thickness of it; no precise direction can be given, as every one knows the circumstance to be attended to, in this case, is to prevent any light edges from appearing either within or without the boundage.---See more to this purpose Rule 7, under the article Cutting.

19. Wherever there are to be pins, mark them on the block previous to its going into the Cutter's hands, that the wood be not chisselled away, and where the pins touch or join the cutting, mark them accurately, and give intimation to the Cutter, that the ends of the shades or stalks may be cut downright, otherwise a disagreeable gap will be left, as fig. 43; and in ascertaining the sizes of pins, be aware that as the wood gets coarse by working, the pins sink in, from the repeated blows at the back; and if worked in colour that has any corrosive quality in it, they soon get finer; hence if provision is not made for these circumstances, the impression of the wood

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wood and pins will in a little time be very disproportionate. It is likewise needful to inform the Cutter of what quality the pins are to be, that the depth of the chisselling may be regulated accordingly.

20. In ruling Bengals the following mode is recommended, in order to make the ends join each other, (provided the block has not been too much warped; or any particular accident happened.)

Make on a slip of thick paper, or rather thin lead, with which tea-chests are lined, as many divisions as you have Bengals to put on, then fixing it to the square line at one end, prick through the divisions on the paper, and transfer them to the block, the finer the pricked holes the better; having done this, remove the slip carefully to the square line at the other end, taking care that the two extreme holes answer to the corners of the square, and prick through the same divisions as you did before; then rule as usual from the pricked marks, thus will each end of your square be a correct copy of the other; but as the ends of Bengals are of most consequence to preserve, it may not be amiss with a sharp thin blade, to cut a little into the wood at each end.

21. If it be a joined block that you use, take care that the joint comes between the Bengals, and as a preventative against the consequences of a print with Bengals warping under the Cutter's hands, it may be necessary to let one end of the Bengals be cut thicker than the other; see fig. 44, and make the ends join by cutting away from the broad ones, when the print goes to work; or whenever Bengals do not pitch to themselves, that is, when they join by pitch-pins, it may be useful to cut both ends, as fig. 45, and in the joining let the points run into each other, as you thereby prevent the disagreeable appearance that the junction has when two square ends join badly, as fig. 46, but in the other instance, at the worst, they will appear as fig. 47, which is considerably better.

22. When you have a number of set objects, such as rosettes, rings, leaves, &c. to put on, it being very difficult, if not impossible, to trace or draw them alike in the usual way, it is best to have the objects cut accurately, and impressed or printed on the block, which if you can do clear enough

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enough to cut from, it will save much time and labour; or if you cannot do it so smartly as you wish, make a mixture of lamp black and flake white, so as to be about the hue of black lead, the paler the colour the better, and let there be little, if any, gum in it; spread this pretty thinly on a piece of soft leather, and so take off your impressions on the block, which done, draw over the objects, so printed, with well-tempered carmine (some add gum bogia) and when finished clear away as much as you can of the colour you printed on, with a piece of stale bread; for if you use India rubber, it will change any colour which has gum bogia in it, to a very dark and dirty one.

Another method is by printing your object on paper with a proper mixture of carmine and treacle, which a little practice will ascertain, and then rub it off from the paper on to the block; the advantage of which mode is, that the colour does not speedily dry, so that you may take what time you please in rubbing it on; but the neatest method is by the object being engraved, and then taken off on paper, either by hand or a press, in the red oil colour that is used in the printing

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printing on paper; which not speedily drying any more than the treacle colour, it may be rubbed on the same manner.

Other methods of a similar kind for another purpose, are proposed further on.

23. If for any particular purpose you want to fix your colour on the wood, a thin white transparent varnish will secure it; or if you use a black lead pencil only, strew some powdered rosin all over, and then move a hot iron about at a little distance over it, by which method the rosin will liquidate and form a kind of varnish over it; or what is still more simple, if you only draw your tongue wet with saliva, over a black-lead drawing, and let it dry, the black lead cannot be easily removed.

24. When you have a pattern to put on, consisting of very small objects, very closely and promiscuously situated, an eligible way to preserve an even face, is to take a small portion of the square of the block (in some cases half an inch will do) and see how many objects will go in it, and then repeat this portion on another paper, to what size you please; varying the disposition of the objects as much as the pattern will admit, in order to prevent the appearance of a repetition.

Note, Small close patterns will well bear enlarging a little, else on the cloth they appear smaller and closer.

25. As circles, rosettes, and other common objects, are always in use, it would not be amiss to have punches of different sorts and sizes, to use occasionally on paper or blocks, particularly where the objects are on dark grounds, as fig. 48, or have a thick boundage, as fig. 49, as the object impressed on the wood will be visible to cut or gouge from; or if the impressions suffer from damping, they may be drawn over in red, and thus from their accuracy much trouble would be saved; or if you want a solid object repeated accurately, it may be managed by stenselling it, that is, by an object as fig. 50, cut out of a piece of oil-skin, a piece of thick paper rubbed over with bees wax, or a piece of thin sheet lead, and then lay the colour on with a pad, or in what other manner you find convenient; or if you want to do something like fig. 51, it may be managed by cutting out the object nearly all round, as fig. 52, leaving just joining enough to prevent the inner piece from falling out, the impression of course will be imperfect as fig. 53, which imperfection must be made good by the pencil.

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26. As sometimes on emergency things cannot be got on too soon, you may, after having put on the print, trace the same accurately with a firm oiled paper, and then retrace it on another block, or at least those parts that the ground which you mean to put on, falls into, or joins; on which accordingly draw your grounds; but strict charge must be given to the cutter that he does not deviate in the least from the drawing.

The advantage of this mode is evident, in having the principal grounds ready as soon as the print; and if they do not exactly fit, perhaps a little alteration may make them; and that is better than setting some prints to work before the grounds are cut, as then whatever is amiss in the impression of the print, must remain so.

It is however suggested concerning this article and the preceding one, that they should only be used in cases of absolute necessity, as their neatness and accuracy cannot be much insisted on.

In fact, every one must grant that any operation, especially where contrivance is necessary, and has to go through many hands, if executed with precipitancy, cannot reasonably be expected to be free from some fault or other; and in this instance it most undoubtedly is requisite, that, with very few exceptions, prints and grounds should be adjusted to each other before they go to work.

27. In finishing the joinings of some certain prints it will do no harm, to let the ends of stalks or objects, that join at the heads and sides, be a little too long, it being an easy matter to pare or cut away what is superfluous; or sometimes if particular parts of a joining are suffered to remain rather longer than might seem needful, as fig. 54; they prevent the appearance of a break in the stalk, see fig. 55, 56, 57, if the print is slackly joined.

28. Avoid so disposing of a leaf, a flower, or several stalks at the corners of a print, as to require four joinings to bring them together, see fig. 58, 59, 60, but, if possible, let the corners of the square fall in some open or blank part of the pattern, as the joinings are less likely to be perfect at the corners than any where else.

The above rule, it may be observed, chiefly respects patterns where the work is close, or the objects small; as in loose patterns, or where the

Rules, &c. for putting on.

objects are large, and light of work, it may not be of much consequence where the joinings are made.

N.B. In joinings it is perhaps best not to give much latitude to Printers, as it thereby makes some of them more careful in the joining, and rarely satisfy them how the grass grounds fall; for if they know they may run their joinings a little, they will be apt to over-run that latitude; It is however necessary to inform them what work is to be grounded, that they may be accordingly careful in pulling over their pieces, and folding them smoothly and even. The Foreman of a shop should be informed of the design of every pattern.

29. Instead of the common way of making out the joinings, by rubbing off from black lead, or by an oiled paper, the following mode is offered where particular nicety is required, at least it must be something more certain, from the circumstance of one side and end being cut, than the usual mode, as there is always a probability of the Cutter deviating from the drawing, or the marking out of the joinings.

After

Rules, &c. for putting on.

After having regulated your joinings, draw or finish one end and one side, as you mean it be joined to the others, leaving the other end and side unfinished, at least within a quarter of an inch, or perhaps less, where the joinings are to be made; then let the end and side that you have drawn perfect, be cut a little way in the work, and likewise the squares; then dab a little treacle and lamp-black on the edge of the part that is cut, and lay over it a slip of strong paper, and press it sufficiently to receive an impression, taking care that you take the impression of the squares, unless you chuse to prick through the two corners, for the purpose of transferring them to the other; either way remove the paper carefully to the other side or end, by joining the squares that you have rubbed off, to the other squares, or fixing the pricked holes to them: then rub the impression which you have received from the end or side which you have cut, which will convey it to the block, to which impression you accordingly have to make good the drawing for the joinings. ---In some cases it may be more convenient to let the print be cut all over to within a very little of one of the sides and ends, observing the same process of rubbing, as before suggested. Or,
by

Rules, &c. for putting on.

by putting temporary pitches at a distance from the square, at the bottom and off-side, and having holes or pins to answer to them, within the squares, and at the same distance from them, if you strike an impression on paper, and then join it, (observing to guard the blank part of the block from the dipping) you will have at once the impression of that part of the block which is cut, and by which you may the easier regulate the joinings.

30. In prints with sprigs that stand wide apart, or in very loose trails, if it can be done without hurting the ground, a few pins placed between, and filed nearly to a point, and rather below the surface of the wood, will keep the cloth down; and cause the work to appear neater, by preventing the edges of the objects pressing too much on the cloth; it likewise answers the purpose of keeping the substance of the block nearly equal, as otherwise a deal of wood must be hand-tooled out; and the hollows that remain must weaken the block, and render it more apt to warp, or perhaps split, if the print requires much knocking. In grounds where the parts stand far from each other, it can be done very conveniently, by letting these (what may be called) guard

Rules, &c. for putting on.

guard pins, fall into parts of the impresson of the print.

It is granted that an objection lies against this observation, as the points of pins standing at great distances from each other, are apt to make holes in the sieve, or in the cloth, especially where coarse or too much blanketing is used on the table; and if one thread of the piece is broken, it will in the process of copper or field-work become a hole; therefore some caution is needful in this case to place the pins, not too far from the work, especially round the outside of it, so that the circumstance alluded to be prevented:

31. Where a print or ground is put on without any drawing, such as rings, bengals, that are executed with dividers, tracers, &c. so that only an indenting is made in the wood, if a thin mixture of colour be spread all over, and the block afterwards scraped with a fine edge, some of the colour will remain in the indentings or hollows, and be tolerably visible; besides, by pursuing this method, if the wood be damped, and the indentings swelled up, there will still

be

be some guide to the Cutter; in short, it will have nearly the same effect as oiling the wood where a curb line is cut.

32. In drawing for pinning, be aware that though in the drawing, your lines may appear to stand distinct as fig. 61, 62, 63, yet the print when pinned will not have that appearance, the certain vacancy between the pins destroying it, as the pins will appear as fig. 64, 65, 66. Observe the same in drawing lights in bodies of pins, as fig. 67, for though the object may appear tolerably shapeable, while only as a line, yet it will be destroyed when enclosed in pins as fig. 68, therefore in such cases, let there be a proper openness observed or provided for.

33. In drawing pinwork for cylinders, recollect that there will be some difference between the width of the surface of the pins, and the bottom of them which in rings, rosettes, &c. will be of some consequence.

Rules, &c. for putting on.

34. In adjusting the joinings and pitches, it may not be amiss, indeed it is necessary, if there be among the Printers, one who has a general judgment, to consult with him respecting them.

35. Though the following observation more concerns the designer, yet as the putter-on is sometimes left to his discretion, it is intimated here that pin shapes for leaves are bad for penciling two colours, viz. the blue over yellow, or yellow over blue, as the blue and yellow are never so exactly on each other but that they are seen at the edges; and so likewise are the edges of leaves or other objects of this kind, fig. 106*

* This kind of refinement is what the writer several times points out as objectionable in the patterns as executed on the cloth by some of the first Printers; in one ground, almost all the leaves (as mentioned already) are of that long shape, fig. 110; so as to heighten the inconvenience when form'd with pins; and in another, (perhaps the first in this country, for the variety of patterns it has produced, and the taste displayed in them] those leaves fig. 111, are very frequent: but the ill effect is at all times visible, though the penciling is as neat as can possibly be done here; therefore the drawing on paper should be regulated in a degree by the similitude that is attainable on the cloth; and, according to the principle of keeping the last stage in view, a little deviation had better be made from the original, though in respect to itself not bettering the appearance, provided it tends to give the whole a better aspect; and particularly so, if it renders the operations easier, or more facile, in any of the branches.

Rules, &c. for putting on.

and of pin shapes, those are the worst that are in this form fig. 107 on account of the sharp end ; but, if such shapes must be retained, it is advised to end them thus fig. 108. Besides, there is another inconvenience attending pin shapes, indeed a general one, which is, that the surfaces of the pins continually get finer ; hence, if not put in as close as possible to each other, or if put in of the smallest sizes, (speaking of them as boundages for colour) there soon will be very little line to be seen ; and every one knows pumicing them must render the wood-work coarser ; and it may be said too of this kind of shapes, fig. 109, that a small accident or little violence soon breaks them ; or if the texture of the wood be not very firm indeed, they soon crumble away, or work gouty.

36. Observe as a general rule, that pins and wood never work well together, especially large pins with fine cutting, or fine pins with coarse cutting, and particularly where they stand close to the wood. — See Rule 19.

37: In drawing on grounds that are to work in thin colour, if they have shades, or other long and thin shapes, terminating in points, remember that such long shades do not shew as such, even if very wide apart ; and if put close together, they blotch up ; therefore in many instances they should be drawn rather longer than apparently needful ; and the Cutter must be directed to cross the ends with his knife.

Of Pitches.

IN the first place it can never do any injury always to have squares cut at the corners, and oftentimes in the middle, both of ends and sides, the necessity of which the nature of the pattern will determine ; but at any rate (as above said) they are needful at the corners, as they determine when you join the print by them, whether the pitch-pins are on the square or not ; and that you may the better join the print by the squares, let the shape of them be as fig. 69, or rather as fig. 70, to hinder the clogging of the colour in the corners, unless the situation of the work hinders their being so cut, and let them stand out as far at least as the pitch-pins ; because in the first trial of the joinings (supposing the squares are cut as they should be) the print may be joined by them, as the pins may be then adjusted, if not put in right, or if moved by any accident.

If it were not for the conveniency of joining by the squares, instead of the shape above recommended, it would be best to cut them as at fig.

71 ;

Of PITCHES.

71 ; but however, when they are cut as fig. 72. (for as fig. 73 they never should, though too commonly done so, as the impresson gives no certain shape) they should not be drawn on the ruled line, as the ruling will perhaps misguide the cutting of them ; and if the squares are left for the purpose of ruling grounds from, they should be drawn within the square line.

2. At the head the pitches should stand out from the work near one quarter of an inch, that the wood may not press on the cloth in pitching the head of the print, and of course appear heavier than the rest of the work.

The first pin at the head should be at least one quarter of an inch within the square line of the near side, for fear of the near edge running on the table ; the second pin, for the convenience of the off-edge printing, should be regulated according to the width of the print, and of the cloth it is likely to work on ; for if the width of the print is such, that the edging is less than half that width ; which by the way is a bad circumstance for the face of the print (as observed already) there is no occasion for a middle pitch, either

O f P I T C H E S .

either for print or grounds; and the fewer pins for pitches is always the better; for if the first pitch should get off the near edge, the Printer, for the sake of the grounding, must get on again if he even makes a cut: as for the third or off pin, it is little matter how near the off-square it is, so it does not stand out beyond the line of the work on the off-edge, as it then would be particularly liable to accidents.

3. As the pitches of the print, from their outward situation, are in danger of being removed or otherwise injured, it should be a rule to put stout pieces of wire deep in the wood, rather slanting, and lessen the tops with a file or other instrument; and in case the print should run on the table, it would not be amiss, especially if it be a close one, to put pins at the off-edge, unless the shape of the work will answer the purpose, to fall into certain places, in order to fill up the vacancy, if there be any of consequence, at the near edge. Likewise for fear the print should come off the near edge, and of course the side pitches for the grounds be rendered
useless :

Of PITCHES.

useless: let there be a pin at the bottom of the ground to fall into the work, if it can be so managed, at the bottom of the print:

4. The first side pitch should be about half an inch down the side, the other as near the bottom as convenient, and if it can be done, let them pitch into objects so that they be little seen, taking care however that the joining of the print does not obscure them. Side-pitches need not be out farther than just to be clear of the work; in order to prevent a light edging.

5. The pitches for the print being ascertained, put in the pitches for the grounds which work next in succession; these must be distinct from the pitches of the print, and be clear when the print is joined; one pin towards the bottom of the near side is sufficient for the ground, taking care to place it below the side pitch of the print, that it may not hinder the printer from seeing his print pitch; this however is not necessary to be particular about when the ground pitch is placed
within.

Of PITCHES.

within the work: Endeavour likewise at all times to make one pitch or a shape do for as many grounds as you can, observing however, that a ground that works to another ground ought not to pitch to the print.

6. If the work is to be grounded after it comes off the grays (as you can make no alteration then) be particularly careful that the pitches for those grounds be not obscured by any means, and if you can place them where pale colour only will cover them, it will be the better, as that will partly hide them; and let them be but just large enough to be seen, which rule indeed should be carefully observed in respect to pitches in general, or if large pins are put in, the tops should be lessened.

7. To be more certain of having your pitch pins in their proper places, they had better be put in before prints or grounds are given to be cut (unless you have no doubt of the carefulness of the cutter, in that respect) and before your prints or
some

Of PITCHES.

Some certain grounds go out, be sure to rub off parts of the drawing on paper, making a memorandum what parts you rub them from, as they will be checks against the cutter in proving whether he has or has not deviated from the drawing, and probably prevent a deal of altercation, when the work is done; or, as a further caution,* the whole face-joinings and all may be procured, by damping a stout piece of paper, laying it on the surface and gently rubbing the back, till you have a slight counterpart of the drawing; and a very slight one will be sufficient to shew the trail, or the shape and situation of flowers, and other objects.

A Putter-on

* For if a Cutter has a pique against the Drawer, or bears ill-will to the master, or if only through wantonness he may alter the joinings, the direction of a stalk, or shape of an object, or in grounds, he may cut out of shape, or move an object out of its place (for such things have been done) and then, without some check, what can the Putter-on say in excuse, or how clear himself.

Of PITCHES.

A Putter-on, and indeed any other person, is likewise here advised for his own sake, to make minutes of what may have been matter of opinion or contention between his employer and himself, about the mode of performing any thing, when his Employer or Principal has it done his way; and have those minutes ready to produce, if, in consequence of such determination, the effect happens not to be as it should, or if the performance be not successful in other respects.

As well as advising a Putter-on to be guarded against the Cutter, the writer advises the Cutter to be on his guard, and that is, to see the rubbing-off performed, and that his employer keep one in his possession; or else to demand one for himself, otherwise it is possible the putter-on in his way, may do a Cutter an injury, by altering the rubbing off in some mode or other, and thus make it appear as if the Cutter had not attended to the drawing or other particulars.

The

Of PITCHES.

The writer is of opinion, that a putter-on at shop, is not amenable in general, for what cutting may be faulty, when brought home; nor can be with propriety be asked, if he put the whole or any part of it on, in this or that manner; for to say he did not, if the cutting be faulty, is criminating the Cutter, even if he has his checks by him; and to say he himself was in fault, every one knows is awkward enough; as in this case the putting-on should have been examined, and if faulty in any shape, rectified, ere it went out; for to let putting-on go out in such a state, implies incapability or carelessness in the Principal, or any other who may have to superintend such matters.

Of Squaring Blocks.

IN making a square (as it is always called) though the four sides are seldom equal, if a print is intended to be a 5 over on 5-4th cloth, or about 7 3-8ths wide, it should not be above nine inches long, it being handier for working, and not so apt to warp, as if longer in proportion to that width, and for very close fine prints that are difficult to join, the smaller they are the better, as they have less cutting, are easier to work, the warping is not of such consequence, and the grounds are more likely to be hit in, especially the grass grounds, and the best general size for them is about 8 by 6 and a quarter, or 6 and a half at the utmost, or what is called a six over, for to make it any thing wider under 7 3-8ths, so much cutting would be thrown away; as it would still be six over, and the worse for it, it then having to work a narrow edging on the off side, the inconvenience of which has been amply discussed.

D

2. For

Of Squaring B L O C K S.

2. For larger prints it is presumed the best general sizes are, for 4 overs about 12 by 9 and a half, for 3 overs 15 or 15 and a half by 13, but when a pattern requires a pair of prints or more, the length and width must be governed by the nature of the design; if not drawn to any particular size, unless the pattern would not be injured by altering it.

NOTE, In speaking here of 5 overs and 6 overs it must be understood (as before remarked) as referring to ell-wide cloths; though after all, (as likewise remarked) the best rule to abide by, is knowing what cloth is most likely to be made use of for the respective patterns that are determined on. The sizes however as above will nearly suit narrows, with one more over.

This circumstance of determining on the sizes of prints, is of consequence from other motives; for to have a print unnecessarily small (which is the case if the work be light and easy to join) is protracting the working of it, and encreasing the expence attending its working, if on account of its smallness, the Printer requires a proportionable price; besides, such a print will be as much worn in doing a hundred pieces as, if made a little larger, it would be in doing twenty or thirty more; which altogether is of some importance,

Of Squaring BLOCKS.

importance, and must considerably outweigh the circumstance of its having cost less for cutting, if that had been an inducement to have had it cut so small.

It is however as necessary to consider what it may have to do in respect to grounding, particularly grays-work; hence if the size is such that the grounds cannot be worked whole, the print in this case had better have been smaller, and this circumstance is determinable by the ease or difficulty of the grounding, for if the grounds are to fall into small objects or fine lines, the print should be small, or if it be larger the grounds must work in halves, unless there is good latitude for the grounds to fall, and then they may work whole with such a print.

3. In squaring a block the most expeditious and certain method, as well as of making the divisions, (if they are required) is to have a plate of copper or pewter, set out with a number of squares within each other, of the different sizes above-mentioned for 6-overs, 5-overs, and 4-overs, as being most generally in use; and set into as many divisions as you chuse, and at the

Of Squaring B L O C K S.

corners of each square, and wherever the divisions are marked, let there be holes pierced through, as fine and as strait as possible; you have then only to lay your plate on a block or paper, and with a fine needle prick through the holes where necessary, and then rule as usual from the pricked holes left on.

4. Another method is, by having a piece of thin wood or metal, made angular as fig. 74, which laying on a block or paper, rule two lines fig. 75, and then with your compasses or dividers (beam compasses fig. 76 are best) extended to the length of your print, fix one point at A, and make with the other a hole or curve at B, then put one point on the line as far distant from A, as, near as you can judge, what the width of your print is, and strike a curve as as D, this done, rule a line from the bottom of the curve to B, fig. 77, then move your dividers to the width of your print, put one point at A, and strike a curve as at F, and with the point at B, make another curve, intersecting that at D; lastly, rule from the intersection to F, fig. 78, and you have your square.

Bart

Of Squaring BLOCKS.

But observe, that the truth of your squari in this manner, depends on the just form of the two sides, from which you first rule, and of the instrument which you use.

This instrument, or the copper or pewter plate first spoken of, if it be cut perfectly on the square, will serve to try whether pitches stand square or not, by laying it to one of the ends and one of the sides at the same time, and repeating the trial at the other end and side.

5. If you square your block in the usual way, and have occasion to make divisions, divide into halves first; then divide those halves; then divide those quarters, and so on; instead of taking a certain part, and running the dividers along the line, because of the great probability that the same number of divisions run along in the same manner, will not form the same length exactly again.

6. In squaring a block for a stripe pattern, if it be on a joined face, take care that the joint is parallel to the side of the square, and (if it can be

Of Squaring BLOCKS.

be so) in the most vacant place : to get it parallel to the square line, you have only to put one point of your compasses on the joint at one end of the block, and with the other make a hole or curve near the edge of the block, from which you mean to raise your square ; repeat the same at the other end, and from the two pricked holes or curves, rule the line which is to be that from which you raise the square. This observation should be attended to in sprig patterns, or any other where the joint can be possibly avoided.

Of Cutting.

AS a Drawer, or Putter-on, should study how to preserve the effect of a pattern before he puts it on, a Cutter should endeavour to preserve the effect intended; and if he has the interest of his employer in view, as well as his own, he will examine as far as his judgment lies, where it is defective, or any way improper, and not, as is too generally the case, think only of contriving how to make the charge as high as he can, (if the price be not agreed on before-hand) to such it may be hinted, they are ultimately not gainers, for it may be expected every employer will think first of those who think of his interest as well as their own immediate emolument.

From what is above suggested, a Cutter is not to infer that he is at liberty to alter the drawing or deviate from it as he pleases, besides, he should be very cautious in that respect, as he may not be aware what counterparts or checks are kept against him.

A Cutter likewise should consider when he takes any work whether he can do it well, if the putting on, or more properly the drawing, be indifferent, because if he does not execute it tolerably and alledges in excuse, it was badly drawn: It is the more inexcusable in him, as undertaking to execute what he knew he could not do as it should be; as among other reasons, it must go to

Of C U T T I N G.

work bad as it may be (unless it be too bad) from the impossibility of its being put on and cut over again in proper time. But much worse it must be in him who will proceed on his work, though it is evident to him, that from some mistake in inaccuracy, the article must be useless to all intents.*

As a general observation respecting cutting, be it noted that the principle of sound and graceful cutting (if the term may be allowed) depends on properly forming the knife, and having a good command of it; as for the shifts of pinking, and other expeditious modes made use of as substitutes for cutting, the face, from being forced or shattered by such modes, rarely works clean or stands well; and by those who require sound cutting, the use of such modes should be exploded, as more proper for carving; but in cutting for callico-printing (it is repeated) the knife, and that alone, can make a proper face, where strength and neatness is required to be combined.

* Sorry the Writer is to say that either through pique to the drawer, enmity to the master, or from that wretched groveling principle of such mischance multiplying work, he has known it to be the case, and he is not backward to own in cases where he has blundered, or not been sufficiently accurate (for he don't pretend to infallibility though he presumes to publish this work) he has experienced instances of such a kind.

Rules for Cutting.

1. A careful Cutter will at first look at the joinings and measure and compare the distances of the pitch pins, and if the pitch pins are only marked, he will be careful to put them in as soon as possible, as the deferring of it till the marks are so faint, that they are almost put in by guess, is productive of much trouble, for even the common practice of drilling or gouging for them, chisseling the wood away, and then driving in the pins is deceptive, the tops of the pins frequently not being where they ought to be.

If however the Cutter puts in the pitch pins he should not chissel the wood away till the rest of the print is finished, or if it is cut at home the wood should not be cleared away till it is taken to shop or some other proper place, as they might be removed even in carrying thither.

Of C U T T I N G.

2. Let the difference between the surface and bottom of the work be just so much as will serve as a foundation for it, as every cutter should be aware, that if thicker, the print will work the coarser, even if the surface be fine, and the first time it is pumiced it will work very clumsily; as for the care of preserving a face, every tyro in cutting must know that is of the first concern, and of course the cutting of it away in any part, or leaving so little foundation that it is liable to be injured by the smallest accident, is the greatest discredit to a professed Cutter that can be.

3. Next to a proper foundation and an even face, a sound print is one where the work is not cut through, at the joinings of branches or shades. see fig. 79, for where the knife goes thro' those joinings, especially if it be a thick one, or the wood very damp, it will easily be seen, after the print has been sometime at work, and lays in a
warra.

Of C U T T I N G.

warm or dry place; but as in some instances it is impossible to cut in that manner, proper attention should be bestowed on those parts that are left without the support alluded to, that they have a firm foundation, otherwise the slightest accident will remove them.

4. Where pins are marked to touch the surface of the wood as fig. 80, cut accordingly, that is, down right across the end, or it will be the cause of much trouble both in drawing for the pinning and in the pinning itself, from the pins not being able to stand upright, nor join with the surface of the wood; but will leave disagreeable gaps as fig. 81, between the impression of the wood and pins; and if the pins are marked to stand near a line as fig. 82, carefully cut more upright than in general on the side the pins are to be, and cut deep or shallow according to the size of them.

5. Where pins are marked and have no cutting near them, leave some wood for the file to rest on.

5. If

6. If you have to cut a curf as fig. 83, cut outside the line as drawn (unless the putter on has provided for the circumstance) otherwise the line of pins cannot be where they were intended, for the drawing being the line that the pins is to stand in, if you cut the curf through that drawing, it is evident the pinning must be within side of that line, because of the wood, as fig. 84.

In cutting lights with the grain, be cautious to cut with a thin knife, and rather slanting, whether you chissel away or not, or when the work is damp the wood will close in some degree, and of course appear in the impresson not so open as those lights which are cut across the grain, tho in the cutting they were full as open.

It seems to the Writer, that in cutting fine lights with the grain, it is not the best way to cut downright of each side, and chissel away at the bottom, particularly if the wood be very dry or scarcely damp when cut, as the surface will nearly close when the wood gets damp, but rather to cut very deeply and take the wood out with the knife, for each side rising slopingly from the bottom, the chance of the two edges of the surface

Of C U T T I N G.

face meeting together is not so great ; but as a counter-balance, the colour is more apt to gather than when cleared at the bottom with the chissel, therefore if cut slantingly and chisselled away with a very small tool, that inconvenience will be prevented.

7. Cutters are not sometimes aware how much they injure a block by extreme partial damping or letting it lay a long time on damp stones or bricks, especially if one end is kept damper than the other a long while, as the face is liable to come up in places by damping or wetting while there is nothing but the glue to hold it ; and as blocks are sometimes badly venerated, or may have lain long in improper places, or may have suffered by a removal from a damp place to a warm one and the contrary, there is the greater reason for a Cutter to be cautious in that respect, hence it would not be amiss as a Cutter clears away, or as soon as finished, if he secured the face by a few brads.

Note, The Writer purposely inserts the following article, though properly belonging to putting on, in order to lead a Cutter to look a little further than the point of his knife.

8. If

OF CUTTING.

8. If you have to cut from an impression always be informed whether the cutting is to be within the line, on it, or without it: as this circumstance is very often a mere matter of opinion, though at other times determinable by particular circumstances. See Rule 18 for putting on.

And, In paste grounds that have to hit to objects surrounded with stormont, or other close or solid ground, it is needful to cut within the line, for it is better the ground should come into the object than not come up to it, as that will shew a disagreeable run of white outside the line; but if the object is only to have loose ground work round it, it would be better to secure the filling up of the object: it is only suggested in that case to be better within than without, making some allowance for the spreading of the colour.

Again, if there be large and small bodies to work together in the same ground, as fig. 85, cut the small bodies rather more within the line than if they stood alone, as the quantity of colour necessary to be carried by the large ones and the blow requisite to impress them, would otherwise cause the small ones to spread over the line. See Rules 12 and 18 for putting on, where there are similar observations respecting both prints and grounds.

Of CUTTING.

Note, In speaking of cutting, it may be observed to those who prefer the useful to the superficial, that as what is required of a print or ground, is its being able to make a proper impression, and for a proper length of time, all that is done which does not tend to that point is delaying its going to work, of course, all that delicacy and formality in the subordinate parts of hand-tooling, chisseling, &c. which some affect; can only give a print or ground a good appearance, but does not enhance its intrinsic value in point of utility; as every one knows that the clearness and soundness of the cutting in respect to the face, is the essential quality that is desired; hence longer time bestowed in those particulars, more than sufficiently clearing the superfluous wood away, is, beside delaying the working of it (as above-said) rendering it unnecessarily expensive to the proprietor.*

The Writer cannot suppress the insertion of a word or two, as a hint to some Masters (though copiously discussed with similar matters in the
essay.

* It is supposed the Writer will not be thanked by many Cutters for this observation, but as he occasionally makes free with Masters (as the following observation evinces, as well as many others, which will appear at the close of this publication, as likewise where he makes as free even with himself) he trusts they must acquit him of partiality in what he advances

Of C U T T I N G.

essay toward the conclusion of this work) that they do not always get their cutting done so cheap as they imagine, when they press a man down to a low price, for a Cutter who is a master of his business has a mode of working, not easily detected when he brings his work home, according to the price bargained for, or what he expects for it from his knowledge of his employer in that particular; especially if he knows his employers judgment of cutting is not very extensive.

As there is a wide difference between being imposed on, and getting work done for much less than it is worth, the writer just hints here at the impolicy of some, who when they get work done very cheap, (no matter through what motive it is so done) cannot be so far contented, but will speak of it, and will perhaps say who the person was, in order to induce others to do the same; the consequence may be a combination not to work for such a person; and any how it renders such a man unwilling to do work very cheap again: after hinting at impolicy on one side, it is proper to hint to Cutters, that it is equally impolitic to make a boast (particularly a public one) how expeditiously they can work, what excellent and peculiar instruments they use, how well paid they have been, &c. when this is the case, can it be much wondered that masters so often doubt the integrity of their workmen, respecting the value they set on their performances.

Of CUTTING.

This valuation of cutting is a disagreeable and difficult part for a principal to go through, if he is willing to give labour the price it deserves, or if he would avoid being deceived or imposed on; some leave it to arbitration, some fix a price at first, and others pay according to their ideas of its worth when it is done, or for what they can get it done; unfortunately each mode has its inconvenience; arbitration is often but another term for collusion, when left to other Cutters, and to many it is disagreeable, and perhaps injurious to interfere between master and man; as to fixing a price, though it may prevent some contention when the work is finished, it does not ensure good work (as above intimated), for as a man cannot always tell merely by seeing the drawing, what work there may be in the cutting, he accordingly suits his performance to the price; or if he agreed to do it well, he may use all the deceptive and expeditious modes that he can (as before spoken of) and lastly, to pay for cutting according to its worth, cannot be done without a consummate knowledge of the operation, which includes a knowledge of the deceptive modes that may be used, so as to make it appear sound, though it be really far otherwise.

It is not here attempted to offer a decision on the above observation, as that must depend on circumstances which will render one or the other

of

Of CUTTING.

of these modes most eligible to adopt ; it however is offered as an opinion, that generally speaking, the last-mentioned one is the most equitable ; but then upon that principle it can only be adopted by a judge of cutting, and such a one will endeavour to suit the quality of what he gives out, to the ability of the Cutter ; and of course makes the necessary distinctions in the estimation of its worth.

It is begged it may be observed, when speaking of expeditious modes, those are meant where deception is used to make the work appear well at first ; for it certainly ought not to be considered by a master as an inducement for a man to work cheap, if he can work more expeditiously than many others, so the work is perfect in every particular ; in fact, he deserves a higher price in proportion to his expedition ; for if he can execute a piece of work in 6 days, that another would be 8 or 10 about, and brings it home, it goes to work so much sooner ; and in many cases no master needs being told such a circumstance is of very material and pecuniary consequence ; but unhappily, workmen suspecting an advantage will be taken from finishing work very soon, and masters suspecting they are imposed on, by a deal of work being soon done, will, most probably, never suffer, in general, such an accommodation : to take place.

Of Pinning.

BEFORE you begin pinning a block, especially if it is to be pretty full, a few brads drove in, in the vacant places or indeed all that are necessary, is very proper to be done, in order to secure the veneer from rising or removing, and if the pinning be very close or covering, take care that brads are first put in, punched down, and pegs put over them.

1. A block that has many pins to be put into it particularly if it is not a small one, should be hollow in proportion to the size and quantity of the pins, and should be in a dry state, for pins acting as wedges even in a degree when bored for, they naturally tend to throw a block round; hence if a block that has a great many pins, and particularly if they be large ones, happens to be very round when began to be pinned, the consequence perhaps would be its being rendered useless, from the extreme round state into which it would then be thrown.

This

Of PINNING.

This inconvenience may possibly be prevented in some degree where the back, or a cross back is but weak, by having a strong temporary back firmly fixed on.

2. It is usual for Pinners in pinning of blocks to begin at one end and work gradually on to the other, whether the pinning is full or not, but perhaps it would be more adviseable to do a little at one end, then a little at the other, then a little in the middle, and fill up or finish in the same progressive manner; as, besides the chance of avoiding the partial warping of the block, you are more certain, by doing thus, of preserving an even face of pinning; for it sometimes happens that pinning is fuller at one end than the other, or different in other respects, from being finished in a hurry, or put into another person's hands, and the like; which would probably be avoided, by pursuing the method above recommended, or something similar to it.

3. Where large and small pins are to stand together, it is in general necessary to put in the large ones first, especially if they be considerably so, as by taking up the most room you will the better judge where to put in the small ones, and small ones can be the easier set to them.

OF PINNING.

4. The quicker pins are put in, the firmer they hold; and the more uniformly upright they are put in, the evener they work; for if put in very slanting, the setting of them upright afterwards, loosens them at the bottom; and consequently in the course of working they will be easily removed, as well as by other common accidents.

5. If you have a number of large pins to put in, avoid (if the pattern will admit) two or more standing near each other exactly in a line with the grain, especially if not bored for, from the great chance of their splitting the face, by standing in such a direction.

6. If you have a flower, or leaf, or other object, as fig. 86, begin at the points, and then fill up the line as regularly as you can, that is, in respect to the distances of the pins from each other: If the shape be like fig. 87, begin at the points, and then fill up the line.

If

Of P I N N I N G.

7. If you have branchings, sprays, curls, &c. as fig. 88, 89, and 90, take care of the line or stalk from which the others run or branch out, as these should be kept in as perfect a line as you can, keeping however the angles in view, that the corners may be open in making the lesser branches.

8. If you have small curve lines, as fig. 91, do not put a pin in the middle, as fig. 92, but rather put two, as fig. 93, otherwise it will have an angular appearance, especially if the pins be large.

9. Where pins are required to be placed near the cutting as fig. 94, the shade of the wood will frequently deceive the pinner, respecting the distance to be observed in placing the pins; in order to guard against this circumstance, frequently look at the block with the face held directly against the light.

ff

Of P I N N I N G.

10. If you file the pins without the wood being wetted or swelled, do not file them even with the wood; else in a very little time they will be too low; as exclusive of the wood swelling by working, the repeated blows of the Printer at the back of the block, draw the pins further in, exclusive likewise of the pins wearing away, especially when worked in colour in which iron liquor is used. Observe likewise, before you begin filing, if there be such a quantity of pins as to make it of consequence, that the face be even; or as nearly so as it can possibly be.

11. If on any particular account, you swell the wood, observe that there be brads to prevent the veneer from rising; this however is a bad method from the chance of the face being damaged by the file or pumice-stone, and consequently rendered coarse or gouty; it is therefore better to file it in a dry state, without filing so low as the wood, as the wood when it is damped will swell and be even with the surface of the pins, unless the pins are left very much above it.

12. In

OF PINNING.

12. In bradding prints and grounds, drive the brads different ways, that they may have the firmer hold; a few brads well disposed of is better than a great many, as they act as wedges in the back, even if the veneer is drilled or bored through, and of course tend to throw some blocks round the same as pins would, as the boring for the brads must not be so deep as the brads are long, they then having no hold of the wood; and remember, in prints or grounds that have backs of deal, or other slight wood; longer brads than common are requisite; otherwise, from the softness of the wood, or openness of the grain, they will be of little service.

13. Take care that brads do not stand in lines close together with the grain, as the more diamond wise they stand, the better they hold; and consequently a less number will do; neither is there such a chance of the face being split.

Care should likewise be taken that brads are not put on a joint; it is however necessary where there is a joint, to put more brads about it than elsewhere, as well as round the edge.

It

Of P I N N I N G.

Note, It may be expected that more might be said about Cutting and Pinning, and more the Writer could have said, but as every Cutter and Pinner has something peculiar in the construction of tools, mode of using them, and the like*, (though some of the advantages they think they possess, are only of consequence, from that satisfaction which every person experiences in doing any thing his own way§) it would be to little purpose to give directions in many cases, even if it were possible to do it explicitly.

* Every one knows how workmen will contend about their respective excellencies: This however would be less ridiculous, if the contention was not too generally carried on in improper places:

§ The Writer here again makes a remark addressed to Masters (tho' touched on already, and will be more generally dwelt on with collateral circumstances, in the essay at the closing of this work) that half the facility of a man's operations (granting he has abilities) is owing to the liberty of following his own method, hence at a shop he seldom seems to do justice, or that what he does is done by a proper mode, it being too customary in Masters to be minuting as it were, how much is done, as well as perpetually enquiring how such a thing is to be done, or why not done in such a manner, thus the man (unless he is little solicitous about his
||situation

Of P I N N I N G.

Hence the writer deems it sufficient to have attended principally to those matters which immediately lead to the point he all along wishes to be kept in view; that is, the effect intended to be produced on the cloth: but nevertheless, Cutters and Pinners, may find in other parts of this work observations enough that concern them; though, (as already intimated) they are more conveniently introduced under other heads. — See particularly Rule 1, 12, 14, 17 and 19 for putting on, as well as several of the Rules for pitches, and what is said about blocks.

situation) is under continual restraint, and consequently the progress of his work impeded, (to say nothing of occasional interruptions,) hence, few expeditious cutters as well as others, who can have business at home, though capable of doing much general service at a shop, have any inclination to be at one: It must not be concluded however, but that the progress of a Man's work should be looked after; what the Writer means is, that as no person is always alike able or disposed to work, it is more adviseable to form an estimate of his abilities, by what he can do in the course of a day or two, a week, or in some cases a month or more, and then set a value on him accordingly.

Of Blockmaking.

PREVIOUS to what the Writer has to advance on the management of blocks, a word or two addressed to Block-makers cannot be deemed unnecessary, as their inattention in general (if not entirely) to what he observes below, has rendered many prints and grounds of no use; while the fault has been attributed to causes very remote from the real ones. Therefore, if Block-makers wish for the credit of making firm standing or good working blocks, they should be careful, that, in the first instance, the faces and backs are free from cracks and shivers, and not tending to a decayed state no more than being too green, and that of crossed backs the backs are alike in age, texture and seasoning; indeed they should be cut not only from the same plank, but from the same part of the plank, else the resistance of one to the other cannot be reciprocal, and consequently the very purpose for which two backs are joined together is directly destroyed: *See the observation respecting cross-backed blocks further on.*

E

Block-

Of BLOCKMAKING.

Block-makers should likewise take care that in joined faces, the pieces of the face be of the same part of the plank, as a joined face that has one side clear, hard, or strait grained, and the other soft, beachy, curly or knotty, is hardly fit for any purpose; the bad being unfit to go with the good, which is only proper for nice work, and the good part is thrown away if the whole block be used for something coarse, or of little importance; and even a whole-faced one had better not be so, unless the whole face is of the same quality all over; therefore two or more indifferent pieces of veneer had better be put together, as serving for something that is coarse, and the same of two good pieces for a contrary purpose.

Further, if one side of a piece of veneer that is broad enough for a whole face is bad and the other side good, the face had better be parted than put on a back whole, it being then in the same predicament as a joined face, that has one piece good and the other indifferent; in short, a blockmaker had better burn his very indifferent wood, than send it out, unless avowedly sent home as such, and as such ordered, as only fit for common purposes; otherwise sending a number of blocks of the above description, gives room

to

OF BLOCKMAKING.

to suppose he has not a sufficient quantity of good wood by him, or is too ignorant or negligent of his business, or else incapable of attending it so as to do justice to the orders he may receive.

He should likewise guard against being suspected of substituting inferior woods (needless to name here) for holly, pear-tree, or whatever else may be ordered, as the discredit will not be escaped, when, in the course of working, their inferior qualities are too evident to cover the deception.

The writer is aware that in some of the instances just mentioned, much must be left to journeymen, who, too often, are not very solicitous about their master's interest, or reputation. This however does not (with every person) acquit the master of his responsibility; he is applied to, and of course looked to for a proper performance of the orders.

It may therefore be observed, as a hint to Blockmakers, or their men, that among the causes of blocks not standing well, may be their taking part of a plank for a back that has a tendency to warp one way, and a piece of veneer with a tendency

Of BLOCKMAKING.

tendency to warp the other, and glueing them together in such a state. The same may be observed of two cross backs; and likewise of joined faces; in which latter case, the consequence is, one part of the face rising from the back at the edges, and the other rising in the middle, that is, the middle of the joined piece, not the middle of the block.

Another cause is owing to planks, veneers, &c. lying in too hot, or too damp a situation, and are accordingly warped this or that way; hence when made into blocks, and laid in a proper place, they cannot long remain true, but endeavour to recover their pristine state.

Another circumstance not always guarded against, and probably the cause of blocks casting various ways when at work, is the grain of the veneer running obliquely, sometimes the grain of the back, and sometimes both; in either of these, or similar cases, it is evident the blocks will warp in different directions. A little care would prevent this, by cutting or squaring the pieces either for veneers or backs, directly with the grain; and then, if they cast, it may be more expected it will be sideways or endways, (according to the construction of the block) rather

Of BLOCKMAKING.

ther than corner-ways, which every one knows is the most difficult to remedy. In short, it may safely be said, of prints and grounds that have never been able to do work properly from warping, that the cause has been owing to circumstances not properly attended to by the Block-maker, in the instances above-mentioned, or in others of which the writer is not competent to speak: However, what he has expatiated on, he here brings to a point which may serve as a kind of memento to every person who has to do with blocks.

If it be a joined block, see that the pieces are of equal quality as to the face, whether both good, or both indifferent.

If it be a whole face, see that it be nearly the same quality of each side.

See that the grain does not run obliquely, and the same of the back, if a single one.

Of cross-backs nothing can be said but of the outer one, and of that it may be seen whether or not it directly or obliquely answers to the face.

Of B L O C K M A K I N G.

Respecting the seasoning, few can judge of that at sight; the other circumstances of knotty, beachy, or other kinds of veneers, are what cannot always be avoided, as all blocks cannot be equally good, neither is it necessary, as very indifferent blocks will answer in some instances, where, to use good ones, would be folly and wastefulness.

Of the use and management of Blocks.

CROSS-backed blocks, if they must be used, are most proper for prints, but particularly for prints that have much work, and that have grounds to them not very easy to be hit in; and the firmer the backs are fixed to each other, the better; in order to render them as little liable to warp as possible; for the evenness of the face of the print being of the utmost consequence to preserve, no consideration should be spared to attain so desirable an object. The grounds however should be on single back blocks, that they may occasionally be made round or hollow, to suit the contracting or spreading of the face of the print. An objection notwithstanding lies here in the case of prints that have the work close and solid; as they cannot be taken off too wide, on account of the quantity of colour which they carry, causing the cloth, if soft, to dilate so much, that the grounds are generally too nar-

row

Of the use and management of BLOCKS.

row, although the print is brought hollow perhaps in order to work it. In these instances, probably single backed blocks may be best, it being difficult, if not impossible sometimes, to force cross-backed blocks round; and to swell them by soaking, lays a foundation for their being always out of order; indeed if the blocks for the grounds could be taken off proportionably hollow, and very dry, and made true, or rather round when they went to work, it might answer the same purpose. This inconvenience however does not happen when the cloth is permitted to get very dry, as then the quantity of colour causes it to contract; but in this case, if too much contracted, the laying of it some time in a rather damp place, will cause it to give out again.

