SCIENTIFIC AMERICAN

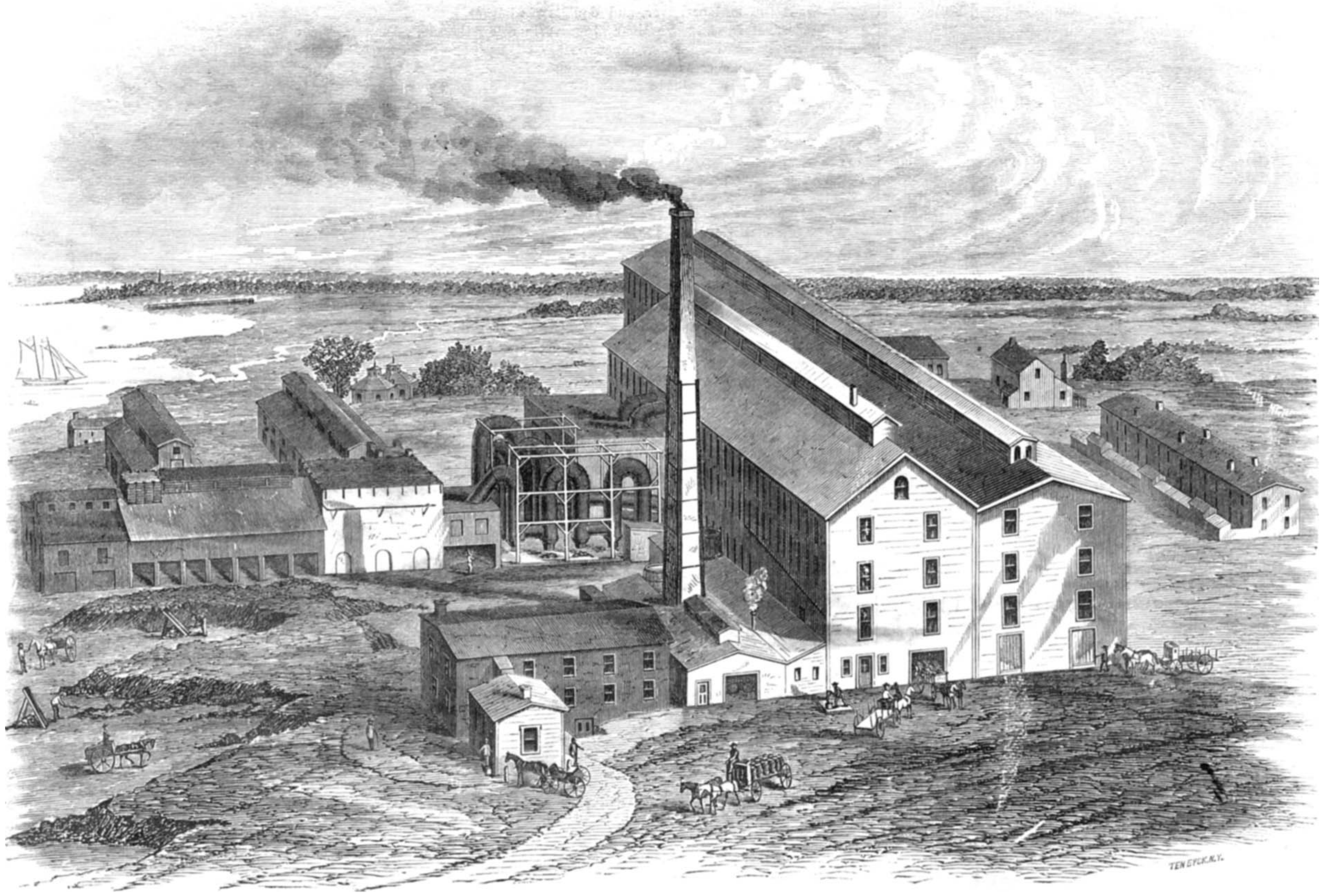
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXIII.---No. 3. [NEW SERIES.] NEW YORK, JULY 16, 1870. $3 per Annum. [IN ADVANCE.]

MANUFACTURE OF ZINC OXIDE AND BARTLETT LEAD.

While the white lead of commerce is the pigment most extensively used, yet there has ever been an objection to it on account of its poisonous nature and tendency to darken from sulphurous fumes, and also of its carbonate to oxidize. In the endeavor for expedients to supplant it, the oxide of zinc was discovered. This pigment, though much whiter, has neither the body nor durability of the lead compound. Yet it is valuable for inside work, as being comparatively harmless and not liable to darken from the fumes of coal fires, etc., hence its use for almost all painting not exposed to the weather.