This object of rendering prints and grounds fit for each other, and the keeping of them in that state, is, in the process of printing, of the first consequence, and (as before intimated) cannot be too much attended; as the immediate and certain effect of their not agreeing, or of the prints getting out of order, is the delay of the work; and the endeavouring to remedy it, by putting the face on another back, rarely answers the purpose.

Of the use and management of BLOCKS.

purpose, especially if it gets into an unskilful printer's hands. For, among other circumstances, a great number of screws are usually put in, which, beside twisting the wood of themselves, the printer is continually tightening or loosening some of them, or forcing in wedges of some kind, soaking one end, then the other, and so on, till at last, the print is rendered entirely useless, and the pattern is stopped from going on with, perhaps, only a piece or two printed; and as it may be too late to cut it over again, the misfortune is aggravated, as the expectation of gain from the working of it is at an end.

The firmer crossed backs can be united without screws (for screws frequently force up the faces) there will be the greater probability of their standing; and if, for the conveniency of having span holes, a back is let in, the screws should stand quite across, or in squares; and it should by no means be so tight as to affect the print endways; therefore it seems more proper to let the grain of the back which is let in, be the same way as that of the upper back, whether it be thinner or thicker than that next to the veneer; for it may be reasonably supposed, that, if the upper back is nearly cut through in the
E 5. middle

Of the use and management of BLOCKS.

middle, to let in a small one, it will lose much of its power to resist the warping of the back which joins to the veneer ; and much less of its power will be lost if the upper back be cut quite across, as well as quite through to the other back ; for from that circumstance, together with forcing the moveable back tight, the probability of the print casting endways, is aggravated to a certainty.

Another reason for endeavouring to fix prints to an uniform state is, that when single backed prints get very round, dove tails are generally let in very tightly, in order to check that tendency ; the consequence of which is, that the back rarely fails of being split, especially if not eased at proper times, or otherwise carefully attended to.

But after all, from the circumstance of not being able to know at first, whether crossed backs are of equal qualities, or as they should be in other respects, sound single oak backs seem preferable for general use, as not laying under the disadvantage attending crossed backs ; which is the great difficulty, if not impossibility, to warp them as you wish ; or if once warped, to get them true again at pleasure.

To

Of the use and management of BLOCKS.

To keep some particular prints true by force, if force be necessary, a strait piece of iron, rather thin, and of a breadth answerable to the thickness of the block, might be firmly bound round as a fillet, and answer that purpose; especially if, to such a check, two pieces are annexed to the sides into which the back is slid.

The crossed backs of blocks, perhaps should be either all of deal; or all of oak, because if one back is of oak, and the oak back is next to the veneer, that circumstance tends to throw the print hollow endways; neither the veneer nor the deal having strength sufficient to resist the casting of the oak; for it may here be observed, and proper use may be made of the remark, that though oak is harder than deal, yet deal has an advantage over oak, in not imbibing water so readily, and of course, not being so likely to cast by damping or wetting; but then, as a counterbalance, heat will sooner affect it.

It may likewise be here observed, of those trees growing where the sun does not affect them all round, that one side of them is softer than the other, the same as wood is softer or harder the nearer or farther it is from what carpenters call the sap; to which cause, among many others, oftentimes not to be accounted for, is the aptitude of some blocks to warp this or that way, in spite of every endeavour to bring them to the state

Of the use and management of BLOCKS.

desired, or to keep them in that state; from which consideration, when it is evident which way blocks are naturally inclined to be, and they have remained in a proper place long in that state, whether round or hollow, or whether that tendency is in the backs, or faces, they had better be brought to the state you desire, by planing, rather than by heat or wetting them; else the consequence would be, their getting into their former state, as soon as left at liberty. But if their tendency to warp any particular way is exhausted, a second planing cannot be properly recommended.

Blocks should be kept in a rather dry place, without a fire, at a convenient distance from the ground: those intended for prints seem to require laying with their faces downwards, and those for grounds with their faces upwards, prints in general requiring rather a round state than otherwise, and grounds the contrary. And for conveniency the different sorts should be kept together, but, if conveniency only is considered, the best situation for blocks to be placed, is on their sides, in proper ranges on shelves one above another, so that one can be drawn out without displacing the rest, which is ever the case when they stand piled one above the other.

Of taking off Blocks *for Grounds.*

HAVING mentioned the inconveniences attending grounds not fitting, owing to the difficulty of taking off some prints round enough; the following expedient, or something like it, may be found to answer the purpose, without being obliged to swell the prints, or contract the blocks intended for the grounds :

Let a piece of silk, satin, parchment, leather, or whatever you approve of as so much ductile and elastic, that after being stretched it may be contracted again, of about eleven or twelve inches in width, be fastened at one end to two pieces of wood, see fig. 95, each fourteen or fifteen inches long ; and at the other end let two other frames be fixed to run parallel with the silk or whatever else it may be : at the other end let there be nuts to receive two screws which are in the frame, and which being taken hold of by them, you can stretch or widen the impression which is to be laid on the silk, or other matter, to the degree required ; which when
done,

Of taking off BLOCKS.

done, lay the block on it, hitting it on the back as usual, to receive the colour from the impression; thus, you are likely to have your purpose answered, without warping either the print, or the blocks intended for the grounds.

In taking off prints for the grounds in general, the purpose is best answered by having a piece of thin silk stretched and tightly fastened to a frame, sufficiently broad and long, to receive the largest prints; as this method has much the advantage over paper, in its laying even, and the colour not sinking into it after being used a few times.

In laying down the block to receive the impression, put the edge very nearly as close as you can, to the impression of the head and side print-pitches; and if it be a ground that is to pitch to another ground, observe a similar precaution; as no work in the grounds can come out beyond those pitches; for by doing thus you save the trouble of sawing off two sides, and sometimes save likewise a portion of block that may be of use.

In

Of taking off BLOCKS.

In order to get impressions clear and black, unless (as is the case sometimes) a black or dark impression is not wanted, rub the faces with a sponge just wetted with sumach or gall liquor.

In taking blocks off with the silk, they want but two or three smart strokes, and sometimes none, to get off the impression; but whether taken off from paper or silk, the blows should be smart and sharp, or the impression will be either faint or coarse.

When a person has not the conveniency of a table, tub, and sieve, some treacle and lamp-black may be mixed, and diffused with a pad made of smooth soft leather, stuffed with wool, over the face of the print; then (as this composition will not soon-dry) lay a stiff piece of paper on the face, pressing it sufficiently all over, in order to receive the impression on it; which when done, take it off without rumpling it; lay it on the face of the block, and gently rub or press the back till the colour, or at least part of it, be transferred to the block. This however cannot conveniently be done if the work is in detached places, or if it be a large or loose flowing trail.

If

Of taking off BLOCKS.

If you take off with paper, endeavour to have your paper smooth and pretty stiff; for if soft, the colour will be imbibed by it, and of course less will be transferred to the block; foolscap run through the calendar is perhaps as well as any; as that process renders the surface glossy, and the colour lays longer on it.

General Rules to be observed at a Shop.

1. **WHEN** a print comes home, if not pinned or bradded, or trimmed out doors, the first object is to get it bradded and pinned (if there are to be any pins in it*) and so much trimmed, that an impressiion may be had of four joinings; then make what alterations and amendments that may be needful, which being done, get it iron liquored § and backed, or span-holes cut; then

* If the pinning be not of such consequence as to affect the block, or that the grounds are not affected by it, the pinning can be performed in most cases while the grounds are cutting, and thus some time may be saved.

§ It is certainly necessary to let the face of a print, or a ground that has fine-work, imbibe the iron liquor, especially if the wood be soft, for reasons

General Rules to be observed.

then get it in order, as well as your blocks, for taking it off for the grounds, and when they come out of the cutter's hands, just fight them to the pitches, but no more, for fear of their wanting some addition ; and try each ground to a separate impression of the print 4 times joined, to see if they all answer in respect to the pitches, joining, and fitting ; which when adjusted, put all the grounds to one impression of the print four times joined, which when likewise adjusted, make your last trial on a piece of cloth, which should be kept for such purposes ; then get them numbered, the grounds marked what colour they work in, and painted between the work where handtooled, and round the sides, to prevent the water much affecting them, (as intimated in the note) then give notice they are ready for working, and keep them in a proper place till wanted ; which you should always know a day or two before-hand, otherwise the print may go to work in a very improper state, in being either too round or too hollow

reasons well known : and to prevent the backs of prints or grounds from imbibing water, the effect of which is well known, it is as necessary to paint them where the veneer is hand - tooled away, and likewise the sides and ends. -

General Rules to be observed.

hollow.—*See the article setting prints and grounds to work.*

Note, If it be a rule to have prints and grounds trimmed and bradded out doors (which, under certain circumstances is most convenient, as at some shops there are too few people to do such things, or they may be busy on other matters) directions should be given in what manner they are to be bradded, and particularly how much trimmed, for fear the joinings or other parts of the work be imperfect, and of course you may find it needful to make some additions.

2. As it frequently happens in prints and grounds, where the work is loose, or wide apart, that the pitches stand detached from the work, care should be taken that a sufficiency of veneer be left about the pitch to admit of two or three brads, otherwise the brads, especially if carelessly put in, are apt to split the veneer, and the pitch pin is consequently injured, or perhaps entirely removed; which at all times is troublesome to replace in a proper manner.

3. As

General Rules to be observed.

3. As it is probable that notwithstanding the care which may have been taken to render the prints and grounds perfect in every particular, something may be faulty, it is necessary (and an injunction should accordingly be given) that every printer when he has to begin a new print, or even a ground, should send for the drawer or some proper person to look at it before he proceeds.

This leads the Writer to observe that a drawer or putter-on ought frequently to go round the Printing Shop, there being continually, from some oversight of his own, the negligence of others, or from accidents that will unavoidably happen, something to alter, remove or rectify.

4. A Print or ground should never be sent to the print room, or any other place to be put by till wanted, without knowing of the proper person whether or not it is done with, and with cutters (as mentioned before) the first object should

General Rules to be observed.

should be to brad and just so much trim it that the pitehes should be seen, and then give it to the drawer, or if it be the carpenters province to brad and trim it, it should be sent to him, and when he has done, he has to deliver it to the proper person.

N.B. A first impressiion of every print, and the last joined one, with the grounds, should be carefully preserved ; and where there are young apprentices, good employment may be made for them, by always having impressiions of prints, and some particular grounds, on clear paper, in order to vary the colouring of the pattern as much as possible, it not being so laborious as inventing patterns, and yet partaking of the nature of it, as it is inventing new grounds for them.

*Of preparing and setting
Prints and Grounds to work,*

Or, in other Words,

*Making the last Trial of the joinings and
fitting of Prints and Grounds.*

IF there be pin work, examine carefully whether it be all in * and properly set, then see how the pitches answer by joining the print by the squares, and that none of them are obscured by the joinings, and see likewise, that the impression has an even face.

2. If the reds are separate, that is to say, if there be a brown red boundage for flowers, or other objects, pitch the brown red next, to see whether

* This is a circumstance very apt to be more or less omitted, and much sometimes depend on it, both in pencilling and grounding, therefore whoever is making this trial, should always have the pattern by him, to compare with the impressions.

Preparing and setting of prints and grounds to work.

whether the stalks want lengthening, shortening or trimming; and if any other colour works with the stalk, it should be struck in at the same time, and amended or altered where necessary; then, if there be two purples, besides the black, strike in the deep one, and then the pale one; and, if there be three reds, observe the same process with them.

3. If there be grass grounds, see that none of the table-work obscure the pitches, even making an allowance for imperfect joinings; or in other words strike in whatever grounds there are, in the same progression that the printer will print them.

4. If there be three purples and three reds, see that the different shades stand distinct from each other; and if there be pinning, see that it joins or touches the wood where intended, or that it stand at a proper distance. Paper being deceiving, it is best, (as said before) to keep a spare piece of cloth for such trials, or at least for the last one, when it is supposed the prints and grounds are all fit for working.

5. In

Preparing and setting prints and grounds to work.

5. In order (as likewise intimated before) to render the work as neat as possible, let the pitch-pins, or the tops of them, be as small as possible, so that they can but be seen plainly enough to prevent confusion or mistake.

6. As it is in general deemed best to work the pieces as given out, first entirely through with the print alone, and then with the grounds in due succession; therefore, while the print is working, there is time to get the grounds in order against they are wanted;* and a print should be carefully looked at before it goes to work, to see that it is likely to have the grounds answer; as for instance, if there be much solid work in the print, and the cloth be soft, it will be needful to work it as narrow as possible; but if it be a light one, and has to work on hard cloth, such caution will not be necessary, neither will such caution be needful, if the print has been taken off for the grounds, by some such mode as is suggested a few leaves back, in order to extend whatever the impression is received on, before the blocks for the grounds were laid on it.

F

Note,

* That is, as required to be either true, round or hollow.

Of preparing and setting prints and grounds to work.

Note, It may be here observed, that good printing depends a great deal on the manner in which cloth (as the phrase is) is got up* ; but particularly, how it is calendered ; and in the case of cloth having to be grounded after it comes off the press, too much attention cannot be bestowed on the means to render the performance easy and expeditious ; in attaining which, the grand object is to get the cloth as near as possible to the state in which it was printed on the table ; to which state the nearer it can be brought, it need not be said that the execution of

* If cloth is calendered too wet, stove drying will take the calendering out ; and if one edge is wetter than the other, then after stove-drying, one edge must run slacker than the other, or if the calender itself is imperfect, and the cloth naturally flimsy, Printers will accordingly complain ; but, such inconvenience may be partly removed, by running the pieces through a liquid of a stiffening quality.

The writer here mentions an error some Printers fall into of always looking at the back side of a piece for the colour : in some cases it is absolutely necessary, but in general it is wrong, to let it go quite through, and in some cases very much so.

Of preparing and setting prints and grounds to work.

of the after-grounding must be proportionably accurate and easy. But,

As the common methods of stretching and tolling are far from being adequate, except perhaps, for very small grounds, a suggestion of two may furnish means for improvement.

First, as the piece comes through the calender, which should be in as square a direction as possible,* or from over the rolls, if it be stowed, let it be received on a thin deal board turning on a horizontal spindle, see fig. 96, and at the corners and middle, let points be fixed, standing rather less than half an inch out, as fig. 97, to take hold of the cloth as you lap or fold the board; and at every fold where the point comes through, make a small mark with some colour that will remain distinct from the colour with which the cloth is printed; this done, the Printer may print from it, as it is unfolded, either by hand, or turning it on pivots at the end of his table; and when it has gone through the usual processes

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of

* In any case, much indeed depends on good calendering, both for the ease and convenience of the printer, and the delivery or receiving of the colour, particularly where most requisite, that it sink not far into the cloth.

Preparing and setting prints and grounds to work.

of copper-work and fielding, let it, preparatory to its being grounded, be received on the same board (perhaps it may be needful to stretch it first,) taking care that the points fall on the cloth where the marks were made before; it being evident, that if they go through where they did before, for which the marks are a guide, and the grounds are laid in as the cloth is unfolded, they cannot be a great way out of their places, even if larger grounds are made use of than in common. In some cases, if the cloth be received on a board without points, and a mark made at every fold, it may be grounded easier than in common, by taking care that the marks answer to every fold again in the same manner.

Or something similar may be done by receiving the cloth on a roller, with marks at a proper distances, and when it comes from the grafs, rolled in the same manner.

The piece might likewise be easily grounded, if stretched on a frame to keep the impressions square, or such a thing may be used in printing with marks made at certain distances, and grounded from the same frame.

Of Printing.

Preparatory to what the writer has to observe, concerning the operation of printing, a word, or two of general import cannot be unapplicable, and probably to some Printers not unacceptable.

In the first place, it is observed, that it is a very common saying among printers, and even held as a maxim by many, "that no person is fit to give directions to Printers, or occasionally point out any thing as faulty, or, in other words, to overlook that branch of the business, unless he is, or has been a Printer himself."

The Writer will not set about in a formal manner to oppose the maxim; because it seems to him, from what he has gathered by an attendance to that department, to be founded on a very restrictive principle, simply this, that printers in general, conclude or apprehend, a person who is not a Printer, does not lay the necessary stress upon
their

Of PRINTING.

their being properly accommodated with every requisite, in respect to colour, sieves, state of their piece, &c. &c. &c. and therefore cannot see the inconvenience, which, in some instance or another they labour under, when such a person ventures to point to any part of their work as not being properly executed; he will only say, that many who make that a maxim, don't consider, that a *mere* printer, is but a little more competent to that situation than a common fieldman; for unless he has a general judgment of whatever has any relation to printing (and that includes some knowledge of the other branches under some systematical arrangement) he is not so proper to superintend as another, who possesses such a portion of judgment, although he never had a print in his hand; as such a one is more able to guard against bad work (unless from the allowed incapacity of the workman) and more able to remedy it when it occurs. But with those requisites it is nevertheless an advantage to him who has to overlook Printers in being or having been a Printer.

In fact the writer apprehends, too many of those who hold that maxim, do not clearly know when every appendage is in proper condition, or
when

Of PRINTING.

when really so how to keep them in that state; hence they are soon at a loss in one instance or another, and when found fault with, quickly get more confused; and then, not knowing how to extricate themselves; lay the fault on any thing rather than their own inability or want of judgment; for unless their ideas go along with the methods pointed out to them how to remedy the fault, they are as much in the dark when left to themselves, as they were at first, if not much more embarrassed. The writer can however say, he has often seen the futility of such excuses, by a Printer of approved abilities, executing with apparent ease, under a similarity of circumstances, what another could not make work with fit to be seen.

Reverting immediately to the maxim above spoken of, the writer trusts, a Printer will however grant, if he has every accommodation he requires, that a person who is not a Printer may at least know when the work does not appear as it should, and may venture to say how it should be; and this leads to remark on another common phrase of Printers, when under certain circumstances some fault is found with their work respecting the joinings, which is “that they keep to the pins.”

Of PRINTING.

Now, however strange it may seem to some Printers, the writer asserts that the pitch-pins are not his proper and infallible guides; for every Printer finds at times, that through the twist of the cloth, the warping of his print, a mistake in pitching, and many other causes, the pins only serve as mere directions or guides, to whereabouts he is to lay his print: in short, joining a print and joining the pitches are different things; the same as pitching a ground by a pin or two, or by pitching the shape of it to the work of the print.

Therefore a Printer ought always to keep in his eye or his mind, how the print should join supposing he had no pins to pitch by, for what will become of his printing when he loses his joinings, if he has no other mode of determining him than the pins? and even in joining by the pins, his sight should take in the whole top and side of the print, and he should consider and know how the work is to fall, otherwise he cannot work to a certainty in respect to the joinings, or getting into them, when by any cause whatever he is thrown out.

It must be observed however, that in this, as well as in every other rule, for any operation
whatever;

Of PRINTING.

whatever, it is impossible to provide for every circumstance, so in this case it is allowed that some prints, from the nature of their construction, such as very promiscuous or irregularly shaped ones, seem to have nothing to direct the Printer but the pins; but even in this case, exclusive of the pitch pins, there is an attention due to keeping the face at the joinings as even, or as much alike the rest of the impression as possible, which will not be the case if the work be too close, or slack at the joinings.

Further, it may be advanced that in these instances, lightly as some printers may think of Grounders, they may be looked to as examples for their imitation, as they rarely regard pins, so much as the shape of the work, especially in grass grounds; and that implies a necessity of studying (if it may be so said) what the nature of the pattern is; for even when pins may answer, they generally have their grounds sighted all round; not looking just at this or that corner, but (as every printer ought) they employ their sight and attention on the whole length of the ends and sides.

After saying thus much, which the Writer begs every journeyman printer not to take as arrogantly advanced, but only as suggestions for him.

Of PRINTING.

him to consider of, and turn to his own advantage, he proceeds to speak immediately to the operative part.

When a Printer takes a new print in hand,* his first care is to try on paper, or a trial piece, that it is in the square, the pitches firm in their places, that the print does not want mending, and that it is neither too round nor too narrow; likewise that his apparatus is in proper order; or if he cannot have it so, he should intimate to the proper person in what particulars it is not so; and the order in which his apparatus ought to be

* As well as the above considerations, a Printer may reflect that the expence incurred by cutting the print he takes in hand, with the additional one of his working it, must be re-imbursed before any profit can accrue to his employer: therefore, as all that depends on his management, he is in a more momentous situation than many think: as all the expence incurred, and the profit reasonably expected, will be lost if through his incapacity or inattention, he spoils what he is entrusted to execute, or suffers his prints or grounds to get any way so out of order, that little, if any, use can be made of them, by himself or any other person.

Of PRINTING.

be, no Printer should need to be informed, is, that his blanket is not too nappy nor too hard, too thick nor too thin, his sieve too fine nor too coarse, and that his piece is properly calendered or stowed. *

These matters adjusted, the tearing is the next object, and not the least important; for good printing cannot be performed without good tearing; and good tearing can only be such, when a proper and equal quantity of colour is disposed over the sieve.

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* Some may expect perhaps that it be specified here in what instances these matters are to be attended to. The writer certainly attempted it, but found from various causes, such as the customs of a particular shop, the caprice of an overlooker, different courses of work at different shops, &c. he could not do it to his satisfaction: it may however be here said, that some person should be informed of what the design of every pattern should be, for much, respecting sieves, colour, strength or lightness of the impression, &c. depends on that circumstance: Indeed (as before observed) the putter-on need in most cases consult a proper person in the Printing-shop.

Of PRINTING,

In the circumstance of trying the joinings, a Printer may be deceived sometimes, though the pitches of the print all seem to answer, and the pitch pins of a ground answer to the pins or holes in the print; for both these cases may occur, and yet the print not join, nor the grounds fit* (as intimated a little before,) hence if his judgment be not sufficient to discover the design of the pattern, in respect to the trail, or the disposition of set objects, or in what manner the grounds should fall, he should consult those who may be supposed to know. He should likewise, for the convenience of those who have to ground after him, see that the pitches be clear, though they should be but barely so (as observed in the article respecting pitches) and that he keeps
his

* This may be illustrated by supposing that the putter-on may have mistaken his square, and put the pitch-pins at the head further out, or nearer in, than they should be; and the same at the side: in this case the Printer, in trying the joinings, will join by the pitches, though the work may be nearer or closer in the joining than it ought to be.

Of PRINTING.

his joinings, and his edges particularly even, which but for the sake of the grounding he might not be so careful of.

As a Printer is answerable in a degree for his print or grounds keeping in order while he is working them, he should carefully observe their tendency to get round or hollow, and should frequently examine whether any parts are broken or worn more than the rest; in either of which cases, he should give proper notice: for if a print gets very round in the course of working a few pieces, it must stand to reason the grounds can only fit a part of them, unless they should chance to follow the tendency of the print, or can be easily warped to such a state; but, as there can be no certainty of that, the work should be stopped, and the print gently brought to a proper state; for every Printer must know, that when (through causes, obvious enough) he continues working a print till it is so much twisted, that he cannot possibly proceed; violent methods are made use of, and the print rarely afterwards is capable of doing tolerable work.

A Printer, besides being attentive to those particulars immediately under his own eye, is accountable

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countable for the ignorance or neglect of his tearer, for as a careless tearer may very soon do irreparable mischief to a print, in washing and drying it, and likewise, by not properly cleaning sieves, and brushes, may do the work much injury; a Printer, if he is not every whit as careless, will see in what manner they are done: indeed it would be well, from the many accidents that happen from prints, and other matters being left to the care of tearers, who are in general ignorant boys or girls, that it had been an established custom for the Printer himself to do, at least, part of these offices.

Besides the above hints immediately addressed to the Printer, as what he should always have in his view, the greatest part, if not all, that has been observed, and may be further spoken of, respecting cloth, colour, blocks, and prints and grounds, should come under a Printers consideration*; for unless he can account, in some

* See the note, respecting the needfulness of a Printer's referring to the rules for putting-on, cutting, &c. at the conclusion of this section on printing. It may however be here said respecting blocks, if a Printer be acquainted with their nature, he

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some measure, for the inconveniences or mistakes that may happen in the course of using those articles, he cannot be supposed to know how to prevent all accidents, or how to remedy them when they do happen through any cause whatever.

||| As nothing that is faulty is too trivial to guard against, or to animadvert on,* the writer will close this article on printing with mentioning two or three instances of inattention in that department.

The Writer once observing, that about one of the corners of every print that was laid, the impression was heaviest; in pointing it out he could

he can the better know how to manage them; and if he be acquainted with cutting, he knows a sound piece of work from an unsound one, and will, (or at least ought so to do) use it accordingly.

* This may serve as an apology for the insertion of those observations, which may probably to some persons, seem of too little consequence to be remarked on.

Of PRINTING.

could get no other reply but that the print worked fuller there than any other part; this, however, from the appearance of the face, he would not grant, the Printer still insisting it was so, 'till at last, looking obliquely on the sieve, as the tearer worked, he saw a ridge of colour left nearly in one place, after the last stroke, which the tearer could not rectify; at length, looking at the brush, it was plain that one part, by some means, had been burnt so considerably, that the hairs were so shortened and thinned, that that part hardly touched the sieve; and from her method of holding it, a ridge of colour was always left, that caused the effect above mentioned: now here was a triple instance of inattention; in the first place, the tearer had carelessly suffered the brush to be burnt in drying it, (as she afterwards owned, and probably fear of being reprimanded, induced her to keep it secret) in the next place she did not perceive the effect it had on the sieve; and lastly the Printer, if he perceived the effect on the table, did not, as he should have done, see that his apparatus (which included the tearing brush) was, or was not in proper order.

Another time the writer seeing the head of the impression in general fuller than the rest, he of course mentioned it; but here the fault could not be discovered.

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covered to be in the tearing, nor did it appear to be in the face of the print, and the Printer was sure it was not his fault ; for he dipped and turned his print, and then dipped again (the print requiring much colour) but at last, he was convinced it was from his knocking it, and yet perhaps he not to blame ; for in the middle of the back that was let in, there was a very hard knot, and the other part toward the head remarkably soft ; so that by insensible degrees the knot had at length, by its resistance to the blow of the maul, caused it to slide as it were into the soft part, where it had evidently made a cavity ; and the Printer as insensibly giving into that direction of the maul, at length, instead of hitting the back in the middle, hit it nearer the head, which made the impression heaviest in that part.

Another having a sprig print to work, either mistaking the pitch end, or chusing that for the pitch that seemed most commodious for him (for the pitches were pins pitching to pins) he finished what was allotted him to do in that manner, and the mistake was not seen till the work was to be grounded ; the consequence was, that the person who had to ground it, was obliged either to begin at the other end of the piece, or to have a set of aukward pitches pnt in to answer the work
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Of PRINTING.

the way it was printed ; either way however was awkward, the side-pitches being off the edge, and particularly so, (from circumstances which cannot be well described) for the grass grounds which likewise belonged to it. In this instance the Printer was in fault, in not concerning himself about how the grounds were to fall ; or in fact it seemed as if he did not note whether any grounds belonged to it, much less to take care, as every Printer should, that they were all clear, and distinct from each other, as before repeatedly intimated.

Another circumstance was observed, in a Printer working a pattern of sprigs, that stood 6 or 7 inches apart, by making it a point to work the near sprigs close to the near edge ; by this it happened that the off-edge divided a sprig, so that but half of it was on the sprig ; now the inconvenience here that escaped the Printer's notice or consideration, was, that in making up a garment, either half a sprig must frequently appear, or two or three inches of the cloth must be cut to waste ; and the pencilling, of course, thrown away, but in this circumstance to prevent or remedy that inconvenience, the Printer had only to work the near sprig an inch or two farther in the piece, which from the great distance of the sprigs from each other was of little consequence ; and then

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the sprig that was half off of the off-edge, would have been entirely so.

Thus the garment could not be made up without either imperfect sprigs, or without cutting to waste; now in this case it may be observed, there wanted an attention to the remotest circumstance, that of the wear, or at least, the making up of the garment; and this includes a query, which might with propriety have been put to that Printer, which is, If he had been printing that piece as a present for a favourite female, whether he would not have bestowed a little more consideration on the particular alluded to.

Other instances to the above purpose could be adduced; it is, however, trusted, by exhibiting these few, that every Printer understands he is requested to consider himself under a necessity of attending to many more circumstances than at the first glance may seem necessary, or even as apparently bearing no relation to his allotted department.

And in proof of what the writer has advanced on the necessity of Printers (as well as others), looking to other departments than their own,

if

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if a Printer refer to Rules 1, 3, 8, 11, 14, 12, 13, 28, for putting-on ; Rule 7, for cutting ; and Rule 3, for pitches ; as well as some others, that need not be particularized, he will find articles enough to observe.

From looking back to Rule 8, respecting the keeping of sprigs whole, it seems proper to observe, that a Printer should take care if they drop or rise in the joining, that he carry one direction through the piece, because if they go one way only half over the table, and half the other, the consequence will be, that the disposition of the sprigs (unless they are all alike and are to stand one way) will appear as fig. 97 ; for instance, suppose six sprigs stand in the print as fig. 98, of course they must rise or drop a third to make the joining ; now if the pattern be composed of two sorts of sprigs, standing thus, fig. 99 and 100, one sort should run across the piece ; but if the dropping or rising is checked in the middle, (because the Printer finds a little inconvenience in the joining, from such a circumstance) they will appear thus in the middle of the piece, or in some other part, fig. 101, that is, three sprigs of the same sort will be together. This may be probably over-looked in printing, but when the whole piece is seen extended over a roll, it will soon catch the sight.

Of Pencilling.

THE Writer thinks little if any thing can be said of this operation, it being simply filling a line with colour, except in cases where pencillers have to form shades or shapes; of this it may be observed, and something more may be said in another place, that some attempts to be sure have lately been made, to make something like Drawers of them, by giving them only lines of pins, or others marks, as fig: 102, as a guide; but how accurately they adhere to such directions, or form a shape as it ought to be, every observer must form a decision.

In foreign patterns, it is known a deal of work is done by the pencil, but why not practicable here, the writer will not (at present) say any thing further than, that there seems to him to be a line, beyond which, in this case, as well

Of PENCILLING.

well as in others, it is absurd to attempt going beyond;—the best Penciller (such as we have in this country) can go but a little way in making shapes of any kind, without some boundary; of course (as above observed) respecting their pencilling to a line of pins, as well as their making shades in flowers, or other objects, it seldom does much credit to the designer, in the imitation of his design, which they so roughly and inaccurately make on the cloth, especially when the colour is of a deep hue; in other cases where a mere stain is perhaps only wanted, they may execute what the writer otherwise explodes, as here the pins, or whatever else it may be which they pencil to, catches the sight and takes off the attention from the inaccuracy or bad shape of the pencilling.

See something respecting pencilling Rule 16 and 35 for putting on.

Of Engraving.

WHAT has been before said of the putter-on, and the Cutter well considering how to attain the effect that is desired, should likewise be attended to by the Engraver; for before the pattern is begun, all impediments towards producing the desired effect, should be removed; hence the Engraver himself should start all the objections that he can discover towards that end, and if reasonable, they will reflect credit on his probity and judgment, as otherwise he might to be sure engrave it, and engrave it well; and yet the plate may not be able to do work properly in every respect; but, (as before observed) if all impediments are provided against, no one need be told there is the greater certainty of the success of the operation; besides, if mistakes happen (and happen they will to the most careful) they will be excusable in proportion to the pains taken to prevent them; therefore

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therefore, that Engraver has the greatest merit, who can best engage for the effect his engraving will have on the cloth through its whole process, and can accordingly manage his work for that purpose, as well as being merely able to cut a clear stroke, or being an expeditious workman; and particularly, his value is enhanced if he be well acquainted with the mechanism of the copper-plate press, and the operation of working it; in short, whatever may be said of an Engraver's good sight, steady hand, neat touches, clean strokes, and so on, it is the appearance which his work has on the cloth when finished (unless ill-managed at the press) that marks his judgment, and makes his labour valuable.

It may be observed, that as every Engraver has his peculiar modes of operation (similar to what has been said of Cutters and Pinners) therefore suggestions towards directing them must in many cases be unnecessary; though here an Engraver is not circumstanced as a Cutter, a Pinner, or Printer, engraving being an operation that stands alone, excepting its being so far connected with block-printing, that the Engraver by making his observations on it, may see wherein he can imitate
or

Of ENGRAVING.

or excell it in any shape, and if he will look carefully over the Rules for putting on the block, and even for cutting, he will find many of them which may be made useful to himself. For instance, Rule 2 points to the necessity of well considering how to transfer the effect of the pattern from the paper to the cloth; Rule 4 points to the consideration of what are the most striking features of a pattern. Rule 6 directs the attention to the preservation of an even face; Rule 10 is often necessary to attend to; and Rule 17 particularly so, if he has any thing to do with dark ground plates. Rule 23 may probably be useful in respect to two or three colour plate-work. Rule 24 may be made useful in an inverted manner, that is, by taking care to keep stalks, or whatever else is to join, rather too short than too long; as it is easier to lengthen when they may be rather too short, than to shorten when they are too long. In some cases where the stalks have to join to dark objects, the Rule may be of use as it literally stands. In short, as one principle inculcated through this work, is, that expanded observation will form the basis of judgment; the end of which is to attain certain points; an Engraver, by keeping that principle

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Of ENGRAVING.

in his view, may be able to educe some advantage from articles apparently very remote from his immediate department, and a stress is the rather laid on it here, because it is sometimes said, a person may be a good Engraver without being able to draw well; but, not to draw well, in its general acceptation, includes a great deal, and perhaps more than is absolutely needful for an engraver to Callico-Printing to know, it is however, insisted on, that unless an Engraver or Copper puncher* study in what effect consists, as taking in taste, spirit, expression, &c. he cannot tell how to ensure it, much less produce it, if left to himself, or if his copy or pattern be not well managed: it may be true, there have appeared instances of good Engravers producing good effect, and yet not able to draw; but to this it may be said, they must have had naturally the principles within them of drawing, though they have never operatively evinced it; and had such persons applied themselves to drawing instead of engraving, it is probable they would have shewn it; but however, this for certain will be granted, that an Engraver can hardly be the worse for being able to draw, and therefore to contend about the necessity or utility of it to an Engraver, or that a man
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* For this operation there is no fixed term, therefore if the above be an awkward one, it is begged to be excused, as the writer cannot find a better.

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can be a good Engraver without it, is frivolous and a mere attempt to put the best face upon what the defenders of such a position are conscious must be a deficiency, whether originating from supineness, untoward circumstances, or that kind of obstinacy which hinders a person from calling forth or improving those faculties with which he may be naturally endowed.

Immediately respecting the following rules, the writer intimates, that he purposely omits saying much of real engraving (treatises enough being published concerning it) as what he chiefly adverts to can hardly be called engraving; yet even in the present mechanical mode of process, it seems very often necessary to adhere to the principle of engraving as adopted for Callico-Printing*, that is, in keeping three shades in view, for in the smallest modern patterns that are chiefly performed by punching, the keeping of those three shades must be attended to*, as in

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* In the History of Callico Printing at the close of this work, see what is said on the introduction of Engraving into the business, its progress, and the innovations it has undergone till this time.

* Strictly speaking, the white cannot be a shade, but propriety must give way to arbitrary terms.—It

Of ENGRAVING.

the first instance a light must be ensured, then a shade (which is best executed by diagonal lines) and then a solid; now in well proportioning these three articles, which constitutes, in general, the good appearance of this kind of patterns, it is necessary to be very careful (as observed above) that the white object, or whatever it is that is to appear white, rises up or stands forward as it were, as in general that it is which gives a spirit to the whole; then to observe that the strokes forming what may be called a shade, be not so open as to cause a coarse appearance on the cloth, or so close as that the impression of them will form a mass: And lastly, That the solid part be just sufficient to give (according to the nature of the pattern) a proper weight, or finish to the whole.

is here said too, that this circumstance must be attended to in the first instance;—that is, in the drawing of the pattern, hence this observation, and perhaps others, may seem more properly belonging to the designer, but it is rather inserted here to induce Engravers (as well as the Writer has endeavoured to induce Printers and Cutters) to look a little farther than to their immediate departments.

Rules, &c.

1. **D**IAGONAL strokes are always best for working, as they are the least likely to be injured by the action of the doctor: horizontal strokes are the worst, being soon torn up.

2. Shades should stand clear of each other, that the work appear not as a mass of colour, from the common circumstance of its spreading, which in general, is according to the texture of the cloth; hence borders for fine lawn, or other handkerchiefs, admit of neater engraving than for cloth in general.

3. Too many points should not come to a centre as fig. 103, as those the most horizontal would be worn out sooner than the rest; as likewise from the confluence of the shades, the colour will spread and appear in a body further from the centre than desired.

4. Instead

Rules, &c. for Engraving.

4. Instead of objects standing in dark grounds, as fig. 104, there should be something between them as fig. 105, to break the action of the doctor.

5. Great care should be taken as the work goes on, especially if it be a close pattern, that one part is not heavier than another, particularly if it be a small or close trail, to which nothing more contributes, than keeping the bevil of the graver alike*; the depth of the engraving should likewise be attended to, that in repairing a plate, if rubbing down is requisite, it does as little injury as possible:

6. In

* The proficient may probably smile at such directions, as if every Engraver ought not to be well acquainted with these circumstances: but the Writer all through the work, begs every one to carry in mind that it is not proficients he ventures to advise, though he frequently recommends matters to be retained by them in memory: in fact, the work itself is more as a remembrancer, than a guide or an instructor, and as a remembrancer it may be an assistant to all.—See the latter part of the Introduction.

Rules, &c. for Engraving.

6. In solid ground patterns, objects should not stand wide apart, as the ground by the action of the doctor will be gone sooner than objects, or more properly the work within them.

7. In respect to punches, the first circumstance to attend to is, whether the impressions they are to make, or parts of an impression, are to stand alone or to have fine, coarse or solid work that is done with the graver, join to them; for, excepting some cases, as perhaps where a strong outline may be required to a slight or faint filling, the impression made by the punch and the strength of the engraving should be proportioned, as in the instance of dark grounds; for in this case, if the outlines of the punch be sharp and fine, the impression that it will make in the copper will be much sooner worn out than the ground, the engraving for a dark ground being generally very strong and deep.

8. Punches should not be larger than fig. 106, it being very difficult to use large ones, so as to make an even impression with them, and they should

Rules, &c. for Engraving.

should be as little solid as possible :—If however, the object be too large to be done with one punch, two or more different punches to form the object had better be made.

9. Punches with coarse bodies or thick lines will cause the copper to rise about the edges, therefore in some instances the graver has double work to do, hence the punches should be so wrought as to form outlines, which are to be filled in with the graver.

10. There being always more or less trouble in the trial of every new plate, on account of the joinings, the fixing the plate to the slider, &c. it is recommended to the proprietor or worker of every press, the following expedient for the preventing of such an inconvenience, similar to what is offered for squaring blocks.

When you have a plate that exactly accords to that part of the roller as intended, whether a quarter plate, on a half quarter one, or both ; and it

Rules, &c. for Engraving.

it is likewise exactly cut on the sides for the purpose of being screwed or otherways fixed to the slider, let there be made at the four corners of the square of it, and in as many intermediate divisions as can be made convenient, fine holes drilled through it, as straight as possible; then, whenever another plate is to be made use of, that and the plate which has the drilled holes, are to be laid face to face, and with a fine needle prick through the drilled holes in the plate that lays uppermost to the plate that is beneath (taking great care that neither of the plates be removed) and at the same time, as carefully mark, according to the notches already cut in the sides of the uppermost plate, where they are to be cut in the other; thus will the square of every plate (intended to work at the same press) be alike, without the Engraver having the trouble (as is usually the case) of squaring every plate, to say nothing of the chance of a mistake; and thus likewise will every plate be adjusted to the press with as little inconvenience.

The writer is aware, notwithstanding what he has above suggested, that it may be necessary sometimes to twist or turn the plate out of its square direction, to render the work more accurate.

Rules, &c. for Engraving.

rate; hence it seems better to be adjusted to the press, after being engraved. And this brings to his recollection a case, where a stripe quarter-plate was obliged to be twisted near a quarter of an inch out of the usual situation; the square being in the direction as fig. 000 therefore the stripes could not join without that twist; but had that plate been squared from a standard plate, perfectly square and adjusted to the press, the circumstance would not have happened; and this is a proof (in the writer's opinion) of the needfulness of adopting some such mode.---- See the same expedient as before offered for squaring a block.

Rules, &c.

The Writer now concludes (at least for the present) his suggestions on Designing, Putting-on, Cutting, Printing, and Engraving, with again enforcing what he recommended at the beginning, and has several times repeated (though probably to some the repetition may be tiresome) that in every part of the operation, the successive stages, and the appearance of the work as for sale, should be kept in view; and that every drawer, cutter and printer, should consider the operation under his hands, so connected with, or dependant on each others respective branches, that unless attended to in that light, the last state cannot exhibit an appearance which is undoubtedly desired, or even an appearance that will do credit to any part of the operation; as an imperfection in one part only, must diminish the value of the whole; and is the more to be regretted (at least in the writer's opinion) if proceeding from the circumstance of one person having, somehow or other, got his work out of his hands, without being able or willing to consider what other operations it has to go through, or in what manner it may be affected by them; and therefore, as every one must allow it is better

to

Rules, &c.

to prevent faults, than having to remove them, the writer has endeavoured to be as particular as possible in the subject of putting on the block ; as the more attentively that operation is performed, in adapting it to the circumstances that are to follow, the after-processes are more likely to succeed.* As for exquisite neatness of drawing, (except in particular cases) the writer does not lay so much stress on it as many do ; he himself seldom affected it ; † it has its merits undoubtedly ; but (as spoken of in the beginning of this work) it only has it, strictly speaking, when

• united

* See the introduction to putting on, shewing the necessity of an operation being accommodated with true and other conveniences.

† As to putting on the block, the Writer owns he never very much desired to have any thing to do with it, not from thinking it beneath him, but from a thorough conviction of the difficulties and other disagreeable circumstances attending it, together with the great probability that after the utmost care, the effect at last, from causes which cannot be always foreseen, would not be as intended.

Rules, &c.

united with more generally essential properties, and which in fact includes the consideration of almost every article which he has mentioned, as well as others which he may yet exhibit; and adverting to what he has so often recommended, and indeed but just alluded to, namely, the acquiring a general knowledge of the business, and in virtue of that knowledge looking to the ultimate effect, let it be remembered by every one, that indolence and inattention will frustrate the best formed precepts and clearest displayed rules; and that he who would acquire fame, or profit, must be vigilant; and if he be fortunate enough to have some track pointed out to him, he will look on all sides, as well as directly forward; and not only take advantage of every encouraging circumstance, but will even make obstructions and difficulties useful to him, by stimulating him to fresh and more vigorous exertions towards attaining the object in view, and of course reaping the credit and recompence due to such efforts and such perseverance.

Ln

Rules, &c.

In fine, bringing to a point all the positions or principles which the writer has been endeavouring to inculcate, be it remembered, by every one, that

HE WHO WOULD EXCELL MUST EXERT HIMSELF.

HE WHO WOULD BE GENERALLY USEFUL, MUST ATTAIN A GENERAL KNOWLEDGE.

IN THE PERFORMANCE OF ANY WORK THE LAST STAGE SHOULD BE ALWAYS KEPT IN SIGHT.

IN EVERY OPERATION, SOME RULE SHOULD BE OBSERVED, BUT THE APPEARANCE OF IT SHOULD BE KEPT BACK.

And lastly

EXPEDITION IS THE LIFE AND SOUL OF BUSINESS ; BUT SLUGGISHNESS OR PRECIPITANCY ARE EQUALLY ITS SUBVERSION.

ADVERTISEMENT.

The next Part will contain the processes of copper and field-work, colour-making, account of drugs, chemical processes, &c. suggestions for a new mode of printing; an Essay on the mutual attention due from masters and men to each other.---History of Callico Printing, including biographical sketches of the most celebrated Printers, Designers, and others.---The state of country-work.---Remarks on the principal patterns lately exhibited, &c. and other matters not prudent yet to announce.

† Several articles will be given with the next part, in order to be transferred to this, that have occurred since the printing of it.

§ *It is here intimated that a work, distinct from this, is under contemplation, respecting Callico-Printing, which, as it will probably be expensive, Proposals for publishing it, will be offered as soon as possible.*

A
T R E A T I S E
O N
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Of Copper - Work, Fielding, and Colour-making.

HAVING treated of the operations carried on within-doors, the writer now proceeds to his Suggestions on those executed in the Copper house, and its appurtenances; or, as it is usually termed, the work without-doors; in which, though not precisely proper so to arrange it, he shall include Colourmaking, (1) from its affinity to Copper-work and Fielding; but in treating of these departments, where he addresses himself to the Workmen generally employed in them, he is aware of having to encounter prejudices of the worst kind; for, to speak freely in this case, as

H well

(1) Colour-making in some respects may be considered as among the first processes, or at least previous to printing (as observed elsewhere) but, as there may be occasion to introduce various considerations with it, that, by their length, would rather break in upon what is exhibited as a series of mechanical processes, it will be spoken of in a separate section further on.

Of Copper-Work, Fielding, &c.

well as he has hitherto done, (2) the generality of coppermen, and head fieldmen, and he will add, colourmakers, may be deemed as little acquainted with the principles of their respective branches, or indeed of being able to consider them in any theoretical view, as laying a foundation for the practical part, as any other class, and perhaps less so, since most of them originally were little better than attendants in the copperhouse, or colourhouse; hence their conceptions go little further than to a certain mode of operation, the only one they have seen; and it naturally follows, that good or bad, improveable or not, they rigidly adhere to it; or, to make use of a more common form of speaking among such persons, they only proceed by weight and measure, (3) (similar to many cutters not having an
idea

(2) See the Introduction, where such freedom is apologized for. It may however here be added, that had the work been of a more general or public concern, such particulars would probably not have been noticed.

(3) Weighing and measuring are in many cases absolutely necessary and convenient, but numberless circumstances concur to render deviations from fixed

idea beyond the mere drawing, or printers beyond the pitch-pins) and according as they proceed in this formal manner, they conclude their judgments unimpeachable; and their operations perfect; and every superior knows when once he has to contend with his Copperman or Foreman of the Field, he seldom gets any advantage by mere dint of argument; for where is there one who has been a long time in the business, but

H 2

what

or imposed rules oftentimes fully as necessary; and this it is that requires, as in every other process, an understanding beyond a merely mechanical or practical one: As for speaking so apparently lightly of Coppermen and Field Foremen, it is not from the agreeableness of it (and general positions will not hold good in every shape) but chiefly to induce superiors not to be *very much* surprized, when they commit blunders; but, on the contrary, to consider that it would be wonderful, from the reasons adduced if they did not; and thus on that account, induce such superiors to exert themselves the more to attain that kind of knowledge resulting from a close investigation of the principles of each department, in order to enable them (as so often recommended in this work) to account for failures when they happen, and prevent their happening in future,

Of Copper-Work, Fielding, &c

what will say in such a case ? that he has seen enough to know as well as any one.