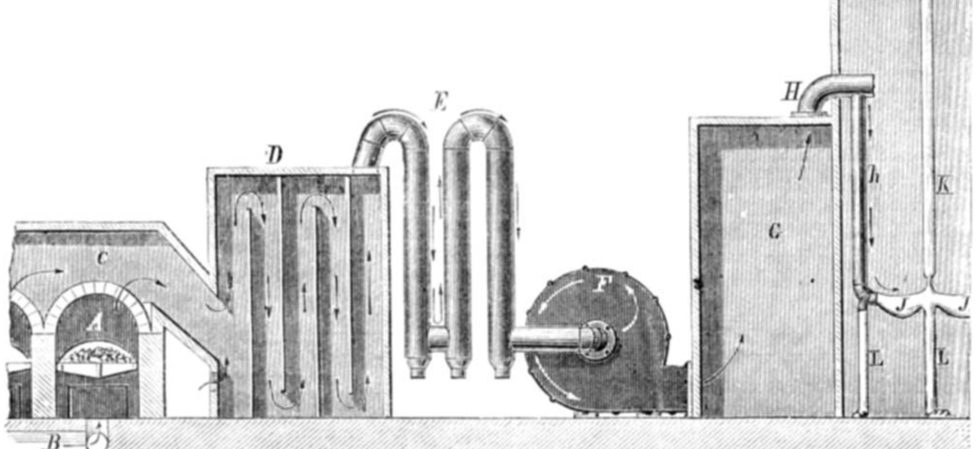
In chemical nomenclature there is but one oxide of zinc, which is composed of one atom of oxygen and one of zinc. It is a white powder with a slightly yellowish tinge. In its use as a medicine it is prepared by precipitation from solutions of the salts of zinc, or of pure zinc in dilute sulphuric acid. The precipitation is usually accomplished by carbonate of soda. The commercial article is made by a fire process. Muspratt states this last article to be "either anhydrous oxide, the hydrated oxide, or the hydrated basic carbonate of zinc." Certainly an ample range, yet it may be any one, or a combination of any two of them. It is not soluble in water, but is soluble in all the acids and under certain circumstances in the alkalies.



BARTLETT WHITE LEAD AND ZINC WORKS, BERGEN POINT, N. J.

There are two varieties of the commercial article: the French, made from the metal; and the American, made from the ore direct. The first is intensely white. Both have the flocculent structure peculiar to the article which gave it the name of philosopher's wool. Under the microscope the oxide of zinc looks like a mass of small white rose leaves. An article made by the same process lately introduced to the trade and the scientific world, called the Bartlett Lead, has an entirely different structure, being amorphous. This seemed strange and was for some time disputed, but has been incontestably proved by numerous microscopic observations.

Fig. 2

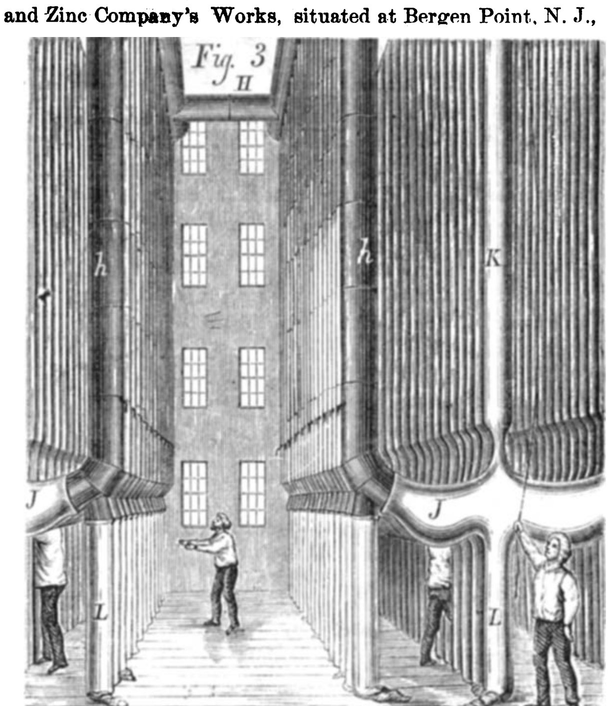


The invention of the process of manufacturing the oxide of zinc from the metal was made by Guyton de Morveau of France; its general introduction was due to Leblanc, and he first erected works for its production. His process is substantially the same as that now used in France.

The metal is put in retorts, and the flowery zinc is condensed in chambers or flues made of zinc wire gauze, to admit the passage of any injurious gases, air being admitted. The retorts are similar to those in use for the production of zinc metal, but the heat is much higher. The American system, for deriving the oxide direct from the ore, is accomplished in a furnace similar to a double reverberatory. The flowers are condensed in bags of woolen muslin.

To enable our readers, however, to more readily understand the interesting process of preparing the zinc oxide, we give herewith a series of illustrations of the Bartlett White Lead and Zinc Company's Works, situated at Bergen Point, N. J.,

Fig. 3



the pigment of that company though, as we have stated, being entirely different from ordinary oxide of zinc, is yet made by the same process.

Fig. 1 is a bird's-eye view of the whole works, located between transportation by water on the Kill von Kull, and the

N. J. Central Railroad. The furnaces have a capacity for over 10 tuns a day, and are prepared to admit enlargement to twice that size.

Fig. 2 is a general section of the zinc works, showing the operation. A is the furnace ash-pit below; B is the flue or tweer for air blast; C is a flue between two furnaces.

The ore ground fine and mixed with its bulk or more of fine anthracite coal, is charged in A. It is first dampened by sprinkling with water. The fire and blast is then applied, and the process commences. The flue between the two furnaces serves to assist draft and also for passage of the vaporized metal. The furnaces of the Bartlett Company do not differ from any of the others, except being larger. Their ore, too, is different.

D is a chamber with partitions alternating from top or bottom, for checking passage of vapor and for settling any ash or coal which may be drawn over. Nearly pure oxide of lead sometimes collects in this chamber at the Bartlett Works.

E—Large iron pipes for cooling the vapor and gases.

F—Exhaust fan. This fan draws the vapor from the furnaces and forces it forward to the bags.

G—Large brick chamber for cooling and distributing the oxide.

H—Pipe to bag room.

h—Pipes in bag room.

The course of the oxide and gases is shown throughout by the arrows. The process is simple. Man throws in the material, and nature does the work with two of her great elements—fire and air. At one time the oxide was made to pass through a water spray, but this was abandoned at the Bartlett Works for some reason.

Fig. 3 is a view of the bag room, in which the oxide vapor is condensed, with its great tall rows of ghost-like flannel bags.

H *h*—Iron induction pipes, as seen in Fig. 2.

J—Balloons of flannel.

K—Flannel bags in which the oxide is collected or sublimated.

L—Bags for receiving the oxide shaken from bags above.

This room is constantly filled with more or less carbonic acid from the coal, and hence has very free ventilation. The bags alone in this room cost over $20,000, and it has size enough to condense 20 tuns of oxide per day. The engine which furnishes power is an excellent one from the Washington Iron Works, and the whole establishment, built two years ago, is excellently managed by Col. Charles Stebbins, General Director, and Dr. Johnson, Superintendent and Chemist.

Fig. 4.

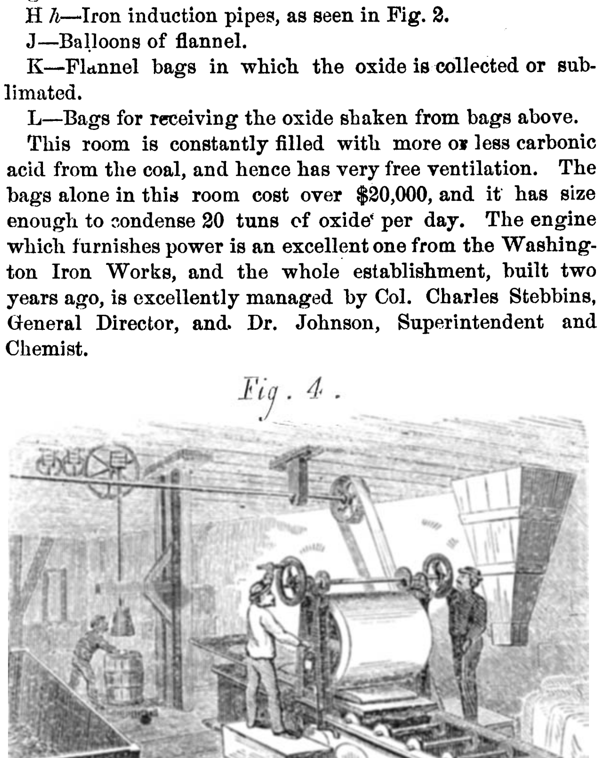


Fig. 4 is the packing room. The oxide is placed in bags and rolled in the machine shown—thence packed in barrels.