As for copperwork, the principle of it is but simple, though the various circumstances that occur in the practice render it really of consequence ; the grand points depending on cleanliness, and the necessary degrees of heat, and if the observations on these objects be brought into some plan, and attended to in the operation by the copperman, he seldom is in very great danger of failing ; (5) nearly the same may be said of the
Foreman

(5) Taking it for granted, that the preceding processes are perfect, the drugs and other articles proper, and making allowance for accidents that the utmost carefulness cannot prevent, or what is still more impossible to guard against, the wanton or mischievous dispositions of too many; similar to what is said in a note at the end of the section on pitches.—See likewise the hints offered to the colour-maker about printing, &c.

Speaking of accidents that cannot be guarded against. At a printing-ground in the country, it happened that for a long time most of the pieces that came off the presses were more or less stained of a yellowish cast, and considerable was the loss sustained by it, and which could not be accounted for, till

at

Of Copper-work, Fielding, &c

Foreman of a Field, his instruments are, sunshine, air, and water, and an attention to their effects on what is entrusted to his care, is to determine his proceedings.

It is not doubted but it may hurt many Coppermen and Foremen, that affect much consequence, to observe, that in some principal grounds common men only are employed at the coppers, and even in the colour house; the Superior himself or a Superintendant giving the necessary orders, and attending to the beginning and closing of each process; (6) not but that it is perhaps
necessary

length it was discovered that a Rabbit-warren being near the place, the rabbits in the night, in running over the parks, stained the pieces with their urine, or, perhaps more properly speaking, the alkaline quality of the urine disturbed the printed colours.

(6) The advantage arising from an attention of this kind by the Principal, is in respect to well-cleansing the work, and the proper degrees of heat. To the credit of perhaps the first Printer in the vicinity of London, this is observed by him, and the end is accordingly answered; for though the stile of work (to this time 1789) in respect to the drawing, &c. is
not

Of Copper-work, Fielding, &c.

necessary to have a principal person, where the business is on a scale sufficiently large, in each of these departments, as well as in every other to receive orders, and dispense the subordinate directions : (8) this, however, cannot always be done,

not of the first rate, yet the brightness of the colours, and clearness of the ground ; in short, the execution of it altogether, in respect to printing and colour, gives it a claim to much commendation.

(8) Principals do not always see it, but it rarely is the case where there is a chief copperman and foreman of the field, that they agree ; for one will interfere with the other's department ; and when any ill accident happens in the out door work, that cannot be easily accounted for, each is ready generally to lay the blame on the other ; though perhaps neither of them is in fault. Of which the following circumstance may be a proof, as well likewise, as of that deficiency of knowledge so often complained of among workmen, from looking no farther than to their own immediate operations.

The pale red of a number of pieces being shown, when they were taken up, though the deep red was as it should be ; an inquiry into the cause of it followed

Of Copper-work, Fielding, &c.

done, persons proper for the occasion not being always to be procured; neither is every Principal competent to distinguish those that are so; but if he himself has a knowledge of the principles of the different departments, there is not much occasion for leaving the whole of the processes to others, provided he is not of that class who shrink from trouble, or expect to proceed without any cause for anxiety. (7)

Adverting

lowed of course: The copperman laid it to the foreman of the field, and he laid it to the copperman; both of them veterans in the business; but it was plain neither of them could account for it, not being able to look beyond their respective situations; for the cause rested in the pale red being fightned with paste, an allowance of adequate strength not being given of the non-colouring drug, and the printer from a certain circumstance hitting the ground but slightly, little colour was therefore imbibed by the cloth, and consequently it soon flew off.---See colour-making.

(7) The writer here, according to the latitude he has allowed himself, of stepping out of the track to make remarks, cannot help observing, and wishes the observation may have weight where it is directed, which is, to those who not bred so callico printing

or

Of Copper-work, Fielding, &c.

Adverting now immediately to the different processes considered in this section, it is again observed, how difficult it seems to be to speak of this work, or arrange the different articles in it, very methodically in regard to the processes succeeding each

or to any of the branches, precipitate themselves into it, on a presumption that their own natural sagacity or general knowledge of business, will enable them soon to conduct it with ease and advantage: but, so complex is the business of callico printing, in comprizing so many branches that may be called distinct professions, and those branches running into other divisions; that few who have been all their lives in it are equal to the management of it; to say nothing of the tediousness of some of the processes; the uncertainty that attends the successive stages; the remoteness of time from the first operation to the last; the caprice of individuals or of fashion; heavy expences, and other numberless inconveniences owing to its peculiar complicatory establishment: hence, it may be said with confidence, that not one in ten who has thus precipitately, or even deliberately, entered into it, without the necessary preparatory knowledge, but has soon found sufficient reason to repent his so doing.

The observation may be even carried to the situ-

Of Copper-work, Fielding, &c.

each other; for in one respect, the first article treated of should be mentioned as preparatory to printing, but subsequent to it in another, so that the consideration of colour-making, madding, &c coming in between, must break any arrangement whatever, and from this consideration, it was at first intended to speak of bleaching as a distinct section, but being in callico printing so connected with the colouring part, and not so well understood as by the term preparation, it must be introduced as well as the circumstance adduced will

ation of those who with a knowledge of the business enter into it, without being able to form such connections as shall uphold it, and hence, as a word of advice, if it may be permitted to be given, let every one ensure such connections before he enters in it, as it is not always found (as hinted before in a note in the section of pattern drawing) that good drawings and work answerable to them will alone be sufficient, even if a large capital is not wanting. This idea could be pursued further, were it necessary, as it takes in the consideration of acquaintanceship, interestedness, dependancy, &c. which in every stage of life tend to form those connections that mere merit will not always command.

Of Copper-work, Fielding, &c

will permit; and that seems to be, and which will accordingly be adopted, by introducing the principal operations with theoretical suggestions, & subjoining others, as notes, that are more distant: It is however apprehended that what is advanced will in general appear more like a description of the processes, than as an analysis of them, or as reducing them into a series of rules, like what has been done in the display of the preceding articles, but here the circumstance is different, as a number of common labourers are employed in each division, taking the work continually out of each others hands, so that in fact there are as many distinct operations as there are operators, therefore a regular chain of rules cannot be laid down for each to observe; and if it were possible to arrange it as the writer wishes, or to bring the system in all its parts into one point of view, it could only come under the cognizance of the principal, or whomsoever he appoints; and principals (as often said) are not those to whom this work is only addressed.

It may be proper to intimate, that in the Directions, &c. respecting the operative parts, those points were chiefly attended to in which different practitioners nearly agreed; for, as two or three times observed, what renders the difficulty great

in

Of Copper-work, Fielding, &c.

in treating subjects of this nature, is, that the discussion appears no farther reasonable or proper to any one person, than as it is reconcileable to his own ideas of practice; and there are seldom two who agree in the same mode; hence, it is endeavoured, rather than dwell upon certain little practical circumstances, to give some general theoretical hints, as tending to convey what is so very much wanted among the majority of those to whom this work is addressed, that is, some idea of the principles on which their operations depend, as such a knowledge, if it can be conveyed, every one must grant will more lead an operator towards some perfection in his profession, than merely exhibiting a heap of practical directions, or displaying a number of precise rules, as all the experience attained from long practice will never form the adept, without a theoretical knowledge.

OF

Note, In the following suggestions, phrases and words not in common use, will be as much avoided as possible, and more familiar ones substituted; such as oily for oleaginous—thick or clammy for glutinous or mucilaginous,---various for heterogeneous, &c. A Glossary will be however annexed, explaining those words that could not with propriety be altered.

Of Bleaching.

Or, as it is usually termed Preparation. (10)

THOUGH Bleaching in a general manner as practised among professed Bleachers, does not in every respect come under the consideration of Callico Printers, it may not be improper to

(10) Meaning among printers that these processes are necessary for preparing the cloth to be printed; hence in printing-grounds the terms bleaching or whitening is confined to laying goods on the grass, and more particularly after printing. It is hardly needful to say that bleaching, strictly speaking, means whitening, by whatever method it is performed, therefore perhaps somewhat forcibly applied here, as it is not always that cloth sent down wants whitening.

Of BLEACHING.

to say two or three words concerning it; two or three occasional references to it will therefore be given, subjoined as notes, rather than by introducing them in the body of this work ;(11)
as

(11) Wool, silk, flax, and cotton, possessing naturally an unctuous quality, it of course follows that they must undergo certain processes, in order to divest them of that quality, or it will prevent their imbibing any colour (cotton, however, has this quality but in a very small degree) and this process is termed Bleaching, in general; but as particularly applied, it is called scouring of wool, ungumming of silk, whitening of thread, &c. and for this purpose it is found necessary to use occasionally acids or alkalies. Alkalies act most powerfully, because the substance to be removed is of an oily nature; and they are used either in a pure state, or else as a soap. Acids are afterwards used, for the purpose likewise of whitening, and to clear the cloth or other body of what alkalies do not remove. For cleansing wool, stale urine is made use of, which being alkaline, and combining itself with the oily quality of it, forms a soap, and produces the desired effect. Silk, naturally of a yellow colour, is boiled in soap and water, rather than subjected to fixed alkali, because of its being an animal substance, and hence more liable to be corroded; it is likewise in general farther whitened

Of BLEACHING.

as what Callico Printers perform in this way is chiefly Ashing and Souring, and in a manner rather peculiar to themselves, as established by custom,

tened by sulphur. The whitening of flax, linen, &c. is however performed with fixed alkali, as the noxious substance is more difficult to be removed than from wool, or silk. Lime is used by many bleachers, though exploded by others, particularly in Ireland, from its caustic power, when used alone.

Sour milk. whey, or an infusion of bran, or rye-flour, and other acids, such as verjuice, lemon juice, &c. were formerly only in use, but oil of vitriol, marine acid, and other more modern improvements, have now the preference.

The antients cleansed their wool with a plant called by Pliny, radicula, and by Linnæus, gyp-phila Struthion, the same which is called in the shops soap wort, used likewise for fulling, and taking out various spots; it is still used in some parts of Spain

Of Bleaching.

custom rather than founded on principles; the arrangement of the processes will therefore be as most generally practised, where the articles are intended to be printed, for perhaps no two grounds pursue the same modes, even in essentials.

REMARKS, &c. (12)

In the first place, the pieces should be sorted according to their qualities of texture and, as nearly as possible, their degrees of foulness; for much indeed depends on it.---See the note below. *

They are then to be soaked (generally all night) in a receptacle entirely free from whatever might stain them; and so contrived, that a fresh supply of water may be admitted when needful, and the foul drawn off, or the scum would subside and be injurious.

The

Spain, instead of soap, the pellitory and marine colvolvulus; likewise the peplos or white spurge, these plants abounding with a kind of caustic milky juice. —See more of the antients in the section of Colour-making.

(12) Formerly, in this process of steeping, rye-meal, bran, or ley was used with warm water, to produce a fermentation, in order to displace the foulness, chiefly contracted from dressing the threads with tallow and other articles, previous to weaving. But the practice is different now.—See the retrospect, and notes 6 and 7 to it.

* Printers are here asked, whether the *confounding* circumstance (see note 32) of goods printed alike coming up different in the copper, is not often owing to improper assortments in this case? and whether, in possible cases, cloth of the same sort

Of Ashing.

The receptacle, it perhaps need hardly be said, should not be covered with a plain board; but with one closely perforated, and that it be rather secured by posts placed betwixt it and the joists, rather than by weights; but if weights or weighty articles are used, they should not be of iron.

Respecting water, see the last note to maddering.

See likewise note 21 to general reflections.

It is however, here just said, if it be alkaline, syrup of violets turns it green. If acid, it turns it red. If aluminous, oil of tartar thickens it. If muddy, allum precipitates the foulness: if it contain iron, galls blacken it, &c. But above all, to procure pure water, a still should be kept in every colour-house.

Of Ashing. (13)

OF this operation it may be said, and in which consist the essentials of Bleaching, that it removes some substance which is the cause of cloth appearing brown; and as the whole depends on knowing its nature, in order to apply what will combine with it, and separate it from the threads, with the least injury, Dr. Home* made various experiments, the result of

intended for the same pattern, had not better be all prepared at the same time, and put by separately?

(13) Called bucking or boiling among professed Bleachers, and by them the cloth is, or was, laid down and watered: But with Callico Printers they are generally laid almost loosely on the grass. Tho' as observed (notes 12 and 21 to General Reflections, and elsewhere) new modes will perhaps supersede the present; great address however will be required to introduce them in England into general practice, and certainty of effect.

* See Dr. Percival's *Essays* and 2nd Volume of *Phil. Trans. of Manchester Society.*

Of A S H I N G.

which was, that, after evaporation, an oily dark coloured substance was left, of an inflammable nature; and, on further experiments, it appears to be compounded of a viscid oil, and the earthy particles of the flax.

It is thought by some, that bleaching with lime may be rendered advantageous; lime having more power in whitening than vitriol has, but (as just said) at the same time it is more dangerous if used alone; but with about one part mixed with four of ash, its caustic quality may not be so effective.

It is a remarkable circumstance that some articles manufactured in India, and brought over unbleached, cannot be made white here. Another circumstance is, that May Dew quickly whitens cloth, and of this it has been observed, that immense numbers of insects are formed in the substance left after evaporation, and these undergo very rapid changes; but how far, or in what manner such circumstances affect the cloth, remains to be determined.

REMARKS

Of *A S H I N G.*

R E M A R K S, &c.

There is no need for this operation when goods are sufficiently clear and white, and ashing pieces that are so, can only be of service to take out grease or any thing similar to it; but when they are uniformly brown, or brown threads are here and there visible, they certainly should undergo the process; therefore, in this case, give them a few ends in the ash liquor, and attend the operation with great care, that it be effectually performed; for if it be not, it cannot be done by souring, much less by winching or planking; and if they are suffered to go to the madder copper without having undergone this process sufficiently, or if any greasy or oily quality remain in them, (14) or if there be any part brown, the madding cannot have its due effect; for, as that brownness is a particular substance in the cloth, that from its nature must prevent the striking of the colour, no one need be told that the madding must be imperfect, if it be not removed.

Take

(14) It once happened that so trifling a circumstance as the skinning of a dog spoilt several pieces, they having been laid, after souring, on the place where he was skinned.

Of ASHING.

Take care that the water be not suffered to boil, before the ash is put in, and in that state it should be continued some time, and the ash should not be put in till near the beginning of the boiling, let it then boil for about ten minutes or more, observing to stir the ashes frequently from the bottom.

The strength of the ley, and the gradation of heat must be well attended, that the texture of the cloth be not too violently acted on by the ash; and the more effectually to imbibe it, it should be opened by degrees; for similar to common wash-women observing in putting linen, especially body linen, into boiling-water, that it fixes the dirt; or, (what is to be sure more remote) in culinary processes, in order to boil vegetables green, not putting them into the water till it boils, so here it may be said, the oily quality in the cloth would be in a manner closed up within it, by the cloth being immersed in boiling water.

It is however necessary to be careful that the cloth is thoroughly dry before it is put in the liquor, otherwise the ley will not enter so readily into the body of it; for if it be wet the action of the salts will not be so powerful on the internal
structure

Of ASHING.

structure, nor answer the purpose of dislodging the filth by the aid of the water; but, on the contrary, will act more on the surface, and probably do the cloth some injury.

With coarse cloths there may not be such danger, through the water boiling before they are immersed in it, as with fine ones, from the openness of the texture; but the precaution before given, is absolutely necessary to attend where the texture of the cloth is fine or flimsy.

After this operation, the goods must be perfectly cleansed from the ash, by soaking them in a cradle, and winching them in a running stream, clear and free from any mineral impregnation; then take them to the planks, or something similar, till deemed sufficiently cleansed; next lay them down to whiten, and after being taken up, rinse them, and get them ready for the sour kettle.

of

Of Souring.

BLEACHING with sour milk or vegetable acid, not being in use now among Callico-Printers, the mineral is here chiefly spoken of; of which mode it may be observed, that it unquestionably took some time to get into general practice, vitriol being of so corrosive a nature it might naturally be expected to injure the cloth very materially.

But experience has shewn, that by being properly weakened, generally so much that it is not stronger than vinegar, and may even be drank, that consideration has therefore vanished. As for vegetable acids, formerly so much in use, that cart-loads of lemons, crab-apples, &c. were frequently brought into printing-grounds, all contain a portion of oil that prevents the effect being gained so easily as by the vitriolic acid: The milk sours in vogue among bleachers, likewise gives way to the vitriolic; for with this acid no fermentation happens in its not tending to putrefaction; but milk sours naturally tending to
corruption,

Of SOURING.

corruption, if through inattention it should happen while in contact with the cloth, it must damage it as well as undiluted vitriol; in fact, milk may be corrupted before it is used. Besides, milk sours take several days to perform its task, while vitriol souring is done in a space of time no way comparative; but above all, its effect in whitening is the great point in its favour, the absorbent particles in the cloth imbibing it so immediately, that the effect is very soon attained.

This operation, besides contributing to the whiteness of the cloth, is deemed generally needful for the purpose of clearing away stains occasioned by ink, iron, or other articles, which water alone would have little effect on; it likewise forwards the whitening of the cloth, when laid down after printing.

REMARKS

Of SOURING.

REMARKS, &c.

What article to use in this operation, whether mineral or vegetable acid, must depend a great deal upon discretion, or other circumstances; vegetable to be sure is now difused among printers in this process, (15) but still the modes in use are so various, that any particular one cannot be insisted on; those most usually adopted are by the vitriolic and marine acids; the proportions most generally about 2 gallons of vitriol to a kettle or upwards of 100 gallons of water, and this quantity is enough for 8 pieces of 28 yard 4-4th wide, or the same number of pieces of 21 yards 5-4th wide; but this depends on the strength of the spirit, and even on the goodness of the water; likewise the quality of the goods must be considered, chiefly in respect to the strength of the warp, and these circumstances are to regulate the time necessary for the process (16); The heat of the water is also of considerable import, for if too hot it takes away from the acid its proper

(15) Except for the purpose of discharging colour when used in printing.

(16) Very various is the time, different coppersmen, or their employers will allow; it is to be

Of SOURING

proper energy, as it is the acid only that is supposed to operate in this case, the water being used only for the purpose of weakening it. By the water being rendered warm the vitriolic particles must the readier enter the pores of the cloth, the

done in a quarter of an hour, but very frequently a considerable time longer is allowed; but a point to be observed, and which ought to regulate it, is knowing when the acid has had its utmost effect, for keeping the cloth in beyond that time, every one must grant is unnecessary, and to a certain degree injurious. Similar to the above observation, it may be added, that the quantity of any article used in any of these processes, is as much undetermined; and even the necessity of some of the processes themselves, but that ever must be the case, while drugs, and the articles they are employed on, are of such different qualities, and the use of them governed by other circumstances of œconomy, custom, prejudice, &c. hence it is more safe to speak in a general, than in a specific or positive manner, and hence what is here said of the processes are called remarks, &c. rather than rules. Galling was formerly much used, but goods for printing being now of a softer texture, and a purer quality in general, it is nearly exploded.

Of SOURING.

the pores being by the action of the warm water rendered more open. (17)

If the souring be repeated, the acid should be diminished, from the texture of the cloth being opened by each preceding process; so that the oily particles which blunted the acids are nearly removed, and the alkaline and absorbent earths occasioned by the ashing, if ashing were used, are easily washed out.

The goods then generally are cleansed in a sack lined with lead, and if they are not foul, the liquor may be used again in the kettle.

After these operations, they must be well cleansed by winching and planking, or some other similar process, then run them between the squeezers, and as usual hang them on the stakes, or in the drying-house, previous to being calendered. (18)

For

(17) A Thermometer is certainly best for the purpose of ascertaining the warmth of the water, some mens' hands being so hard, that their sense of feeling in this instance can hardly be a criterion.

(18) In respect to the modes of cleansing goods, it is amusing to think of the various ones that have been adopted by battledores, stocks, wash-wheels

Of SOURING.

For goods that are to be printed in chemical colours, or that are to be brought up in fumach, or american bark, no preparation is necessary, unless the cloth is evidently too foul to pass without. (19)

and the like, most of which tend considerably to injure the cloth (this however is a circumstance very likely not much desired to be prevented by printers) but it does not appear absolutely certain the effect is so much produced by such violences as by the action of the water; hence the wash-wheel may be said to have the preference; the wash-wheel, though, like other improvements of the day, has probably had its turn; for much mischief may happen if it be not attended: The dumb plunker or *wooden-man* now seems to have the preference. But after all, a plenty of water, with a good falling force, well directed, and the cloth kept in proper motion, would be better than any of those violent methods, especially if some goods be suffered to remain a little time in a soft soap ley, (of no very considerable strength) and afterwards sufficiently rinsed and thoroughly dried.

(19) The complaint against colours brought up in fumach, or bark, is, that a good white is not procured no more than a good black (as spoken of before) and consequently ~~that~~ ^{that} course of work is confined to close patterns. The writer however has seen a slight fielding used with success, in light ground work.

Of Calendering.

Respecting this operation, it has been intimated, how needful it is to be well performed, and that very much depends on it; it may however be here said, that the chief care is to keep the web as much as possible in the same state as when woven, that is, in respect to the direction of the threads; the omission of which, even when work is folded to go for sale, is evident in many patterns. As for instance, if a piece be calendered so badly, that the threads lay all very obliquely across the table, and the pattern be of a square set kind, it must be clear that if printed on in such a state, and in the course of the following processes, the cloth gets into its original state, the work will appear just in the same oblique direction, as the shoot of the cloth did when it lay on the table; and instead of the object being of a square kind, it will appear more like a diamond, which is almost making a different pattern of it, and in the instances of small sprigs or other set objects, it must greatly tend to throw them out of shape and their proper distances.

The

Of CALENDERING.

The general inconvenience of calendering in respect to printing is, that the cloth in passing between the rollers naturally spreads or expands more or less according to the closeness or evenness of the rolls; hence after printing, in proportion to the quantity of colour used, the cloth gets into its natural state, and is generally found to contract the most lengthways, so that it is often very difficult to get grounds in, especially if the print be long; and therefore it is deemed needful to stretch it, particularly when work off the grass is to be performed.

In the operation of printing, which follows, an article is used that much concerns some part of the copper work, which is lamp black, other articles are used in fighting, but none are nearly so pernicious, though all are hurtful in a degree; but something must be used at times for that purpose; the consideration of these articles however, come more immediately under the colour-makers department, and of course will be spoken of in another place.

Of cleansing Goods,

previous to Madding, or bailing off.

THE goods being now supposed to be printed, and properly stowed or dried, they are to be snitchelled or folded, and brought to the copper-house; which being done, throw them into a copper of bran liquor made warm, and winch them as quickly as possible, otherwise the colour may start or run, (20) but this depends very much on

(20) The term colour must in this case, be used here, as well as elsewhere, though improperly, it being, strictly speaking, the non-colouring article combined with the thickning or fighting, for the colour is not produced till the work is in the copper.—See the note at the beginning of colour-making.

In some places the goods are put on a roll or winch before brought to the copper, and put into it, as turned off from the roll.

Of cleansing Goods.

on the nature of the thickening or fighting ; for if either be of so loose a kind, that it is quickly removed, the operation, it need hardly be said, will be as quickly performed ; but if of a contrary quality, it consequently takes longer time ; this circumstance of the quality of the thickning or fighting, is however not what every copperman looks at, or even sometimes whether there be any fighting at all, (21) though if the goods are properly and thoroughly cleared, it perhaps is little matter whether he knows the difference or not ; but if he regulates his clearing by time, that is, by uniformly allowing so much time to a copper-full, let the thickning or fighting be of any quantity or quality, he may be much deceived ; for, (as said before) some kinds of fighting are more difficult to be cleared than others, as well as some kinds of paste-work ; or will bear the
water

(21) The vehicle (or thickening) for carrying the allum, &c. they must be supposed to know of, as there can be no preparation matter on the cloth for their processes without it. A copperman, however, may be deceived in sorting the pieces, as some with heavy fighting may not have such deep or heavy colour as others that have no fighting.—See the article madding.

Of cleansing Goods, &c.

water more heated ; (22) hence in this case, a deal depends on the copperman's judgment, and in this instance it therefore behoves him to be attentive, as well as in the next operation of dunging, for if carried too far, in respect to heat, the certain consequence must be some destruction to the work in boiling off. (23)

(22) Here is included the resinous paste used in printing, and where paper preservatives have been used.

(23) With tender or pale colours it is a material matter that all the pieces of the same pattern be equally dried, for supposing a piece to be boiled off with a bare flowing and another of the same colour has been in a hot stove several days, there certainly is a chance of the colours of the two pieces varying.—See note 8 and more to this effect addressed to the colour-maker.

Of Dinging. ⁽²⁴⁾

THE use of this operation is said to hinder the white part of the cloth, or that part wherever it may be, which is to appear white, being stained by the superfluous colour, or according to the usual phrase of coppermen, it is to guard the colour, and prevent marking off: this however will not be the case if too many pieces, particularly if the work is heavy, be entered in the same copper, and which may very easily be accounted for, as it is possible the copper may contain, after some pieces are entered, besides the dung, a solution of mineral and other salts, from the quality of the thickning or fighting, or other superfluous matter that may be dissolved or dissolved in the copper; and which may mix with the acting power of the dung, and cause stains. In this operation, by letting fresh water into the copper, the increase of the liquid will cause the foul stuff to run over.

Something likewise may be observed, respecting the dung itself, according as it is gathered in, whether as taken up in a fresh state, or when dry, or having remained a long while on the ground;

or

(24) It is thought the volatile alkaline particles of the dung, prevents the particles of the colouring drug from too copiously entering into the ground, (which is what is supposed to be meant by guarding the colour) and that of course they will chiefly be imbibed where necessary.

Of D U N G I N G.

or whether in an almost liquid state by rain or urine ; as these circumstances must more or less affect it in the quality ; for, be the effective principle what it may, it certainly must vary according to the different states in which it may be gathered : but whatever may be the case in that respect, care must be taken that the copper be not made too hot (as before said) especially if the dung be fresh and pure (if the word may be allowed) its effective quality being then of the greatest power, and, if the paste or fighting be not entirely got rid of, the action of the dung will disturb the colour, and prevent the madder from striking as it ought.

As to the operation itself, after having filled your copper, proportion the dung to the work, in general, about 3 jets to 2 pieces, giving them about 40 ends in the copper, as quick as possible ; the water that you impregnate with the dung must only be sufficiently heated, in order gradually to loosen the colour ; and as it much depends on the superfluous matter being easy to be removed or not (as just observed) it must of course be carefully attended, and the proportions must be varied accordingly. After this operation, the goods must be winched and well planked, or otherwise cleansed ; they are then, according to
th

Of DUNGING.

the quality of them, to be fumached, and then
snitchelled off, and washed:

In fumaching, proportion the drug to the
course of the work, for which, as is often said,
certain circumstances prevent giving precise rules,
(25) sometimes indeed fumach is not necessary,
and sometimes in common work it may be used
with the madder, as it is supposed to assist it.

(25) So here it may be said, though weights and
measures may be deemed standards, yet coppers,
pails, &c. cannot, as being of no regulated sizes;
and to say a little or a great deal, a proper quan-
tity and the like, are but comparative terms, and
consequently indefinite.—See note 3.

Of Maddering.

TO speak theoretically of this operation, is applicable to any other, where by means of some preparing substance, a colour is communicated to the cloth, that water nor any other liquid (not corrosive) cannot soften so as to remove, nor the action of the sun reduce to a calx, or other state, so that it easily goes off another way :

Of the Hypotheses respecting the operation of fixing colour, none are deemed absolutely decisive and satisfactory, the theory however as generally accepted will be here displayed.

It is first of all noted, that the particles of whatever substance is used to colour any article, so that it is durable, are not soluble in either of the usual menstrums (26) whether water, spirits
of

(26) In menstrums, or dissolving liquids, three things are needed, 1st, that the parts of the body attract the particles of the menstrum more powerfully than those are attracted by each other

Of Madding.

of wine, or alkaline lixivium; caused by their adhesion to certain gummy and resinous substances, but are liable to be disengaged by whatever has a greater cohesive power, such as allum or tartar, to which the colorific particles of madder, woald, &c. adhere:---But in whatever manner such saline articles act, they fix a colour, that, in general, can be no otherwise obtained; as to those solutions which of themselves form the colour without such preparation, which some certain vegetables do, their effects are attempted to be accounted for, on a supposition that they contain a tenacious, glutinous, or other adhesive quality, with which the cloth, or whatever else it may be, being coloured, can never be removed, when once thoroughly dry: But it is supposed, in every colouring process, by means of boiling, that the colouring particles find admission into the pores of the cloth, which are opened by that operation being previously cleansed by the preparatory salts, and that afterwards contracting
by

ether. 2d, That the body have pores adequate and open to the particles of the menstruum. and, 3dly, That the cohesion of the parts be not so strong, but that they may be torn asunder by the violence of the dissolving particles rushing together.

Of Madding.

by the cold, they retain these particles; and which are further secured by a vitriolated tartar, lining them, as it were, with a crust or what is termed a coagulum, which coagulated matter is generated or produced from the alum, &c. conveyed to the cloth by printing, and the colouring particles they imbibe; this, as said before, is the generally received idea: it is however here observed, that from what is hypothetically advanced, it seems as if heat were absolutely requisite to open the pores for the reception of the colouring particles, but in the instances above-mentioned of the juices of some certain vegetables and other subjects, giving a perfectly fast colour without heat, an objection seems to lay against it. (27)

Among other hypotheses concerning the adhesion of colour two or three will be here mentioned

(27) It is said, a salt only will not dissolve, when once chrySTALLIZED. Tartar as it comes from wine casks, and that made by a vitriolic salt, and one already alkalized, or which will become so when deprived of its acid. Dr. Lewis in his notes to Neumann's Chemistry, opposes this hypothesis; it is likewise disproved in the Chemical Dictionary, on a supposition that fixed alkalies will effect what is here said, and that the vitriolated tartar can be dissolved.—See observations respecting Indigo, the ancient purpura, &c. in the section of colour-making.

Of Maddering.

tioned, though the above it is clear, must hold the first rank, at least till a better can be adduced.

According to some, the fibres of cloth, silk, &c. are transparent tubes, into which the colouring particles entering are there formed into a kind of crust, plainly appearing through their transparent encasement; others think these fibres are solid lengthways, but are outwardly full of little pores exceedingly close to each other, into which the colouring particles enter and are there secured; while others think they are entirely solid, or at least not provided with these cellular pores, but that the salts intended to strike the colour corrodes them, sinks into them, and unites with their colouring properties; or else, that the colouring is performed by a coagulation of the colourific matter itself, whatever that quality may be. Thus, it may be observed, ingenious men frame conclusions, formed undoubtedly upon reasonable grounds, which from the confined portion of penetration that we have respecting the internal properties of things, they are glad to embrace sooner than acknowledge an incompetency of knowledge: (28) however in regard

(28) In this, as in other cases, it is impossible the mind can carry its powers so far into the internal

Of Madding.

gard to what is advanced above, the grand test is air and sunshine. But as in considering the article of colour-making there may be occasion to speak

ternal constitutions of substances, not observable by any physical operation, as positively to say, that such things act on each other in such a manner as tending to establish the principles of any operation; therefore in such cases our reasoning is only by inference. But, the further we go in our mental researches, we form more abstract hypotheses; till, at last, our inferences becoming almost fanciful, we talk of invisible operations, and consequently have recourse to agents of an imaginary formation, to execute them.

This comment may probably seem presumptuously trifling with the sentiments of very great men, but whoever peruses chemical works will find how freely each succeeding writer treats his predecessor respecting remote theoretical points. (See the preceding note, and notes 30 and 37 to colour-making where the theory of colouring cloth, &c. is disputed) and the same may be observed respecting experimental processes, in succeeding writers complaining of inaccuracy or misstatement.

The above, however, must not be understood as
invalidating

Of Maddering.

Speak further on this matter, little more will be said here; what is advanced being deemed sufficient as leading to the operation itself.

As the point of most concern in maddering is the quantity of madder used, it will therefore be spoken

invalidating all theory, or setting aside the principles of operations; the consideration of which is, and will be particularly enforced further on: but only as laying a stress on those points that are not deemed subtleties. For notwithstanding, the modern discoveries shew fire, air, water and earth, not to be primary substances, they may here be still held as such, as our practical knowledge must commence from their operations on other substances, deemed secondary ones, or as they enter into their composition: so, in the theory of colours, whatever may be said of the nature of those substances that help to produce them, reasonable positions and practical knowledge can only commence from that point at which they begin to exhibit their effects.—See note 1 to the retrospect at the end of colour-making.

N. B. In the preliminary suggestions to Fourcroy's Chemistry, the scientific contention above alluded to, among moderns

Of Maddering.

spoken of, as well as the criterion that ought to determine it (which consideration is equally applicable to ashing and fouring) (29) and is the more desired to be noticed, as it is on this point that Coppermen as well as their Principals, seem so undetermined: some contending for the propriety of allowing plenty of madder, and others being as strenuous for restricting the quantity; and consequently neither can act with that certainty of effect which constitutes the value of any operation.

In the first place (according to the principles, which will be more fully discussed further on) it is not merely by allowing a large quantity of
madder

moderns respecting the new theories is displayed. See likewise an abstracted view of the same, prefixed to the chemical compendium in the section of colour-making, and Note 9. to the same.

(29) This chemical or philosophical mode of considering the matter, was intentionally avoided while speaking of these operations (see the retrospect at the end of colour making) for, in fact, it is of such a nature, that few common coppermen can be supposed to have any conception of it, all they talk of is the *f. ald.*—See note 31 further on.

Of Maddering.

madder that the effect is the more ensured ; but the grand point to decide it by, is the knowledge of that affinity or attraction one substance has to another. For here, the question is, how far will the salt or astringent used in printing, act upon, or attract the colouring particles? (30) As to the liquid in the copper being apparently coloured, it is not in consequence of the particles being to the
highest

(30) In the article of colour making, this is more fully treated. The writer however does not here affect to point out how to make those distinctions, he only points to the necessity of considering about them, convinced that a Printer of a philosophical turn, might turn what is said to advantage. For though a scheme was absolutely formed for that purpose, yet on reflection, as some might think it would be exhibiting too much, it was laid by, at least for the present : but it may nevertheless be said, that the proper criterion, is regulating the quantity of madder by the quantity of the astringent used ; as according to the quantity used in printing any number of pieces, so should be the quantity of madder, weld, &c. in proper proportion.

The above suggestions, it has been said, are equally applicable to astring and souring ; and on the
same

Of Madding.

highest degree blended or saturated with it; (31) as they are only divided and suspended, and must so remain till some other substance immersed in that liquid attracts and retains them, in consequence of being able to unite with them beyond the power which the liquid has. For, notwithstanding some may say, there should be a sufficient

same principles it is advanced by Dr. Home. See notes 3 and 7 to the Retrospect, with the text belonging to note 3, that in scouring among bleachers by profession; the foulness, or rather the absorbent earths left in the cloth after the alkaline process (ashing) so much attracts the acid particles, from having a greater affinity with them than with the water, that thereby the water at length becomes quite tasteless.

It is added, merely as a remark, this binding or fixing the colour, is reversing the process of preparation; as the liquid there, impregnated with a saline substance, attracts and joins the unctuous substance in the cloth; but here, the salts previously applied to the cloth, attract and join the unctuous colouring substance, suspended in the water.

(31) For they cannot possibly unite with it to the point of saturation from their unctuous quality.

Of Madding.

cient or equal impregnation of the water by the madder, whether work be light or dark, yet that can only be under a supposition that the particles fall and rest on the astringent just as they would on any other place, only that they would be there fixed : but the astringent particles are here supposed to have a certain sphere of attraction, acting on every colouring particle that comes within that sphere, and uniting with it accordingly. Therefore the quantity of madder, whether the work be light or heavy, should be according to what is likely to be attracted by the astringents, the rest being consequently superfluous; which always must be, while the cloth is not all over impregnated with the salts, or the whole capacity of the copper not filled with the cloth : as in this instance, it must be clear there will be more colouring particles than will come within the sphere or force of the attraction of the astringent particles.— See note 31 in the section of colour-making.

It may be observed that in some cases without the use of preparatory salts, this attraction is greatest with the cloth itself; but then the particles

Of Madding.

ticles are not permanently fixed.---See notes 26 and 41 in the next section.(32)

In order to illustrate what has been just said, suppose ten pieces printed with the same object, either large or small, in deep red; ten more in the second red; and ten more in the palest. Now here, it is not because there appears the same body or mass of colour in one as in the other, that an equal quantity of madder is necessarily alike for each ten pieces, for, if there be barely enough to bring up the palest, there will not be enough for the second, and still less for the darkest: and, inverting the rule, by having a sufficient quantity to bring up the darkest, there will be more than sufficient for the pale shades, and consequently some madder will be wasted, from the attraction not being so strong in the pale sprigs, through their containing a smaller number of astringent atoms, as in the darkest sprigs which have considerably more. The

(32). This wonderful property of affinity in Chemistry is deemed different from the Newtonian grand doctrine of Cœlestial attraction; the former acting on small particles proximate to each other, the latter on large bodies at great distances; and both these properties are distinct, in certain cases, from terrestrial attraction, the property of weight or principle of mechanics.

Of Madding.

The above may be likewise instanced in a piece of pale blotch work, and a piece of dark; as in the dark blotch, there must be a greater number of astringent particles, and consequently their powers of attraction more multiplied than those in the pale blotch, from having a less quantity. In common engraved copper-plate work, this is evident in what is called the spewing of the colour; but it is particularly so, in the tinted work lately introduced; for whether done in black, chocolate, blue or olive, according as the colour is received by the cloth from the lightly tinted parts, it shews different shades; hence in these cases, as the colour is not previously thinned, it can only be occasioned by the astringent particles being more dispersed than in the dark places, or in the grounds.

It may be subjoined that there are cases where the copperman may be deceived in sorting the pieces.--See note 21. Indeed it is here asserted, that the leading principle in copper work is properly sorting them. As to the common wonder of printers, that pieces of the same pattern, colour, &c. do not come up alike, See colour making, under the article of the application of colour by printing.

REMARKS.

Of Madding.

REMARKS, &c.

In madding, 3 certain distinctions should be made, the' the copperman as just said, should know how to make more according to the lightness or heaviness of the work. The three alluded to, are dark grounds, close covering work, and light grounds; but in this distinction it is impossible to ascertain here what quantity of madder to use, as a copperman who has attended the previous processes, if the cloth has been well managed in other respects (saying nothing about what has been just discussed) will bring up work with nearly half the quantity that some others will; for too many if left to themselves, rarely deal out madder with a sparing hand, (33) However,
it

(33) At a certain Ground (the writer thinks Newton's) where madder is by no means spared, the Principal perceiving one night a light near the Copperhouse, found, on going thither, the Copperman in the drug-room, adding more madder to what had been weighed out for him; and it appeared, on enquiry, to be only for the purpose of insuring his reputation as a Copperman, on the principle

Of Madding.

it may possibly be said, if it be of a good spending sort, heavy work may require seven or eight pounds to a piece, and for light work from four to six. But all this, as observed respecting ashing, fourcing, &c. must depend on discretion or other circumstances; for written documents cannot provide for every course of work.

As to the general mode of process, according to the size of the copper, the course of work, or dimensions of the goods, tie up more or less, rarely more than ten of light work, but less of heavy: bring the copper to a scald (34) in about an hour

principle above mentioned, of thinking he could not use too much. It must be superfluous to add, repeated circumstances of such a nature are of some pecuniary concern, especially where much work^{is} done.

(34) This term of a scald is much used by common coppermen, as they build their merit and certainty of effect on their judgment about it; and here undoubtedly they are right; though few precisely know why: for in this process, as well as in ashing or fourcing, there is a certain instant of time when the

Of Maddering.

hour and a half; and keep it in that state till the colour has sufficiently risen. With light goods this first scald will answer for sumaching.

After this scalding, have them planked or washed, then enter them in fresh madder, and bring the water to a boil in about an hour; but great caution must be taken that the colour is raised

the effect is accomplished, which, chemically speaking, is the point of saturation, (see note 16) and to carry the process on further must be injurious, or, at any rate, superfluous; which point of time is when the noxious or obstructive substance is decomposed or removed; from an assimilation with the alkali or acid then used.

In the fixing of colour, it is when the combination of the salts and colouring particles is formed; for, as in the preparation, if there be any alkali or acid remaining in the copper, after the noxious substance is removed, it either has nothing to act on, or it must act on the cloth. So in maddering, or welding, if the cloth be kept in beyond the point of saturation, or the water be too hot, the red or the yellow will probably be dingy, or otherwise injured as well as the other colours, from the colouring particles acting with other powers, than their merely colouring ones. See note 16.

Of Madding.

raised before the work is taken from the copper : and it may be observed that too much boiling will extract a brown from the madder itself, which of course must debase the work.

After this second process, have them washed, then bran them, and after being well washed in the stream, strike them off in the barrow, and have them snitchelled up for the purpose of draining previous to being laid on the parks.

Branning is supposed to smoothe the surface of the colour, by removing intervening particles that might render it otherwise.---See note 6 in the retrospect. (35)

After

(35) It is too common in the country, for purposes well known, to use logwood and brazier, and weld likewise in a mode not proper to display ; the work of course cannot be very respectable. But even this is better than the frequent flushed up colours, or those pale ones, put in on a chymick principle, chiefly in work which is to be hurried up to town (see note 10 in the Retrospect at the end of Colour-making) but these practices, it is hoped, for the credit of the business, are falling into decay,

Of Maddering.

After the process of branning, the goods should not be suffered to lay long in the heap, if they be, they must suffer from the fermentation that will naturally arise. (36) As to the processes of fumaching, woalding, &c. they being similar in respect to striking the colour, excepting that some

as more fully observed further on. As to branning but a few pieces at a time, it certainly is an improvement ; as among the modes practised in the country (at least more so than about town) goods are frequently branned so much white (and bran liquor may be converted into fours in a certain time) as to be deemed sufficiently passable : and indeed in some close covering kinds of work, the goods may be so much branned, as to need little if any grassing : but then (as just said) such work will always be distinguished from that which has a good white.— See note 37.

(36) A natural consequence of a heap of vegetable matters, as well as animal, laying together, according to their humidity, and their acid or alkaline qualities, is a heat arising in the middle, which by degrees spreading more and more, will at length putrefy or rot them ; this intestine motion disintangling the acid or alkaline quality from the earthy and

Of *Maddering*.

some articles give out their tinging qualities very easily, it would be almost a repetition to speak of them. In rinsing and streaming of pencilled and chemical colours, the chief consideration is throwing them in quickly and keeping them in motion; and especially in streaming, that the pieces be kept as clear of each other as possible till the work be pretty well cleared.

Cleanliness

and oily parts, that till then retained in them. Something like this happens in soaking white goods (as mentioned before) and it may here be added, that white goods as well as when finished, should not be piled up too damp, nor in too damp a place; and at any rate they should be examined at times, or stains at least will be the consequence. It may even be said, that the injury white goods may thus receive (as what are called mildews, are the first stages of putrefaction, or rottenness) may affect the preparation and printing.

The modern anti-phlogistic or pneumatic theory of Chemistry, including Dr. Priestly's celebrated discoveries, have thrown some light on the subject of putrefaction and its preceding stages; though still it is far from being satisfactorily developed.— See the subject discussed by Fourcroy Vol. 3 — See likewise Higgins on the acetous acid, air, &c.

Of Maddering.

Cleanliness having been repeatedly mentioned, as a grand point of copper work, the copper man here is particularly advised to it in the first instance of supplying the copper with water, for if taken from some streams, various matters may be brought down that may do considerable injury. And in ground reservoirs or ponds, it should be noted that there be no influx of filth of any kind, and especially that they be not near ponds or other places where ashed or soured goods are rinsed, for fear such foul waters find their way to them. (37)

(37) Speaking of what may come down in a stream, the following circumstance which happened some time ago is quite in point. As a number of pieces were rinsing, printed in chymick colours, to the surprize of the rincer, he found the colours changed. The cause on examination appeared to be from a quantity of ash and other matters from the clearing of the coppers, coming down with the stream from an adjacent dye-house.

As the purity or certain quality of water is of great consequence, whether for Colour-making, Copper-work, or Fielding, it is just intimated, that its gravity being generally in proportion to its purity, the common hydrometer will discover it.—In Bergman's works, his experiments on waters, in order to
remove

Of Maddering

remove impurities, and render waters fit for various purposes, are truly of importance to Callico-Printers, Dyers, and all who use considerable quantities of it; and in this case (as well as in others) if it were not from the fear of doing a particular injury, it could here be shewn, from experiments actually made by the writer himself, which Printing-grounds in the vicinity of London, are more or less fortunate in that respect.* In fact, it is matter of wonder this has not been more an object of enquiry among Callico-Printers and others, where the goodness of water is of some concern; especially as little trouble and expence are required to render impure waters in certain cases, and in certain quantities otherwise.

Perhaps the singular effects (as has been observed) of waters in India are owing to high degrees of purity, through a friendly interference of nature; and, as applicable to the subject, it is mentioned as no secret, that at a capital Printing-ground near town, the waters of a very copious spring, which for a time had been used for Fielding, were at last, by accident, found not to be so efficacious as the water that was rejected.— A Printing-ground could
be

* Among the works referred to, may be found the modes of doing it. If this is thought too exposing, let those who are not fortunate in this case, endeavour to remove the complaint; as the methods are there shewn.

Of Maddering.

be even pointed out, where the waters are of a saline quality, and the ill effects even acknowledged.

To philosophical men it is just hinted, that probably the modern discoveries respecting air, might be turned to some advantage in nice operations, if the wonderful properties of water impregnated with fixed air, be considered. But to expatiate further on these points would be entering into too large a field, the reader is therefore referred to the works mentioned over-leaf, or advertised at the end, for that information which would be perhaps awkwardly exhibited here if compressed.* These remarks however, must shew the usefulness of philosophy, and the advantage the arts acquire where its aid is obtained: and hence the superiority of many operations on the Continent, where such a combination is encouraged: indeed, the merely mechanic arts cannot aspire to improvement without it, nor proceed with certainty, even in common operations, from the very obvious reason of its implying the necessity of thinking as well as acting.

These observations likewise include the great necessity of regarding situation, particularly in forming Bleaching or Printing Grounds; for, as partly observed already, it is morally impossible to command brilliancy of operative effect, if (besides what is above intimated) they lay under disadvantages arising from

* Some particulars will be found preceding the *Compendium of Chemistry*.