The invention of the American machinery marks an era in the history of the zinc trade of the world. The article produced is not so white as the French, yet the Lehigh Company have produced nearly as good a product from the carbonates and silicates of Pennsylvania.

The New Jersey Zinc Company was the first started in this country. They commenced operations in 1848. Their history is one of struggles and failures, but perseverance triumphed. They commenced with the retort process, and it is said made oxide which cost them $1 a pound. In 1850, disheartened, the stockholders were thinking of abandoning the enterprise, when the present style of furnace was erected by Mr. N. Bartlett,and the bag condensers invented by S. F. Jones. A new impetus was given to the business, and the trouble then was not to make the oxide, but to dispose of it after made. Two barrels of the first made were sent to the World's Fair of 1851. Now there are nine zinc companies at work in the United States, and the New Jersey alone produce about 5,000 tuns a year, of which nearly two-fifths is exported to Europe. Their profits have been immense, and the stock has sold, since the flush times of the war, as high as 200 per cent above par. The Lehigh Company was started in 1854.

The New Jersey Company use an ore of zinc and iron and manganese, called Franklinite, of which they control a large deposit. The carbonates and silicates of zinc are used by the Lehigh Company, but they are scarce of ore. This ore abounds in Virginia and Tennessee, and in the latter State works have been erected to use it, but as bituminous coal will not answer for the furnaces, they are at disadvantage in distance from anthracite.

The fire process by which these pigments are produced is very similar. The ores yield variously, that of the Bartlett Company nearly twice as much as the others. The product collected farthest from the furnace is the whitest. That falling in the cooling chambers is usually worked over.

It is only within two years past that it has been found practicable to use the most abundant ore of zinc, the sulphuret, called in mining parlance "black-jack." The use of this ore was made the subject of a patent, granted the Bartlett Lead and Zinc Company in October, 1868. A peculiar pigment was thereby produced, to the structure of which we have alluded. The properties of the pigment made by this company may be due in a great measure to the ore used, which is *sui generis*, as the ordinary "black-jack," while producing a pigment containing lead, certainly does not have it in near equal proportions, or the same chemical form.

This pigment probably deserves more than a passing notice. It is made from an argentiferous galena ore containing zinc, found in North Carolina. It contains about $15 of gold and silver to the tun of ore. Until lately the ore was "buddled" and concentrated; for ten tuns of raw ore one of concentration was obtained. This yielded from $150 to $225 in gold, silver, and lead. The rest of the 10 tuns was roasted in a peculiarly constructed furnace to get rid of sulphur, and then brought to Bergen Point, N. J., opposite New York, and oxidized. The owners found that their process of concentration did not get near all the lead or silver, and doubting whether it would not be better to improve their pigment by using the fresh ore merely roasted, without concentration, tried the experiment with such success that now they have abandoned the concentration, and produce a pigment containing over 40 per cent of lead, and weighing 500 pounds to the barrel—flour barrel size—same as would hold about 200 pounds of ordinary oxide of zinc, or 600 pounds of white lead. It has been rather a matter of dispute in what form this lead is contained. That it is an entirely new form all admit. Our theory is this: The roasted ore as received from the mine contains a certain percentage of basic sulphates, these are set free by the fire-heat; the lead is also oxidized and goes over as a peroxide, the zinc in its usual form; the sulphur of the sulphates is set free as sulphurous acid, this unites with peroxide of lead and forms a new character of sulphate, not being enough sulphurous acid to take up all the lead, the remainder, assuming its acid character, unites with the zinc as a *plumbate of the oxide*. Our theory is one derived from practical observation of the pigment from its first production.

This pigment was introduced to the public about two years ago by Messrs. C. T. Raynolds & Co., the oldest and one of largest paint houses in America, and though a new article, hence meeting with much opposition, while at the same time its singular nature was not understood, it has met with great favor and is firmly making its way into general use. And we are informed that Messrs. C. T. Raynolds & Co. sold in 1869 over 1500 tuns. It is claimed for it that it has more body and greater durability than white lead, and will not peel off as does zinc oxide. Its peculiarities are that when mixed with oil or spirits of turpentine it does not settle as other paints; that a building painted with it bleaches whiter instead of turning yellow; that when mixed and exposed to the air it thickens, and it has a peculiar gloss unknown in any other pigment. At least some of these peculiarities may be due to the fact that a large part of its oxygen is in the form of ozone.