Of Maddering.

from dense vapours, or gross fuliginous matters, variously impregnating the contiguous part of the atmosphere.—See something to this effect notes 6 and 7.—In short, without pure water, and pure drugs, operation is uncertain, and the effects discreditable.

N. B. Those who desire information on these heads, and others equally important, are here desired to consult Bergman's *Chemical Essays on Air, Water, &c.* Priestly on Air; Fourcroy's compendious statement of *General Theories and Experiments relating to them*; Cronstedt's *Mineralogy*; and Higgins on *acetous Acid, Air, &c.*

It is however here said, that allum, saccharine acid, lime, galls, fixed alkali, &c. are the agents for detecting impurities, in waters; it is likewise said, however strange it seem, that vats and other certain receptacles of waters should not often be cleared from the green matter that gathers on the bottom and sides. And this observation may be perhaps applied to ditches, so the sedy matter is not floating, nor liable to be taken up with the gittern, as it is said to imbibe the phlogiston from the air.—See Priestly particularly.

It may not be quite foreign to this subject to add, that Dr. Priestly says the air which he procured from a Callico Printing-ground (most probably the Printing-shop) was the most offensive of all the specimens that he procured from different manufactories.—See something to this purpose in Percival's *Essays on the air of Manchester.*

Of Grass - bleaching, or Fielding.

HAVING spoken of bran - bleaching or souring as subsequent to maddening, and observed (in a note) that by the improved mode of branning but a few pieces at a time, a white is almost procured without laying the pieces down (though that it need not be said is not proper to be done in all cases) it remains now to speak of laying cloth down to clear the ground or other parts, from the superfluous particles of colour; it is therefore observed that this effect appears to be chiefly accomplished by evaporation (35) and most effectually in sun-shine and moderately windy weather, the heat of the sun opening the pores and thereby giving egress to the colouring particles, detained in them till then; but in dull wintry weather, it is well known, the process of whitening goes on very slowly; there being no power by heat to dislodge those particles; for without it, watering is insufficient; the use of that

(35) Perhaps inhalation by the air may be more proper, evaporation being more applicable to a chemical process.

Of Grass-bleaching or Fielding.

that operation being only to advantage when combined with the heat of the sun ; one power insinuating itself into the pores of the cloth, and the other continually exhaling the watry particles, bringing away every time, some of the superfluous colour, and leaving those that by the action of the binding or contracting quality of the acids are with-held ; though even these it is known, were the process carried on too long, would be removed in some degree ; especially if the work consist of pale or tender colours.

It has been before said, that attention should be bestowed on the quality of the water, that it be light, soft, and free from filth ; it likewise is necessary to attend to the quality of the soil of the field ; for the facility and success of the operation depend on the mutual action of heat and watering ; therefore the drier the soil, or the more gravelly it is, the water will sooner pass through it, and the heat on the surface will not be so much opposed as otherwise. (36) Smoke or vapours from very foul boggy places, may be said to be injurious, if frequent, and in great quantities.

It is noticed, that cloth does not get white so soon in windy weather as in still sunshine ; therefore, it appears that its influence penetrates the

(36) It is here offered as an opinion, that parks should be sloping from the middle.

Of Grass-bleaching or Fielding.

the inward parts by its evaporating power, while wind only dries it, and in a manner prepares it for succeeding operations of watering; for wind alone, especially if cold, would close the pores of the cloth; but the power of heat naturally acts to the contrary; and in the case of evaporation, it seems the particles are partly dislodged by water, and then finally drawn out as those particles rise up.

In many places on the Continent, strange as it may seem, the printed goods are never watered, and to this dry bleaching it is owing that in most foreign printed goods, little colour is seen in the back, particularly in what is called Swiss chintz; but then the texture of the cloth is unavoidably nearly destroyed.

It is a particular circumstance to attend to in printing-grounds, where printed goods are watered (which the writer thinks is every where the case in this country) that the water be not hard, nor tinged by any mineral quality; one reason for not watering on the Continent, may be, the waters there abounding with mineral impregnations; indeed about London, work done in some places, is clearer in the white, from the superiority of the waters; and it is well known the soil in general in the north, from its mineral

Of Grass-bleaching or Fielding.

mineral quality, is unpropitious to producing a good white, and without a good white no work can appear perfect.— See note 6.

That a deal depends on the soil and water is further evident in the case of foreign articles, particularly some from India; for at a place called Seconge, the waters have, it is said, a surprizing tendency to whiten the cloth, (37) and of course to render the colours more brilliant, hence goods are brought thither from distant places for that purpose, as likewise to two or three other places on the same account

(37) This may be considered philosophically as well as merely mechanically, the sensation of colours being caused by certain reflected coloured particles, or rays of light striking the eye, according as certain substances are disposed to receive those particles, thus, a bright colour lying by a dull one, the rays from each being intermixed with each other before they reach the sight, the bright colour helps to enliven the dull one, and the dull one deadens the bright one, so in painting, it is not sufficient that shadows be properly disposed, but that every colour, according to its quantity or proximity to another, communicates a portion to the parts near it, receiving at the same time, according to the laws of reflection and refraction, a portion likewise from the other.

Of Grass-bleaching or Fielding.

In managing the field-work, the great concern is to put those kinds of work in the same parcels, that will take the same time to be brought white; that in fine open weather they are kept regularly watered, particularly work with delicate colour, and that the water be kept free from fedge and other filth; the other common processes of laying down, (38) pinning, taking up, drying, &c. every common fieldman is supposed to be acquainted with, and therefore dwelling on those circumstances is deemed unnecessary.

Before this section is closed, it is repeated, and begged it may be remembered, that in respect to particular processes, little is offered as positive, the difference of thinking and acting among different practitioners rendering such confidence absurd (see note 16) but here it may be said, that the rejection or adoption of any mode of practice, is no further demonstrative of propriety than as it is, or is not, in consequence of a rational investigation of the object, therefore those who simplify any set of operations, (not from parsimonious views) but on the principle that nature uni-

(38) It is a pity this part is not better attended to, than it is in general, in preventing the ill-effects of high wind, as a little extra trouble would accomplish it, either by laying the work down in small parcels, or by means of moveable laths or ropes, or trees, hedges, &c. placed as screens.

Of Grass-bleaching or Fielding.

universally observes in the sources of her operations, is alone likely to succeed, and (as particularly observed further on in respect to experimental colour makers) deserves credit even if he be unsuccessful; for certain it is, that in all mechanical operations, as well as natural (however complex they may appear) there is a simple point, on which they all move, or from which they spring and branch out, and from this consideration the man of acuteness and reflection, whatever may be the subject of his employment, will trace every part through its connections and dependances to this first movement, this essential point, this actuating principle, and thence back again to its ultimate intended effects, endeavouring accordingly to remove what is superfluous, and supply what is deficient; while on the other hand, the man who proceeds in the vague uninformed manner, so often reprobated in this work, soon feeling his deficiency in this requisite chain of knowledge endeavours to compensate for it, by repeated alterations of every kind, merely in the blind hope of accidentally stumbling on what is proper. (39)

(39) Thus, in all chemical operations, they are to be traced to the agency of the four simple elements; and, to come quite home, in producing fixed colours on cloth; it is to be traced to the simple operation of an astringent.

Of Colour-Making.⁽¹⁾

AS observed in the introduction to Copper-work, so here it is said of this subject, that the chief intention in treating of it, consists more in an attempt to enforce the consideration of its principles, than in a wish to exhibit a number of recipe's or other similar deceptive and inefficacious modes of filling up this publication: It is however begged to be noted, that

(1) There is no avoiding this mis-naming this operation; custom has so established it, for (as observed before) what is called colour-making is but preparing the means to procure the colour from the colouring materials. (in dyeing it is really and properly called the preparation) and even in chemick colour-making, where there is not the process of boilings it is not always just; for even in that case the substance imparted to the cloth is not exactly what it will be in respect to colour when rinsed, or otherwise brought up; indeed some of those cases
seems

Of Colour - Making.

that though in this light the subject is affected to be treated, it is not to be understood as addressed to the scientific reader only, for that would be equally useless in respect to those to whom it is par-

seems an inversion of the process, being, as in the instance of liming, brought up or struck by a non colouring article.—See note 1, to Copper-work,

It is agreed that the art or mystery of colouring various articles was in use among the ancients, and in some instances they excelled us, at least it seems our mode of operation is but little different both in respect to preparation and finishing, though some parts of their knowledge is certainly lost to us; it is however certain, that they used other substances to what are in present use; the presumption of this being the case, is taken from the writings of very ancient authors, particularly the Greeks, and from some who have written expressly on the subject.

The Greeks, it is certain, distinguished the operations of preparation and colouring, by terms exactly to the same import as with us, as relative to opening the pores of the subject of to be coloured, the consideration of the colour, and then the fixing of it; and that in the practice astringents were used as amongst

Of Colour - Making.

particularly directed; as Callico-printers and those employed by them, have other considerations in plenty to attend, though people in general, and some theorists in Chemistry, think the whole business, or at least the consideration of it, is comprized in producing colours; but at present, most printers are contented with the mode as adopted in common, or else reconcile themselves to it from not having either ability, opportunity, or inclination, to pursue it further; their view being to gain something by what is known and attainable, rather than to devote much time to the uncertain effects of speculation.

us. From them it is probable it passed to the Romans, and their colour-makers or dyers (for here the terms are to the same meaning) made use of a species of fucus, which fixed the colours as firmly as is done by any modern process, this plant is to be found in this island, it is, however, not deemed proper for whitening of linen.

The use of allum, tartar, lime, and other astringents were known to the ancients, though perhaps not exactly for the purpose we use them; what is said of them could be introduced here at length, but for reasons several times given, it is deemed superfluous.

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tion. Of Dyeing, it may perhaps be said, the chief matter to study and practise is this article of procuring and conveying colours ; but before colour is conveyed to the cloth in printing, there are processes to be observed and to acquire a proper knowledge of, more difficult to attain than the mere art of colour-making, according to the present accepted practice of it ; and in truth, to speak from a certainty, the imperfections of printing, and even the miscarriages of printers, originate as much, or more, from their inattention to other circumstances or departments, or their ignorance of them, than merely that of colour-making. See the observations on putting on, and at the end of the first volume.

It is however certain, notwithstanding, that from the great number who practise it, and with some reputation, who have very little acquaintance with chemistry, there seems perhaps no necessity for it ; yet in order to attain a proper knowledge of the principles of this department, it is indispensably necessary (particularly with the affinities of saline and metallic substances) otherwise the practice of it must be attended with consequences vague, tedious, and unnecessarily expensive.

However, be this statement considered as just or not, the writer, as he has all along affected to
blend

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blend advice with precept, shall preface what he has to advance respecting the consideration of colour-making, by addressing himself to those who are attached to making experiments, without any principles to direct them, which negatively may be of some service ; as by pointing out what cannot be done, and wherein so many have bewildered themselves, it may shew the fallaciousness of certain operations, and in consequence divert their attention from that mode, which ultimately will not answer the desired purpose.

As to laying down rules for making colour, or exhibiting a great number of recipe's for that purpose (as observed more fully in other places) it would not avail much, but on the contrary, might do considerable injury, by throwing out a stimulus to numbers who vaguely dip into the practice of colour-making, particularly in chemical processes ; and hence too frequently dedicate their time and attention to what in the end bring disappointment and regret.

As to the modes of imparting colour to the cloth, the consideration of them is reducible to a small compass, as it concerns the principle of colour-making for Callico-printers, their preparatory,

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ratory mixtures not running into that great diversity, in respect to the number of shades, as among Dyers. (2) It may nevertheless be said, that one part of Callico-printing is Dyeing, though not called by that name, notwithstanding the colour is communicated but in a partial degree; dyeing being generally understood as colouring the whole extent of the subject, having previously immersed it in the preparation liquid; but here a method must be used to convey this preparation (called colour, and by an operation called printing) to the cloth in certain lines, shapes and bodies, so that only shapes are visible when the work is finished; and here it is, that the skill of the Colour-maker is visible; for though, by his memory or recipe's, he is informed that

certain

(2) It is not here meant that printers are to be restrained in this respect; they undoubtedly wish for as many colours as they can procure; but the difference alluded to is, as observed a little before in a note, that the mere producing of colours, as with dyers, is not their only object, Callico Printers having to exhibit a certain design, consisting of flowers, figures, &c. on the cloth, therefore, unless the writer is very mistaken, here is certainly a difference.

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certain proportions of iron liquor, allum, sacrum saturni, and so on, properly applied, produce certain effects; yet the many, undecipherable circumstances necessary to be attended to, render that department so extremely difficult to support in a proper manner, that very few indeed are found adequate to it, (3) even where no attempts are made at improvements, searching for new colours, or more advantageous modes of mixtures; though in fact to attempt this (as hinted before) is the height of folly without a sufficient knowledge of a chymical analysis of what is already in practice; as without such a knowledge, experiments must be inconclusive, and there is little hope of advantage from them, but by downright chance; and this leads to observe on the many instances we have of such experimental practitioners, and their little success in proportion to the boasts (4) that have been made of procuring

(3) See further on, where some hints are addressed immediately to the colour maker.

(4) Here the writer, in his usual unreserved manner, intimates the entertainment he has received when he has heard some Colour-makers in discourse;

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procuring durable colours by the simplest operations ; that is, as must be understood by every one in the printing business, without being brought up in the copper ; for it does not much enhance the value of that operator, who by some addition to the articles, with which another has produced a certain colour, or by some deviation, or retrenchment from them, if he can make it bear two or three more washings, for still it cannot

course ; what was generally advanced being mere boasts of what each other knew beyond the rest, without touching on the principles of colour-making ; for almost every master printer and every colour-maker will say, and probably believes, he is possessed of some advantage in this case over every other ; by which, to consider it in a general manner, that is, in every one possessing something extraordinary ; it would seem as if on the whole nothing was wanting on this side perfection, but that is well known not to be the case ; and it often happens, and every master Printer is appealed to for its truth, that when recipes have been purchased, it is rarely till after many experiments they derive advantage from them, and very often nothing can be made of them at any rate.

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not be called permanent, though it may be deemed fast enough. (5) But the principle of most chemick operations or false colours, being little more than certain solutions combined with certain substances; with which every dabbler in chemistry is acquainted with, it would appear like affectation to dwell much upon it; (6) every one of those that make such pretensions will most likely talk highly of his recipe's, and experiments; but great indeed is the experience requisite to ascertain the effects of chemick processes, as that only can be done by bringing them into practice so as to execute a course of work with some certainty of the operations not failing.

It is far from the writer to wish to lessen or discourage any laudable attempts toward any improvement, but those whom he treats thus cavalierly, are of a class distinguished in the printing business by an appellation too ludicrous to be here mentioned

(5) This phrase is in every chemical printers mouth, and some deem it so, and perhaps in some cases it is so, if it will endure two or three washings.

(6) See at the close of this section a few thoughts on the probable effects of an universally adopted chemical mode of printing, if it could be attained.

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mentioned, as it is not likely much service or improvement can be educed from their vague experiments; as for those who proceed on rational principles, whatever may be the fate of their researches, they are, and ought to be treated with adequate respect; but if they do succeed, their reputation must be in proportion; as little progress is yet made toward the point desired in proceeding, even on the most scientific grounds.

Pursuing this Idea further, some will undoubtedly say, who knows what may be produced from a number of experiments, if only by mere chance? as many discoveries originate more from accident than design; but still, all this is not a sufficient apology for making experiments without certain principles at hand to proceed by, for without them, the practice must be less pleasant, less likely to be affective, and what is of great concern indeed, less likely to be attained with little expence; but here it unfortunately happens, that of the greater number of such experimentalists, is included those, who have a smattering of the practice from having been assistants to a colour-maker, or otherwise have caught the idea for the practice, and pursue it eagerly, though under every disadvantage; another class is among principals.

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cipals themselves, who having ingredients at hand, rush into the practice of combining and compounding one thing with another, just in the same manner, and upon the same uncertain grounds; the consequence, undoubtedly, is much anxiety and embarrassment, with very little benefit: as for the idea (just mentioned) of something turning up by chance, that is too absurd to give it countenance so as to recommend a series of experiments from such a hope; but advice in this particular it is apprehended will not be of much avail, most persons in this case, imagining that if they have but opportunities of making experiments or seeing the result of them, or what is sometimes worse, getting together a number of recipes, they may save themselves the trouble of studying the theory or principles of what they undertake; for the idea of studying and storing the mind with certain regular ideas, carrying with it that of much labour and time uselessly employed, very few indeed by choice enter into it: but waving all this, it may be said, that even in such a vague course of practice, it would not be so discreditable or unprofitable, if either class, just specified, regularly made a point of transmitting to paper

per

Of Colour - Making.

per the sequel of their experiments, (7) as ever that would be of service, since by so doing, they might, at all times, see where and how they have failed, or where they have gained any advantage, and accordingly might afterwards proceed upon surer grounds: but even this is seldom done, though at all times necessary, under every circumstance, indeed it cannot be of much use, unless the minutes are accompanied with proper reflections on the probable causes of their failure or success.

To all this it may however be said, there are many who cannot attend to such a mode; in fact some practitioners are hardly able to write, and

Principals

(7) This brings to the writer's recollection his having read a book, he thinks called Marshall's Minutes of Agriculture; which in point of utility to the farmer, is a thousand times beyond a dry scientific disquisition of the subject; as it contains a great number of observations apparently transmitted to paper as they occur, some of importance, and some but trivial, (or at least as might appear so to many) but these practical observations, as such, must be evidently of use, and the more so, as they are adapted to the capacities of those for whom they were intended to be useful.

Of Colour - Making.

Principals have in general enough else to mind to dedicate much time for that purpose ; hence is another reason why little benefit is reaped from such a chaos of uncertain or inconclusive experiments.

After dwelling upon this inconclusive mode of practice and the consequent circumstances, it may not be improper, by way of illustration, to intimate in a general manner wherein such practices fail, and then a word or two will be offered as recommending a properer mode of proceeding.

It is first observed, that the substances capable of producing colours, are almost infinite ; so that the field being very large, the mere dabbler has too much opportunity of fruitlessly making attempts : Some substances give out colours that can be removed by soap, some will oppose that, but cannot resist air ; and some cannot be moved by either ; now respecting substances that are not permanent or fast (according to the common phrase) and known not to be such by a number of experiments ; some persons have endeavoured to improve on them by joining a durable one to them ; blending them as intimately as possible, from a presumption that the weak substance
would

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would have received assistance from the other; but it has always followed that the false colouring substance soon flies off, leaving the permanent one behind: Some have endeavoured to procure a permanent one, by first putting on a fading one, and covering it afterwards with a permanent one, on a supposition that the permanent one would secure it, and by being externally situated, might defend that beneath it or within it, or at least that it would operate in that manner for some time, so that there might be a little longer durability to the fading one, but this likewise will not answer; and in the practice of using acids, some by endeavouring to mix various ones together, without knowing their qualities or affinities, have found the effect of one destroyed by the effect of the other, like solution of tin and cream of tartar, or solution of tin and sacrum saturni, as the marine acid will quit the tin and join the saccharim, the acetous acid being at the same time suspended by it, is of no effect on the tin:— see experiments of this kind further on;— others have had a notion that a mixture of different salts will keep the colours better; but it is proved to have a direct contrary effect: hence when they have acted in this manner, without any positive knowledge of the principles of this
part

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part of chemistry, they have made such a confused mixture, that it was impossible to know which ingredient, or what number of ingredients caused the miscarriage; much less to know in which was the efficacious property sought after. Now, in this case, it may be further said, a necessary circumstance is omitted, and that is, first of all to try what effect each salt has on the colouring substance in regard to their similarity of effect or appearance, for in knowing this, there is the greater chance of succeeding. But, if persons will plunge themselves into a practice of making experiments, let them begin with making them first, with simple solutions or extracts upon separate vegetable or mineral subjects, making suitable remarks upon each result; though even that will not be sufficient, unless the qualities of the solution are alike, or a previous acquaintance with them be obtained, so as to know their different effects in point of strength, or time of operation; and this implies an abundance of food for observation, from the various mixtures that may be made only of one article used as a basis, if considered in its different degrees of strength or purity, and the different subjects it may have to act on. However, by proceeding in this simple manner, they may

Of Colour - Making.

may then unite or multiply them. But if they proceed here in too precipitate a manner, they will presently be bewildered, as it must be clear from the above statement, even to an indifferent person, into what numberless channels the simplest mixtures of simple subjects with each will run; and much more so when compound ones are taken; hence without some clue in this practice, the same indifferent observers must as plainly see, that such operators must very quickly find themselves in an inextricable labyrinth, hemmed in with doubts and difficulties, and if they proceed, it will be more from a shame of going back, than from a hope of getting into any regular channel.

In proceeding now to the intimation of a more proper mode of making experiments, it is premised, that the consideration of colours (as may be supposed) is exhibited only as relative to printing, hence it chiefly alludes to those that are permanent or fading, as applied to linen or other substances of the same kind.

By

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By permanent colours, every one in the printing line considers those that are not to be removed by soap, sun nor air; the others are of various kinds, as some withstand washings, but will fly on the air; others will withstand neither, and others only for a little time; but what is of the most concern is, that, with few exceptions, those colours that are the most permanent, are the least brilliant; though for this, it may perhaps be said, that entering but into the superficies of the subject made use of, the colouring particles are more crowded together; and consequently exhibit their rays more glowingly than if more dispersed or separated; which must be the case when entered (as is supposed in the case of permanent ones) into cells adapted to receive and retain them; and the more compound the colour is in respect to its ingredients, it is the less vivid, and less likely to be durable.

As to what bold speculatists, or even experienced practitioners may suggest, our knowledge of the nature of colouring substances is very limited; or if we know something of any substance in one state, that substance, when separated, will present a new appearance in its separated parts, and so on ad infinitum; hence,

L

likewise

Of Colour-Making.

likewise is our knowledge very small indeed in judging or determining on the result of those applications of one substance with another, for the purpose of discovering or fixing of colours. In simple processes, instances are very rare of permanency, but of any combination of ingredients, when one article seems to bid defiance to the great proofs of air and sun, there is the object for investigation; and therefore in colour-making, a great point is to discover those articles that naturally possess those permanently tinging qualities, or that can easily, and in the simplest manner be procured by a combination with some other.

As it is not certainly known, nor perhaps will it ever be, why some colours fade, and others will not, suppositions have been formed, specious enough (as already exhibited) though they are received not as being indisputable, but only as the best or most rational that can be given.

The most remarkable instance of simple substances for giving out their colour, as it were
spon-

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spontaneously, was in the tyrian dye, (8) which had power enough of itself, simply to communicate to silk and some other substances, a colour as firmly as can, now be procured by any process, whatever: Other instances are in the solutions of indigo and silver; the latter when mixed with
chalk

(8) In the Spanish seas is found a shell-fish that resembles the antient purpura, the purple dye is in its throat; Cloth of Segovia is dyed with it, and bears a high price. The colour from the fish when first laid on linen, is a light green, which by the air is changed to a dark one—in a few minutes to a sea-green—a little while longer into a blue—from that it turns to a purplish red—and in an hour or two to a deep purple; here the sun has no more power, but by washing it in scalding water and soap, and drying it, the colour ripens to a beautiful bright crimson.

The Americans of Peru and Chili had knots of wool, which by the variety of their colours served for characters and writing; the knowledge of these knots was called *quipos*, and was one of their greatest sciences.

The Otaheiteans procure a beautiful crimson by mixing the yellow juice of a species of fig with the juice of fern.

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chalk turns the sediment to a purplish black when exposed to the sun, or rather the action of the sun's heat is the cause; the other circumstance respecting indigo, is perhaps more known to callico printers, in the solution at first appearing green, but on exposure to the air turning to a blue, as observed in another place.

Having spoken of the vague and inconclusive operations of many, the following display of the institutes of chymistry in view of establishing one on a firmer basis, is humbly offered, which will be followed by a few thoughts immediately relative to the practice of what is the subject of this section.

It has been said, that an acquaintance with chemistry is indisputably necessary for a colour-maker to have, but it must be understood not in every division of it; as chemistry, in its extensive signification, comprizes considerations that have little to do with the subject of this treatise; therefore the elementary parts and principles only will be just touched on, as leading to what is the principal object of it,
that

that of prompting those who look at this treatise, to pursue the enquiries it recommends towards attaining knowledge, rather than expecting to find it in the work itself. Hence it is supposed as this little abstract can quickly be perused, and easily retained, it may incite some, from the evident insufficiency of it, to look further into the subject, whom otherwise the generally voluminous appearance of chemical treatises would have deterred.

From the above it may be supposed, that what is exhibited in the following sketch, will be as free from contested points as possible; as well as being limited in the subjects of it. Therefore, notwithstanding that, through the numerous discoveries made, and still making, Air, Water, Earth, and Fire, are no longer deemed elements (Fire is deemed ideal) they will here be considered still as such, and the account as well as the rest of the compendium, will be chiefly taken from Macquier; he standing, as it were, in the mid-way between the old and the new theories (see Fourcroy's Chemistry in the Translator's preface.

Here it would not be unpleasant to dwell on the new discoveries and theories, as almost numberless transcriptions could be made, that,

† †

at

at least, might amuse: however, those who are inclined to look into the most modern authors will find a list at the end of the work, each of which contains more or less of what would not only entertain as theories, but as otherwise are practically proper for every Callico-Printer to consult. (9) See maddering and the last note to it. But respecting Dictionaries and other similar compilations, a few excepted, nothing is more fallacious (see note 40 to this section) from their nature containing little original matter, and few of the new discoveries. For so many have been the opinions and facts promulgated within the last 10 or 12 years, that authors however respectable before that period,

(9) Among them will be found the means of rendering impure waters otherwise.—Detecting sophisticated allum, tartar, and other salts, with the discovery of new ones.—Various preparations of colours.—Experiments on Prussian blue, Indigo, &c.—a new green colour procured from phlogisticated copper and arsenical acid, &c. In the Manchester Philosophical Memoirs, are enquiries in view of procuring new dyeing materials by Dr. Delaval,—on the use of acids in bleaching by Dr. Eaton.—The state of the imitative arts among the Ancients compared with their present state, by Mr. Thomas Kershaw, &c. &c.

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riod, are in many points superseded; and Dr. Priestly himself declares, that theory itself is now unhinged, and Philosophers have to unstudy what they have been long labouring to acquire. Not but that the more this great arcana is pervaded, the more we discover of that wonderful connection of the whole; that rotation of effects, where nothing is displaced but its room is supplied; and that what is called destruction is only a preparative to new combinations and forms. *

The following are some of the modern innovations and facts, represented as briefly as possible, though far from being generally received.

---Phlogiston, instead of residing in inflammable bodies is resident in the Air, and is an element of Water.---Air contains phlogiston and water.---Inflammable air resolvable into water not smok.

---Common air contains out of 100 parts, 27 pure, 73 phlogestic.----- Water transmutable into earth.--- Water contains phlogiston and acid.---Ignition a substance put into a condition to imbibe phlogiston from the air; bodies therefore by being burnt acquire weight.---Vegetables exist by imbibing phlogiston.---Cer-
tain

* See this admirably exemplified in Fourcoy, vol. 4, on the subject of putrefaction.

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tain green sedge matters purify water and keep it so.—In solutions of metals, the diluent or water is the solvent, and the metal decomposes the acid. Several of the affinities are reversed. (10) and Phlogiston generally put at the top of each column.

In fine, the elements are now almost as much a subject of decomposition as any other substances.


And here, to deviate from, or, perhaps, rather to enforce the subject just dwelt on, as it is offering a great counterpart of discovery, and by the contrast, rendering what has been observed the more striking; may it be exhibited as a respectful, and from the sublimity of the circumstance introduced, an awful testimony that the present glorious epoch of knowledge transcends all previous human efforts; as taking all nature, as it were, into its grasp, and collapsing the extremes of creation? For, while philosophy on
one

(10) Not being generally known, and to shew that scientific discoveries, though not directly useful, may lead to what is so, it is said here, that the reflections on the filling of Balloons, gave rise to certain experiments on air.—It may be added for the above reason, that the effects of light on vegetable and other colouring substances is such, as to give the Eastern countries their superiority in that respect, as well as their original claim.

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one hand, bursting through the elementary barriers of nature, pursues her to her inmost recesses and analyzes those objects, whose minuteness confound the imagination, and which are only perceptible by their effects ; on the other hand, it not only adds new orbs to our solar system, but darts into the immeasurable expanse and scrutinizes objects that as equally confound by their magnitude, and the spaces they possess ; in short, it can be said, it explores immensity itself, gages the very Empyreum, and exhibits its construction ! ! ! ! ! -- But of this stupendous effort, the writer dare not venture to say more, as the scientific analyzers of literature themselves, while they subscribe to the success of it, follow the explorer with timidity, and investigate his pursuits with astonishment !

This erratic descant is therefore closed with informing the reader, the whole is to be found in the memoirs of the Royal Society, 1785, as delivered

 In order to give persons of confined information some idea of those regions, the object of the above great Astronomer's researches, it may be said the orbit of the Herschel (originally named the Georgium Sidus) or the revolution it describes round the sun, is between 10 and 12,000 millions of miles ; or above 3000 millions in diameter. Now here let the reader stop

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delivered in by Dr. Herschell ; and the writer proceeds to the Compendium, beginning with the elements according to the positions just suggested ; and first, of

A I R,

Air it need hardly be said, is that fluid which surrounds our globe, and pervades all bodies not filled with a heavier substance than itself. Its chief and distinguishing quality, and from which results the general effects of it, is its elasticity or spring, or its property of expansion and rarefaction, according to the presence of fire and heat. Its weight is about 800 times lighter than water; or a quantity of water 1 cubic inch in bulk,

stop and contemplate the magnitude of this space, as occupied by the sun and the rest of the planets ; or suppose it is said a sphere or globular object filling this space. — Now let him compare this vast object or occupied space, to the regions now exploring, containing millions of millions of such occupied spaces, and it must appear as a speck, a grain of dust, or a point. But further, if he considers these regions as unlimited, then this vast object, or space of above 10000 millions of miles in circumference, if compared to such unlimited space, must seem smaller than any particle of matter is (which tho' we know it exists, yet cannot perceive it by the most powerful microscope) compared to this object of above 3000 millions diameter, or above 1000 millions in circumference !!!

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will require 800 times that bulk of air to be of the same weight, taking the air in its common state, the bulk as before said, being continually susceptible of change.

W A T E R.

THIS is a transparent and insipid substance, and fluid or solid according as affected by heat or the privation of it; its natural state is supposed to be solid, and rendered fluid only by heat; exposed to actual fire, it acquires a certain heat (by boiling) beyond which the greatest force of fire can never raise it; the effects of dilatation (as when a small quantity is thrown upon metal in fusion) are occasioned by the air it is supposed to contain, and like air it enters into the composition of most bodies, except metals and minerals, as it is only supposed to be interspersed between their parts, without entering into their composition.

E. A R T H.

THIS element is different from those just mentioned, in being fixed; they being volatile, or easily separated by the action of fire, from the bodies with which they may be united; hence earth absolutely pure cannot be affected by any
●operation.

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operation, and resists the utmost force of the strongest fire, being the caput mortuum, or that substance left after a chymical process, which to all perception cannot afterwards be changed. Earth may however be divided in respect to its qualities, into vitrifiable and unvitrifiable; one that will melt by fire and become glass, and the other that will remain unaltered, such as sands, which are likewise called absorbents, from their quality of imbibing liquids.

F I R E.

This element is divisible into that which is concluded to originate from the sun, and that which is called phlogiston, as being universally held a constituent part of any body: that coming from the sun may be called a fluid substance uninterruptedly flowing from him, and diffusing itself through the whole planetary system, and every particle of matter in it, but not as a native principle; hence it may be supposed the air itself would become a solid mass without this intervening and active principle; its rarefaction and condensation, with the dilatation of water, and similar effects produced in the earth originating from it; and in all our operations it is the most powerful agent, and when collected in the focus
of

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of a large lens, is at the greatest possible height producible by human art.

What is understood by phlogiston seems to be different, being apparently fixed to all bodies, so as to make a part of them ; but how so active, or, as it were, so restless a substance can be so fixed, is not yet determinable, as it differs from elementary or pure fire (just spoken of) in communicating neither light nor heat when joined to any other substance, and produces no change in its state ; so that a solid body becomes not fluid, nor a fluid solid, by its absence. The sign of any substance containing phlogiston, is its being capable of taking fire ; but, as in the case with metals which abound with it, and which are not inflammable, it is not thence inferred they have none. Thus a body may be said to contain its phlogiston, when after a flame subsides it sparkles or wastes, till reduced to a coal ; and, adverting to the subject of colours, it is known, that the number which we perceive is owing to the varied combination of phlogiston, with oils, earths, and salts.

The

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The next general consideration is, that of secondary principles, (11) which are constituted chiefly of saline and oily parts; and as all the experiments that have been made, prove there is such a mutual agreement, connection, or dependance on one part with another, the knowledge of what substances thus agree or disagree, under their various combinations, forms (as must be clear to every one, and which has been repeatedly enforced) the foundation of some certainty in making experiments for any purpose whatever; but before that can be known, in respect to particular substances, the nature of this universal affection should be conceived, and likewise what are the affinities of the different classes of substances which comprehend the species belonging to them; therefore the following postulata or propositions received as fundamental truths, (similar to axioms in mathematicks, or maxims in common life;) and the table or scheme of affinities which will afterwards follow, have been formed for that purpose.

I. Any

{11} So deemed as containing an analyzation of substances more simple than what they help to form, and are yet composed of primary principles.

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1. Any substance having a conformity with another, the two will unite and form one compound.
2. All simple substances have affinity with each other, and will consequently unite; such as water with water, fire with fire, &c.
3. Substances when united together lose some of their respective properties, and the compounds resulting from their union partake of the properties of those substances which served as their principles.
4. The simpler substances are, their affinities are more perceptible; hence it is most difficult to analyse bodies that are the least compounded.
5. If to a compound, consisting of two substances, a third be added that has no affinity with one, but has a greater with the other, than the first 2 combined have with each other, a new decomposing, and a new union must ensue. (11)

(11) Thus if you pour vitriolic acid on common salt, the mineral alkali having a greater attraction for the vitriolic acid than for the marine; leaves

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6. A third substance offered to a body consisting of two, no decomposition may follow ; but the two uniting with the third, without quitting each other, may form a union of three principles ; presuming the third substance has an affinity, or nearly equally so with each of the other substances. (13)
7. Though a compound consisting of two substances, having a greater affinity with each other than with a body presented to them, may not be decomposed by it ; yet that body, when combined with another, having an affinity with
with

leaves the latter and unites with the former. The vitriolic acid is also said to have a stronger attraction for the mineral alkali than the marine acid has : hence the former acid is said to expel the latter from its basis ; or it may be said demonstratively thus ; If A being united with C, upon B's being afterwards applied to them, lets go C and joins B, A is said to possess a greater attraction for B than C.

(13) Thus when pure calcareous earth (lime) is dissolved in the nitrous acid (aqua fortis), a caustic volatile alkali will not disunite them, because the attraction of the alkali with the acid is not so strong as that of the calcareous earth.

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with it, compensating for its want of it with the others, may separate the two, by uniting with each of them ; therefore in this case there is a double affinity, a double decomposition, and a double combination. (14)

What next follows is a table of affinities, or elective attractions, of one substance to another, or a more specific representation of the substances just alluded to, in the relation they are observed to have with other as productive of those appearances that ensue by their operation on or with each other ; the substances in each column or division are placed in the order they agree with that at the top : thus in the first division, Vitriolic Acid stands at the top ; accordingly the substance that has the nearest affinity to it is
Phlogiston

(14) Thus, to pure calcareous earth dissolved in nitrous acid, (as above) let ærial or vitriolic acid be added, and the effect is obtained ; the ærial acid acting on the earth on one hand, while the alkali acting on the nitrous acid on the other, diminishes the cohesion of the earth with the nitrous acid to such a degree, that the volatile alkali is now able to unite itself with the latter acid, and expel the earth.

Of Colour-making.

Phlogiston; Fixed Alkali has less than Phlogiston;
Calc. Earth less than Fixed Alkali, and so
on. (15)

Vitriolic Acid.

Phlogiston.

Fixed Alkali

Calcareous Earth.

Zinc

Iron

Tin

Copper

Quicksilver

Silver

Volatile Alkali.

Magnesia

Earth of Allum

Nitrous Acid.

Phlogiston

Fixed Alkali

Calcareous Earth.

Zinc

Iron

Lead

Tin

Copper

Quicksilver

Silver

Volatile Alkali

Marine

(14) It may be intimated, that all Chymists do not agree in the justness of these affinities in particular cases, for in this instance (as well as in the instance of printing, and indeed in all human sciences) circumstantial differences will ever happen, since the perceptions of hardly two persons are affected alike.

Of Colour-making.

Marine Acid.

Fixed Alkali
Calcareous Earth
Zinc
Iron
Lead
Tin
Copper
Reg. of Antimony
Quicksilver
Spirits of Wine
Volatile Oils
Gold

Sulphur.

Fixed Alkali
Calcareous Earth
Iron
Nickel
Copper
Lead
Tin
Silver
Reg. of Ant.
Quicksilver
Arsenic

Liver of Sulphur
is partially decom-
posed by

Quicksilver
Solution of Fix. Alk.
Lime Water
Vol. Alk.

Fixed Air.

Calc. Earth
Fix. Alk.
Magnesia
Vol. Alk.

Alkaline Salts.

Vitriolic Acid
Nitrous Acid
Marine Acid
Acetous Acid
Vol. Vitriolic Acid
Sedative Salt
Fixed Air
Sulphur
Expressed Oils

Calca-

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Calcareous Earth.

Vitriolic Acid
Nitrous Acid
Marine Acid
Acid of Tartar
Acetous Acid
Sulphureous Acid
and sedative salt
Sulphur

*Metallic Substances,
Lead, and Reg. of
Ant. excepted.*

Marine Acid
Vitriolic Acid
Nitrous Acid
Sulphur and
Acetous Acid

Lead.

Vit. Acid
Mar. Acid
Nit. Acid
Acet. Acid
Expressed Oils

Reg. of Ant.

Vit. Acid
Nit. Acid

Mar. Acid
Acet. Acid

Arsenic.

Zinc
Iron
Copper
Tin
Lead
Silver
Gold

*Reg. of Antimony
(with Metals.)*

Iron
Copper
Tin
Lead
Silver
Gold

Quicksilver.

Gold
Lead and Tin
Copper
Zinc, Bismuth, and
Reg. of Ant.

Of Colour - Making.

<p><i>Silver.</i> Lead Copper. Iron</p> <hr style="width: 30%; margin-left: 0;"/> <p><i>Water.</i> Fix. Alk.</p>	<div style="border-left: 1px solid black; height: 100%;"></div>	<p>Spirits of Wine Mild Alk. Salt and some Neutrals</p> <hr style="width: 80%; margin-left: 0;"/> <p><i>Spirit of Wine.</i> Water Oils and Refins</p>
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In consequence of heat, sedative salt decompose tartar and sea-salt, phosphorus acids decompose vitriolated tartar, nitre and sea-salt.

Instances of double elective attractions.

As where the two compounds being mixed, those opposite to each other, as they are here exhibited, unite and form double affinities.

<p>Acids. - - - - -</p> <p>Calcareous Earths, or Metallic Substances.</p>	<div style="font-size: 3em;">}</div>	<p>Vol. Alk.</p> <p>Fixed Air</p>
<p>Vitriolic or Marine Acid.</p> <p>Alk. or Earth.</p>	<div style="font-size: 3em;">}</div>	<p>Mercury, Silver, or Lead.</p> <p>Nit. or Mar. Acid</p>
<p>Lead. - - - -</p> <p>Nit. Mar. or acet. Acid</p>	<div style="font-size: 3em;">}</div>	<p>Vit. Acid</p> <p>Alk. Earths or Metallic Substances</p>

Of Colour - Making.

Silver - - } Vit. Mar. or acet. } Acid. }	{ Fixed Air { Fixed Alk.
Nit. Mar. or acet. } Acids. } Calc. Earth. - }	{ Vol. Alk. Magnesia, or Earth of Allum. { Vit. Acid

Instances in Distillations and Sublimations, and
that require heat.

Vol. Alk. - } Acids. - - }	{ Fixed Air { Calc. Earth
Vol. Alk. - - } Vit. Acid. - }	{ Nit. Mar. or acet. Acid. { Fix. Alk.
Vol. Alk. - } Nit. Mar. or Vit. } Acid. }	{ Acet. Acid. { Fix. Alk. or absor- bent Earths.
Reg. of Ant. } Sulphur - }	{ Mar. Acid. { Quicksilver.

Instances in Mixtures by Fusion.

Tin - - } Silver - }	{ Iron { Lead ^s
Copper - } Gold - - }	{ Sulphur { Lead

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Metallic Substances	}	{	Sulphur
Gold - - -			Reg. of Antimony

The affinities or attractions here displayed are either in the humid or dry way; the humid is, when one, at least, of the substances is fluid in the heat of air, or a heat but little beyond; the other is, when to produce a fluidity, the application of burning fuel is necessary.

Example in an instance of single attraction.

Apply to cinnabar and iron filings, a certain heat; the mercury of the cinnabar will rise, and leave the brimstone, its other element, combined with the iron, which it attracts in preference to the mercury.

Example in an instance of double attraction.

Unite mercury with common salt, by means of a like certain degree of heat, a new compounded combination will commence among the substances: by the marine acid of the common salt joining the quicksilver of the mercurial salt, forming a new salt called corrosive sublimate, while the mineral alkali of the common salt unites with the vitriolic acid of the first mercurial salt, and forms what is called Glauber's salt.

Of Salts in General,
or Saline Substances,
comprising Acids, Alkalies and Neutrals.

SALINE substances are combinations of earths and water, or they are combinations capable of uniting with either of them, or with both together, for all salts are resolvable into earth and water, and the more or less they are united to their earths, they are fixed or volatile, which circumstance makes the difference between acids and alkalies. Acids are the simplest of salts, uniting readily with water, are sharp to the taste, and have the distinguishing property of turning vegetable blues and violets red.

Alkalies have a greater proportion of earth than acids have, and have less affinity with water, but unite violently with acids, producing an effervescence and hissing; they are fiery and acrid to the taste, and turn vegetable blues and violets green.

Neutral

Of Colour Making.

Neutral Salts are formed from the union of an acid and alkali, by which union they rob each other of its properties, which are then so blended that neither predominates, and which intimate union is called the point of saturation: they produce no change in the blue colours of vegetables, and are neither acrid or sour, but salt, such as is the taste of kitchen salt, and are generally known by the plain general term of salts. Imperfect neutrals are those in which either the acid or alkali predominate.

Of the universal or vitriolic Nitrous and Marine Acids.

The universal acid, according to its name, is found diffused in the waters, in the atmosphere, and in the bowels of the earth, but seldom pure or unmixed with other substances; what the greatest quantity is collected from is vitriol, hence it is called the vitriolic acid; and when it contains only just phlegm enough to give it a fluid form, it is called oil of vitriol; if it contain much water, it is called spirit of vitriol; when it has not enough to render it fluid, it is called the icy oil of vitriol.

This acid combined with a certain absorbent earth, with the nature of which we are unacquainted

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quainted, forms a neutral salt called allum; differing in quality according to the earths with which the vitriol is combined: An alkali being presented to allum, the acid will quit the earth and join the alkali, and from the junction of the vitriolic acid, with a fixt alkali, a neutral salt is formed, called either *arcanum duplicatum*, or *vitriolated tartar*, one of the fixed alkalies most in use, being salt of tartar.—See Maddering, and note 27.

The conjunction of this acid with phlogiston forms sulphur.

Nitrous Acid.

This is no other than the vitriolic acid combined with phlogiston, by the agency of putrefaction, at least such is the received opinion, the nitrous acid being found only in earths and stones, impregnated with matters subject to putrefaction; when combined with chalk, stone, marble, &c. it forms a salt, that does not chryftalize, which runs in the air, per deliquium, and is decomposed by fixed alkalies, with which the acid unites and quits the earths, and from this union results *salt-petre*.

The most remarkable and distinguishing property of nitre is its disposition to unite with phlogiston,

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phlogiston, in its purest state, such as char-coal, sulphur and metallic substances; thence bursting into a flame with great noise, called its detonation or deflagration, in which case the acid is dissipated, and the alkali which is left is called fixed alkali.

A nitre is to be procured by dropping into spring water, a solution of fixed alkaline salt, filtrating the liquid and evaporating it to a certain degree.

Marine Acid or Sea-Salt.

In respect to the constituent parts of this acid, wherein it differs from the vitriolic and nitrous, it is not certainly known, no more than it is wherein they differ from each other; but when combined with absorbent earth (lime or chalk) it forms a neutral salt, that does not cristallize, and when dried, attracts the moisture of the air: This acid, like the others, has less affinity with earths than with fixed alkalies, but as well as the others have, it has a greater with phlogiston; and when combined with fixed alkali it forms a neutral salt which shoots into cubical chrystals, and is inclined to run in the air.

The acid of this salt when freed from its basis, is called *spirit of salt*, and when containing little phlogiston,

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phlogiston, it is called the smoaking spirit of salt, from its then continually emitting vapours.

Combined with phlogiston, a kind of sulphur is the result, that takes fire on being exposed to the air, called *phosphorus of urine*, being generally prepared from urine.

India supplies us with another acid called borax, which flows and takes the form of glass, and possesses some of the properties of fixed alkali.

L I M E.

Any substance that has been roasted in a strong fire without melting, is called a calx; stones, (which are substances composed of different earths) reduced to this state is called lime; this applied to fixed alkalies make them more active and renders them corrosive or caustic, and from which the common caustic stone is prepared: Lime unites with all acids, and chrystalizes with the marme, but not with the nitrous.

Quick lime attracts the air like concentrated acid, and dry fixed alkali, but not so as to render it fluid; it only takes the form of a powder, and is then called flacked lime; when once flacked, though it seem ever so dry afterwards, it requires a violent calcination to separate the water from it,

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it, which it had imbibed. Sand is mixed with it in making mortar, or it would otherwise contract and consequently crack and break.

In Chemistry it is deemed holding a middle rank between absorbent earths and fixed alkalies.

Metallic Substances.

These consist chiefly of a vitrifiable earth combined with phlogiston, and are therein fusible; they are likewise ponderous, opaque, and sparkling: a third principle is contended for by some chymists, called mercurial earth, but it is doubted to exist by others.

Metallic substances readily unite with most acids, and in that case an ebullition with vapours arise; by degrees the metallic particles become invisible in their solvents, and the metal is then said to be dissolved; but, as with alkalies, an acid can only take up such a portion as is sufficient to destroy some of its properties, and to render others weaker. The affinity that metallic substances have with acids, is less than

M

what

Of Colour - Making.

what they have with absorbent earths and fixed alkalies, so that the acid which will unite with these substances, will decompose the metalline salts, and precipitate the metal, which are then called precipitates and magisteries.