The works of the company, of which we give a bird's-eye view, have now a capacity for production of over 10 tuns of pigment per day. The mines in North Carolina have been repeatedly pronounced inexhaustible by the most competent scientific and practical authorities. We occupy this much space with this pigment because we think, as with the first production of zinc oxide, that its introduction marks an era in the paint manufacture of this country.

It is singular that while the ore from their mines contains an average of over 30 per cent of sulphur, the company have never utilized it for the manufacture of acid, which would add greatly to their profits. In England such an ore would be worth $12 to $15 per tun for the sulphur alone.

As a paint, zinc oxide is generally used for inside work. For nice work of this kind French zinc ground in poppy oil alone, or in poppy oil and thinned with white Damar varnish is used; this last is classed by the trade as China Gloss, Enamel Finish, etc. American zinc is chiefly in use as an adulterant of white leads, and the production of a class of pigments called cheap "leads," which are mere mixtures of sulphate of baryta, zinc, and more or less—sometimes no—white lead. The Bartlett Lead is an inseparable mixture of some form of lead and the anhydrous oxide of zinc. It contains from 30 to 40 per cent of the former, is finer than any pigment known, and has peculiar properties possessed by no other pigment. It has now been before the public for about two years, and barring the disadvantages incident to any new article, has met with almost universal favor, and is increasing in popularity. It is a singular product and emphatically a new discovery in science and the manufactures.

The capital employed in this business in this country is over $12,000,000, and the annual product about 15,000 tuns. The Works of the Vielle Montaigne Company are very large, and are chiefly located in Belgium. The production of metal zinc is, however, a great part of their business. About 450 tuns were imported in 1869. The American article ranges in price from 6 to 8 cents per pound; the French sells at about 9½, gold. The duty is 1½ cents per pound.

STEAM ON COMMON ROADS.

[From the Engineer].

What is the true reason that we nowhere see the steam engine used to any great extent for common road traffic? There is probably no problem in the whole range of practical mechanics, and there is certainly no other problem in steam engineering which has taxed ingenuity so long, so much, and yet with such comparatively slight results. Almost innumerable inventors, dating from Cugnot, have been trying their hands at it for more than a century. It is true that their work has not been without some fruition. Steam traction engines now carry themselves and their plowing tackle in farm operations; they are used for drawing heavy loads for short distances on special bits of road; but that is nearly all. Road engines have never yet found general application in England; and, after many different trials at various times, they have almost completely failed in France, in Germany, and America. The multiplicity of the proposals and attempts in this direction is remarkable. We have Savery, and later Dr. Robinson, ten years before Cugnot's trial, proposing the thing. Then Oliver Evans; in 1784 Watt patented the application of his engine to the purpose; William Symington tried it; and afterwards Murdoch. Oliver Evans actually propelled an engine of some size. The most ingenious attempts were made by Trevithick; and, after him, by Gurney, Gordon, Ogle, Dr. Church, and Dietz in France. The curious, and perhaps significant, point about the history of these attempts is that the principal ones were renewed with an interval of a generation between each. Thus, after the first schemes in 1759-69, we find Trevithick working in 1802-4; Gordon, Church, and many more in 1832-6; and, lastly, Boydell, Aveling, and others, from 1855-65. We now have another ingenious plan, but, in spite of all that we have lately heard from Edinburgh about Mr. Thompson's road steamers, we are not inclined—while we wish him every success—yet to make an exception in his favor. In the first place, they have not worked long enough; and, in the second, we do not know the proportion that the excellent roads in and about Edinburgh have contributed to his success. In fact, isolated cases of the partial success of steam power on common roads can generally be traced to the good state of the roads in the given locality.