Metallic substances are 6 in number, 2 perfect viz. Gold (Sol) Silver (Luna) and 4 imperfect, viz. Copper (Venus) Iron (Mars) Tin (Jupiter) and Lead (Saturn;) Quicksilver (Mercury) is by some, called a seventh metal.

G O L D.

As metals are the heaviest substances known, gold is the heaviest of all, and when pure, is unalterable in fire as far as any experiment hath hitherto proved, neither can it be dissolved by any pure acid; but only by the acid of nitre mixed with that of sea-salt, called aqua regia. Gold is likewise the most ductile and most malleable of all metals.

A remarkable circumstance, and as yet not clearly accounted for, is the fulminating quality of the precipitate by an alkali or absorbent earth, gently dried and exposed to a certain degree of heat ;

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heat; this is called *aurum fulminans*, but the acid of vitriol poured on it, will deprive it of that quality, as will likewise be the case, if it be cleared of its saline particles, which, washing it in water will accomplish.

Gold is not affected by a pure sulphur when combined with an alkali.

S I L V E R.

This metal is the next perfect to gold, being lighter and less ductile, but like gold it resists the greatest force of fire, in which is their superiority over all metals: The true solvent of silver is the nitrous acid, the crystals formed thereby are particularly caustic; it is likewise soluble by the vitriolic acid, if it be concentrated, but spirit of salt, and aqua regia, as well as the other acids, are not capable of affecting it: yet in reality it has a greater affinity with both, than with the vitriolic; for if the vitriolic or marine acid be added to a solution of silver in the nitrous, the silver will directly join it, and the precipitate procured by the marine acid, is called *Luna Cornea*: Fixed alkalies and absorbent earths will separate the silver from the nitrous acid, though the nitrous acid cannot act on it when mixed with an equal quantity of gold, but when

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When in a triple proportion it can with ease : If aqua regia be employed when they are in equal quantities the separation will be effected, by the gold being dissolved and the silver left free ; but the operation by aqua fortis is to be preferred, it having no effect on gold, and a little of the silver is always taken up by the aqua regia : Silver united with sulphur soon flows, and forms a malleable mass, the colour of lead:---Solution of silver in the nitrous acid stains hair, bones, wood, &c. from a brown to a black, and gives a stain to marble and other stones.

C O P P E R.

This is the first of the imperfect metals, it resists fire a long time, unites readily with gold and silver, and is soluble in all the acids, neutral salts, and even in water; to some imparting a green colour, and to others a blue : dissolved in vitriolic acid it forms blue crystals, called blue vitriol or vitriol of copper : dissolved in aqua regia, the marine or nitrous acid, it forms a salt which does not crystalize, and runs in the air : The precipitates by alkalies or earths retain

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tain nearly the colour the solution gives: mingled with nitre and exposed to the fire, as well as the other imperfect and semi-metals, it is sooner decomposed and calcined than if presented alone: mixed with sulphur and made red hot, it soon melts and forms a new compound more fusible than alone.

I R O N.

This metal stands alone for its property of being attracted by the magnet, but loses it if reduced to a calx, or converted to an earth: by repeated melting it is rendered purer than by having only undergone fusion, but is not malleable till after being heated red and hammered in all directions: before this process it is called *pig-iron* but *bar-iron* afterwards; and is then harder to fuse: Fusing it with articles that contain phlogiston, or enclosing it in phlogiston matters, and exposing it thus in just a red hot state for a certain time, it is converted into steel or hardened: Suddenly quenching it when red-hot in a cold liquor, the hardness is augmented, and that in proportion to the heat of the metal and coldness of

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of the water; it may be brought back by cementing it with calcined bones, chalk, &c. rendering it red hot and leaving it to cool gradually, or if heated alone, and left thus to cool, the temper given to steel is destroyed. Iron being calcined turns to a yellowish crust, by losing its phlogiston, and is then called *crocus martis* or *saffron of mars*. All acids, as well as certain salts, alkalies, and water itself, operate on it, but the vitriolic acid dissolves it the readiest, rendering the solution of a beautiful green; the crystals produced by which are called *green vitriol*, *vitriol of mars*, or *copperas*: Ochre is the sediment produced from green vitriol dissolved in water: Spirit of nitre dissolves iron with ease, producing a brownish yellow, but the calx formed by this solution cannot be a second time dissolved, for having lost its phlogiston, the nitre will not act on it, neither does this nitrous solution crystallize: The solution by spirit of salt is green, the vapours of which are inflammable, as well as those caused by the vitriolic acid: the solution in aqua regia is yellow.

Iron having a greater affinity with spirits of nitre and spirits of vitriol, than either silver or copper has, if offered to a solution of either, the
silver

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silver or copper will precipitate, by the acid quitting them and joining the iron: Iron filings exposed to the dew, turn entirely to a rust, called *crocus martis asperius*: united with sulphur, it acquires a great degree of fusibility: Iron makes a part of almost all substances (which the magnet will discover) it is found in the caput mortuum of all vegetable substances, even in honey, the earth being supposed to be impregnated with a ferruginous or vitriolic matter, and from thence received into vegetables, and from vegetables it passes into animals: It is the only metal that sparkles in the focus of a burning glass.

T I N.

This is the lightest of all metals, has but little ductility and runs long before it is red hot: The calx when vitrified, being mixed with some other substance is called enamel, which is differently coloured by means of other metalline calces: Tin unites with all metals, but destroys their ductility and malleableness, lead excepted: Those the most ductile it effects the soonest, and in the greatest degree: Bronze and bell-metal are made from a composition of this metal with zinc: mixed with lead it produces pewter, and

Of Colour - Making.

and is used with quick-silver in making looking-glasses.

The vitriolic, nitrous and marine acids have an affinity with it, but cannot easily dissolve it, as they only reduce it to a kind of calx : The proper solvent (as mentioned more fully further on) is aqua regia, and has even a greater affinity with it than with gold: Gold precipitated by this method is a most beautiful colour, and used as a red for porcelain and enamelling : It has the property of giving red colours in general, hence tin vessels are used in making fine syrup of violet. It is not affected by water as iron and copper are, but it loses its polish on exposure to the air : It readily unites with sulphur.

L E A D.

This is the heaviest of all metals, gold and silver excepted, is softer than any, and except tin, melts the easiest : Vitriolic acid affects it nearly as it does silver ; the nitrous acid dissolves it with much ease, and in great quantities ; the crystals are of a sweet taste, of a yellowish colour, and are not easily dissolved in water : Spirit of salt, or the salt in substance, added to the solution in nitrous acid, produces a white precipitate called *plumbum cornea*, which dissolves

Of Colour-making.

solves easily in water : Being melted, it hardens into a kind of horny substance, like the lina cornea (whence the name :) Lead boiled a long time in a lixivium of fixed alkali will partially dissolve : It is rendered very refractory by sulphur.

QUICKSILVER.

This substance is soluble in acids, but to each acid, particular circumstances are annexed ; thus the vitriolic acid concentrated, and made boiling hot, reduces it apparently to a white powder ; which on the affusion of water turns yellow and is called *turbith mineral*.

Quicksilver is easily dissolved by the nitrous acid ; the solution is clear, and as it cools shoots into crystals : If evaporated to dryness, it produces red precipitate : With solution of copper the precipitate is green.

Combined with marine acid, it forms a metallic salt, the crystals of which, called *corrosive sublimate*, are pointed like daggers, and is the most violent corrosive hitherto discovered : From this sublimate is produced yellow precipitate : Quicksilver unites with sulphur very easily, and produces by the mere mixture, *ethiops mineral* :

Of Colour - Making.

neral: By rendering the union more perfect by a strong heat, a ponderous substance is procured called *cinnabar*, which finely ground produces *vermillian*.

Of Semi - Metals,

Namely, Regulus of Antimony, Bismuth, Zinc, Regulus of Arsenic.

Reg. of antimony has the brilliancy, opacity, and gravity of a metal, but like all semi-metals, crumbles under the hammer: It soon dissipates into smoke and white vapours by a violent heat; flowers of antimony are those vapours, collected by any cold body, which stops them in their ascension.

Its affinity is greatest with iron, copper next, and then with tin, lead, and silver.

Its proper solvent is aqua regia, marine acid next, if highly concentrated and applied by distillation; The vitriolic acid likewise dissolves it, but with the nitrous it is little more than calcined.

Liver of antimony is procured by mixing nitre with it, three parts nitre and one of antimony produces

Of Colour - Making.

produces a calx called diaphoretic antimony, or diaphoretic mineral. Antimony is used to separate gold from other metals, and the precipitate from its union with an alkali, is called the *golden sulphur of antimony*.

B I S M U T H.

This substance is rather duskier than the former, and like other semi-metals is volatized with a violent heat: It mixes with and quickens the fusion of all metals, whitens them, and destroys their malleability.

Bismuth is not soluble in the vitriolic acid, but in the nitrous it dissolves with much fume: Marine and aqua regia dissolve it, but with less rapidity; alkalies, and even water only, precipitate it, forming the *magistry of bismuth*. In its union with sulphur it forms a compound, appearing like needles lying sideways by each other.

Z I N C.

Zinc differs little in appearance from bismuth, except having a bluish cast, though essentially it differs very much: It melts the moment it grows red, soon turning to a calx; and in an augmented heat burns like an oily matter, evincing the great quantity of phlogiston which it contains.

Of Colour - Making.

It unites with all metallic substances except Bismuth ; It is soluble in all the acids, particularly in the nitrous ; sulphur has little or no power over it.

It has a greater affinity with the vitriolic acid than iron or copper has, forming a precipitate called white vitriol, or vitriol of zinc : United with copper it makes brass, pinchbeck, &c.

REGULUS of ARSENIC.

This readily unites with all metals, and is the most volatile of the semi-metals, flying off even by a moderate heat : the calx is plain arsenic ; the properties of which are peculiar to itself, having great volatility, having a saline character, being soluble in water, and excessively corrosive, a quality none of the other semi-metals possess : It cannot be decomposed by any acid, except when joined to metallic substances : Combined with the alkali of nitre or sea-salt, if they be in a fluid state, it forms a singular saline compound, called *liver of arsenic* : Arsenic unites readily with sulphur, and produces *yellow orpiment*.

Inflammable

Inflammable Substances.

These are Sulphurs, Oils, Refins, Bitumens, Spirits of Wine, Charcoal.

ALL bodies, probably contain more or less phlogiston, but these are deemed inflammable in which it abounds, but with which, at the same time, it is not so intimately blended, but that it may be driven out from them, under certain circumstances, by the intervention or rushing in of the air.

Sulphur (as said before) is the vitriolic acid combined with much phlogiston. Oils are mineral, vegetable, or animal, and are, in general, unctuous bodies, that burn and consume with flame and smoke, containing phlogiston; which by means of an acid is united with phlegm or water, together with a certain portion of earth: Nitrous and vitriolic acid, act on oils according to the portion of phlegm which they contain.

Charcoal, or any charred matter, is what is left from the burning of any vegetable or animal matter, that has an oil united to much earth; this substance is unalterable by any other body than fire; hence acids ever so highly concentrated have no effect on it.

Refins will be spoken of in the next section.

Of Vegetable Substances.

From the analysis of vegetable substances, it is clear they contain phlegm, an acid, a light oil, much air, and a thick oil, but none of these principles can be obtained pure by mere distillation, as their separation is only begun by this process, therefore others are adopted to compleat the analysis.

Some vegetables, by analization, prove that they contain the same principles as animal substances possess, and instead of yielding an acid, a volatile alkaline only is to be obtained; probably because the acid of the vegetable suffers such changes when it enters into the composition of animals, that is, it combines with some of their earth and oil, in such a manner as to be changed into a volatile alkali.

In burning any vegetable substance in the open air, the analysis is more rapid and compleat, burning till all its oil is consumed, and a coal remains, and this continues wasting till all its phlogiston is dissipated, what then is left is its
earth

Of Colour - Making.

earth and fixed alkali, commonly called the ashes. Water, the natural solvent of salts, takes all of them up that are contained in the ashes, so that by lixiviating them, nothing at last is left but the pure earth.

All balsams, as well as turpentine, are oily aromatic matters, procured by different methods from those trees which produce them; these abound with essential oils separated from the vegetable in which they exist,

Resins are distinguished from natural balsams by containing less oil, and more acid, so that they are less disposed to be fluid, and are soluble only in spirits of wine; they however differ from each other according to the quantity or quality of acid to which they owe their consistence: The saline character of Benjamin is evident from its being soluble in water, but then it must be boiling; the salt produced from it will chrysalize and may be dissolved in spirits of wine.

Gums differ from resins in being soluble in water, but (as before said) resins are not; resin being an essential oil grown thick, and have an aromatic odour, which gums have not: the small portion of oil which gums contain, being so thoroughly mixed with their acid, does not hinder their

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their dissolving in water, and therefore they resemble honey, and other vegetable juices, in being originally fluid, and only grown hard by the evaporation of their moisture; the same as resins become solid by losing, in the same manner, their fluid parts: but in gum-resins, the two qualities are so blended, that each will dissolve in its proper menstruum, leaving the other entire.

Sugar, manna, and all the saccharine juices of fruits and plants, are of the nature of honey, containing a phlegm, an acid, an oil, and a coal: but differ from resins in not being inflammable, or will not flame till nearly reduced to a coal: All these substances are deemed natural soaps, consisting of an oil rendered miscible with water by means of a saline substance, but differ from common or artificial soaps in having their saline part an acid, while that of the others is an alkali: Why they are sweet, though containing much acid, is from the acid being intimately sheathed or smoothed by the oil: Of soap it may further be said, that alkalies or acids combined, in a certain manner with oil, produce them; for oily and saline substances combined, follow the same rules as other combinations, by reciprocally combining the properties belonging to each other, and

Of Colour - Making.

and (according to the rules of affinities) soaps are decomposed by alkalies, and alkalies by acids.

The most expeditious mode of making a soap (being Dr. Lewis's improvement on Mr. Beaume's) is, by heating the alkali red hot, then throwing it into oil of turpentine, and stirring them well together; in time, a salt crystallizes both within it; and over its surface, but its nature is unknown.

Of Animal Substances.

These produce jellies, which when inspissated and become solid in the cold, form glue, and by the evaporation being carried further, it becomes horn.

This jelly, or gelatinous substance, is the only true animal one; as all human parts, bones and all, are to be reduced to it; the other properties it has in common with vegetables gums or mucilages, except that the animal one makes a stronger cement: Acid, and alkalies particularly, easily dissolve animal jellies; but the nature of these combinations is not known.

Of Earths.

Earths are either ponderous ; calcareous (*Lime*) magnesia ; argillaceous (*Clay*;) or silicious (*Crystal*) They are characterized by remaining unaltered in a red heat, and of those five above mentioned no one has been yet able to decompose or transmute one into another.

Ponderous earth forms with vitriolic acid, ponderous spar, and is not soluble in one thousand times its own weight of boiling water.

Calcareous earth saturated with vitriolic acid forms *gypsum*, known by the property it has of forming, after a slight burning, a hard mass with water.

Magnesia saturated with vitriolic acid, forms what is called *Epsom salt*.

Pure argillaceous earth with vitriolic acid forms an allum.

The above four kinds may be called absorbent earths, but the last has the least claim.

Silicious earth is not affected by vitriolic acid, it is however dissolved by that of spar, the diamond excepted, neither is the diamond changed by the greatest heat, if not exposed to the air.

Of Fermentation and Putrefaction.

By fermentation is understood (as partly mentioned before, see notes 12 and 33 in copper work) be a spontaneous motion in a body, by which a new disposition and combination of its parts is produced: To procure it there must be a certain proportion of watery, saline, oily and earthy parts, the subject must be in a temperate heat, and have the assistance of the air: And as all animal and vegetable substances contain the principles just mentioned, they are of course all subject to fermentation: Minerals are excluded, not being as far as can be discovered, subject to this operation.

There are three species of fermentation, the vinous or spirituous, or what produces wine, and spirituous liquors; the acetous or what produces acid liquors, such as vinegar; and the putrid, or what generates an alkaline volatile salt.

The subjects of the spirituous are most fruits, seeds and grains, diluted with a certain quantity
of

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of water ; by certain processes, air bubbles arise with vapours, so extremely active and pernicious that without caution the effects may be fatal, this operation, if not stopped, will proceed to the last stage, namely putrefaction ; the impurities then precipitate and leave the liquor clear and transparent.

By distillation an inflammable liquor light, pleasant and penetrating is drawn from wine that has fermented, which by repeated processes become more and more rectified, and is called spirit of wine ; and if considerably purified, an ardent spirit ; which burns without smok or leaving any coal : united with acids they lose their pungency, and are said to be dulcified. This ardent spirit may, however, be rectified, or entirely dephlegmated till it produces æther, which is so volatile that it flies off in the air, fires at the approach of a flame, and leaves not the least appearance of ashes ; dissolving oily matters with the greatest ease, and has a greater affinity with gold than even aqua regia has.

Besides this ardent spirit, a deal of water, oil, earth, and a kind of acid is afforded by wine, which when the spirituous part is extracted suffers no farther change / but if they all remain, the

Of Colour - Making.

the fermentation, after some time, will begin again, the liquid turns sour, and then acquires the name of *vinegar*; but this produces no noxious vapours, nor deposits any tartar: Wine however is not alone the subject of acetous fermentation, for several vegetable, and even animal substances, not subject to the spirituous, turn sour before they putrefy: this acid has the same properties as the mineral, and has effect on the same substances that the mineral acid has, but in a weaker degree: It has a greater affinity with alkali than sulphur has, and a neutral oily salt is formed from its saturation with a fixed alkali. By its solution in spirits of wine, is produced *regenerated tartar*: Several saline compounds are produced by its union with calcined pearls, corals, shells, &c. it perfectly dissolves lead, converting it into a neutral metallic salt, from which is produced *Sal Saturni*, or *Sugar of Lead*, because of its sweet taste; The vapour of vinegar has that effect on lead as to produce *cerufs*: Vinegar likewise corrodes copper, and converts it into a green rust, called *verdigras*, though not commonly employed for that purpose, wine, or the rape of wine, being more used.

Tartar

Of Colour Making.

Tartar is a saline compound, containing earth, oil, and a super proportion of acid ; it is formed in wine-casks, adhering to the inner sides, particularly in those that contain acid wines ; when purified, there appears on the surface a crystalline pellicle, or sort of skin, which taken off is called *cream of tartar*, the crystallizations of the same liquor are called *crystals of tartar*, and only differ in form from the cream ; and though they have the appearance of a neutral salt, yet they have all the properties of a true acid, but weaker than any other : by calcination a fixed alkali is procured from tartar, stronger and more saline than what is formed from most other matters.

The last stage of fermentation (though by some deemed a distinct operation (16) is putrefaction, to which state when a body is approaching, it is evident by a superior degree of heat, the effect of which, as in the preceding spirituous and acetous operations, tends to change the disposition of the particles of the body in which it is excited ; though how it is brought about, is not yet discovered ; but after it has undergone the change, the body seems then to contain a principle

16 Boerhaave particularly, Stahl however denies it.

Of Colour - Making.

principle that it did not before, a saline matter exceedingly volatile, and is, when separated from the other principles of the body which produced it, either a volatile urinous spirit in a liquid form, or a volatile urinous salt in a mass. In this state, whatever difference there might have been, before in vegetable substances, none is now visible.

End of the Compendium of Chemistry.

Note, It is in different places observed, that it would be absurd to offer positive or specific rules for the performance of the operations just treated of, and for which, various reasons are given (see introduction to copper-work note 16, and other places) therefore according to the same principles the subject of this section will be treated in a similar manner; and as the preceding part of this section was exhibited under an idea that a knowledge of chemistry should be the foundation of the practice in its fullest extent, so the following compendium or general view of operative circumstances is exhibited as the foundation of those processes which arise from them, spreading every way into an endless variety, and which can only be conceived by long experience in the practice of them.

Red,

Of Colour-making.

1. Red, yellow, and blue, are the primitive or fundamental colours, and from which, under various combinations, all colours or shades that exist in nature that are to be procured. Black is excluded on a philosophical consideration.

2. Most colouring materials require some operation to separate or dissolve their tinging qualities; some will give no permanent colour, till the subject intended to be coloured is printed with some astringent, such as allum, which will secure the particles of the colouring such, such as red from madder, yellow from woad, &c. or by the addition of others the colour is varied according to the quality of the additional salts, as tartar, &c. vary the shade or colour that the allum only would procure.

3. In general the effect of colouring materials produced by certain solutions, is different from their natural outward appearance.

4. No substance is yet discovered that of itself will make permanent green (17), consequently all durable

* 17 Thousands of unsuccessful attempts have been made to attain this point, but till the tinging blue and yellow substance can be so equallized in quality, or harmonized in union. it is granted it must remain undiscovered.— See more on this matter further on.

Of Colour - Making.

durable ones are compounded ; neither is there any black material in use, that, of itself, gives a permanent black. (18)

5. In some cases, the colouring liquid must be boiling, in others luke-warm, and in others cold : some drugs require a certain age, and others not : the materials which form different vessels, in which colours are made or kept, should be considered, as well as their capacities, or the uses to which they may have been before applied.

6. In the operation of fast work, should be considered 1. the opening of the body to be coloured : 2. the colouring matter itself, and 3. the fixing of it, to which may be added, the clearing or brightening of it. (19) See the end of copper-work.

Note, Cleanliness at all times, and in every stage, cannot be too much enforced ; thus if the colour maker be ever so careful, his endeavours may be

N

rendered

(18) It is remarkable in many cases, that the deepness of the black depends on the height of the white of the substance from which it is produced, as ivory when burnt ; and some materials, as madder, woad, and indigo, will turn black in their effusions, by repetitions of their tinctures,—see note 28 farther on.

(19) This brightening is too much practised, not as here meant, but merely to flush up the colours, —See madding, and note 39 of this section.

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rendered abortive by the careless use of sieves, pans, &c. A Colour-house should never be open to every one; and a place should be set apart for delivering out colour: for wantonness and malevolence, it is well known, has in this case great latitude.

Drugs, and other Articles used in Colour-making. (20)

VEGETABLE Substances.

Gums arabic, fenegal, tragacanth, mastic, lac, copal, and dragons blood, Madder, Indigo, Woad, Weld, Sumach, Fustic, Saunders, Annatto, Greenwood, Logwood, Brazil, Safflower, Barks, Flower, Starch, Bran, French berries, Resin, Ash, Vinegar, Verjuice, Crude tartar, Galls, &c.

MINERALS

(20) Non-colouring drugs, such as allum, tartar, and other astringents, are those which after being used, must undergo the process of boiling with certain colouring drugs, such as madder, weld, &c. &c.—This is a dyers term, and applied to articles used previous to colouring.

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M I N E R A L Substances, Salts and Earths.

White and yellow copperas, Orpiment, Arsenic, Corrosive sublimate, Roman vitriol, Vitriolic nitrous and marine acids, Salt-petre, Sal ammoniac, Verdigris, Tin, Pewter, Copper, Steel filings, Antimony, Chalk, Tobacco pipe Clay, Lime, &c.

MISCELLANEOUS Substances.

Urine, Dung, Lamp-black, Acid of tar, Iron liquor, Hartshorn, (21) &c. Other articles might be added, but the above are chiefly in use. ---See account of drugs, &c. further on.

(21) The goodness of drugs is of the utmost concern, and well it is for those Printers who are not under the necessity of being restrained in this respect some by choice will not have the best even when needed, and others for reasons, too common in every station of life, must take what materials they can get.

The

Of Colour Making.

The most durable Black and Purples, are brought up in madder, by the agency of iron liquor: Reds by allum, and occasionally tartar, salt of lead, and iron liquor, to vary the hue to a Pink, a Blossom, a Chocolate, &c. Yellows in weld, by allum and tartar: Olaves, Drabs, &c. by allum, tartar, and iron liquor: Doves, Browns, Greens &c. in Sumach, Fustick, Greenwood, &c. by allum, tartar, and iron liquor: Blue, from Indigo or woad, by the agency of ash, lime, and orpiment.

Less permanent blacks, reds, purples, pearls, &c. are brought up in logwood, brazil, bark, &c. by the agency of iron liquor, galls, copperas, &c. but in skilful hands are to be much improved.

Chemical browns, buffs, pale greens, blue, salmon, and other colours, are by the agency of Tar acid, Iron liquor, Verdigris, Woad, Annatto, &c. brought up or struck with lime, and other colours, such as berry yellow, pencilled blue, procured from indigo, &c. require streaming or rinsing in water only.

Note, As the above is only a summary, or e'ementary view of colours &c. a plan of a table for fixing proportions and shades to certain circumstances, is offered further on.

For conveying these mixtures to the cloth various articles are necessary to be used according to certain circumstances; these

Of Colour - Making.

vehicles are gums and pastes (22); paste being of a more compact consistency than gum diluted, is used when lines or fine bodies or shades are required to be accurately expressed; diluted gum is more used in conveying solid bodies, in which no great accuracy of shape is required.

Of gums, tragacanth has several advantages, and if properly managed, would distribute as well as the arabic, but this article as well as the oak-gall is not always made the most of.

Lampblack(23), Brazil, &c. are necessary to deepen the colour of those mixtures, which would otherwise be too pale for printing, in some cases.

(22) Pastes are made from flour and starch, and those articles as well as gums should be of the purest kind, when used as vehicles for carrying the colour.— Gums should be tried that no saline quality has been incorporated with them by their having been before in a liquid state by any accident, particularly at sea.

(23) Lampblack is the least innocent in general from its oily quality, it should therefore be the lightest and blackest that can be had, which depends a great deal on its being well burnt, indeed it would often be the better for work if it were spared. Brazil is so innocent and the stain so easily removed, that little objection lays against it; it gives out its colour best with hard water.

Of Colour-making.

Attempting now to speak immediately of the colour-makers practice, the first consideration is in what degree of responsibility he stands, both as he has to act himself, and as he is concerned in the operation of others; which collectively considered, comprizes, 1. Ashing, Souring, &c. or the preparation for the reception of his mixtures. 2. Printing or the application of them, and 3. striking or fixing them, including rincing, streaming &c. of chemical ones, or those not brought up in the copper, (24) for though colour-making is a distinct process from preparation, printing and boiling off, yet (as more fully considered further on,) being of the utmost consequence to a colour maker how they are performed, he may be said to be closely concerned in them.

The preparation has been spoken of, but for the sake of preserving a kind of formality in treating this part, what has been said will 1st, be briefly recapitulated; 2dly, the nature and use of astringents will be next touched on; 3dly, some suggestions offered concerning colouring substances; including the result of various experiments; lastly, the application of his mixtures in the operation of printing, with notes and observations on the whole, more or less applicable to the subject, as the

(24) The fielding, may be said; to be a process which rests with the foreman of the field, of which more is said further on.

Of Colour - Making.

discussion of it leads the writer (according to the unrestrained mode in which he indulges himself) to deliver them.--- See introduction, and note 2 in copper work.

It is therefore first observed, that as goods appropriated for printing, though having undergone the processes in use among whiterers, or bleachers by profession, may nevertheless contract in the course of their removal from one place to another, foulnesses of various kinds: they are in general soaked or steeped in water, that any loose dirt may be removed; but there may be foulnesses which water only will not remove, of course something more penetrating must be applied; if ash be used, it is presumed some unctuous substance is to be removed, which the ash effects; but as the earth of the ash is supposed to be left in the cloth, which water will not easily remove, an acid is to be applied for that purpose, or sometimes to answer for ashing, and the cloth thus (after the usual processes of planking, &c.) is rendered as pure and white as possible.

Here then commences the colour-makers immediate concern, and consequently the considerations respecting it, of which, it need hardly be said, the first is that of the nature or properties of those substances that are requisite to form a basis for the colour, chiefly in respect to the relation

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lation they hold with each other in view of producing certain effects, according to the principles as established by nature, which principles in the first case are applicable only to chemical experiments (as exhibited in the tables of affinities and the rules immediately preceding them) but in advancing a step further, that knowledge must be considered as furnishing us with means of turning those experiments to advantage; therefore a colour maker when surrounded with his drugs &c. should look upon every article as an instrument in his hands, that ought not to be employed in vain; but this knowledge, to its proper extent (so rarely to be met with) is not to be acquired merely from self experience or the experience of others, and not only that such ingredients mixed or applied in such a manner will produce such effects, but why and upon what principle it is established, and by what laws it is governed: here is the spring that should give motion to this department; here is the basis on which the practice should be erected and diffuse itself; and here originates the grand source of a colour-maker's practice, namely, the knowledge of the laws of affinities, and the certain effects of combinations, previous to the adding of certain substances to each other: for in every mixture that can possibly be made, invariable effects according to those rules will naturally follow.

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Thus beginning with the principal articles in a colour-maker's province (see note 39 at the end of copper-work) namely, salts or astringents; (see note below) it is necessary to know, according to those rules established by nature, how each species affects any substance it may be offered to, and how it is affected in return; for all substances mixed with others of different qualities, must cause a change in some respect or other, according to the fundamental principles as exhibited in the beginning of the compendium of chemistry, (see rule 3) and this knowledge (it is again said) is the proper foundation or support of the practice of colour-making.

2d, *Of Articles that procure from various Substances their colouring Properties.* (25)

The articles of this description are very numerous, and are the chief or only agents we are in possession

(25) These are chiefly allum, lime, marine salt, nitre, sal-ammoniac, tartar, fixed and volatile alkalies, with various metallic salts, and are in general called astringents, though rather forced, as astringent is more applicable to medicine, and some articles have astringent and colouring qualities united, as galls, sumach &c. but salts or acids would be too general terms; and technicals frequently want allowance in the use of them; thus, specifically speaking, lime is caustic; ash, alkaline; tartar, acid; allum, saline; &c. hence, though not a practical term in printing, wherever astringent is used it alludes to striking or fixing the colour.

Of Colour-making.

possession of, in procuring permanency of colour, and the most general in its application is allum; its superior power is confest by its uniting two qualities, heightening colours, and fixing them at the same time. (26)

Colours that are not permanent, are, it is apprehended, owing to the want of some such substances being previously applied to the cloth; or of not being able to unite with them; hence (as has been said) the colouring particles not finding pores

(26) The manner of salts being applied in dyeing is different, according as the subject is wool, cotton, silk, velvet, thread, &c. their pores being different, in various respects, and consequently their aptitude to receive colour is so likewise: thus some substances, as cochineal and kermes, that in dyeing give a scarlet to wool (which is the easiest substance to colour) give a very dull one to silk and cotton, and require a larger quantity, see note 36 and 41. The remark is likewise applicable to the different manufacturing of goods; and it is mentioned in the beginning of Bleaching, that the preparation is necessarily different. This is intimated here to those who think it is indifferent what subject any tingeing substance may be applied to, and may have occasion to print an other article than cotton or linen.

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pores sufficiently open to imbibe them, are supposed to lay chiefly on the surface.

Lime has the property of uniting two of the greatest opposites in nature, Salts and Earths; it is soluble in water, by means of fire; but the air renders it indissoluble again; thus it is capable of forming an unalterable cement when united with other matters; but allum, as above-said, has a property beyond, which is that of attracting certain colouring particles (27): nitre, marine salt, sal ammoniac, sacrum saturni, and tartar, are, strictly speaking, only alterants, by changing the red to a crimson, a blossom, a pink, &c. Neutral salts with a metallic basis, rather give strength to the colour, than solidity in respect to its fixity, for every colouring substance will vary its shade, according to the nature of the earth that attracts its particles:

Two neutrals, Copperas and Roman vitriol, with metallic bases, are in common use, owing to their astringent quality being in union with their alterative principle.

In

(27) Roman allum being white, and pure, is the most proper, as rock allum contains iron.— See Pomet on drugs and the compendium of chemistry.

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In procuring a black, it is in general by introducing within the pores of the cloth, particles of iron dissolved in various liquids, and precipitating them on the subject by means of some astringent substance supplied with phlogiston, sufficient to render the iron black; but this should be done so that the precipitating matter do no injury, and that can only be accomplished in proportion as the particles are dissolved. (28)

It

(28) Iron, rather than causing a black, contributes to it from the effect of its attrition, as oak turns black by sawing; white grease is made black by its friction with iron; green fruit turns black if cut with a knife; the black colour in earthen ware is owing to vitrified iron; and copperas which is used in procuring a black, is the salt of pyrites, with which iron is incorporated.

The cause of rottenness, attributed generally to the copperas, used in procuring black, is owing to the earth of iron (where it is used) not being separated from the solution, and when said to be rotten from copperas, it is from the gross particles not finding easy admission into the pores; hence they in a manner burst open their enclosures, tearing of course, the parts that resist.—See iron liquor further on.

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It is to be understood (as before said) there is no black substance, vegetable, animal, or mineral, that possesses the durable tingeing properties of indigo, madder or weld (these blue, red and yellow substances are mentioned, being most in use) for all black fœculencies are of too dry a nature to be introduced and fixed in any subject, either by any adhesive quality of their own, or by the previous use of astringents, as they only act on unctuous substances. (29) Galls, sumach, logwood,

(29) Here, according to the laws of affinities, (which should always be borne in mind in whatever relates to colour-making) it is said (though observed before, see article maddering) that between the astringent introduced to fix the colour, and the colouring substance itself, there must be a mutual attraction, or a greater one than between either of the substances and the liquid in which either may be suspended, else they cannot unite so as to form that cement which causes permanency; hence (as before observed) there are no black substances that any saline astringent will take hold of, and even from their natural dryness, their particles keep at too great distance in water, ever to attract each other sufficiently.—See note 31.

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logwood, &c. containing within them the primitive colours, blue, red, and yellow, it is thought a black is produced from a combination of them, and according as either is acted on by the salt of copperas or iron, and as made use of for procuring a black, it indicates by the shade that is left when the black is flown, on which the salt was employed. (30)

Of

(30) Hellot and D'Apligny says there are many plants, which, treated like the anil (from which is procured indigo) would probably produce a black feculence, such as the liquorice root, choak weed, and several others, as mentioned further on in speaking of colouring substances; Dr. Lewis, however, doubts it.

The antient Gauls used myrtles in dyeing purple; and it is thought with the use of astringents a black might be raised with them, as well as from the barberry or prickly sorrel; though some who have tried have not succeeded: Linnæus says, St. Christopher's herb gives with allum a black, and Hellot says, a tree in the Brazils is of such a black tingeing quality, as to dye the flesh and bones of animals that eat it, black, similar to the red effect of madder: the anacardium nut is said to produce simply of itself a fast black: but in cases of this nature it is not much to be expected that persons will go out of an old track,

and.

Of Colour - Making.

3. Of Articles containing COLOURING Properties.

Various suppositions respecting the fixity of colours by the use of astringents have been mentioned, though (as intimated Note 29 in copper-work) the theory generally adopted is contested; and it may here be added, that Mr. Macquer likewise contests it, he however observes, that when the earth of allum, after being conveyed to the cloth, is moistened, it imbibes the colouring particles of the bodies it meets with, though the cause of the attraction is unknown (31),
(see

and if inclined to it, sufficient quantities of such articles are not to be procured till cultivated for such purposes.—See note 42.

In general, infusions of astringent vegetables mixed with green vitriol, produce black; rain water caught in the open fields has a blue tincture, but what is caught from houses grows purple, from some alkaline quality it thus receives.

(31) The acid of the allum is the vehicle for carrying the earth into the pores of the cloth: this substance, from being moistened, shews a disposition to unite with the principle of inflammability, on which colours depend.

The principle of attraction consists in . . . The astringent and the colouring substance) must be mutual
mutual

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(see note 28 on copper-work, and the article maddering, where what is here said is alluded to) thus, according to the laws of affinities, the colouring particles would remain in the liquid in which they may be floating, such as the particles of madder, but that the earth of allum has a greater affinity with them, from their unctuous qualities, than they have with the water: (32) in cases where the earth of the allum does not attract the colouring particles, these particles may however have less affinity with water than those which need this earth to fix them; hence though they enter the pores, yet, from their minuteness, they are not retained, and from their foamy qualities are soon washed off; but the unctuous quality above spoken of, and the phlogiston incorporated with it, is supposed by its union with

mutual in their powers of attraction. 2. They must be at a distance proportioned to their powers of attraction. 3. This force must be superior to that with which either is attracted by the fluid it is in.

(32) Acids having greater affinity with alkali than with earth, they leave the earth in form of a precipitate. See Rule 2, of the principles of combinations.

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with the astringent to form that cement often spoken of, though with dry substances such as zaffre, cinnabar, ochre, &c. it cannot be accomplished, however moistened the astringent may be, as the colouring particles would soon escape.

(33)

Adverting to the doctrine of a vitriolated tartar (see introduction to maddering) Mr. Macquer

(33) It is a knowledge of this nature that callico-printers are requested to acquire, in order to ascertain the quantity of madder, weld, &c. necessary to be used as mentioned in maddering. — See the article Maddering.

As lakes are caused by the combination of one substance with another, upon a principle similar to what is above alluded, it will be here just observed as an example, that if a decoction of turmeric or madder, be made in a watery solution of fixed alkali and a proper quantity of solution of allum be added, the yellow or red particles will subside; but at the same time the acid of the allum being absorbed by the alkaline salts, the earth of the allum likewise subsides and dilutes and likewise brightens the colour, the cause of this operation is however allowed to be not fully known.

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observes he cannot suppose it perfectly stable (34) but the earth of allam or lime containing the phlogistic principles of colour, consequently those colours are produced, that are incapable of being destroyed except by acids; these phlogistic principles (as before observed) are earths, oils, and

(34) In callico-printing this seems to be the case, from the danger purple and sometimes the reds are generally in, when in the weld copper, but this is most likely to be the case when tartar or saccharum is used, they being (as observed before) only alterants. It may however here be said, that the same salts being again used, may in some degree join with those that were used before, separating them, as it were, from the other substance to which they are joined; or it may be said (see below) that the yellow particles find admission into pores, not filled by the red or purple, when opened by the hot water.

Their solubility, as well as that of the allum before formed into a cement, by uniting with madder, &c. is oftentimes too evident when one colour is laid over another, even when stowed as much as possible, (in Printers' phraseology the colour is said to run) and this is particularly evident in heavy ground-work, and most so in black grounds, with large masses of purple.

Theorists do not seem clear in the case of

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and salts, from the quantity and quality of which all colours result, and the simple addition of any salt to any oily vegetable colouring substance will either vary or expel its colour, because any salt simple or compound, destroying by the laws of affinity the combination subsisting till then; the rays of light are differently refracted, therefore those substances whose colour cannot be altered by any salt, are those whose phlogiston is perfectly combined with their other principles; Indeed if we perfectly knew the nature of these combinations, it would help us in making artificial compositions, by analyzing these permanently tingeing substances, but not knowing (as observed before) the manner in which these principles

several colours, raised at once, or in succession; as where purple is laid over red, blue over yellow, yellow over purple, or over purple and red, and so on; as here it can only seem that the salt first conveyed does not enter all the pores, but that it contracts some, and leaves others open, which in turn are entered by succeeding applications; some have thought that every pore would admit any number of colouring particles, one above another, and that as they succeeded each other, like blue over yellow making a green, different shades were accordingly formed.

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principles are combined, as the utmost we can do, is only separating them by decomposing the colouring substances, we are under the necessity of endeavouring to improve on the known means with which nature has supplied us.

The juices of vegetables that will not give a fast colour, are liquids combined with certain oils, and being easily converted into a kind of soap, by alkalies or neutral salts, are soon removed; for in this case (turning to the laws of affinities) the colouring particles are so intimately united with the fluid in which they are suspended, that the earth of allum will give their dyes no stability. It is however thought possible that substances may be rendered permanent in their colouring properties, that naturally are not so, could absorbent earths be introduced into their pores, (35) or by adding acids to the colouring juices, in order to decompose the soap, and facilitate the union of the astringent with the colouring substance; notwithstanding such decomposition might produce

(35) In Percival's Essays it is said that logwood may be rendered fast, by a preparation with fixed alkali.

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a change in some respect with the colour. From animal juices colouring substances are rarely obtained; and could more be procured, it would be only going a further way about, as animal juices are derived from vegetable substances.

As the merely simple juices or fluids of animals and vegetables, rarely furnish materials for durable colours; and minerals, on account of their dryness are incapable of being attracted by astringents, we must seek those substances whose principles form, or help to form that unctuous and phlogistic gluten or cement which is the cause of permanency; and of these the most able to impart their colour are, kermes, cochineal, gumlac(36), madder, weld, &c. being both gummous and resinous, though in different degrees, or in other words possessing that phlogistic or inflammable property resulting from the union of oils, salts, and earths, on the various combinations of which, colour (as repeatedly said) depends, and which exhibit themselves when attracted by the application of proper astringents. Brazil, log-wood,

(36) These 3 belong more to dyeing, yet might nevertheless, be used in printing, but the price is against them:—Kermes was much used formerly by dyers, but cochineal is now substituted.

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wood, fustic, &c. being particularly resinous, their colouring substances are not so easily attracted by astringents, and the colour they give is therefore of less permanency.

Yellows are to be procured from most leaves, barks, and woods, that on chewing discover an astringent taste, if treated in the same manner as weld; for the colours of most yellow flowers are durable, and are little affected by acids or alkalis, but other coloured flowers, as well as juices of plants, are rarely found to possess any permanently tingeing qualities, according to the experiments practised in common.

Respecting the general method of imparting permanent colour, the principle of the process is but simple, (see note 39 in copper-work) saline substances being (as said before) the chief means with which we are acquainted; thus, it may be observed, though a watery infusion of madder and other articles, will impart a tinge, yet washing will easily remove it; but that is not the case if the cloth have a saline article previously applied to it; there is however an exception to this rule in indigo, which it is difficult to
dissolve

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dissolve (3) except by alkalies, oil of vitriol, orpiment, or combinations of orpiment with sulphur. When dissolved by alkalies, the colour is green, the colour naturally produced in vegetable blues by alkalies; but on exposing cloth dipped in it to the air, it turns blue: other exceptions in vegetables are mentioned elsewhere, as likewise the received opinion why they are so.

Proceed.

(37) The great solvent power of alkalies, by clearing away the fordes, will help to bring the particles of indigo more in contact with the cloth: the cause why cloth, which when dyed by indigo, is green, turns blue when exposed to the air, is thought to be owing to an attraction of the fixed air, by the alkali from the atmosphere rendering the salt unable to dissolve the indigo any further.—See Hellot on dyeing, but Dr. Lewis disputes Hellot's theory; he says acids will affect the same appearance, and that with vol. alk. it shews no green. Hellot however, shews unless green appears it is not dissolved, hence fixed alkalies are only proper.

In the solution of indigo by alkalies, fine encrasses the dissolving power, and if rashes be thrown into the solution it throws up a copper-coloured scum, which gives a dye in a moment: Prussian blue digested in an alkali, will produce a blue if what is coloured with it, lays a little while in a weak solution of copperas, but very inferior to indigo in durability. Dr. Lewis gives a recipe for making blue colour, but few practitioners will approve of his proportions.

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Proceeding further in the discussion of colouring qualities, it may be observed, as the fixity of colours produced by different substances being mixed together, is proportionate to the power of such substances to withstand the weather, it would seem as if there were some method to determine on their permanency, since it appears that the nitrous acid in general tends to heighten red colours, the vitriolic to crimson them, the marine to dull them, and alkalies to deepen them, (38) for, in this case, the colour produced by the nitrous acid, can remain no longer, when exposed to the air, than the spirit of nitre itself, because the nitre being drawn into the air, the colour must fade; and the disposition of colour to fade, must be in proportion to the permanency of the substances that produce them; colour, in this sense, being only colour as it is in possession of some substance to withhold it; (39) but

(38) In drying plants between sheets of paper, the paper is at last tinged with colour; this is supposed to be occasioned by the allum used in making it — By rubbing a plant on blue paper, if acid, it turns the paper red, but green, if alkaline.

(39) Similar, in one respect, to the above observation, it may be said, that among callico-printers a great point to attain in making colour, is to render the

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but whatever substances are most proper, it is certain that on combining acids with alkalis, earths

the articles for the purpose of printing, all equally buoyant. It may be said too, that in all compositions there is the basis which is supposed to be unalterable in its effects; other matters may be added; but from them, certain modifications only, will be the result; hence this principle should be much thought of, that the more simple the basis of the composition is, the more easy is a variation to be made; and, in a contrary light, if what is supposed to be the basis, be compounded; as for instance, in a blue and yellow put together to make a green, it is highly probable that what may be added will disagree with either the blue or yellow more than the other, and if more articles are added, the less certainty there can be of an effect.

In endeavouring to make a green, if a yellow feculence could be procured from a vegetable, as a blue one is, and that these two on being mixed, would perfectly unite, and be equally buoyant in whatever vehicle they may be used, there would be the stability required, for in this case, both partaking the same durable qualities, of course one would remain as long as the other, and thus the green might be said to be permanent; but at present there is a
O difficulty

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earths and minerals, effects are to be produced so infinitely various, that no rule can be precisely laid down to determine on what appearances will ensue on such combinations, or how this or that particular salt will affect, or be affected, by this or that substance; see a few experiments below: (40) however, among these various articles

difficulty even in rendering the pencilling blue sufficiently buoyant, so as to print with it; this is however practised in the country, but the colour is generally uneven, and seems only practicable in dark grounds, from the latitude the grounding requires.

(40) If concentrated oil of vitriol be mixed with strong spirit of nitre, or of salt, the acid that is weakest will become very volatile, and throw off very elastic fumes; and if put into a close stopp'd bottle, would very probably burst it: the same will happen by mixing spirit of nitre and spirit of salt together; such mixtures should therefore only be made when wanted.

2. Vitriolated tartar and strong spirit of nitre, in equal quantities, dissolved, by being heated together in a mattrass, the stronger vitriolic acid will be displaced by the weaker nitrous one, and crystals of nitre will be formed from it: the same will happen if spirit of salt be used instead of nitre. This experiment

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articles it is known that imperfect neutral salts act powerfully, the perfect ones but weakly ;

riment seems to oppose the general opinion, that the vitriolic is stronger than the marine or nitrous, unless it be understood that quantity is observed more than quality.

3. If vitriolated tartar, or Glauber's salt, dissolved in water, be mixed with another solution consisting of calcareous earth, silver, mercury, lead, or tin, dissolved in the nitrous or marine acids, the vitriolic acid will leave the fixed alkali with which it was combined, and unite with the calcareous earth, or the metal, and fall to the bottom. Any acid may be used for this purpose, for here the vitriolic acid meets with such bodies as it cannot easily liquidate. This experiment shews, that the additament of water weakens the attraction of acids with alkalies or metals.

4. By dropping a solution of vitriolated tartar into lime, the acid will unite with the lime and precipitate with it into an indissoluble selenite, the alkali remaining pure in the water.

5. Green vitriol mixed with any solution containing substances which cannot be dissolved by the vitriolic acid, such as sac. saturni, the vitriol will be immediately decomposed, and combine itself with
the

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ly ; (in neutral salts the acid is the menstruum, and the alkali the basis, in imperfect neutrals one quality

the lead, and thus become merely a solution of iron.

6. In the mixture of a solution of tin in aqua regia, and solution of sacrum saturni, the marine acid will quit the tin, and unite with the lead of the saccharum, the acetous, or, perhaps more properly, the vegetable acid combined with the lead, will at the same time be kept suspended, by the lead being unable to dissolve the tin ; hence both being effectually decomposed, the mixture of course is useless.

7. Mild volatile alkali united with a quantity of fixed air, and poured into a solution of chalk in the nitrous or marine acid, will precipitate the earth, and form a true sal ammoniac ; and if the whole be evaporated to dryness, and a considerable heat applied, the acid will again part with the alkali, and unite with the chalk.

8. By mixing together, and subliming equal parts of sal ammoniac and corrosive sublimate, they unite in such a manner as not to be separated without decomposition : this compound is a very powerful solvent of all metallic substances, even gold itself.

9. By pouring vitriolic acid upon any salt, difficult to dissolve in water, it becomes then easily soluble ; thus vitriolated tartar and cream of tartar may be dissolved.

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quality predominates) thus, making a transition to what is relative to dyeing, see note 41; allum and sal ammoniac heighten cochineal, madder; log-

It may be added, that on calcining fixed alkalies with the charcoal of ashes of various vegetables, such as, southernwood, sage, rue, fern, pine-tops, &c. different coloured appearances will ensue, owing (it is supposed) to some proportion of the oily or phlogistic matter (on which colours depend) of the vegetable remaining in the ashes from which the salts are extracted: the salts thus obtained will produce different colours in the metallic solutions, precipitated by them, in this state.

Acid infusions heighten red flowers in general, and many red, white and blue flowers are turned green, then yellow by alkalies, but which have little effect on yellow flowers, and some articles that alkalies turn red, purple or blue, are changed to a yellow by acids.—See Boyle and Lewis.

The affusion of ley will likewise procure from various flowers, insects or caterpillars, blue, purple or carnation colours, but in general, the flowers or plants that will not give a durable tinge with ley, are destroyed by it; there is however more hopes of fast colours being obtained from roots.

Among vegetables on which experiments have been tried, are the hemlock, producing a green: the
wild

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logwood, brazil, fustic, &c. but Glauber's salt, salt-petre, common salt, and other neutrals, act less

wild lettuce and thorny fow-thistle, a yellow; the fungus tubolofus, a purple; and the celandine and wild patience, a blue.

In Linnæus's works, mention is made of a quantity of moss having rotted by the sea side, which produced a beautiful and durable red colour; and a kinds of moss are in use in Swèden for dyeing red.

Were the writer inclined, he could swell this work to any size, by extracts from various works, with experimental articles, but very few would be of real service, and the majority are far from being incontestible, (see note 28 in copper-work) the best however of the kind are to be found in Hellet and D'Apligny on Dyeing, Lewis's Notes to Neuman's Chemistry, his *Commercium Philosophicum Artium*, and in L'Memoire d'Academé d'Art et Sciences, and various chemical treatises.

As for the Polygraphic Dictionary, School of Arts, School of Wisdom, and other collections of that nature, they contain too much trash to compensate for what little may be valuable.

The best account of drugs is to be found in Pomet's History, in Lewis's Notes to Neuman, and in the Chemical Dictionary.

It

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less powerfully. A black is struck in the above substances (madder, logwood, &c.) by solutions of iron, likewise with sumach, galls, and other astringents; see note 25, solution of sacrum fat. acts as an alterant on red colours (as already said) solution of copper changes logwood purple to a blue, and is reconcilable to most blues; solution of the superior metals, gold, silver, and mercury, have the least pleasing, or least extensive effective powers; (see the chemical compendium) but in this respect, solution of tin in aqua regia takes the first rank, having a surprizing power of coagulating the colouring matter of many articles; thus it procures

It is here offered to set persons right in respect to colours, who affect to say, that as good or better were done fifty or sixty years past, for as good were done two thousand years or more past; the very means as well as articles being of as ancient a standing: indeed the origin can hardly be traced: so in printing, the method immemorial, has been by using allum, &c. to procure and fix the colouring particles; it may be even said, what we call new colours, have been produced many years past, under different appearances: if there be any real improvements, a principle one is in the mode of cleansing the cloth, and that perhaps is only in being rather more expeditiously performed than before.—See three or four leaves further on, and note 10 in the retrospect.

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éures from cochineal and gumlac a fine scarlet; from brazil a fine red; from logwood a beautiful purple; and from weld, fustick, turmerick, and many common yellow flowers more beautiful colours than can otherwise be obtained. It likewise changes to a red the colour of most blue flowers, but as a counter-balance it in some measure deadens madder, safflower, and archil, and changes the vitriolic tinctures of roses from a red to an indifferent green. (41)

Solution of tin, (it may be added) is likewise the best article to try the durable quality of a vegetable substance; for in general, where the solution does not destroy the colour, there is a probability of succeeding with it; but this solution will not combine with several substances, particularly with sugar of lead and cream of tartar (as already mentioned) neither will it unite with any calcareous

(41) In the vitriolic acid it brings hues from the bright pink to the flame, in aqua regia it brings a scarlet, in the marine it brings a dull colour.

Note, Where solution is mentioned it should be understood as occasionally diluted.

The calx of tin (Sal Jovis) is used in dyeing to procure the fine scarlet from cochineal; and in this case is superior to allum.—See the process in Hellot on dyeing.

It may

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careous earth, nor alkalies ; but with allum it may, and is bettered by it.

The astringents proper for procuring the colour from madder (as already said) are allum and tartar, sacrum fat. solution of iron in a vegetable acid, &c. Iron liquor mixed with the red renders it, according to the quantity used, chocolate, pompadour, or brown red, (as observed before) but it must be carefully avoided in preparing for pale reds.

In proving the fixity of colours, lemon-juice, vinegar, aqua fortis diluted, &c: are insufficient, their degree of acidity being very variable ; but solutions of allum, white soap and red tartar are more proper.

For

It may here be repeated (see note 24) that what will give colour to wool, will in some cases, give little if any, to silk, linen, or cotton, as wool is supposed to contain larger pores, and is of an alkaline quality ; and in some cases it gives different colours, such as a purple to wool, while with linen or cotton it will be red.

Volatile alkalies heighten madder colour, though it hurts its permanency ; but practices of this kind should not be made public, too much being done in that way, as is evident enough in country work.— See note 32 to copper-work.

. It has been said this is partly applicable to dyeing, for in discussing the theory of colours, it could hardly be avoided.

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For discharging colours, alkaline salts only are effective where solutions of tin have been used, or the cloth otherwise strongly coloured, and even then it requires grass bleaching; but vitriol diluted will discharge colour procured from logwood, where allum has been used, though with more difficulty if lampblack has been added.

☞ In the composition of penciling blue colour, by the alkaline salts being intimately blended with the indigo, the same purpose is answered as when allum or other astringents are previously applied in procuring madder colours, and by treating other articles in a similar manner, may therefore be considered as a basis for what is called chymick printing, or as bringing to a point what has been said concerning the procuring of colours by the simplest operations; that is, where a saline or an astringent substance and a vegetable colouring one can be united, a durable effect may probably be obtained, as a great number of different coloured feculæ or dregs, are very likely to be procured from various plants, similar to the process for procuring indigo, woad, or archil; (42) or by precipitation in
the

(42) Woad is of the same nature; archil is procured from a moss.—See notes 30 and 40.

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the manner of procuring calces of metals, or lakes from vegetables (see note 33, and end of note 40) and with proper solvents and thickenings might be made useful in printing; but, as it is not the design of this treatise to create colour-makers (43) a deal must not be specifically said on this score (difficult as it certainly is, to steer between saying too little and too much) since common operators in that way (see the beginning of this section) notwithstanding what has been, or may be said, as advising a better mode, would catch hold of any thing likely to be put into immediate practice, rather than think a little and act in consequence.

This work not being addressed to those unacquainted with the use of drugs, &c. and it not being intended unnecessarily to swell it, the reader has been referred, (see note 40) to certain works for accounts of such articles; but, as this part of the section would by many be deemed inconclusive, without saying something of colouring drugs, a concise account is therefore annexed.

(43) For the writer's sentiments on the inefficacy and impropriety of giving recipes for making colours, with some general reflections on chymical printing, see the end of this section.

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MADDER, under various names, is of very ancient use; there are various species, the best is imported from the Levant, though that from Zealand is most in use; the root of the best is of a lively colour, and when powdered and put on blue paper instantly adheres; (Printers in trying it generally make infusions) it should likewise be pasty and unctuous, and when dried and ground should not be above a year old; the red of this root is considered as a fixed oil united with an acid, giving it the nature of a bitumen.

WELD, of all yellow colouring substances, and there are more than of any other colour, gives with ease the truest dye, and every part is useful; It is cultivated in large quantities in many parts of England, the thickest is the best.

FRENCH-BERRIES are used as a substitute, but, as well known, are much inferior in colour and durability.

FUSTICK is a species of the mulberry tree, growing in Jamaica and Brazil, it very readily gives its colour with a moderate warmth; Old Fustick gives a darker colour than young. Sumach and various barks have similar effects.

INDIGO.

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INDIGO is of many species, it is procured by large quantities of a certain plant (see note 30) being highly fermented, and the feculence moulded into lumps: the sort mostly used comes from America, but the best is made at Java ; it floats on water, is almost violet, and sparkles when broken ; or if exposed to a fire, it will consume immediately. **WOAD** is procured in a similar manner.

LOGWOOD or **CAMPEACHY-WOOD**, grows plentifully about the Bay of Honduras, and lately has been introduced into Jamaica ; it generally comes over in large logs.

BRAZIL is a general name for this wood, wherever procured ; the soundest and highest in colour is the best ; to extract the colour by water, hard water is the properest.

IRON-LIQUOR is generally procured by a solution of iron in stale beer ; formerly it required twelve or eighteen months, though now procured in a very short time ; but whether in all respects it is the better for it, will not here be decided ; however, Gatty's is now in request by many printers, but still good old Iron Liquor has its value.---See note 28.

OAK-GALLS

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OAK - GALLS are excrescences from the stem and branches of the tree, caused by the puncture of insects, in order to deposit their eggs.

ALLUM, TARTAR, SALT of LEAD, &c. are spoken of in the compendium of chemistry.

KERMES, is an insect which feeds on an astringent shrub, and though little in use, all allow is not excelled by any article for imparting its colour, which is a bright red, variable by using different salts.

GUM LAC is a bright red colouring drug; produced by the moisture left by a species of ants on the branches of trees in the East Indies, which is hardened by the sun and air: some think it is a moisture which they draw from the trees.

COCHINEAL is an insect found on the *Opuntia*, a species of the Fig-tree; acids and alkalies easily vary its shade; it is chiefly in use in dyeing scarlet, as a substitute for *Kermes*:—The best carmine is made from this insect; carmine is likewise procured from scarlet rags, by extracting the colour, which is in reality the cochineal itself.

Note,

Of Colour - Making.

Note, The three last articles are little in use among Printers (cochineal in some cases excepted) but as well as *Coccus Polonicus*, various red and green Woods, Archil, Roucou, Walnut Rinds, Santal, and many other colouring and astringent substances, in use among Dyers, might certainly be rendered useful if needed, in callico-printing; hence it seems a reprehensible circumstance in many Printers, treating the art of dyeing with little concern; for the principles of it include the foundation of printing, as far as procuring colours are the object; consequently, those who wish to extend their knowledge, whether for amusement or interest, might undoubtedly find advantage in perusing works, either on the theory or practice of dyeing; and therefore the writer has occasionally had recourse to it (see note 41) but, however improvements in any shape may be recommended, deviations from efficacious and established modes should not be made without proper reflection, much less from a mere love of innovation, for every innovation is very far from being ultimately an improvement, or otherwise advantageous, and articles already are perhaps not so much wanting as a proper use of them, by bringing them under such regulations as to ensure some certainty of effect in their application.

Of

Of Colour - Making-

4th. Of the Application of Colour in the Operation of Printing.

As every Colour-maker must grant that he cannot always ensure any particular piece to be so well executed, as that his mixtures shall have their proper effect; or that any two or more pieces shall be alike at the last stage, it must be allowed it is necessary to enquire into the causes; if on enquiry they are not clear, there certainly is a probability of their originating in some circumstance that has passed unnoticed, or been really thought not worth noticing; the business then is to endeavour to develop these causes; for a circumstance trifling in itself, or little obvious in its beginning, may lead insensibly to others, till a number being accumulated and combined, the consequences then are visible enough to make them a matter of importance: this therefore is one idea in taking up the subject of this part, and a few observations will accordingly be offered on several circumstances attending it: besides, as they are intimately connected with the operation of printing, of course they may not be unworthy a printer's consideration, especially as it may be added, that it includes the
the

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the theory or principle of printing itself, which is, that according to the blow or impression given, the colour is received by the cloth, and the intended effect, as far as printing is concerned, is or is not obtained, allowing for the state of the cloth, colour, sieves, &c. for it may be said, that if there be any need for striking any print or ground with the maul, why should not all be struck alike? but to this it is aware it may be replied, that a line will give the colour easier than a solid, and, to view it rather philosophically, a solid may be considered as an assemblage of lines or points, therefore the small force needful to cause a line to furnish, must be increased or multiplied, to cause the body to furnish in proportion: but be this as it may, it seems to be among those circumstances that cause appearances not at all expected, and therefore whether the observations here made, have any weight or not, the principle on which they are raised, cannot to a thinking Colour-maker be totally unworthy his regard; for as before intimated, merely making colour is no great secret, nor is it treated as such (see note 48) the grand matter being in accommodating it to the cloth under all possible circumstances, and until he can do that with some certainty, he has something to learn.

Proceed-

Of Colour-making.

Proceeding now immediately to the subject, it is certain that in colour-making, the operator either does, or should, attend to certain proportions in mixing his drugs and other articles, according to the shades that are required, the quality of the cloth, and the articles used for fighting or thickning, which when done, he generally thinks himself safe; as having acted at least according to rule; or if he saw the pattern, according to the appearance of that; and if the colours were all worked by the same printer, and similarly managed in every particular, the effect might be as required; but that is often far from being the case, as for instance, among innumerable circumstances it might probably happen thus with a pattern that may have three reds and three purples; one printer may have the brown red, another the pale reds, and another the purples, as they succeed each other in the application; now the printer with the brown red may deem it needful to give it two or three smart blows with his maul, the next printer or grounder in putting in the other colours or shades deems it needful to hit the grounds but slightly, and perhaps the palest shade may go into another's hands, who may hardly hit it on the back

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at all ; while the purples may be treated in a direct contrary manner ; therefore here it must seem that the second red will not be impressed into the cloth like the first, nor the third like the second ; consequently, the second will be a degree paler than required, and the third two degrees ; but, on the contrary, the second purple will be a degree stronger than it ought to be, and the third two degrees, which will destroy the balance of shade, that ought to be preserved. (Nothing is said yet respecting the state of sieves, brushes, stowing, &c. as the bad state of either must aggravate the case.) Hence it must seem, that whatever pains the Colour-maker took to proportion his ingredients, and to adapt them to the cloth, or the sighting and thickening, the grounds have not been treated so as to produce the requisite degrees of shade. (44)

Or, The matter may be thus illustrated : The outlines of two patterns may be nearly alike, but probably one may have a greater quantity, and larger bodies of pale reds than the other ; and the other may have a super proportion of the pale purple ; or in one the shades, or other parts may be in small bodies, so that wood only will

(44) See note 8 in copper-work where this circumstance is illustrated.

Of Colour - Making:

will be sufficient to work it, and in the other there may be bodies that require hatting, though the patterns in appearance may be of one class; now in this case, (45) if the Colour-maker see the patterns only, (46) it is a chance if he makes any difference in his proportions according to these circumstances; for the flowers or other objects seeming to him to consist of three regular shades of colour, either as reds or purples, the proportions for one pattern may be deemed needful for the other; but when the grounds go to work, they may receive different treatments from each other; hence the shade of colour that will be but barely deep enough for the purple or red ground that has large bodies, and which accordingly will be strongly impressed on the cloth, by several blows with the maul, must be too weak for the red or purple of the other, that may be just struck with the Printer's hand; or one ground, because of the shades or fine lines, may be worked in paste, while

(45) It is said, "in this case," because in others where two patterns differ very much in their appearance, it is very likely allowed for.

(46) It is not always that he even looks thus far, though if there be any weight in these suggestions, he ought to look at all the prints and grounds.

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while the other may be worked in gum; the consequence however will be, that though the two pieces have the outlines alike, yet the paler colours in the separate pieces must be different in respect to the requisite strength of them.--- as observed in note 8 of copper-work.

These observations may be brought still closer, as for instance. Two pieces are to be printed with the same colour, but with different prints; one print fine and the other coarse, or with solids in it; therefore very probably that with the solids will be more impressed in the cloth than the other, from its being deemed necessary to hit it more forcibly; hence though the colour for both pieces come the same from the colour-house, the effect may be different in the shade of the colour: and in printing doppies it sometimes happens, that if a piece is not thoroughly dry, or if it be of a flimsy nature, the colour may be forced through, (47) while another
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(47) Here it might seem to many, that cloth being so thin, this is a matter of indifference, but when it is considered, that the astringent and colouring atoms are so small, that a great number piled on each other would bear no proportion to
the

Of Colour-making.

more dry, or of a firmer texture, will resist that circumstance; therefore here again, though the same colour is used for both pieces, yet one will have a paler or more washy appearance than the other; and the most ignorant Printer knows, that if a shop be not kept warm, it is dangerous almost to work any colour; (see note 34) and that it is always best to finish a piece, though the colour may be used out of the same pan; a difference may arise too from colour being old or fresh; and to all these may be added the chance of some part being performed with foul brushes or sieves, worked on hard blankets, or from coarse sieves, lying on very stiff gum or paste; or some pieces may be worked with the first colour without

the thickness of the cloth (something similar to the microscope discovering thousands of animals in the breadth of an hair) it must then appear otherwise, and must accordingly be of some importance whether they are only on the superficies of it, within the body, or whether they are forced quite through; in the first case the tinge can be but weak, in the second it is likely to be more effective, but in the last the atoms must be too much dispersed for procuring that closely connected body or mass of colouring particles which is requisite.

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out being drawn over the stove ; or perhaps taken to the copper without being properly stowed ; while other pieces are treated in a direct contrary manner. (48)—See again note 34.

It is likewise of some consideration, upon an optical principle (see rule 8 in putting-on, and 7 in cutting) whether pale colours are near to or enclosed with strong bodies of dark colour, for what may appear of one hue, standing by itself, or only near to, or enclosed with a fine line, will appear of another if otherwise circumstanced.---See likewise note 37 in copper work. but in respect to shade, it will not appear so dark when surrounded by a mass of dark colour, as when alone on a white ground, owing to the contrast.

These circumstances, and more that might be adduced, are, it is presumed, of consequence enough to engage a Colour-maker's attention, for though on the supposition that he has proportioned his ingredients to the kind of cloth, the pattern, and the nature of the thickning, yet it must be evident that unless each colour or shade

(48) Some printers will, if they can, sometimes smuggle as it were, pieces without being stowed, in order to have them stiff, though at times very improper so to do, as some calenders are not in very dry places, or the cloth itself may not be sufficiently dry when taken to the calendar.

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shade, is in its applications similarly managed, according to the proportions given, its effects in the end must be different in a greater or less degree from what was intended.

As to the Printer, he generally regulates his blows or pressure by the quantity or quality of colour, or whether his print or ground be hatted or not; but even here, some Printers dip and lay their prints so slowly, and hit so sluggishly, to what others do, that even this circumstance may aggravate the others, for there are some colours that dry very quickly; therefore (it is repeated) though one or two of the circumstances just mentioned may possibly be of little consequence, yet when all or mostly all are joined, it then must be allowed by every one to be of some weight; as for the share the Copperman has in this case, it depends on what manner the mixtures are imbibed by the cloth, supposing the preparation, &c. to have been properly executed, and the drugs, &c. proper; (49) for if, of a number

(49) This renders dyeing but a simple operation compared to callico printing, as in the management of the preparation, it is only relative to the different kinds of articles to be dyed, as intimated in the beginning of this section; hence it may be said in Colour-makers language, that thickenings are more wanted than colouring articles.—See note 39.

Of Colour Making.

ber of pieces boiled in the same copper, one colour comes up perfect, it is a proof he has done his part.—See note:8 in copper-work.

From what has been said, it seems that a Colour-maker should either be a Printer, or be able to put himself in a Printer's place, chiefly in respect to the printing apparatus being in order, and (as already said) likewise in the Copperman's, particularly in the preparation, (50)

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(50) It has been mentioned to the credit of the first printing-house (in respect to the quantity of work done at it) in the vicinity of London, that the copper work is well attended; it is certain too that the same attention is bestowed on the printing, one of the Principals having been a Printer; and being able to command every convenience, it is of course the better for it; and Journeymen having a maxim (as mentioned in the section of printing) that a Printer only should overlook Printers, are perhaps more to be influenced by such a one; whether this is the case or not, certain it is, that much depends on the cleanliness of brushes, sieves and pans, especially when pale colours are used; indeed ground-

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so as to have the chief circumstances properly arranged, that may aid or attend the application of his mixtures; but at the same time it is granted, it must be an extraordinary attention indeed, that can nearly keep in view the almost infinite cases under which colour may be applied, to say nothing of having to combat with indolence, ignorance, carelessness, prejudice, or malevolence; (51) and sometimes, though rarely, overzealousness.

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ing should be done in a separate shop, and the apparatus of course be by itself.

A remark is here ventured on, which if narrowly looked into, will be found not very wide from truth; that according to the branch a principal may have been brought up to, or most engaged in, that branch will mostly engage his attention, and his aim for excellence will tend chiefly to it.

(51) It is repeated here (see note 33 in madding) that white goods laying in a heap may receive an injury which may affect the printing; it therefore evinces the necessity of the processes antecedent to printing being carefully attended; but for these as well as every other process, to be done properly, is unhappily not in the power of all Printers; some will not have the conveniencies necessary

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To lay down a plan to regulate these applications, would probably be spurned at by old practitioners, as it is hardly probable any that could

cessary, and some cannot have them, consequently when the means are obstructed, the execution must suffer. As to those who with such a complex business on their hands without either means or capacity, or who under the infatuated idea of being masters, have precipitated themselves into it without proper support, they are really to be pitied, for when raising supplies become so pressing, that (as in the memorable failure of Mosney-House dwelt on in another place) the business in the operative part is but a secondary concern, any one may judge how confusedly it must be prosecuted or discreditably terminated.

Remarks like these may appear invidious, but if they cause any who are inclined to commence callico printers to reflect sufficiently on the nature of the business, the writer is not apprehensive of meeting with censure for such freedom, being certain that he has done a real service.

He likewise cannot here forbear giving a hint of advice to the Printer, and he will add, that it is of consequence to a Draper to attend to it; for unless a Printer can evince his capability of executing work properly, the Draper has a chance of losing,

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could be specified would be reconcileable to another's requisite mode of practice. It may however be suggested, that if a Colour-maker would arrange

as it is presumed to be more acceptable to have goods returned well executed, than to have to lay damages as some compensation for bad work ; besides, a Draper should not only inform himself whether a printer can execute what he undertakes, but whether he can do it in proper time (chemical and general patterns are not here included.) A circumstance of this nature not being attended to, was the subversion (or at least forwarded it) of a considerable printing-ground at Old Ford (Lay and Adams) a few years back, the Principal having undertaken late in the Autumn, to execute for the Spring, a considerable number of very elaborate patterns ; but though every nerve was strained, the effort was in vain, and as well as the Printer being overturned, the Draper must have suffered.

What helped to raise the names of Newton and Kilburn to such distinction, was in their outset being forward with their work, as well as excellent in general in the execution ; and much was it regretted then, by the lovers of excellency, when the firm was dissolved ; though the exertions and productions of each since that circumstance, have been still so respectable, that Callico-printing in England

nearly repeating what has been said,

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arrange the different courses of operation his colour has to go through, * in regard to the texture of the cloth, state of the prints and grounds, blankets and sieves, thickning, pressure, &c. the operations might be reduced into some system, beyond what is at present done, which is rarely more than proportioning the ingredients for fine or stout cloths, blotches, and fine prints and grounds; for certain it must be that according to the proportions or manner in which the iron liquor, allum, &c. is imbibed by the cloth, whether from

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gland may be said to owe its revival and present credit to their efforts; 2 or 3 other Printers are certainly entitled to commendation; but not standing so forward in the articles of novelty and taste in design, or brilliancy in execution, they are not particularly pointed to.

• Even in nearly the last process, that of whitening printed goods, a careless Fieldman may render all that has been done abortive, especially in strong sun-shiny weather attended with a drying wind, if goods are watered in patches, or suffer too long an interval between watering: the mischief will be still more obvious, if pale colour work, such as laylock, blossom, or other pale blotch grounds, are thus treated—See the article *Grass Bleaching*.

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the manner of their being mixed, or their treatment in the printing shop, the colouring drugs can only impart their qualities towards giving the effect that is desired.

The writer however presuming that a Table something like the opposite, with the proportions annexed to the different circumstances under which colour may be conveyed, inserted according to each Practitioner's mode, would often be useful, he has therefore offered one; leaving the blanks to be filled up according to each Operator's discretion, or course of practice; or it may serve as a kind of model at least, for a better.

Adverting now to the inefficacy of written recipes for making either permanent or fugitive colours (as observed note 43, and in two or three other places) it is here suggested, that the most explicit modes of displaying them will never form a Colour-maker, as so many practical circumstances occur, which there is no language to describe, and for which experience alone can provide (52) (see note 4 of copper-work) but exclusive

(52). Such as the different kinds and qualities of cloth, the proportions, thinnings, and thickenings

nearly repeating what has been said, observed, that it would not be disclosing
 P say, by way of recipé, that to make
 M ur, take so much Iron liquor, so much
 much flour, boil them so long, &c. or
 B um, so much Sac. Sat. &c. for other co-
 the secrets are in a rigid attention to
 mstances under which they may be
 and all these cannot be specified in a
 y it may be gathered from the above
 C rained as it is, to say nothing of the
 R epetitions of it, how many circum-
 to be provided for, which experience
 tain, and which must evince the ab-

De too often regularity must stoop to
 bo propriety to absurdity; and judg-
 D to downright ignorance!!! Hence
 ov se of uncertainty.

De the principal processes of Callico-
 and more fully exhibited further on.

&c ding. blu ch acc to	Cutting, Making, on, ring.	}	Printing.	{	Stowing, Clearing, Raising the Colour, Blue dipping, &c. Fielding, Pencilling, After-courses.
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cur at home. Town Business, &c:

bl
 cifi thinks an apparatus might easily be
 eeping certain colours, while in the
 motion.

No.	Name	Age	Sex	Profession
1	John Smith	35	M	Teacher
2	Mary Jones	28	F	Homemaker
3	Robert Brown	42	M	Engineer
4	Elizabeth White	30	F	Nurse
5	William Black	55	M	Farmer
6	Anna Green	22	F	Student
7	James Grey	60	M	Retired
8	Sarah Hill	45	F	Shopkeeper
9	Thomas Lee	38	M	Doctor
10	Patricia King	25	F	Teacher
11	Richard Clark	50	M	Businessman
12	Jane Scott	32	F	Artist
13	Michael Adams	48	M	Lawyer
14	Linda Baker	27	F	Writer
15	David Wilson	65	M	Retired
16	Michelle Evans	33	F	Designer
17	Christopher Hall	40	M	Engineer
18	Stephanie Young	29	F	Teacher
19	Andrew King	58	M	Farmer
20	Rebecca Green	24	F	Student
21	Jonathan White	62	M	Retired
22	Karen Black	47	F	Shopkeeper
23	Gregory Hill	36	M	Doctor
24	Christina Lee	26	F	Teacher
25	Benjamin King	52	M	Businessman
26	Victoria Scott	31	F	Artist
27	Timothy Adams	44	M	Lawyer
28	Deborah Baker	23	F	Writer
29	Eric Wilson	68	M	Retired
30	Michelle Evans	34	F	Designer
31	Christopher Hall	41	M	Engineer
32	Stephanie Young	30	F	Teacher
33	Andrew King	59	M	Farmer
34	Rebecca Green	25	F	Student
35	Jonathan White	63	M	Retired
36	Karen Black	48	F	Shopkeeper
37	Gregory Hill	37	M	Doctor
38	Christina Lee	27	F	Teacher
39	Benjamin King	53	M	Businessman
40	Victoria Scott	32	F	Artist
41	Timothy Adams	45	M	Lawyer
42	Deborah Baker	24	F	Writer
43	Eric Wilson	69	M	Retired
44	Michelle Evans	35	F	Designer
45	Christopher Hall	42	M	Engineer
46	Stephanie Young	31	F	Teacher
47	Andrew King	60	M	Farmer
48	Rebecca Green	26	F	Student
49	Jonathan White	64	M	Retired
50	Karen Black	49	F	Shopkeeper
51	Gregory Hill	38	M	Doctor
52	Christina Lee	28	F	Teacher
53	Benjamin King	54	M	Businessman
54	Victoria Scott	33	F	Artist
55	Timothy Adams	46	M	Lawyer
56	Deborah Baker	25	F	Writer
57	Eric Wilson	70	M	Retired
58	Michelle Evans	36	F	Designer
59	Christopher Hall	43	M	Engineer
60	Stephanie Young	32	F	Teacher
61	Andrew King	61	M	Farmer
62	Rebecca Green	27	F	Student
63	Jonathan White	65	M	Retired
64	Karen Black	50	F	Shopkeeper
65	Gregory Hill	39	M	Doctor
66	Christina Lee	29	F	Teacher
67	Benjamin King	55	M	Businessman
68	Victoria Scott	34	F	Artist
69	Timothy Adams	47	M	Lawyer
70	Deborah Baker	26	F	Writer
71	Eric Wilson	71	M	Retired
72	Michelle Evans	37	F	Designer
73	Christopher Hall	44	M	Engineer
74	Stephanie Young	33	F	Teacher
75	Andrew King	62	M	Farmer
76	Rebecca Green	28	F	Student
77	Jonathan White	66	M	Retired
78	Karen Black	51	F	Shopkeeper
79	Gregory Hill	40	M	Doctor
80	Christina Lee	30	F	Teacher
81	Benjamin King	56	M	Businessman
82	Victoria Scott	35	F	Artist
83	Timothy Adams	48	M	Lawyer
84	Deborah Baker	27	F	Writer
85	Eric Wilson	72	M	Retired
86	Michelle Evans	38	F	Designer
87	Christopher Hall	45	M	Engineer
88	Stephanie Young	34	F	Teacher
89	Andrew King	63	M	Farmer
90	Rebecca Green	29	F	Student
91	Jonathan White	67	M	Retired
92	Karen Black	52	F	Shopkeeper
93	Gregory Hill	41	M	Doctor
94	Christina Lee	31	F	Teacher
95	Benjamin King	57	M	Businessman
96	Victoria Scott	36	F	Artist
97	Timothy Adams	49	M	Lawyer
98	Deborah Baker	28	F	Writer
99	Eric Wilson	73	M	Retired
100	Michelle Evans	39	F	Designer

Of Colour - Making.

clusive of all this, as every Printer is supposed to know the common routine of colour-making, and many will say, they know as much as can be known (see notes 4 and 10) it would be folly to attempt publishing recipes, unless every one excelled in some essential part, all that they or others knew; but where is the man who will pretend to display such? or even granting it were done, where is the Practitioner, who from motives of one kind or another, would allow it to be done, or stoop to adopt much of what might be displayed? hence, (as said note 16 in copper-work, and at the close of the same section) it is more prudent, and perhaps more useful, and, as it might injure those who make a living by their possession of recipes, it must be more considerate in another sense, to speak generally, rather than specifically or positively in practical matters; and in discussing the theoretical part, recommend the study of it, or point to the means, rather than confidently offer to exhibit

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them;

of the colour requisite for each; the mixing, boiling, application, &c. of them, in respect to time, quantity, quality and materials: the customs of particular places, caprice of Principals, obstinacy or ignorance of those who have to use them, &c. &c.

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them; for to those so disposed to enquire, practical knowledge will be obtained much more perfectly than ever it can be gathered from books of any kind whatever: even what the writer has attempted to display on the applications of colour by printing, is little more than mentioning such circumstances, and leaving others to form conclusions; for practice and experience, it is again said, must suggest the most efficacious means of rendering such observations, or any others that can be made, useful in any respect; but this, it is apprehended, need not be further dwelt on here, as it is more than once intimated the slender efforts in this work, are with diffidence offered to induce certain practitioners to think, not arrogantly to direct any how to act. (53)

Respecting

(53) As illustrative of the above suggestions it may be observed, that works avowedly written for the benefit of Manufacturers or Artificers, often contain so much speculative and scientific matter, that such persons are rarely benefitted; as their ideas in general reaching little beyond practical concerns: this may be owing to few Manufacturers or Artificers being writers, or having time to write, or perhaps from dreading the austerity of criticism; hence that employment rests more with writers by profession

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Respecting chemical colours ; there is a greater plea for withholding recipes, for granting (only for a moment) they could be improved, so as to equal those brought up in madder, (and the field for discovery is very wide, and some are very sanguine in this case) yet there are considerations that deserve notice, which weigh against the universal adoption of such a mode of printing, with all its boasted advantages ; for when once operations were so known, as to be performed in a short time, with little trouble, and small expence, numbers of indigent or desperate adventurers would naturally rush into the business; and by their mutual underworking and underfelling efforts, Callico-printing would soon lose its
respectability

profession, and their discussions, as mere Theorists, are more apt to be philosophically amusing, than operatively useful ; even those great works, the French Encyclopediæ and Memoirs of the Academy, may be complained of on this score (to say nothing of their high price preventing most Artificers from purchasing them) the writer's not having been able to procure the necessary practical information, or if they procured it, they could not always explicitly and satisfactorily convey it to those who were most interested in it, to whom it would be most useful, or who were most likely to render it useful to the world in general.

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respectability; and (in the Draper's phrase) prints in general becoming vulgar, and within the reach of those who have but little to spare, other articles must be substituted more worth the notice of persons of fashion, or taste.

Besides, since most Drapers, by a certain criterion, know whether some kinds of work are fast or not, there is a necessity for Printers to keep up, at least, a line of respectable work; otherwise Drapers would naturally expect it executed for little, and then they among themselves, would contend (by practices too common already) for the greatest number of purchasers, till prints, considered in this light, likewise become of little value; and it needs hardly be said that with Drapers, retailers particularly, that work is deemed the best which brings returns the soonest, however small the profit.

It may be added, that by the adoption of an universal chymic mode, a national or commercial injury would be experienced; by many articles, now in use for procuring fast colours, being no longer wanted; which includes the loss of employment thousands must sustain, whose living depends on the cultivating, manufacturing, and the conveying of such articles
from

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from place to place; but mechanical or other improvements necessarily supersede these considerations. Though after saying, thus much, it must be added, that, until every Printer thinks it no way discreditable to be deemed a chemick Printer, or every Draper cares as little about his share of repute in vending chemick work, permanent printing on the present establishment must retain its staple value.

Pursuing this subject a little laterally, it may be observed to chemick Colour-makers, who make a parade about this or that colour or shade, that such matters rarely give a turn to a stile of work; figures or shapes being more the essential parts, and a mere chemick stile of work performed on any material, every one knows, has but its day.

Thus in chemick printing, as far as the writer's memory reaches, Arbuthnot made some stir with green stalks in light chintz, which soon flew, and no provision being made to supply the vacant parts (see the latter part of the section on pattern drawing,) the cloth then had a truly ludicrous appearance; the flowers seeming scattered here and there without stalks or any other appendage. Preston's chemical course on various materials, a few years afterwards, made some noise,

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but an idea prevailing, however unjustly, that it was by oil colours, and that the heat of a fire side would destroy them, that course soon dropped. Huet's came next, but his stile as well as Preston's was very confined and shortly subsided: black and orange, or (as commonly called) gold colours and other coloured shawls, came next in vogue; said to be Naylor's invention; other fancies, such as springing or splashing, soufflee, &c. might be added; with the blue and buff lately much in request, and lastly the kerlymere waistcoat shawls, but none of these ever stood the proofs of a properly fast colour; as to the blue and gold, or black and orange, continued to this time, and even introduced into furniture, (and which as well as the black dove and yellow stile, from the ease and facility of its execution, drew many unto the business, that perhaps now with they could elegibly quit it) as proving what has been just said, it has decreased from twelve-pence and more per yard for printing, down to three halfpence, or even five farthings!!! (54) and probably black, dove and yellow

(54) It is notorious that in many commissioned and other shops, the lowest chemical work, even with

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yellow would have experienced a fate something similar, but neatness and fulness were generally required, and respectable Printers did a deal of the work.

In short, as these courses are little to the credit of callico printing, it prompts a suggestion, that to restrain them within proper bounds, it would ultimately be of general service if some such regulations were established as are in France concerning Dyers; those who dye fast colours and those

with such colour as almost, literally speaking, would shake off, is warranted and ticketed as fast, and often called chintz; and as one consequence certainly is causing purchasers to be doubtful of all kinds of work, it would here unhesitatingly be shewn how to know at sight which is so, if it could be done perspicuously; as to saying that cheap ticketed work is suspicious, is what every one knows; and when little more is given, whether through necessity or choice, than what the cloth is worth, no one can reasonably complain; but very often a high price is required, and freely given in expectation of adequate work; In some cases it must be however allowed the imposition rests not with the Draper.

Of Colour-making.

those who do not, being deemed of distinct professions, and fast and fugitive colours confined to certain kinds of cloth.---See in the general reflections more to this purpose, as well as the means of improving Callico-printing.

End of the Section on Copper work. and Colour-making.

Enlargements on the preceding subject, being a more chymical discussion of it; or, in which the agency of chymistry is more exemplified, both theoretically and practically.

HAVING attempted to give a general view of preparing and colouring processes, as accommodatory to the state of philosophical knowledge among those to whom the work is addressed, as perhaps can be done, the writer now, in order to lead them as it were step by step to the point he wishes them to attain, will endeavour to be a little more scientific, and speak more particularly of the operations of nature in those processes, in view of rendering them useful or subservient to the operations of art. And, as failures in practice are as much owing to improper qualities in the articles employed, as well as in the unions and applications of them, he will subjoin some certain modes of analyzing them, partly from experience and partly from respectable printed documents: but still expressing himself in as familiar terms and language



Of Colour-making.

as he possibly can:---as what he has said respecting coppermen (note 34 to maddering) may be said respecting the mass of colour-makers (he speaks here from certainty and dares refutation) for being little solicitous about principles or causes, and little acquainted with the proper names of articles which they use, the modes of analyzing them, or the true signification of chymical terms in general, it probably would be of little advantage, nay it would appear like vanity and affectation, to use the new terms of chymistry (55) expatiate on new theories, or display certain new opinions, or even facts, though relative to the subject. (56)

The

(55) Called the new nomenclature, which at a proper time is intended to be given with new opinions, experiments, &c. included in what is intimated note 7 to preliminary suggestions.

* Among absurd phrases in general use, are killing acids, opening indigo, verdigrease, and the like. The abuse of the term colour has been mentioned,—see note 1.

(56) And has given so slight and imperfect a compendium of chymistry as to omit some of the metallic

Of Colour-making.

The time however he trusts is hastening when philosophical principles will be cultivated (57) the necessity of it becoming every day more evident. He will even venture to say, when this crude treatise is scanned, and he has sufficient reason to suppose it will be by many in the profession, however cavalierly he treats them, that a desire for better information will commence, and, of course, an endeavour to obtain that knowledge which is the proper basis of practice, and which as such is so often spoken of in this work.

metallic substances, most of the acids, and intirely the gasses, though important primary agents in the new chymistry.

To those who have least spare time, are recommended as a selection of works on chymistry, first Nicholsons Elements, then Fourcroy's and Lavoisier's, but chiefly Berthollet's Memoirs, of which the writer has often availed himself in this work.

(57) Probably the present distracted state (1790) of France, may cause some of her scientific artists to migrate; of course, where they go, they will carry science with them, and callico printing in this country may be bettered by it.

Of Colour-making.

Concerning permanent BLACK and PURPLE.

Iron-liquor, or calx of iron dissolved in vinegar, from whatever liquor procured, is the agent for obtaining permanent black from madder; and by judicious tempering with water forms purples and laylocks;* the black itself being only a deep purple :---With logwood a less permanent black or purple, of a bluish duskier hue is obtainable. With weld and other yellow colouring substances, the hue is brown. When added to the red colour, or more properly the aluminous solution, then chocolate, pompadour, blossom &c. are formed in the madder copper, according to the proportions of mixture, from the colouring matter being taken in combination by both the calx of iron and the earth of alum at the same time.

Some think the additament of alder bark, or decoctions of other astringents might help the iron liquor in certain cases, as when newly prepared or procured by a weak acid.

Of the tar acid iron liquor, or the chalybeat one, the writer will say little; the expedition of procuring either may have its advantages, but
much

* Using paste or gum occasionally as thickenings, or vehicles for carrying them to the cloth.

Of Colour-making.

much caution is needful before a course of work is attempted with them, unless the manufacturers are of undeniable repute: for though a deal may be said of the acid employed and of its immediate operation on the previously prepared calx, yet every printer, as already observed, is fully sensible of the value of good old iron liquor, and of course preserves it for particular purposes.

As to what is said by some of the acid procured from cyder, perry, &c. and using steel filings, it still is but vinegar, and the steel must be converted into a calx before a drop of iron liquor can be formed. Hence the only superiority it can boast over any other, is in its being freer in its first stages of manufacturing from useless or injurious matters; and from the iron being very minutely divided, and, of course, presenting more surfaces to the action of the acid, the solution is more expeditiously performed.

It may not be irrelevant to add, that the more concentrated the vinegar; or the nearer it approaches to distilled or radical vinegar (58) it

§ 3

may

(58) Vinegar distilled from verdigrise; but to speak of this as well as other articles, new terms of
of

Of Colour-making:

may be proportionably effective, both in respect to power and expedition: and small beer or weak wines are known to give of little power. As to the age of common iron liquor, that is, such as is procured in the old way, it is indisputable that the particles of iron or its calx are found to cause a finer colour and of being more uniformly dispersed, however lowered the mixture may be, than in the new iron liquors. In fact, it is this perfect saturation, and the case is applicable to aluminous and other solutions, that denotes its excellency. And this is no where more evident (as well as with the red colour) than in the charging of copper-plates, where the engraving is very fine: for it is certain that the colour made at different grounds by different operators, will not suit the same engraving. Other circumstances to be sure may intervene, yet the
above

of doctrine must be used, at present deemed incompatible

As vinegar dissolves iron slowly, and only then with access of air, the tar acid, or more properly the acid of wood, has been lately much used and extolled, being applied immediately to the calx.

Of Colour-making.

above is certainly one worth attending to (59) But in this instance it may be said in one case, that, by the particles of iron being more saturated with the liquor, and in the other by the earth of allum being completely saturated with the vinegar, of course, both the calx of iron and the earth of allum are carried with their solvents into the finest interstices.

N. B. With blue colour for copper-plate printing the difficulty is greatest: hence the colour here cannot be too pure and free from adventitious matters, not only for filling the interstices, but also for the sake of the doctor or clearer.

Perhaps what tearers call vittry colour, or that which in boiling, or other stages of preparing black, appears frothy, scummy, lumpy, &c. is from the iron liquor not being free from plumbago (which is a combination of the base of
fixed

(59) The perfect digestion of galls and other astringents; or their saturation with their solvents, is as fully needful in certain courses; for in both cases, the extreme division of the particles produces the best effects.

Of Colour-making.

fixed air or pure charcoal with iron. Of which much might be said, but for reasons just given, it is waved at present, except that being black lead, it is insoluble in acids.

In the copper a decomposition of the liquor takes place either by attrition (note 28) or by an attraction of the colouring matter of the madder, or else by an attraction of the cloth itself (60) to the calx held in union by the vinegar: which in this case is similar to the earth of allum in combination with vinegar.

The writer will not yet pretend to say how the foxing of the purples (a common phrase) may be avoided with little trouble, but he observes as it is sure to take place if the water be heated to a certain degree, it renders the purple an iron mould, or a metallic stain; the combustion having decomposed it, and separated the colouring matter from it. For here be it observed that the purple on the cloth is a compound matter,
formed

(60) The latest modern opinion is that the cloth itself in the copper undergoes a partial solution.

Of Colowr-making.

formed of the calx of iron and the colouring matter of the madder.

Why the red is not so easily decomposed is from the clofer attraction of the colouring matter of the madder with the earth of allum: and it has been observed, the black and consequently the purple is deemed only a deposition of the calx; besides, as a proof of it, it is known that the deeper the purple, the easier it is affected, which only seems so from there being more substance to be acted on.

In maddering if the heat be too intense, a similar circumstance happens, that is, a brownness ensues, so likewise does it in mere welding; only in the first case the colouring substance already on the cloth is changed, but here the colouring matter of the weld in the copper is changed, combustion being the cause of both.

Note. An iron liquor, not generally known, is obtainable from a decoction of rice in which red hot iron is thrown; it is then to be added to a certain quantity of vinegar in which red hot iron has likewise been thrown.

Concerning

Of Colour-making.

Concerning permanent RED.

Allum, (that is, vitriolic acid and clay,) being mixed in solution with sugar of lead, (which is composed of vinegar and calx of lead,) a decomposition or change of union takes place according to the laws of affinity; the vinegar leaving the calx of lead to join with the clay, or more properly the earth of allum; while the vitriolic acid leaves the earth of allum to unite with the calx, forming with it an insoluble and useless mixture (61) consequently what remains, as useful, is the vinegar in union with the earth of allum (according to vulgar observation and language, sugar of lead prevents the settling which would otherwise take place too suddenly) but in this mixture there being more acid than necessary, expressed in chymistry by the terms either of excess of acid, or a supersaturation of acid, chalk being added, takes hold of it: the chalk at the same time undergoing a decomposition (by the vinegar expelling the fixed air) (62) the effervescence which commences, evincing this operation.

Whether

(61) Thus, it is common for the colour at the bottom of the tub to be unfit for use. see something similar in Exp. 6 in note 40

Of Colour-making.

Whether the necessity of this additament was discovered a priori, or by chance, or experiment, is no matter; it is certain that without it the colour is not so deep. For according to the common mode of proportions, without the use of chalk, there is a useless substance remaining, increasing the bulk of the liquor without adding to its efficacy. (note 61) An alkali being added tends likewise to take up the excess of acid, hence some use ash in the red colour. (63)

The result, however, being now vinegar and the earth of allum, necessarily diluted; when it
goes

(62) Chalk is lime saturated with fixed air, or aerial acid. Lime is chalk deprived of it.

In this case the stronger acid, that is, the vinegar, expels the weaker, that is, the fixed air, and takes its place, according to the 5th rule of affinities in the compendium.

(63) If waters were carefully analyzed before being used, some would be found fit for black, though unfit for red, and so of other colours; in truth, few are aware of the consequences of an indiscriminate use of hard or soft water; in short, it will render the proportions or articles necessary at one ground, perhaps useless at another.—see article preceding ashing and note 37 to madding.

Of Colour-making.

goes into the madder copper, the union between the colouring matter of the madder, and the earth of allum (which forms what is often spoken of in this work as a cement) is easier affected than if with only a mere solution of allum.--- Here be it observed, a second decomposition takes place, that is, of the vinegar and earth of allum, by the interposition of the third substance, namely, the colouring matter of the madder or weld, as either is used.

The vinegar is likewise found to agree better with the thickening than a mere solution of allum will, it being in tearers language, not so vittry, lumpy or specky; perhaps from not being so crystalizable.

In making red colour (64) various other articles, such as ammoniac, corrosive sublimate, tartar, calx of tin; arsenic, zinc, &c. are or have been occasionally added. When arsenic is used, there certainly should be ash added: Respectable colour-makers are however very sparing in the use of these articles (note 39.)


It

(64) The reader is again reminded colour here is a very improper term.

Of Colour-making.

It is unnecessary (and in fact for reasons just added, not intended) to enter into a detail of their immediate effects, or the causes of them; their chief effects as said already, being as alteratives, (65) but they are necessarily spoken of here again.

It is, however, just intimated that tartar in its union with allum, does not act like sugar of lead: there is not a mutual decomposition, though they attract each other; the attraction is nevertheless destroyed in the copper, and a decomposition then ensues of the previous mixture, followed by a union of the colouring matter with part of it.

Calx of tin, ammoniac, &c. in their effects of brightening (as usually called) are efficacious in consequence of preventing that close attraction of the madder, weld, &c. to the allum, &c.—Tartar used for yellow has this brightening effect in a particular degree; it likewise brightens chymical colours, such as solution of cochneal,  brazil

(65) Their attractions to the principal substance or basis of the colour is to be known by studying the laws of affinities.

Of Colour-making.

brazil, &c. and in printing kerseys, &c. and other animal subjects this salt is very useful. Urine in some cases strengthens the colour; corrosive sublimate tends to deepen it, but like as with tartar, ash should be used with it. Common experience will shew the effect of other substances, though now few of them are used in callico printing, as just observed. (66)

It is not to a vegetable substance that the attraction of the earth of alum is confined, it acts readily on animal substances, as in the instance of lakes (see note 33) here the alkali seizing the substance suspended in the solvent till then, is thrown down. In printing on woollen this circumstance is very manifest: hence it may here be said, that as in dyeing, a solution of isinglass, or of glue, added to the decoction of the vegetable substance, helps the effects by its attraction to calces, which otherwise would not be attracted

(66) Some colourmakers nevertheless affect to be wonderfully secret in use of some of these. The writer knows of a great sum being given not far from London, for a receipt for red, because calx of tin was an ingredient.—see notes 35 and 79.

Of Colour-making

tracted by the colouring substances. (67)---(See calces further on.)

In want of sugar of lead, it may easily be procured by dissolving any of its calces, cerusse excepted, in vinegar.

Concerning YELLOW, &c.

The solutions of allum, sugar of lead, and tartar united, is the agent for procuring yellow from weld; tartar is however not now much used. The natural operation here being similar to that of madding, excepting the colouring matter being yellow instead of red. (68) Various articles are sometimes used as substitutes, but none excels it. The New-England oak

2

bark

(67) The usefulness of dung, as an animal substance, helps the colouring process in callico printing.—See dunging.

(68) The action of allum and lime on the colouring substances is similar to that of lime or alkalies on indigo.—See further on.

If allum be boiled in a copper vessel, the liquor will be impregnated with copper, which vol. alk will detect.

Of Colour-making.

bark, used by many in Lancashire may however be mentioned as the best.

A weed called by some Ladies Bed-Straw (see the sheet with the table for proportions) has had a little undeserved repute for bringing up several colours at once: it may nevertheless serve as a substitute for weld. The root gives a red.—Several fields near Bow in Middlesex are appropriated for the cultivation of this plant.

The varieties of drabs, teas, clays, dull-greens, &c. are easily procured by varying the proportions of sumach, fustick, &c. as already stated.

An orange or snuff-colour, is procurable by not letting the maddering come up to a scald, so that the red is barely produced, and then welding it. It may be subjoined, that a repetition of maddering or welding by adding various salts or calces to what remains, will produce various effects. Variegated effects are likewise to be produced by welding first, then printing an after-course and maddering it: but these, however, are only tricks to be pursued with moderation. (69)

It

(69) Such practices helped to forward the failure of Lively and Co.—See further on, note 80

Of Colour-making.

It has been observed (see note 30, maddering) that a philosophical mind might come near to some proper criterion for ascertaining the quantity of madder, &c. merely requisite in all cases. The hint there given may possibly be improved by the practice of dyeing, where the weight of the stuff that is to be dyed, regulates the weight or measure of the articles that procure the dye. There are however great obstacles to such ascertainment in Callico-printing: but, if only for experiment sake, cloth might be weighed before and after being printed, and the difference in weight acquired by printing, made to regulate the quantity of madder, weld, &c. taking into account the dry and wet state of the cloth, the thickening, &c. But, at any rate, the super-quantity of the colouring articles might, by certain processes, be separated from whatever else that may necessarily be left in the copper of the thickening, lightening, &c. and the madder, weld, &c. not taken up, be separated in a pure state (this at a future time will probably be specified, though deemed needless now, as the agency of chymistry must be brought in, in a rather particular and operose manner. The writer is aware, and has mentioned, (see maddering) that, in common, this super-quantity is made use of for inferior purposes; and even in the colouring house in making yel-

Of Colour-making.

low, &c. but something like what is hinted as above, would be of much better advantage.

Concerning BLUE.

The chief, and, perhaps, only proper agent in the production of this colour is indigo; as woad, prussian blue (70) logwood and some other substances, have hitherto not answered the hopes of any. Woad however is the closest of kin to indigo; in fact, indigo is obtainable from it. (71)

The

(70) Prussian blue is iron, in combination with prussic acid, which acid has precipitated it from its solution. The acid is prepared by calcining animal matters (generally oxes blood) with alkali. The common solution of Prussian blue is by solution of tin or marine acid; something of which kind was lately hawked among London printers as a blue to print with, and called the true Switzerland blue. But the whole proved rather an abortion,—See further on, respecting metallic calces and precipitates.

(71) By the agency of lime, or by adding pure alkali to the woad, when fermented with water.

Of Colour-making.

The common solution of indigo, or opening of it, as usually termed, it has been said is with ash, lime, orpiment (72) and concentrated vitriolic acid: but, it is here further observed, that indigo, in order to be dissolved, must be de-

❀❀ 4

composed

(72) Forming a liver of sulphur, which is the true solvent.—Livers or hepars being combinations of sulphur, with alkalis and earths, and the orpiment here which is decomposed, in the course of the processes, contains sulphur.

The properties of indigo are such, that nature seems to have set a barrier to any attempt to use it like many other articles, when it is formed into the pencilling blue colour; (china blue colour being governed by other processes) so as only to require rinsing, with all the ingenious contrivances of wired sieves, agitators &c. either in procuring fine lines, or evenness of colour, when the shapes are large and frequent (note 39) for as partly observed, note 37, till we can either displace or deaden the attractive powers of a component part of the atmosphere, or else chain down, as it were, the volatility of a principle in the indigo, we must despair of having it in subjection. The new doctrine, however, of gasses, is at present employed with strong hopes of using it, at least, to more advantage than hitherto.

Of Colour-making.

composed, and a substance which it has acquired, which see below, be expelled. Woad, in which putrefaction has commenced, affects this, and at the same time gives a blue. The appearance that indigo exhibits (note 37) in solution, is its becoming green, or shewing a green surface with lime, alkali or certain calces: The colouring matter here evidently flies off, and until that takes place it is insoluble. (*) The copperas and orpiment are supposed to do this from certain powers of affinity or attraction.

The best methods for forming blue vats, according to the most respectable French chymists and dyers, are ist, By macerating the indigo in a strong ley, then grinding it, adding lime and water to it, raking it when the lime is slacked, and then adding green copperas or orpiment.--- After this, the indigo (previously ground) is to be added, raked and then suffered to rest as usual. 2nd, method, being more simple, is by adding certain proportions of indigo, green copperas, lime and water, and this composition, after raking, is fit for dyeing in a few hours.

In these and all other processes in which lime and water are used, the lime must not be too chalky

* Vital air, which the indigo acquires during combustion, according to the new theory.—See Berthollet's memoirs.

Of Colour-making.

chalky (73) nor the copperas too calcined, and the lime should always exceed; or the solution of the indigo will be the more imperfect; neither should it be in use but a few days, as it then gets weak.

Immerging the cloth afterwards in diluted vitriolic acid heightens the colour; it is generally immersed twice, the first time being called roughing, but this commonly hurts madder colours, hence chiefly used with china blue colours only, and these when dull may be mended by further immersions. †

To make this blue, some make a solution of antimony first, and add indigo afterwards. A dry preparation in these processes as well as in others is to be procured from indigo.

The curious may sublime indigo, and thereby procure flowers as with zinc, sulphur, &c. For



5

experiments

(73) Which will unavoidably be the case if kept too much exposed to the air, by attraction of the fixed air* from the atmosphere, chalk being lime saturated with fixed air, which when impelled by fire, or a stronger acid than the fixed air is, is extricated; but which the time afterwards, endeavours to regain. But this attraction if fixed is most manifest in lime water, and every one knows time gets moist soon in the air, especially if the air itself be moist.

*Which is a weak acid.

† A blowing day is bad for drying the cloth, as it is apt to smudge; but when the blue is once fixed, it is not easily moved.

Of Colour-making.

experiments in a small scale it may be done in a common flask over a common fire, defending the flask from the contact of the fire.

To speak of the Saxon blue is hardly worth while, it is so very fugitive, being a mere solution (if it can be called such) of indigo in vitriolic acid. If this, however, be added to a proper solution of indigo, a green may be procured; and if the acid be rather predominant, it increases the intensity.

In blue dipping, if the cloth appear clean and white, as in other cases mentioned under the section of copperwork, the preparation is generally dispensed with, on a presumption the cloth has no oiliness in it; but this does not always seem to be the case, and the writer cannot think subordinate blue dippers, printers, and cylinder workers, are always in fault, when stormont and other close work appears uneven. And he knows, that faults are fewer where preparation is more indiscriminate. Even for common chemical work, it may be more needful than perhaps many think; for it is certain, that if the washing be not properly or sufficiently performed, the cloth will turn brown in time: and this, by the way, may account for the brownness that is observed to take place in cloth
where

Of Colour-making:

where chemical colours are brought up in lime water, unless it be supposed that the lime may deposit some of its earth, or some substance that may be in union with it, (as lime itself is earth) which in time causes that brownness. In this case, how far an immersion in some acid may dislodge it the writer will not say, but the acetous acid seems most proper: as to the vitriolic that must unavoidably form a selenite. (74)

In making paste colour (75) in order to preserve certain shapes in white on a blue ground & waters

§§ 6

(74) A desideratum in chin a blue, printing exhibiting it, with deep and pale shades along with madder colours, without pasting or otherwise preserving it. It is however to be done by certain preservatives, though not by common paste; and even a strong blue to be formed by certain prepared vats, so as not to hurt the madder colours; and it is well known, the writer a few years ago drew patterns with two blues intermixed with chintz work (the house of Ashby and Philpot had the first) but it was deemed impracticable; he however hopes thinks it will not long be deemed so.

(75) A composition of tobacco pipe clay, and soft soap.

Of Colour-making.

waters impregnated with felenite or other earthy matters, are detrimental. (76) However, in any case where the soap is decomposed, the paste does not work freely. Instead of tallow to which it is requisite to keep a heat continually applied; some of the fat oils; butter of cocoa, &c. might probably be used to advantage. In wax printing the wax is necessarily kept fluid over burning charcoal.

Lemon-juice being made use of in some cases to procure similar effects, by discharging the colour, it is intimated here how to procure it.

Express

(76) If vitriol of lime or magnesia be in water, the vitriol unites with the alkali, and the lime or magnesia with the oil, forming an almost insoluble soap, floating on the water having the appearance of a curd: hence here cannot be a perfect solution of the soap.

••• A solution of soap being poured on a metallic solution, its acid seizes the alkali of the soap.

Fat oils and bitumen make a fat varnish. By combining fat oils with calces of lead, adding a quantity of water and evaporating the liquor, a thick syrup is obtained which does not crystalize

Of Colour-making.

Express the juice of lemons, of any sort, ripe or unripe; expose it to the sun till it deposits a sediment, filter it till the liquor is clear and set it in a sand bath; change the receiver when the drops are acid: The acid preserved in the receiver, is to be kept in vessels secured from the air; Or, saturate the lemon-juice with lime, wash it and pour it on a due quantity of vitriolic acid; the liquor poured from the precipitate is the acid of lemons.---*Lavoisier's Chymistry.*

The best lime is that what effervesces the least with vinegar, (77) or which mixes quickly with water, and with the greatest heat.

To get the purest lime (though not so absolutely needful in the above-mentioned processes) is by boiling powdered chalk repeatedly, dissolving it in radical vinegar, and precipitating it by concrete ammoniac. For pencilling blue, pure lime is, however, indispensably needful; in fact, in all the solutions of indigo where it is used, as is the lime so will be the colour.

Lime

(77) Being most deprived of its fixed air (see note 73) and consequently there can be little effervescence.

Of Colour-making.

Lime water when used to bring up the colour, whether bright green, buff, chemick blue, &c. produces the effect by decomposing the mixture applied to the cloth: the acid that held the articles in union being separated from it, and the remainder left on the cloth.

From the preceding suggestions it is inferred, that good black and purple colour is only to be procured from well saturated iron liquor: good red, and yellow from pure vinegar and earth of allum; and good blue by the solution of indigo with pure lime, ash, &c. but to enter here into a description of the tests and analyzation of these mixtures would be too complex and prolix, and for reasons given, it would be almost useless, for it comprizes an analysis of every article that is used both in its simple state and when combined with any other substance. It is, however, certain that no man can properly be deemed a colour maker unless he can do it, if only respecting the common application of them, saying nothing of those accidents that often confound the best colour makers that we have.

Of

Of CHEMICKS. (78)

Metallic calces, precipitates, and certain substances held in solution by acids, are here the common agents. Calces in general have more attraction for, or, perhaps, rather are more attracted by animal or woollen substances (79) than vegetable,
viz.

(78) The reader is reminded, proportions are intentionally withheld, but particularly in chemical processes; note to prel. sug. for besides the reasons given, he will add here, that those recipes which he has procured, contradict each other. He however would willingly give information of certain venders of them and whose indigence it would even relieve.

(79) Bright colours on Kerseymere, and other woollen matters, are not the best on the score of permanency. (note) Brightners however are easily obtained, as said elsewhere.

A great sum (as before intimated) was given for a recipe for red, (at Nixon's, the writer thinks) because calx of tin was an ingredient, which acts as one of these brightners.

The writer knows of a first attempt to print hammer cloths, fabricated with a mixture of animal and
vegetable

Of Colour-making.

viz. linen, cotton and the like (calces of iron excepted) particularly if saturated with an alkali, from their affinity to them, as they leave the acid in which they are suspended, being at length thrown down, (note 33) Or it may be said, the solution of any metallic substance in an acid, produces the desired effect, by the substance it is applied to, having a power of decomposing it and joining the colouring part; therefore it may be observed the most likely circumstance in favour of forming chemical colours is the solution quitting its acid readily.

Where calces can be introduced along with the solvent, so as to form an union, it must be in consequence of the article intended to be coloured, having attraction for the calces; and hence the great advantage of woollen printing, as animal substances

vegetable matters; but the difference of the substances not being provided for, the endeavour failed (note 26 and 41) An ingenious artist (Naylor) has however done beautiful work on these articles, knowing how to provide for the mixture; as well as he has operated on the linings of carriages &c. and he now has deservedly the countenance of several of rank and fashion.

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substances have stronger affinity to calces than vegetable. As to the circumstance of iron-liquor causing a black as supposed by a deposition of its particles. (note 28) the new idea of a partial solution of the cloth may be brought in to aid the operation.

The calces of gold, silver and mercury cause too much combustion to be rendered of proper subserviency; or in other words, their tendency to affect too strongly the articles to which they are applied; while copper, lead, or bismuth approach the other extreme.

Many calces give a purple; Godfrey among his attempts has made several fine ones, note 4 to Prel. Sug. Ilet had one before the society for the encouragement of arts; but without undervaluing the labours of any, and Godfrey's respectability as a chymist is well known, as well as the professional practice of Ilet, and others, unfortunately most chemical colours, unless they contain within themselves a proper buoyant, a buoyant or thickning is with difficulty incorporated with them; (note 49) and to temper them like aluminous and other solutions, destroys most of them at once, by the water taking hold of the solvent. Even the brilliancy makes them

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them suspected. Another thing is the articles and processes being too expensive. Further, among attempts of this nature, from the power of the menstruum, not only an early injury will happen to the cloth, but a chance of the very prints being destroyed. (80) Hence solutions of animal and vegetable substances seem better calculated for service in general, but particularly for cloth of vegetable fabric.

Various acids (81) will form many precipitates from brazil, but with solutions of tin the most general

(80) Among the causes of the failure of Livesy and Co. may be included the irregularity and confusion Hall occasioned, as intimated elsewhere.

Brazil steeped in certain acids gives out a colour, which precipitated by an alkali, is a lake or inferior carmine

(81) Nitrous acid by its fumes, commonly called steaming, gives a dye to silk, which when dipped in an alkaline solution, is rendered orange; some other acids have similar power.

The fuming of dilute nitrous acid, is sometimes caused by its containing iron; which of course it
much

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general effects are obtained, and the most powerful is the solution in aquæ regia; on the goodness of which much however depends.

Among the effects thus produced, are,

1st, Red from cochineal:---The hue to be varied with tartar, sal ammoniac and other salts, [note 41] From safflower effects are likewise obtainable. Archil in this solution has likewise considerable effect, Among calces, bismuth may be used to advantage. On woollen, as before observed, most of the calces may.

2. Purple from logwood, and of some intensity.

3. Blue, by the addition of verdigris.

4. A lemon or salmon from annatto; and

5. An orange by addition of an alkali.*

6. Bright or pale blue green from verdigris and spirit of sal ammoniac, and sometimes tartar. Vinegar was formerly used till the ammoniac

The

much behoves the operator to be very careful of. The acid rendering many substances yellow, by its contact with them, is from the combustion which it causes.

Among the new acids that bid fair to be of the greatest advantage, are those of phosphorus and borax, from the fixity of their nature.

* The common peach or salmon is with ash and annatto.

Annatto colours with blue will hardly stand the lime.

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was introduced by a chymist at Manchester' (82) The vol. alk. should however be absolutely pure; but its great pungency is no proof of that see tests further on. A green has been before-said to be procurable from the proper solution of indigo and the Saxon blue. Weld, brazil, ash, and copperas will form a green, if steeped all night, the hue and strength, of course varying with the proportions; but these decoctions or macerations should be in soft water, otherwise the ill-effects of selenite (vitriolic acid and lime) being decomposed will be too visible. Greens are likewise procurable by decoctions of various barks and woods by rincing. Among metals whose calces are green, nickel stands prominent, and is to be used to advantage.

Note. Respecting the procuring of a green whether from calces of metals, or precipitates, or lakes, from vegetables or animal substances (note 72) it is observed that whatever may be the boasts of operators, it must be allowed, none equal the green procured from indigo and subsequent welding: the others in general, being blue
or

(82) A chymist at Old Ford, Middlesex, and a manufacturer of sal ammoniac, glaubers salts &c. likewise introduced this article to use about London.

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of olive greens. In short, nature seems to say, a simple green shall not be allowed (83) or in the language of printers, a fast chymical green: for if we look round to all the operations of nature and art in producing a green, we shall find it the result of a combination of yellow and blue, and the combination evidently to be traced out, and in many instances decomposed.

French berry yellow, whatever other substances may be added to it is so fugitive that it is rarely used now in respectable work.

Black of a most indelible nature, is procured by diluting a solution of silver in nitrous acid with distilled water, and a little gum; and imprinting it on a cloth impregnated with solution of isinglass.

The

When vinegar was used, it is a certainty the quality of it was not properly inquired into, and without a knowledge of chymistry the ammoniac cannot be managed always with certainty. But a deal depends on the nature of the thickening.

(83) In the prismatic colours, green is the point of contact between the extreme colours, and in this instance, some analogy may be found between permanent colours produced by dyeing, and those by the prism: the extreme colours or the most simple, being red and deep purple: but as the order of the rays approach to the green, they seem to coalesce, till they advance to the green itself, which is a direct union of the blue and yellow.

The artist mentioned note 79, is in possession of the best chymick green, of all the writer knows of.

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The most modern test of the strength of a colour is the dephlogisticated marine acid, (see Berthollet's treatise on it, and see note 21 to Gen. Reflect.) as it operates very quickly, just as the air and sun does in a long time. The change it produces is attributed to a slow combustion, on the same principle as it operates when used for bleaching; but in discharging colours, if there be iron in them it is not so effective.

After the gradation the writer has hitherto affected, from the language most commonly in use in the printing business, to something closer to that of science, he would willingly rise to the most modern, which is daily getting ground: but this, were he ever so competent, he must not be diffusive on yet (84) for, to exhibit now what
little

(84) In a supplement, or else in the work hinted at note to prel. sug. the new terms, the new theories, and new facts, will be exhibited both distinctly and incorporated with what is of practical concern, properly explained and exemplified. (Perhaps he may give a specific views of proportions) As to what he has in this work attempted, he could here correct himself, especially in some practical matters, but he desires the reader, particularly the critical reader, to note what is observed at the back of the dedication,

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little he knows of the foundation on which it is raised, would be supposing an acquaintance with principles to exist among those to whom he writes, that certainty does not (especially about London) which he here means to mention for the last time. However, what he now advances, he does only with a view to stimulate those few who know something of the old chymistry, to a better acquaintance with the new.

The greatest agent in most natural operations is called oxygen, and its effects oxygenation; which is, that certain substances in consequence of certain powers of attraction or affinity absorb the vital air of the atmosphere.

The diminution of oxygen, or vital air, in the oxyd or calx, and of Hydrogen, or inflammable air, in the colouring substance, is the cause of colouring effects. If the oxygen combine with the colouring particles, the hydrogen is retained and consequently the colour; but if the hydrogen be disengaged, the carbone, or charcoal, manifests

tion, and what is affixed to the end of the work as an advertisement; only begging to repeat here the time he had to spare from his engagements. (See prelim. suggestions) was little, he durst not have risked expences of editors, revisors, &c. and lastly that he had to combat the ill will of those who deemed the publication a mere divulging of practical secrets.

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feels itself by the colour appearing brown or yellow (this theory is applicable to what is called foxing the purples as just spoken of) for carbone being contained along with hydrogen in all vegetable substances, according to the proportion of carbone left by any operation it will be seen by the hue it leaves. Indigo has more carbone in its composition than must substances.

Thus the processes of ashing, souring, raising the colour, fielding, &c. are accounted for by oxygenation having taken place, that is, an absorption of vital air; and its attendant and consequent combustion of the colouring matter (85) or, in some cases, as in unbleached flax, silk, thread, or cloth, what may be called the discolouring matter.

Of new terms, the chief acids, vitriolic, marine, and nitrous, are called sulphuric, muriatic, and nitric. Allum is sulphat of alumine. Copperas acetite of copper, &c. &c. The combinations of vitriolic acid with various other substances are sulphats or sulphites; marine acid, muriats, &c. (see note preceding) as already alluded to before.

(85) In branning, the bran acts only on the colouring substance, which an alkali would do, but the alkali would disturb the acids that hold the colouring substance, of course the whole would be disturbed.

A concise Display of several Tests or Reactives for ascertaining the Qualities of various Articles in Use among Callico-Printers; with a few Experiments illustrative of the Modes of applying them. (85)

Note. It is to be understood though solution is not always mentioned, the articles mentioned are mostly used in a dissolved state, and the solvents, whether acids or water, must be perfectly pure. Water must be distilled. (86)

LIXIVIUM of Prussian blue detects iron in any liquid by turning it blue.---Tincture of galls, by

(85) Sets of these tests may be had of several Chymists; or see Gottling's Treatise, from which advantage is here taken.

(86) Thus, suppose it be required to know if iron be in alum, the solution of the alum must be in distilled water, otherwise the alum, though pure, may be dissolved in water that itself contains iron; of course, the iron that is detected will be no proof of the impurity of the alum. Or, a test itself may be impure; and have within itself the very

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by turning it violet or black. (87)--- *Tincture of litmus* shews an acid by turning the liquid red--- *Paper coloured with brasil liquor* an alkali by turning it violet. (acids turn it red again)--- *Turmeric paper* detects alkaline salts by a brown (acids turn it yellow again.)-- *Litmus paper made red with vinegar* shews alkaline salts, and earth held in solution by fixed air by the red turning blue-- *Vitriolic acid*, shews fixed air, by a slight effervescence; alkaline salts and earths by a selenite or insoluble substance; ponderous earth, by a sparry one; nitrous acid, by the fumes produced by heating the liquor, moistning the stopper with vol. alk. and holding it over the heated liquor; marine acid by the same test--- *Nitrous acid*

very substance it is wished to detect in another: hence, the effect must be obviously inconclusive; and hence, though these tests are here displayed, and just said to be certain, they can only be so, according as they are pure, or as they are properly applied; and to do which, requires no small share of chemical knowledge and experience; but in short, like other documents in this work, these are offered, to shew how needful a chemical knowledge is to a colour-maker, and as an inducement to try to attain it,* rather than as any thing like what may be deemed perfect, or conclusive in point of practice, or fit for the chemical adept to look at; for the writer repeats, he does not address himself to proficients.

(87) Untests held in solution by fixed air.

(88) This

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acid detects fixed air by a slight effervescence; liver of sulphur by the smell of rotten eggs, and a white prec.---*Lime water* detects fixed air by a chalky prec. corrosive sublimate by a dirty yellow prec. copper by a green, emetic tartar by a white. ---*Acid of sugar* detects lime by a selenetic prec. and rendering the liquid thick; magnesia by a similar selenite---*Vinegar* detects vol. alk. by holding the outside of a glass tube over the liquor by fumes arising from the surface; nitrous acid by the same---*Pure vegetable alk.* detects magnesian earth by a white prec. likewise lime, earth of alum and iron partly---*Mild veg. alk.* precipitates all earths and metals held in solution by means of an acid; detects an acid by little bubbles of air; corrosive sublimate by a white or orange prec.---*Caustic vol. alk.* precipitates all the earths and iron almost in a metallic state: Copper by a blue.---*Mild vol. alk.* separates all earths; detects copper by a blue---*Soap* shews fixed air or any other acid; or it is decomposed by earthy or metallic neutral salts, shewing a flaky substance (note 76)---*Solution of silver* in nitrous acid, detects vitriolic and marine acid, after saturating them with nitrous acid first. It shews vitriolic acid by a white powder, the marine by a flaky substance; liver of sulphur by a black prec.---*Corrosive sublimate* detects min. alk. combined with fixed air by an orange coloured prec. chalk by a white; hepatic air by a black---*Sugar of lead* detects

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detects vitriolic or marine acid by a white prec. liver of sulphur or hepatic air by a dark one---
Arsenic detects hepatic air by a yellow prec.---
Epsom salt detects caustic alkaline salts by its being decomposed;--- *Sat ammoniac* shews alkalies by augmentation of cold, and extrication of vol. alk.---*Roman vitriol* detects veg. alk. by a dark green; min. alk. by a bright apple green; magnesia by a dark sea green; lime by a yellowish green; earth of alum by a verdigrease green; sulphur or liver of sulphur by a blackish brown.---*Cuprum ammoniacum* detects arsenic by a yellowish green prec.---*Highly rectified spirit of wine* decomposes all solutions in vitriolic acid; and in large proportions the solutions in nitrous and marine acids, the metallic solutions excepted; it decomposes salts in solution by throwing them down. It likewise separates resinous and ætherio-oily substances.---*Hepatic water*, i. e. water impregnated with hepatic air, detects lead, or any deleterious metal by a dark prec. and iron by the addition of tincture of galls.

Instances of some of the foregoing Tests applied to several articles, by way of examples.

VITRIOLIC ACID containing iron, copper, or lead, a solution of mild vegetable alkali being added, it will throw down a more or less dark coloured precipitate. If the prec. be then dried and edulcorated, and pure caustic veg. alk. poured

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poured on it, if copper be in it, it will appear blue. If the prec. be dried, and hepatic water added, if lead be in it, it will appear blackish. If iron be in it, it will be found in the liquid after separation. If it contain ammoniac, by adding acid of tartar, cream of tartar will be produced.

----*Nitrous acid*, containing vitriolic or marine acid, by adding solution of heavy earth, or sugar of lead, ponderous spar, or vitriolated lead will be produced. The marine acid is detected by solution of silver (in aqua fortis) yielding a horny precipitate.

----*Marine acid*, containing vitriolic acid, a solution of heavy earth or sugar of lead, will produce white clouds. If it contain copper, by adding an excess of mild veg. alk. it will appear blue. If iron, it will appear blackish by saturating the acid with fixed alkali, and adding tincture of galls.

----*Vinegar*, containing vitriolic, marine, or tartarous acid, a solution of heavy earth or sugar of lead will throw down a white insoluble prec. if marine acid, a white prec. by solution of silver. If tartarous acid, a white powder by saturating the vinegar with potash. If copper, a light bluish or green prec. by saturation with ammoniac.

----- *Salt of tartar or pure veg. alk.* containing any of the earths, they will be thrown down by saturating the alk. with an acid. If vitriolic acid, an insoluble prec. of a white appearance by saturating it with pure nitrous or acetous acid, and adding solution of ponderous

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ponderous spar, or sugar of-lead. If marine acid, a horny substance by solution of silver.---
Mineral alkali, (88) containing vitriolic or marine acid, detected as salt of tartar above. If it contain salt of tartar, it yields cream of tartar by adding acid of tartar.---- *Caustic spirit of ammoniac*, or *vol. alk.* containing fixed air, yields a chalky substance by adding solution of lime in marine acid.---- *Concrete ammoniac*, containing salt of tartar or sal ammoniac, -by heating it on an iron instrument, a digestive salt will be left behind; but if it be pure it will entirely volatilize. Spirit of wine being offered to it crystals will be thrown down.---- *Spirit of hartshorn* containing lime, effervesces by adding an acid; or it yields no crystals on spirit of wine being added:---- *Sal ammoniac* if pure, will entirely volatilize by heat; if not, it will form a prec. by adding solution of silver or sugar of-lead.---- *Nitre*, containing marine acid, the marine acid is detected by solution of silver, shewing a horny prec.---- Glauber's salt, by an insoluble prec. or heavy spar, by adding solution of heavy earth; impure nitre is likewise detected by its bitter taste and weak detonation.--- *Alum* (which should be mere earth of alum, vitriolic acid and water,) (89) containing iron, the lixivium of Prussian blue

(88) This alk. has lately got much into use about Manchester, in preference to ash.

(89) Concrete ammoniac added to a solution of pure alum, the alkali and earth unite, and the clay precipitates with a small quantity of fixed air.

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Blue produces a blue; tincture of galls a black: If it contain copper, an alkali tinges the liquor blue,--- *Corrosive sublimate* containing arsenic, mild vol. alk. will precipitate it, and if the liquor be filtered, and cuprum ammoniacum added, a transparent blue liquor will be formed, and the pure corrosive sublimate left free; but if it contain arsenic, the prec. will be green.--- *Cream of tartar* containing vitriolic salts, yields a white prec. insoluble in nitrous acid, by adding sugar of lead. If it contain copper, it is detected by vol. alk. held over the fumes. If genuine it is known by its peculiar smell.----- *Sugar of Lead* containing nitre, gives the smell of aqua fortis, by warming the solution, and adding vitriolic acid.--- *Roman vitriol*, if pure, by adding caustic vol. alk. to the solution, will at first appear turbid; but more of the alk. will render it transparent. If it contain iron a black calx will be thrown down; if it contain zink, it will be white.--- *Green Copperas* containing copper, a piece of polished iron being put into a solution of it, it will be covered with a coat of copper, (90)--- *White copperas*, or vitriol of zinc containing copper, is detected by vol. alk. held over the fumes. If iron, it is detected by tincture of galls.--- *Tin* having lead combined with it, or pouring strong aqua fortis on it and setting

(90) This gave rise to the vulgar idea of iron being turned to copper, by the Anglesea copper company, as they purchase large quantities for the purpose of immersion.

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setting it in a warm place, the tin will be calcined while the lead will remain free. Vol. alk, liver of sulphur, hepatic water, and sugar of lead, will detect arsenic, if any be in it besides the lead, by shewing a yellowish green precipitate, by first adding an alkaline salt, and then adding cuprum ammoniacum to the filtered liquid. *Verdigrease* containing lime, a selenite will be formed by offering diluted vitriolic acid to it. Gypsum, i. e. vitriolic acid combined with lime, may be detected the same way.---- *Iron* containing copper, is shewn by a blue appearance, on digesting the iron with caustic vol. alk. or if a small quantity of the filings be dissolved in marine acid, and a polished plate of iron be added, it will be coated with copper.

N.B. The Writer has said (note 85) tests may be had at several Chymists, but it is here added C. O'BRIEN will give any one, who is known by him, as of congenial wishes with himself, particular and useful intimation respecting them, by applying to him personally, or at his house Islington, his views being (as several times said) to advance the respectability of the business beyond every other concern, (see Prel. Sug. General Reflections, and elsewhere.)

* *The want of requisite time among Printers and Colour-makers for such a study, has been noticed, (and just said, to be for the last time) but still, though the writer has great respect for some as men of good natural talents, as well as of great experience, yet he cannot but subjoin, that the neglect of such a study must certainly be a drawback on their merit, be it of what cast it may, or however they may be pressed with other immediate concerns.*

*A Retrospect, or abstracted View of the Subject
just discussed, with occasional Observations,
and a concise Corrollary educed from the
whole.*

IN the close of the section on copperwork, it is observed, and necessarily here repeated, that all operative effects, however complex they may appear in process, are to be traced to certain simple or elementary sources, depending on principles that give energy to the whole of the operations; and the closer these principles are attended to, or investigated, operations are to be proportionably simplified, and more easily and with more certainty carried into (1) effect; thus

as

(1) This consideration of principles (attempted to be the ruling one throughout the work) may be applied to mental operations, or works of fancy; and is so exhibited in the section of pattern drawing where genius is spoken of, as that principle or vivifying spark (there so termed) which is the spring of excellence in works of invention.

By the term principles (so often mentioned) it is concluded is understood, not those subtle points that

A Retrospect, &c.

as illustrating the above position, in considering the processes treated of in the two preceding sections, they may be comprized in four parts, which here, similar to the elements of any art or science, are the points from which the subsequent operations spring, or to which they may all be referred.

First, Cleansing, or so preparing the cloth, that the astringent and colouring atoms are not prevented from entering.

Secondly, Expanding the pores when cleansed, so that these particles find a ready admission.

Thirdly, Cementing fixing or binding them when entered into the pores when cleansed and expanded:

Fourthly, Securing or closing them in the cloth when thus cemented, so that no future natural nor artificial operation can fairly remove them.

Now

that refined theorists contest; much less those more remote ones, enveloped almost in metaphysical obscurity. But those only, as observed in note 28 to copper-work, from which we can form reasonable conjectures, as the springs or commencements of physical operations, and which are universally allowed to be valid; and in certain degrees immutable.

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Now, in order to enforce a consideration of these principles, and to simplify and bring together the operations treated of, it is necessary to ask in general terms, what are the means to procure those effects, and wherein and how far lies the efficacy of those means? or to speak still closer to the subject, what are the substances necessary to be removed or applied, according to the quality of the cloth, and what are the articles and processes necessary to be used for that purpose?

In the first place, the substance to be removed being allowed to be of an unctuous quality (whether naturally so or as applied to the threads previous to weaving, see note 12 to copper-work) it can only be removed by applying another substance that will attract and mix with it, in preference to whatever else it may be offered to; and as alkalis when joined to certain unctuous matters, are known to form a soap, they are therefore here applied, and a kind of soap being consequently formed, the hot water loosens it, mixes with it, and easily removes it; but as the salt of the alkali chiefly acts in this case, the earth is supposed to be left in the pores (2) which the
water

(2) Alkaline salts are changed into absorbent earths by frequent solutions and evaporations.— See the compendium of chemistry.

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water not being deemed able to remove commodiously and sufficiently, recourse is generally had to souring; as acids more readily effect it (3) the absorbent earths attracting the acid particles from the liquor in which they are suspended, forming a neutral salt, easily dissolved in water, and of course easily washed out (4) and the whitening is facilitated from the absorbent earths being thus neutralized.

These operations therefore are deemed needful to cleanse the cloth, which is only effectually performed, when its pores are sufficiently clear to receive the saline or astringent atoms, that are to attract the colouring ones.—See note 29 in copper work.

The above, it must be plain, only respects cleansing; the other parts, including the operation of printing, fixing the colour, &c. being dwelt

(3). Hot water, every one knows, will dislodge oil or grease, and, as in this case, alkalis and absorbent earths; but it is not sufficient, unless what dislodges them retains them, by combining with them.

(4) Mineral acids act similarly to alkalis in removing the brown or unctuous substance.

A Retrospect, &c.

dwelt on in other places, the reader is therefore referred to them; but in view of enforcing the idea of considering operations as proceeding from a certain point, it may be asked, how are those various colours and shades produced? the answer is, by the agency of certain saline substances, (see a few pages back) such as allum, saccharum saturni, &c. which after their application, form an union with certain colouring particles, as of madder, weld, &c. assisted by various and successive operations; and which if looked into will be found proceeding from that point into certain direct or lateral connections, that otherwise would seem confused and in many cases superfluous.

All the circumstances included in this consideration, cannot possibly be specified, but was every person, concerned in these or indeed any other operations, to enquire from what points they originate, how they branch out, and to what they lead, it would by degrees form an habitual desire of acquiring knowledge, which when only partially acquired the summit is the easier to be attained. (5)

Concerning

(5) As the writer affects to bring in cases something in point, he here mentions a circumstance of

A Retrospect, &c.

Concerning *ashing, frowning, &c.* of more commonly speaking, the preparation, it is much simplified

a person being employed to repair a copper-plate press, having been much used to such work; he accordingly took it to-pieces, as the best way towards making (as his phrase was) a good job of it; and after working at it three or four weeks, it was deemed completely in order by a few trials that were made; but that, it soon appeared, was far from being the case, for though he knew what parts should be together, he did not seem to have an idea of tracing their relative connections, as proceeding from the first movement; and thus overlooked the firm situation the cylinders should revolve in, towards performing with the necessary pressure: for the gudgeon, or pivot-hole, that the pivot or spindle at one end of the upper cylinder turned in, was so insecurely placed, that in the passing of the plate, it was lifted up a third of an inch, and the consequence was always evident in the impression, and when the cause was discovered it was by mere accident.

It would be like affectation to enter here into a copious mechanical disquisition of the matter, but it may be said the considerations in this case, should have been, 1. what the effect required, 2. what the power or velocity to procure that effect, 3. what the

plified to what it formerly was; (6) and of late years, the processes among professed bleachers, have

resistance to that power, and 4, what the method to obtain it and likewise to secure it? and then to have proceeded accordingly.

It is however ventured to observe, that in copper-plate printing presses, the situation of the winch does not seem to be properly attended to in working quarter or $\frac{1}{2}$ quarter plates; for, as it is in the pinch that the force is most requisite, the winch (which mechanically speaking is a lever of the second kind) should be so fixed, as to be at that time either in the highest or lowest part of the circle which it describes; or, if but one person acts, in that point from which he pulls, as in any other the persons, who turn it, cannot use their strength to the most advantage, though with the assistance of the flier; which, by the way, as an assistant, is contended among mechanics wherein it is so; in fact, for reasons which will not here be entered into, there should be a winch at each side of the press, but then for whole plate printing, they should not stand one up and the other down, as for quarter, or half quarter plate work, but rather thus. I—

(6) Some at this time lay very little stress on the utility of dunging, &c.

A gross error is prevalent among Printers, respecting

have been so altered or retrenched, that in respect to practice two elaborate and judicious writers, Dr. Home and Mr. Curry, are growing obsolete

respecting the introduction of dunging, which is, that a Cow having got among goods that were laid to whiten, where her ordure fell they were observed to be the whitest; but the use of dung was common long ago, in many cases, on the Continent; some however think it might be spared from Callico-Printing, though some imagine it rouses the colour, but what effect it has is supposed to proceed from its volatile alkaline quality (as said already). Dogs excrement is used in the Levant for brightening the ~~the~~ used in dyeing goats skins; and it is common here in the dyeing of thread to use sheeps dung.

Now, according to the intention of this Retrospect, it should here be asked, what is the quality of dung? which when answered, we may then judge of the propriety of using it; as an answer, it may be said, it is a vegetable putrefaction; of course it is alkaline, and should not be indiscreetly used.—See the section of Dunging.

In agriculture, the salts in it are supposed to open the roots of vegetables, and that thereby they are more disposed to receive that humidity from the earth

obsolete; (7) to which the great improvements lately made in the cotton manufacture, and that of British callicoes, have undoubtedly contributed, and even at this time (1790) bleaching is undergoing a considerable improvement. (8)

The

earth necessary for their nourishment, and fruitfulness.

The above suggestions may be applied to branning; and if the purpose for which bran is used, be investigated, other articles would be found as useful, which are far more economical: but for cleansing, some acidity is required, and there, perhaps, the writer has forced a meaning in deeming it souring.

(7) Dr. Home says, that among Bleachers by profession, the pieces are first soaked in warm water; but this is not done now in Lancashire. He likewise says, in souring, the foulness in the cloth so much attracts the acid particles, that the water is tasteless; this however is not the case in souring among printers.—See however note 12 to copper-work, and the article maddering.

(8) The writer now knows a Chymist of repute, who says, he has discovered a mode cheaper and more efficacious than any yet used; and the same with iron liquor; which will perhaps shortly be publicly announced.

The above causes a suggestion, that though the metropolis ever must be the center of taste and fashion, and though (turning to the subject of this treatise) some Printers about town have had sufficient reason to complain of certain practices of many in the country, but which by a late legal process it is probable will be checked, (9) yet it is in the country that improvements,

as

(9) The case was a pattern of Messrs Greaves' Newton and Co's being closely imitated by Watson and Co. the fact not being contended, but only a misconception of the meaning of the act, Lord Kenyon in his charge, severely reprobated the practice of such piracies, as bidding defiance to law, and the protection Parliament had granted to genius and industry; and plainly intimated, that if such a case came again before him, of an imitation being so near the original, as to pass for it, very little indulgence indeed might be expected.— See notes 13 and 15.

Of the performances in the country, on the principle of expedition, none have more surprized Printers about town, than those of cutting and finishing various patterns; but respecting the mode of doing it, no more, for sufficient reasons, will be said, than that it has been frequently done to answer a very illaudable purpose, and generally with the

A Retrospect, &c.

as generally called, have chiefly originated (see note below) though very likely the offspring of necessity more than choice, or from the low price

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coun-

the power only of printing a piece or two, as the whole was often cut over again, to execute a course of work.—See note 32 to copper-work.

An instance has been lately given of similar expedition in copper-plate work, in the imitation of a celebrated and truly excellent dark ground pattern, (see further on) the imitation being executed in a tenth of the time the original took: the execution, however, it must be owned, is neither to the credit of the drawing, nor the engraving, whatever engraving there may be in it; and on the principle just reprobated, of still less to the publisher of it; but, notwithstanding these practices, it is plain the infatuation of setting up printing grounds in the country on a monopolizing or underselling plan, has, like other furors, had its paroxysm (see note 13) and the fallacy of the prediction, that the business would be nearly all done in the country, is now evident enough: as land, labour and provisions are not to be had on such easy terms as formerly; exclusive of the little credit of country paper currency, since the failure of Mofney, and the many subsequent ones, and the market being overstocked by the quantity of wretched work, latterly disembogued by that house as well as by several others.

A Retrospect, &c.

country work in general is rated at ; they have however, from the modes of pursuing them, ruined, or helped to ruin many ; though perhaps a few who act with foresight and on some plan, are profiting by them ; (10) for instance, the
greatest

(10) Innovations, particularly on a mechanical principle, are spreading pretty widely in the country ; and machines of various constructions are increasing about town ; and perhaps many town Printers will hardly credit that engraved cylinders perform as expeditiously as the common pin ones, that a machine for block printing was invented and used some time, with which any one could print as easily as turn a winch, (the specification for a patent was even made out) and that in machine printing, four cylinders may be used at once in different colours.

The writer can speak of this with confidence, having the advantage of knowing what has been done, and what has been farther attempted ; and was absolutely in a concern where an almost general course of printing by machines only, was to have been adopted ; a system being formed for that purpose ; but certain considerations, among which the idea of such modes being ultimately injurious, from enabling the proprietors to underwork others, operating not a little with him, set the plan aside.

But this is a subject neither safe nor proper to
speak

greatest house of all (Livesy's and Co) where every thing that was deemed an improvement

Q₂

was

speak of, at least for the present ; unless it may be permitted to say, (as having some relation with it, and being among the causes) that a spirit of combination has unfortunately prevailed, opposition will inevitably follow, and few ultimately will have occasion to rejoice ; for when the necessary distinction between principals and subordinates is destroyed, who will willingly enter into a business liable to be thus cramped, or remain in it unless under very particular considerations, without seeking the means of executing work with less manual assistance? and that such means are to be obtained, the writer, from his own knowledge can say, is, under certain circumstances, to be performed beyond what many imagine, or will perhaps believe ; besides, without affecting a prophetic spirit, let it be considered, that in the mutation of stile or fashion, callico printing has to fear a decline, or at least a suspension ; and then the spirit of combination must evaporate ;—even at this very time (1790) something may be apprehended from the countenance given by Royalty (and Vice-Royalty) to a manufacture, that for some years has been little encouraged.

It is very far from affectation or opposition, that these

was put in practice, and where labour was had
at

these matters are freely treated; for it is to be feared that those who boast of having carried their point, (which by the bye, a favourable coincidence of circumstances forwarded perhaps more than wisdom or sagacity) are too much blinded by it, to see the certain consequences, that sooner or later *must* follow*, as to their plea on a legal score, it would have little countenance in a court of justice, if we may judge by the severity with which several late combinations have been treated, the letter of the law itself being directly pointed to inflictions of that nature, without opening for escape or evasion; and why the law is so pointed, is on the principle that combinations obstruct trade: and in this case, what master Printer can venture to engage patterns,
when

* *When subordinates or lower classes acquire power in any shape, it is rarely used with temperance: and in this case, it would not be wonderful, if the Congress, as usually called, hindered certain disapproved masters from having any men at all; or perhaps some of them might be for prescribing what kind of work they chuse to print, as well as they have often condemned certain prints; these suggestions are only intimated to the intemperate, as the few intelligent men that are among them, or those that through necessity closed with the scheme, do not need them; and many, it is well known, find it very heavy to contribute to the fund; which, by report, can hardly answer the demands on it.*

at the lowest price, has, to appearance, irremediably

Q 3

bly

when he doubts (which he may now) whether he may be allowed men to work them, or men to even work at all; thus, if the regular channel of business is impeded, stupidity itself must see the certain consequences; as to the restraint about apprentices, it would be proper enough if every apprentice proved to be a tolerable workman, but that is not the case with one in ten; of course, a proper succession of hands is prevented; but, if the association had been winked at, or if certain exertions for moderating this refractory spirit, and procuring an equilibrium of interests between master and man, had been aided, an extremity of proceedings (which will undoubtedly be the case) would have been prevented; however, at any rate, and for reasons which those who look only as far as a Saturday-night, cannot see or will allow, power, in this instance, should be in the hands of the Principal.

At the same time let Principals be reminded, as a counter charge, that compacts between them respecting journeymen have been broken;† and were any to be made, and confirmed and sanctioned by law,

various

* Though some may not be pleased at mentioning it, yet great wages is an evil to those who know no use of money, but to get rid of it at that period.

† In a late trial (July 1790, at Guildhall) 500*l.* damages were given, for one Manufacturer enticing men away from another: heavy damages being directed by Lord Kenyon to be laid.

A Retrospect, &c.

bly failed; (11) while its great and avowed rival seems (see however what is said further on)

to

various causes will still tend to break them: for when men are wanted they must be had; but a junction of interests in such a case is hard to be formed.—See something relative to this in the essay respecting masters and men.

Something on a combinatory principle, has been in agitation among another class, but of which no more will be said, than that the writer laments any proposals should ever be made, to sell works of genius or fancy at so much per inch.*

(11) It is said this place was the means of giving bread to near 20,000 persons; cloth in whitening has occupied ground 12 miles in length, near 300 tables have been employed, and near 40 coppers at work at one time; 6 or 700 cylinders have been cut or pinned; common prints, &c. innumerable; and it is well known, one man, at the beginning, made a decent fortune by the cutting of them; but, as observed above, the price of labour was latterly reduced as much as possible: by converting (as done at other places) herds of Lancashire boors into drawers, cutters,

* *A Plan of Mr. Lukey's (included in the general one) to excite emulation among Designers, merited consideration; but Master Printers and Drapers must join for that purpose before it can be effected; and being for their mutual credit and interest, it were well if they would. It however can never be too late to adopt something of the kind.*

A Retrospect, &c.

to have hitherto profitted by adopting similar modes; and by attending to quality as well as

Q.4

quantity

cutters, printers, machine-worker &c. and the work was latterly proportionably execrable.

Of the failure it may be said, who in times past would have believed, or who in times to come will, that a connection reputedly worth above 150,000*l.* at its commencement, should in a few years crumble under the deficiency of near a million and a half; and that among those involved in the accommodation labyrinth, who fell in consequence (exclusive of Gibson and Johnson) some were for 10 or 20,000*l.* who, comparatively speaking, possessed little indeed? saying nothing of those who lingered some time, or those who were more or less shaken, or may be shaking at this moment.

It must however be observed, that in trying to reinstate the firm, it was endeavoured to prove that if it were supported till affairs could be arranged, there would be a balance in hand of 60,000*l.* but the attempt was in vain; the answer in general being, in effect, that such egregious folly and extreme madness had little title either to succour for the present, or confidence for the future.

As to the manœuverings to raise supplies, they were carried to such enormous and unprecedented heights, branched out into such complicated mazes and so finely spun, as hitherto to have baffled the
powers

quantity, it has in some cases exhibited respectable work; but without a compliment to the principal

powers of a Thurlow or Kenyon to unravel*, but perhaps it was thought the magnitude of the concern was so great, its connections so wide and important, the resources so various, and the bank so expedient, that it would be upheld in defiance of common contingences; and probably the blow was at least, not so soon expected.

But whether or not that was the case; many must smartingly remember the immediate effect of the shock was an awful gloom, diffusing itself as if credit were at its last gasp; or, as if that species of honour on which the very existence of Trade, Manufactures, and Commerce depends, had approached its dissolution; Manufacturers and Trades of various descriptions, crowding to town, tremblingly anxious to know their fate; the *miasma* expanding so widely that few in any trading connection knew on what ground they stood. The consequences however must transmit a warning to future adventurers, how they precipitately adopt ill-digested plans, pursue immethodical operations, or execute desperate resolutions, especially if on a
mo-

* At the writing of this, the principle of their fictitious notes was under the consideration of the twelve Judges.

Principal, his labour, attention, investigation and systematical arrangement of the business, as well as his conception of trade in general, must have been very great to reach the height to which he is now arrived; and, judging by what has happened, unless vague politics now distract his attention, (12) he is the man of resolution and enterprize, whom other Printers (a very few excepted) have either to fear or emulate.

Q 5.

But,

monopolizing and underselling principle, or, as if determined either to be the greatest gainers, or greatest bankrupts; but in short, of the whole it may be suggested in a few words, without distortion or aggravation, and a lamentable remembrance it is to hundreds, that its commencement was rash, its prosecution desperate, and its termination *** !!!

(12) Being returned a Member of Parliament. See a Pamphlet ascribed to him on the national debt. (Something similar was published a few years ago under the title of "The national debt: no national grievance.")

In the political *mania* existing among Manufacturers, if Moliney had stood, it is probable the competition between it and Bury would have extended to

But, while praise is bestowed where merited, it is here freely said, may those practices just spoken

to this object; for as it was, the Principals seemed lately to have lost sight of Callico Printing, among their various speculative practices; indeed one of them (Smith) generally had political business enough on his hands; (his interference respecting the Callico-Printers' bill, is as well remembered, as his argumentative powers were acknowledged) but with what propriety Printers, Manufacturers and Tradesmen in various and extensive dealings and connections, plunge into the abyss of politics, beyond what concerns their immediate vocations, is not attempted here to decide; as it may be partly gathered from the rebuff Lord Thurlowe gave Josiah Wedgwood, in saying, whatever he might be as a Potter, he was an indifferent politician.

Of the pamphlet above alluded to, it may be observed, that most men in business, in what they write, naturally have an eye to their immediate vocations and interests: thus Mr. P——e dwells upon the increase of manufacture, but passes over those practices that, however they overload the market, lessen the value of commodities, and is silent about that respectability which keeps up the spirit of any profession, or that is a proper inducement for genius to exert itself; for of the vast quantities he
himself

spoken of, (too notorious to need specifying,) be ever stigmatized, discountenanced, and repro-

Q6

bated

himself has thrown into the market, a great part is well known to have cost him little on the score of design and execution, the sale at the same time being undoubted.*

And the writer cannot but lament, that while the Minister in the late display of the prosperous state of the nation, on opening the Budget for 1790, was attributing it to the increase of manufactures, and the consumption of articles, he was silent on the probability of some of the manufactories going to decay at the same time, as he only regulated his decisions by the state of the excise and customs; thus to come home to the subject, he can only estimate the prosperity of the Callico-printing business by the entries which in this case is the same, whether work sells at 10d. per yard, or 10s. (if the same kind of cloth is used) but it is evident while this has been increasing, Printers have been ruining themselves, by aiming at quantity rather than quality, and lowering the market to get off that quantity. Here the case of Lively and Co. offers itself,

for

* *What a triumph it is, that notwithstanding this, there are Printers still gaining by a respectable line, and though their work sells high.*

bated, as they must *eternally blacken* the character of the practiser of them, in the eyes of those who have a regard for the present and future respectability of the business, or the protection and reward that
genius

for, while they were deluging the home and foreign markets, they were rapidly declining, in credit at least; and undoubtedly many 1000 yards that paid duty years back, are not disposed of yet: therefore the quantity they did, as appearing in the Excise books, was no proof of prosperity, but quite the contrary.— See note in General reflections about the Minister's knowledge of the minutiae of trade.

And, here it is repeated, is the oversight in the Pamphlet, in no notice being taken of that respectability which ought to be preserved in any business, that by proper means the market be kept open, and that one Manufacturer should not, by illaudable practices, render his profession, and what he produces, of such little value, that at last it is neither beneficial nor creditable in any respect whatever.

Of the point chiefly dwelt on in the above-mentioned pamphlet, it may be just remarked, that national credit, like that of tradesmen, can only reach a certain height without breaking; and high as England is now in political health, or firm in constitution, who can say how long she may remain so, or that ~~even the~~ means employed to keep her so, may not defeat the intent, or that another Gibbons, in some centuries hence, may not attempt to account for

genius, and a spirited exertion to maintain that respectability, has a right, not only to *expect*, but to DEMAND. (13)

for the decline of the British Empire? as every century produces great political and commercial Revolutions; and the present appears remarkably pregnant.

(13) As there always were, and always will be, men who bid defiance to legal obligations, as well as mere moral ones, those piratical practices, unwarrantable in intention, disgraceful in execution, and destructive in their tendency, will probably never be stopped; and the check they have received, (see note 9) is far from remedying the evil, for an elaborate pattern of the same Parties was soon after imitated.—See note 14, and the General Reflections, &c.

Respecting monopolizing and underselling by means of *cramping* the market with low priced work, it must inevitably, in the course of things, help to bring Callico Printing into disrepute; and, as it has been said, if it could be supposed for a moment, (see the end of colour-making) a chemical course were universally adopted, printing would soon lose its repute; so here it may be said, without that being the case, if what is called fast-work be brought into such a disreputable stile, similar consequences must happen; and if three or four houses about town, which in regard to design, execution, and an adequate price, keep up its respectability, were to decline the business, the time would

In regard to the business itself, it may be intimated, as a further attempt to reduce the whole
of

would not be far off; but such an idea is unpleasing, and it is therefore waved.

Perhaps it is fortunate the original plan of the Linen Hall intended to have been opened on the Continent, Apr 1788, has not been pursued; for certainly it would have caused an opening for large deposits of wretched work; but of that matter, what the writer can say about it will be particularly reserved for another occasion.*

Having spoken of cheapness of labour, &c. in the country, it is here suggested, that what has been done, and perhaps is now doing there, cannot be so done about town; for at the great country houses the subordinates have been used to look up to the principals as a superior kind of beings; and were therefore held as much as possible in a state of mental subjection, (perhaps the school at Bury is an exception; though who can judge the founder's views) but subordinates about town have higher ideas; and it is said here to a certainty, how disappointed principals used to such implicit obedience, and, procuring on almost what terms they pleased, the extremity of service at a nod, have found themselves in attempting the same about town; this however is probably gone by, for it

* It need hardly be said, that now, Public Sales are perverted to partial instead of general accommodation: hence that great scheme would have missed its proper end.

A Retrospect, &c.

of what has been said in both parts of this work, as much as possible into a contracted view (for it seems

is fact, that at this time (1790) the first houses in the country begin to find, that in the intoxication of temporary gain, they overshot prudential caution, having nurtured what now proves rebellious; and would willingly compromise with the Printers for the suppression: and likewise finding they have brought the marketable price so low, as to destroy the balance between that and the price of labour, would gladly join in reducing it, and fixing it by law: (tho' that always renders workmen doubly rancorous against Principals) but the evil is of very natural growth, and the folly or impolicy is now seen and felt, of putting at one time and another, 50 or 100 rude country linds to printing, cutting, copper-work, &c. as they now begin to be of consequence, considering themselves as something more than machines, and pretend to dictate about price, time, apprentices, cylinders, &c. for in compliance with their demands one of the first Printers has put down one third of his machines, and submitted to other injunctions; and it seems as if apprentices had caught the influenza, for two grounds have advertised for about 30 each, that have absconded, and two others for near 20 each (see the Manchester papers for June and July 1790*) and it is not quite irrelevant to say the minister is not likely ~~now~~ † to be threatened

* *A threatening Letter was sent to Rowland Kersbaw, demanding the suppression of Machines. See the same papers.*

† See P—le's examination by the Lords and Commons.

A Retrospect; &c.

seems impossible to bring it absolutely to a point) that in the establishment and management of it, it is naturally divisible into three distinct parts, *Firstly*, The inventive and mechanical, as treated of in the first part of this work: *Secondly*, The chemical and philosophical, as discussed in this second part: and *Thirdly*, (what has not come within the plan of this treatise) the trading and commercial, or, in printing for Drapers, the home accounts and town business; thus, pursuing the same mode as in the Retrospect of bleaching and copper-work, if a train or connection of all the operations in the business could be formed, it is presumed it would be something like what follows; for the necessary distinction above made, prevents a regular chain of process; one part being to prepare utensils for conveying colour to the cloth, while the other is preparing the cloth to receive the colour; though afterwards, the processes go on in a single series.

threatened with their being transplanted along with the business to another place.—See General Reflections, and note 19 to the same.

In fact, town Printers have partly to blame themselves; having first supplied country ones, by selling them their old prints; and old Mr. Peale has often said, the sending of goods into the country to be whistled, forwarded the establishment of Printing-Grounds.

A Retrospect, &c

One division therefore undoubtedly comprehends, with their subordinate considerations,* those of

1. **DRAWINGS**, or **Patterns**, which, whether originals, imitations, or direct copies, the principle consists in adapting them to certain markets:

2. **PUTTING - ON**, or transferring them to blocks, plates, cylinders, &c. requiring as its principle, an even face, and joining, or such management, that in the end the effect of the pattern is obtained : In this department is included the management of blocks.

3. **CUTTING** (comprizing pinning, &c.) on the principle of a sound bottom and clear face.

4. **ENGRAVING**, requiring distinction in the strokes, and depth combined with strength and neatness.

The other division comprizes, with the usual or occasional intermediate operations of branning, dunging, washing, pencilling, after grounding, &c. the considerations of

1. **STEERING THE CLOTH**, or removing dirt or certain slight stains.

2. **ASHING**,

* It cannot be enforced too much, that every consideration includes that of what will be the effect at last.

A Retrospect, &c.

2. **ASHING**, or removing brownness, grease, &c.

3. **SOURING**, (sometimes alone sufficient) for removing grease, iron-moulds, stains, &c. the principle of which, as well as of ashing, being to open and enlarge the pores of the cloth, that it may properly imbibe the astringent and colouring particles.

4. **CALENDERING** (including stretching, occasionally stiffening, stowing, &c.) requiring an attention chiefly to keep the wool, and shoot as square as possible.

Here the division of processes ceases, coalescing in the operation of

PRINTING, the principle of which, whether with blocks, plates, cylinders, &c. is properly furnishing them, and regularly impressing the colour into the cloth.* As to colour-making it cannot be brought into either of these trains of processes, it standing by itself in providing those agents applied to the cloth by printing, for procuring the colour, assisted by the two distinct preparatory trains of processes just exhibited.

After this junction, the considerations then are

1st. **STOWING**, or drying or keeping the cloth in a dry state, that the saline particles in the colour

* This being the case, the capacities of lads put to the printing table should be better considered than they are; and were it done, the dulness of journeymen would not be so proverbial as it is. In

A Retrospect, &c.

colour may not be dispersed, or as the phrase is, that the colour does not run.--- See note 34 to colour-making.

2. **CLEARING**, or removing the fighting and thickning, so that as little else as possible, besides the astringents be left in the cloth.

3. **MADDERING, WELDING, &c.** or using certain substances, on the principle of their colouring particles being attracted and retained by the astringents already in the cloth, as applied by printing.

4. **FIELDING**, or displacing the superfluous particles of colour, by laying down, planking, &c on the principle, that certain effects are procured by friction, pressure, evaporation, &c.

As to the mode of managing the business, it would be absurd and highly presumptuous in the writer, to advance any thing particular for reasons repeatedly given, except that to conduct it properly, requires an understanding beyond what is conceived as a common one, or even one acquired merely by experience; for leaving it to superintendants is always attended with more or less

fact, every thing depends on it, for unless the colour is properly imbibed by the cloth, (as said already) the Drawer, Cutter, and Colour-maker, have laboured to little purpose; and the Copperman cannot possibly remove nor cover the evil.

A Retrospect, &c.

less inconvenience; and servants, who make their employers interests their own, or even able to advise with, are rarely to be met with; but generally speaking, it may be said, whether in the commencement or prosecution of it, resources or connections to supply work, and conveniences to execute it, are equally of the first concern; next to these, as far as such a complicated business will permit, is forming an estimate of certain expences, in the price of drugs, labour, and utensils, as well as the probable profit; which includes the knowledge of the nature and value of drawing, cutting, &c: whatever else is necessary to be considered in respect to theory, system, &c. is so often spoken of, that it must be needless dwelling on it here; it is however earnestly again recommended to be thought of (see note 7 to copper-work, and note 51 to colour-making) that from the complicatory nature of callico-printing, and the difficulties attending the prosecution of the various requisite processes, (which a slight survey even of this tract will evince) it must be folly superlative for any person rashly to enter into it (14) on an idea he can in a year or two

(14) The numbers who have not succeeded, particularly in the country, are strong proofs of this; even at Mosney, not one of the Principals could

two, acquire a proper knowledge of it; as to those who are in it, it has been repeatedly intimated they should turn their thoughts towards its principles, the parts that compose it, and the relation they bear to each other, (see note 28. to copper-work, and note 1 of this retrospect) for merely knowing whether work is done well or not, may be sufficient for a Draper, or Salesman, but a Callico-Printer ought to know why work badly done is so, and consequently, how it should be done otherwise.

Similar now to what is said at the end of the first part of this treatise (there necessarily placed, and chiefly applicable to practice, and what could be partly reduced to rule) are annexed here, a few positions gathered from the substance of the second

could be supposed nearly competent, according to what is frequently advanced in this work; but to look round and see men, and of some understanding, rushing into a business absolutely requiring a junction of mechanical, chemical and philosophical knowledge; exclusive of the common concerns of all businesses, leaves little room to wonder how soon they get confused in every sense of the word, and that what they produce is disgraceful, and of course unprofitable.

cond part, as more applicable to theory, or those principles, without which, practice must ever be uncertain in its operation, or incomplete in its effects ; therefore, be it well remembered, that

THEORY is the BASIS of PRACTICE.

ALL OPERATIONS ORIGINATE FROM A CERTAIN POINT, HOWEVER DIFFUSIVE THEY MAY PROVE AFTERWARDS.

ALL SYSTEMS ARE COMPRIZED OF PARTS THAT HAVE A RELATION WITH EACH OTHER.

PRINCIPLES SHOULD BE CONSIDERED BEFORE OPERATIONS ARE PURSUED.

IN OPERATIONS THERE IS A CERTAIN POINT OF TIME WHEN AN EFFECT IS OBTAINED, AND GOING FURTHER IS SUPERFLUOUS OR INJURIOUS.*

And, as in the positions at the end of the first part it is said, **EXPEDITION WITHOUT PRECIPITANCY IS THE ESSENTIAL SPIRIT OF BUSINESS,** so here it is said, that

CERTAINTY

* See note 16 to Copper-work, and about the scald, at the end of Maddering.

CERTAINTY OF EFFECT IN ANY PROCESS IS THE MATERIAL OBJECT, the ULTIMATE POINT, or the GRAND DESIDERATUM to be, IF POSSIBLE, OBTAINED.

Hence, for the last time, it is observed, that in pursuit of this MATERIAL OBJECT, and, in order to it, to procure a familiarity with causes and effects, the springs of operation should be discovered, the channels traced which flow from them, these channels re-traced to their springs, and the various connections considered as intently as possible; thus from the consequences of thinking as well as acting, a capability of looking through every stage of process to the last will necessarily follow, the general cry of the difficulty of managing the business be partly removed, and a greater CERTAINTY of EFFECT be obtained, with its consequent appendages of profit and credit, as well as of mental satisfaction, (15) and

(15) If it be not too ludicrous, it may be here said, though ANXIETY be not entered in the Journal or Ledger, yet much may very often be placed to its account.

The anxiety here alluded to, is not
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and the writer will go so far as to say, that under such circumstances, from the nature of many of the processes, in which fancy, taste, arts and science, lend their influence and powers, it would (extravagant as all this may seem to the mere drudge) be to an active and penetrative mind, a perpetual source of rational exercise; and supply an extensive fund for philosophical investigation, and intellectual enjoyment. But, he must go further, and say, that until men of this complexion, able to render that a pleasure, which to others, however profitable, is perplexing and burthensome, are more engaged in it, than now are; little may be expected beyond its present confined powers of execution, and relative degrees of effect.

so much that which arises from the causes hinted at, in note 51 to Colour-making, or those that are inseparable from business, so much as that resulting from mistakes in operations. To prescribe equanimity in such cases is useless; the remedy must be a preventative; but, nevertheless, though a man is not to be reasoned with in a perturbed state, something may be advanced at other times, which if imprinted on the mind, may prevent or lessen that mental ebullition. Of which see the Essay on the relative duties of Masters and Men to each other.

GENERAL REFLECTIONS,

or

DESULTORY SUGGESTIONS

relative to

CALLICO - PRINTING ;

and various articles allied to it ;

which may be considered either as improveable hints, monitory effusions, or mere occasional observations.

AS one excitement to forming the whole of this work, was the disagreeable reflection of many being at the head of the business treated of, little competent to the management of it, even in its present state ; so the writer would be happy to see every Callico Printer, what he ought to be, a man of genius, as well as a man of business, or any other quality ; as emulation would undoubtedly be one consequence, and the effects of emulation among men of genius, no one can be ignorant of, is aiming at superior excellence over each other, or the exaltation of their respective professions ; for supposing, instead of two or three Printers maintaining a respectability, because it is certain the majority of them cannot reach

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it

General Reflections, &c.

it, that the performances of every one were equal to the best now done; what is it those *very* few who are at the top of the profession would not attempt in order to retain their pre-eminency? (1) and what is it that might not further be done for furniture; hangings, ornaments, and other appendages of Opulence and Taste, were Callico-printing countenanced (to carry on this illusion) as the great Colbert, under the auspices of the great Lewis, countenanced the art of dyeing? (2) and what advantages would not attend it in various cases, were it rendered as much an object of the Great and Refined, as many articles of fashion, taste, and

(1) What is it a certain senatorial Printer would not attempt, were he in a line of commanding a price? for who is more capable or spirited? in short, what is it any man would not attempt, whose maxim is, "A Man may be a Lord if he will?" — See the retrospect!

(2) The reign of Lewis XIV. has been deemed the third Augustan age; and in Lewis's SPLENDIDLY DESPOTIC reign, so emphatically termed by Burke, Colbert had only to suggest, and Louis commanded it to be done.—See 5th note.

Voltaire makes four ages, i. e. of Alexander, Augustus, Medicis, and Lewis.—See likewise Gwin on design.

General Reflections, &c.

and luxury are, though of less intrinsic value, as nature, by exquisiteness of execution, might be more closely imitated, and fanciful designs farther assisted, than they can possibly be by the common modes now in practice; but, at present, persons of taste and judgment in drawing, painting, ornament, &c. (if uninterested in the business) rarely find any thing worth their notice in the best execution of the best full chintz patterns, as being far behind a tolerably decent imitation of nature, either by painting, tapestry, weaving, needlework, or even paper printing (which by the way is now in a rising state) (3) even the necessary out-line is a sufficient bar; and to instance an essential part of such patterns, a rose, how little like nature in shadow, folding, shape and colour, is the best three red rose that ever was, or even can be, printed in the usual course of

(3) See a French paper pattern of roses, (the writer thinks imported by Middleton,) which at a proper distance has the effect of a painting;— But when had cloth such an effect?

In France, paper printing, in many respects, throws English callico printing to a great distance; but it is there made worth employing first-rate artists as designers.—See the advertisement at the end.

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executing patterns! perhaps the nearest approaches to nature in drawing, as far as cutting would allow, and in colour, as far as three reds, three purples, buffs, olaves, and so on would permit, have been in various patterns of Kilburn's; (4) and particularly so, in respect to drawing, in his late excellent dark ground tinted plate patterns; but how soon was one shabbily imitated, and underfold? (see note 9 to the retrospect) as has been the case with many of his coloured patterns; and what is disagreeable to mention, when speaking

(4) His patterns for 1790 run chiefly on an imitation of sea weed, and in effect, at least, excelled what any other printer exhibited, and is particularly noted here, as being an instance of what might be done, were Printers not confined to a certain expence; for the cutting in them is such, that no other Printer could or would execute them; and no other Draper, but he for whom they were done, would have dared to engage them: in fact, strange as it may seem to many, and incredible to some, it is without flattery here observed, that out of the great number of Drapers in England, Scotland and Ireland, there is but that one who boldly ventures, in concert with the Printer above mentioned, to strike into unbeaten tracks, and consequently prevents that *langour* in exertion and *sickliness* of complexion which otherwise would be the case.

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ing of such exertions, probably the retailers' ends were better answered; hence, how can persons of taste, fashion or opulence be expected to countenance a business, while (by way of instance) for what such persons would willingly give five or six shillings a yard, their very servants can have an imitation of, or what has nearly the effect, for two or three? and what stimulus has genius and industry to exert themselves, when exertions are liable to be quickly imitated, most commonly in a slovenly manner, and shamefully undersold? this alone is enough to quash the spirit of exertion; therefore the writer confidentially says, if any regard be due to the improvement of a profession, requiring genius and a philosophical understanding to conduct, it has a claim on the attention of the highest legislative powers, that such a distinction and regulation be established (beyond the meaning of the late act) so as to annihilate such practices; but this can only be done by preventing that confounding of the excellent and execrable, where inferior work, whether original or imitative, chymick or fast, answers the general marketable purpose as well as, or better than, the best.--See the retrospect.

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In whatever light this suggestion may be looked at, by those whom it concerns, or those to whom it is immediately directed, it is affirmed that the great Minister just mentioned, as he deemed the art of dyeing worth his endeavour to fix on an establishment, which comprehended such a distinction and regulation (confirmed since his time) (5) would no doubt have extended his wishes to this object; and the rather, as Calligraphic Printing, by exhibiting figures, flowers, and fanciful objects, on certain articles, instead of merely colouring them, is indisputably a great improvement on dyeing. — See note 49 to colour-making, — and from such considerations, however presuming

(5) They are carried so far, that Dyers who profess dyeing fast colours, are not allowed even to keep in their shops, the drugs used for false or fugitive ones. — See the end of the suggestions on Chymick Printing. And this by the way, may serve to justify what is advanced about Chymick Printing; on the necessity of some regulation on that point, as well as the apprehension of the consequences of an overflow of inferior and low priced work, though executed with fast colours.

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presuming it may appear to direct any thing like dictation to a Premier, he is notwithstanding here told, that though an interested individual may naturally enough say, 'What value I the disrepute attending my productions, or even the execrations of my practices by posterity, so I gain my pecuniary ends? yet a Minister, from his situation as a general Guardian of Manufactures, is bound to take the matter up on a more liberal scale, and to regard the reputation and prosperity of the rising generation, as well as the present; therefore, pressing forward the immediate subject of these suggestions, before the Minister is again applied to by deputations (6) from town or country

§ 4

Callico

(6) And why should not the Minister attend to a deputation from those who have the respectability of the business, and its advancement in point of execution, at heart, as well as giving an ear to deputations from others, who have only an idea of doing a great quantity, upon plans calculated for immediate emolument, however highly they may talk of sinking vast capitals, employing 5, 10, or 20,000 hands, forming extensive connexions, encreasing the revenue, &c. &c? for, smacking the
masters

Callico-Printers, for partial or other illaudable
pur-

writer's ideas of improvements to this political one, advancing the respectability of the business must advance the pecuniary worth of its operations; and by procuring new and more respectable openings for its reception, it would bear higher duties, compensating for what deficiencies there might be in quantity of work, if that should be a consequence; which however, on the supposition of super demands only for what is super-excellent, would have little to do with what may be done in common, as is at present.

Besides, as such an improvement would require the most respectable persons to carry it on, there would not be the probability of the Revenue being defrauded, as frequently done by indigent or desperate adventurers; and which many probably suppose is oftner the case than it is, when work is sold in the shops for hardly more than the prime cost of the cloth, every one not knowing why it can be sold so.

(When improvements are spoken of, it is begged to be understood that the usual course of practice should first be rendered certain.)

As to what is said of a Prime-Minister's knowledge of trade (if such a topic may be here ventured

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purposes, let him be here informed, that a profession, which is a great source of revenue, instead

tured on) it can only be on a general scale, as he cannot know much of the minutiae of it, and much less of particular points, where every individual is differently interested and circumstanced, from each other; * and in this case it will well admit a query (some may think not) whether those deputies from the country, when closeted with the Minister, a few seasons back, were as ready in explaining to him the nature and consequences of those practices that caused the Town-Printers to apply for a remedy, † as they perhaps were

* It is just remarked, as apposite to this observation, as well as relative to the subject of this work, that, at the late trial about copying a Pattern, a common Putter-on must have smiled, at Mr. Erskine's attempt to inform the Jury how patterns were transferred to the block.

† It can be said, that those whom such practices have particularly injured, are not solicitous about what printing is done in the country, so it were but done upon that principle of honour which ought to actuate Tradesmen, as well as any other class; and as a proof of the above suggestion, it is on record, that on the late trial, Lord Kenyon paid high compliments to the honourable behaviour

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instead of being properly nurtured, is not only kept
back

were quaint, fluent, diversified or energetic, on the
injury they might receive from (innocently to be
said) printing a pattern likely to be construed a
copy?

Nets, It is begged to be observed, that it is not
because the practices often alluded to, are exe-
grated, as done by this or that particular person in
the country; since the first Printer, Draper, or any
other concerned in the business about town, would
have been treated just as freely in a similar case;
for whether in Town or Country, he only is pointed
who spiritedly and honorably holds his situation
as a Tradesman, or as dastardly and disreputably
contaminates it. Their necessity may perhaps
plead for indulgence, and on that score pity is
due rather than indignation, and pity is be-
flowed.

view of the Professor, on the conciliating compromise
that previously took place between the parties; evincing
that the Plaintiff only wished his "exclusive right"
to be legally ascertained.

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back from gaining maturity; but even its present scarcely budding state, has been and is attempted to be

flowed.—See note 51 to Colour-making. And well would it be for many, into whose hands these suggestions may fall, if they prevent their being added to the list of those active or passive underminers and debasers of that respectability in operation, and that liberality in dealing, which is the proper foundation and prop of any profession, trade, or manufacture whatever.

Of piratical or invasive deceptions, the late adjudicated repulse (see note to the retrospect) adds to the triumph of legitimate exertions; and genius and industry may look forward with a hope of proper encouragement and protection; for in this case it may on an equitable principle be said (and Lord Kenyon's oral testimony—(see note 9)—was to that effect) patterns should be considered like literary property.

It is said "attempted," because all have not succeeded. The firm of Lacey & Co. must never be forgotten, and as yet may be ranked first among monsters of this kind; being equivocal in its generation, mishapen at its birth, irregular in its accretion, and premature and infectious in its dissolution.—See this retrospect.

be nipped and debased, by certain individuals, in view of making that profit in a few years, which ought to be a patrimony legally descending to after-ages; as well as preventing it from rivalling most other professions depending on the exertions of genius, by bringing it entirely under marketable constraint: (7) let him likewise be told, it was undoubtedly in this light that the great Colbert would have viewed it (making allowance for local and temporary circumstances) since he acted not as if he consulted a few interested individuals, or as to throw immediate riches into the Treasury, much less as if he wished to force unnaturally any art to its highest state, for the pride of beholding it so himself, no matter how soon after his time it withered; no, that admirable

(7) *Mere mechanical or manual operations perhaps are proper to lay under such constraint; thus the plain cloth as being a mere piece of labour may be under such regulations; but when an excellent piece of fancy is exhibited, it surely ought not to come under marketable or measurable regulations, or at least it should be considered as a distinct article — for the end of us is about combination in the retrospect.*

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rable man was satisfied with the dawn of such a prospect; he was content to plant the arts in such a soil, that the roots might take firm hold, and the growth be natural, though it might require ages to bring the fruits to their highest state of cultivation; or before individuals, the nation in general, or the world at large received emolument or pleasure from them.

Being on this subject of improving the profession treated of, it is intimated, that some years ago, an artist of repute (Mr. Edwards, F.S.A.) was employed in painting flowers, &c. as patterns for working furniture, &c. for the Queen; now here, looking forward in an effervescence of hope, for the exaltation of Callico-Printing, what would not a high price (suppose it is said 30 or 40 shillings per yard) enable an ingenious Printer to perform, by using a greater number of shades of colours, more blended, or less abrupt in their gradations and transitions, with the pencilling applied to more advantage in attempting to imitate, on various materials, patterns so drawn and coloured? it is surely to be inferred, he could do something that the first Artist in the kingdom would applaud for its effect; and a suggestion.

General Reflections, &c.

gession is presumed on, that Royalty only waits to know something could be done for furniture, ornaments, &c. to match these paintings; which being known and noticed, no one will dispute the influence such notice would have on the subordinate degrees of rank and fashion; and then (still indulging a delusive hope) from such an operose mode of execution, elevated degree of effect, and proportionate value of the performance, the Artist above-named, and others of acknowledged capability, would have that justice done to what he or they could produce, not possible to be obtained by the present highest efforts! then would the usual unceasing imitation of nature, the restricted display of fancy, the unmeaning appearance of what are even called good patterns, and that criterion of excellency by what will suit the market, be superseded by performances, that in effect, would be compatible with nature, taste, and propriety, and accordingly would be judged by a standard just and immutable, totally distinct from that of the market, or the caprice of the day! and then would commence an era in the history of Callico-printing, honourable and celebrated to the commencers, and super-eminently reputable to every one concerned in the operation, or in the disposal of what may be performed!

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Before the closing of this digression, it may be mentioned that an eminent Printer (Arbuthnot) had a pattern cut for Queen Caroline, but though elaborate and well executed, it was in the common stile of effect, with 3 reds, 3 purples, an outline, and so on, and produced by the usual and uncertain course of process; but this the writer cannot help saying is what remains, not only to be rendered more certain in operation, but, to be exceeded in effect; and must be exceeded before Callico-printing can approach to even a very humble degree of perfection.

But, notwithstanding what has been said, it is too obvious, that the settled oconomy of the market, which says nothing beyond such a price will sell, is the most insurmountable obstruction to any considerable improvement in execution and effect, or even to equaling what is done on the Continent; for the most elaborate of our work, that, as the phrase is, will pay, is only an approach towards the excellency of our neighbours. (8)

Another

(20) It is known such work is done on the Continent, that, according to the price of labour here, would

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Another impediment results from the common idea received among many Printers, that rendering

would require 12 or 15 shillings, or more per yard, to execute, if it even could be done; *but many Drapers look now more for profit from bargains than from a regular custom of giving so much for printing, and advancing it on the buyer; and as this is an irregularity that must be removed, before an improvement can take place, it would be beginning a new æra in trade, and new modes of conducting it: and possibly, notwithstanding what is said note 51, some Drapers, in their connections with some Printers, would not wish work always to be so well done, as not to have occasion for a Damage-book. — See the last note but two to Putting-on.

* It is particularly in the article of pencilling that the best Continental work excels ours (see Pencilling, Vol. I) but why the cutting and printing should, is not so clear; some late efforts, however, show emulation is not wanting, but to effect an equality; the tyranny of the market must be crushed in certain cases, as above alluded to.

The above is applicable to paper printing on the Continent, (as before spoken of) but what is imported not being under a marketable controul, no more than Foreign prohibited Chintz, it can command a proper price, and is therefore in request by the opulent.

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dering operations cheap, easy, and expeditious, are the only points proper to be deemed as aiming at improvements, from being of immediate pecuniary consideration (9) besides, it is a very difficult matter to get journeymen out of an old track.

In

(9) This it is granted is so in this sense, but then the consequence is lowering the price of the articles, which (as often particularly dwelt on) strikes at the very root of that respectability which only can render Callico-printing more worth the notice of the opulent and fashionable.* But according to the writer's idea of improvement, totally the reverse of that mentioned above, the consequences would be a greater demand for works of genius, an increase of mechanical and manual operation, and a more extensive request for utensils, drugs, &c. with a sufficient inducement for men of scientific knowledge, to make proper experiments on articles not in common use, at least in printing (see the notes at the end of the account of Colouring Drugs, and the end of the Retrospect) for thus it was, by calling forth the powers of Philosophy and Genius, in conjunction with the knowledge of the mere Practitioner, that the illustrious Patron

* This destructive principle, the writer is sorry to say, seems to crush any further progress in that elegant improvement, copper-plate printing. — See note 10 to the retrospect.

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In another light, a great hindrance lays in the lukewarmness with which Government listens to proposals of countenancing any art, unless they tend to an immediate increase of revenue, or at least do not interrupt the channels of it.

From these considerations, enthusiastic as the writer may be in his wishes for the exaltation of the profession in which he has a concern, it is feared, that what has been advanced must remain an ideal prospect little likely ever to be substantiated; or be considered as an airy excursion, productive only of a delusive hope, or an imaginary advantage; and as those who are particularly cramped and injured by piratical and debasing practices, can do little more than complain, so, in respect to improvement, whatever may be said for bringing the usual courses of operation into more certainty of effect, the business must nevertheless remain in this restrained and imperfect state; which strictly speaking, is, that

two

Patron and aggrandizer of the arts, above spoken of, so advanced the art of dyeing, as to give France that pre-eminence in it which she even retains to this day.

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two or three can command a price to enable them to execute decent work (which is only so in a comparative view,) and the rest fill the market as well as they are able; and thus, season after season, Calico-Printing retains the same complexion, only the features are now and then a little altered, and frequently distorted.

However, according to the mode the writer affects of bringing what he advances to a point,* so here it may be said that

The improvement of any profession depends on a knowledge of its principles, and the application of them to practice.

Increasing the respectability of any profession increases its intrinsic value.

Under-working, under-felling, and piratical practices, are, on the contrary, destructive, or subversive of it; and this consideration comprizes, the usual consequences of adopting cheap and expeditious modes of operation.

Turning now to the treatise itself, the writer is aware it may be said by some, that what he has proposed (and what he may offer) is unattainable

by

* See the ends of the first and second volumes.

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by the generality of those to whom addressed : and even romantic in some cases; or else that it does not give information such as many expect, who think nothing but practical directions can, or ought to be spoken of :--to the first remark he can only say, he certainly attempts to go out of a beaten track; to the other, (as often repeated) it is as little 'in his inclination, as in his power, or perhaps any other persons', to exhibit such directions; his intention being to pursue a middle course, offering the chief of what he says, not to amuse novices, deceive the credulous, or oppose the reasonable, but as almost mere matter of reflection, to those who are in a certain state of practice; as well as earnestly recommending it to those who may be inclined to enter into the business, to consider the nature of it; or if determined to enter, to be equally aware of the difficulty of conducting it.*

Whether what he advances under either idea, is equal to the intention or not, he will not use any thing like the insipid hacknied apology of "leaving it to a candid Public to determine," but he will venture to say, that as *his* highest idea of the usefulness of this work, is the probability of its rousing reflections on the principles of

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* See note 7 to copper work.

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Callico Printing, which otherwise might have lain dormant, his views must appear as tending ultimately to encrease it in beauty, taste and expression. This however, it is enforced, cannot be attained till a philosophic spirit is roused and diffused among Callico Printers in this country, (which if these humble efforts may any way assist, the writer will be amply consoled for any treatment they may meet with) and as he thinks he could point to two or three, whose latent powers only want rousing, it is here distinctly intimated* that if modern philosophy be called in to aid what is already known and performed (21) it will appear it does not only establish theory on grounds more directly applicable to practice, but

* It being only casually mentioned in this work.

(21) See Delaval on Colours.—Berthollet on Acids—Bergman on Indigo—but see especially the annals of Chymistry.

Mr. Delaval's doctrine is, that colour is produced by light transmitted through transparent particles, from its reflection on a white ground or medium.—In Berthollet's memoirs, are particulars respecting the dephlogisticated marine acid, of wonderful efficacy in solutions, Bleaching, clearing the ground after boiling off, a test of the fixity of colour, &c. &c.—It is however as yet little used in England, in fact, a Revenue concern, that formidable *Remora*, is against it. (See likewise Nicholson's Elements.)

Of the discoveries respecting air, much surely

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but to render practice itself more simple and efficacious; and not only detects and removes impurities and imperfections in articles that oppose the severest common tests; but analyzes, rectifies and applies them beyond conception or belief: In short, it rivets speculation with practice, and the agreeable with the useful.

But

(as observed in the article of Madding) might be turned to advantage. Fixed air having the property of renovating certain vapid liquors, of keeping meat sweet a long time, giving water a sparkling appearance and a most lively taste, as well as superlatively purifying it. (To convivialists it may not be inexcusable to add, that the beverage of punch is much improved by it.) The inference, however, to the Callico-Printer is, that water any how purified and joined with salts equally pure (note 36 to madding) must be incontestably advantageous in colour-making, as the water likewise must be in bringing up colour. And every Printer has by him, the principal ingredients, viz. chalk and vitriol.*

* An odd idea is adopted by some, that the Indian fast colours are raised by sand; some add the sun; of this, the writer has often enquired, but what he has heard is too absurd to repeat.—In truth, the principles of Indian fast colouring processes are like ours, for no other is known; and as they have existed some thousands of years (note 40 to colour-making) so there is no appearance of their ever being otherwise. A deal too is vaguely said of all the colours being put in with pencils. But this will be discussed in a history of Callico-Printing.

* It has been mentioned how needful a still would be in a colour-house. Chemists in their processes are particularly careful in this respect, and why not callico-printers, dyers, &c.?

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But while thus paying tribute to the exertions of philosophy, may the writer just glance at consequences which philanthropy, however it may admire those exertions, cannot but deplore? namely, the depriving many of their (perhaps) only means of subsistence, and exciting them to acts of turbulence and desperation (22) and is the rather mentioned, as the present disturbances in the Callico Printing business are partly owing to such causes. (23) Hence, at any rate, in order
to

(22) Sir Richard Arkwright is said to have cleared 50 or 60,000l. per annum by his Cotton Mills; but how fared it with the hundreds "turned over to Providence" by the invention?

N.B. A work is just published on the subject of granting patents.

What was it the ever to be execrated Firm of L——y, H——c, A——e, S——h and H——ll, wished to do with machine printing? (note 11 to the Retrospect.*)

(23) By Cylindrical printing. The report of a Patent for printing green (as has been mentioned) has caused a ferment among Pencillers: and so might the new mode of Bleaching above spoken of,
from

* One execrable attempt (rather extraneous here) not universally known, was to draw a certain Printer in Surry (see note 4) into their connection, not a month before they failed! It was however treated deservedly with the highest disdain.—Lay and Adams offered the same person 500l per annum to draw for them just before their failure:—Was this, folly or any thing worse?—See note 50 to colour-making.

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to compensate, in some measure, for such partial injury, by instituting something generally advantageous (as often enforced) the improvement of effect, and procuring new and more respectable channels for disposal, in all possible cases, should be always kept in view.

May it likewise be observed, though dwelt on elsewhere, that, as merely practical men in extensive businesses, are more alive to immediate "Loss and Gain," (like Ministers to certain sources of Revenue) than to distant advantages, which require deviations from established modes of practice or supplies, the greatest discoveries sometimes produce only a transient blaze, and are, alas! consigned to oblivion, unless accommodated in some degree to what is already in practice. In short, as the mere practitioner cannot

from the idea of its rendering watering, &c. unnecessary, have some effect on Fieldmen.—See similar thoughts where speaking of chemick printing in the section of colour-making.

Of the disturbances above alluded to, (allowing the above cause as some extenuation of them) it is just said here, (see note 10 to the Retrospect) while funds are supported; and the distinction of fair and foul shops retained; while different Masters have different interests, and some actually benefit by the divisions, it is impossible to conceive any end but a self-destructive one, or until the members clearly see the evil consequences, as above referred to, or at least hinted at, or when it is taken up by the legislature, in an alarm for the revenue.

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cannot understand the language of theory, till by gradual information his doubts and prejudices are removed, it is an oversight in scientific writers (with trepidation it is said) to publish researches only as theoretical; greater, if announced applicable to practice with no practical matter incorporated with them; but greatest of all, openly to avow a total ignorance of the practice of what they are offered to improve; as that at once precludes further notice from the merely practical man, who looks for practical information. (24) But, notwithstanding these and all other impediments, and surely it is but fair to state them; if a proper emulative spirit be but once raised, the writer still hopes, delusive as he may represent his hopes, he shall see London Callico-Printers' names in the list of the Royal Society, as well (with some little reproach to London Printers be it said) as there are two or three country ones in that of the Manchester Philosophical Society.---That he shall see practice grounded on philosophical principles; and consequently

(4) As for instance, will not a merely practical Dyer rather turn to the translation of Hellot by Haigh, a professed dyer, than to a late excellent one where the translator avows his ignorance even of common technicals?—See likewise Dr. Eason's paper on bleaching. Vol. II. Manchester Phil. Transf.

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frequently rendered more certain and of better effect.—That he shall see this combination of Theory and Practice patronized by a Premier and vivified by Royalty ; (25) and that then *he shall see England*, as she excels all other nations in arms and commerce, likewise excel, among other arts, all other nations in

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(25). A premium coming from a Royal source, and adequate to the expence of the attempt, would go much further towards improvement than the premium for patterns. For one excellency there, is adapting them the best to the present restrained mode of execution ; but as this *would much improve* that mode, drawings would not be under the restraint they now are.—(See the end of note 9 to the retrospect) and then English Artists, in their designs, would find inducement to emulate French ones. In fact, restraint in this first stage precludes excellency in the succeeding ones. (See notes 3 and 20 to this section) and until it be remedied, English Callico-printing will ever be behind that on the Continent, especially what is *now* (1791) attempting at Juoy, near Versailles in France.

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*† Several articles spoken of or referred to in the preceding work are intended for a supplementary part, with an appendix of certain articles of undoubted utility, and all the apposite *liberal* animadversions, and even ill-natured truths, which the writer can procure. For as the development of the subject is what he has in view (see Preliminary suggestions) he is on that account as willingly hostile to his own errors as any other person whatever can be, or as he would be to those of others.

*† This work not being formed to meet, indiscriminately, the public eye, and the art of *Book-making* of course not being rigidly attended to, it, among other informalities, was not paged, that the sections might be interleaved for the purpose of making *memoranda*, and that any one might form an index to his own mind. Besides, it was of service to the writer, in the desultory, indeterminate and detached manner in which it was composed and published.

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