Trevithick, the greatest genius among traction engine inventors, seems at first to have even believed that "railroads are useful for speed and for the sake of safety, but not otherwise; every purpose would be answered by steam on common roads which can be applied to every purpose a horse can effect." In this there is, of course, an evident fallacy. The only reason that greater speed is obtainable on a pair of rails, with a locomotive and its train, than if the locomotive and train were put on a road without rails, is that the rail offers a hard, smooth, unyielding surface, and that the ordinary road offers a soft, rough, and yielding surface. If we took an ordinary train of a locomotive and carriages, turned the flanges off the tires, and placed them on an iron road, made with one smooth level surface—one long metallic table, in fact—we could evidently get the same speed on such a road—which we may suppose perfectly straight and sufficiently wide to get over the difficulty of our want of flanges—as on an ordinary line of railway. As soon, therefore, as a locomotive and train were got to run on rails, it might have been seen clearly that the locomotive steam engine did not want improving, but that, in order to put steam power on roads, it was the roads that wanted improving. In fact, only a year or so after his patent for 1802, Trevithick came to the conclusion that steam carriages could not be placed on common roads before common roads were radically improved and rendered able to bear heavy loads without giving way and increasing the draft to an impracticable amount. Some of the more able later inventors of traction engines saw this, more or less clearly, and attempted to make the engine carry its own railway, though we are not aware that even Boydell's traction engine and endless railway are now anywhere in practical use. After making the most successful road traction engine of any, we now see Messrs. Aveling and Porter taking the lead in the production of steam road rollers.

Briefly, the whole future of the application of steam to common roads clearly lies in the improvement, not of the engine, but of the road. In the same way as rails must be laid down before running the locomotive, so must common roads be rendered able to bear heavy weights, and have given them a hard, level surface, one approaching as nearly as possible that of the rail table. The nearer this condition of hardness is approached, the more extended will be the use of steam on common roads.

These premises being granted, the solution of the old problem of applying steam to common roads is simply to be found in the general use of the steam road roller. The steam roller must precede the steam traction engine. Experience shows that this process of road-making and maintenance gives us a hard level surface, not liable to sink and take ruts under the wheels, and affording more than sufficient adhesion for propulsion with smooth wheels. The possibility of applying steam in this way would give us what might be termed a universal tram-road, rendering available for steam power our 200,000 miles of macadamized roads. Much in this sense was a passage in a late public speech of such an experienced engineer as Sir Joseph Whitworth, in which he pointed to the improvement of common roads rather than an extension of tramways. The roads are there, and their improvement by the process, instead of involving an outlay of capital, actually greatly reduces the cost of their maintenance. In our especial case the employment of an engine on common roads, able to move about with facility, also means the application of steam to the conveyance of stone from the various deposits along the road; to breaking it up and taking it to the required spots before rolling it down. Of extraordinary value would these applications of steam be in countries with such dear labor as that of America.

The *Coach Maker's International Journal* suggests that if some inventive person could get up some better simpler and neater arrangement for finishing the side lights in leather carriage tops, a good chance to "make stamps" would result to the inventor.

IS MAN A FEEBLE ANIMAL?

[From the London Spectator].

Glancing the other day over the Duke of Argyll's essay on "Primeval Man," it struck us, as it had often struck us before, that a little too much is made now-a-days of man's feebleness as a mere animal. We do not believe he ever was one, and the Duke's argument, that if he was one, he would have got stronger, and not weaker, is unanswerable; but his feebleness does not disprove the theory of his animal origin quite so conclusively as civilized writers, who know they could not get their living if turned naked in the fields, have a tendency to assume. That man, apart from his special intelligence, is one of the weakest of all animals for aggression is no doubt correct, he being almost the only beast of his size who has been left by nature totally unarmed. He has neither claw nor horn nor jaw capable of rending, nor hoof nor paw that of itself and untrained can strike a deadly blow; the natural man being, it is believed, with a possible reservation as to one or two tribes of negroes, entirely unaware of the power latent in his own fist, and striking always with the hand unclosed. But for defense, man in his savage state is probably as well provided as any but the most formidable beasts of prey. He certainly could not fight a tiger or a lion or a panther or an elephant, but it is by no means clear that he could not run away, and as he is one of the swiftest of animals, would probably escape. He is, however, possessed of a faculty, given to no other beast which can run as fast, of climbing up a tree. In a state of civilization he almost entirely loses this faculty, but in the savage state it remains almost unimpaired. An Eton boy can climb in a way, as he can go up a ladder, but a savage will go straight up a smooth pole, using his feet as if they were a second pair of hands, and crossing from tree to tree with a facility which, to the highly educated naturalist watching him, seems at once marvelous and degrading. *He* could not do it, because he has not only lost the use of his feet, partly from using shoes, partly from reliance on his hands and his intelligence for everything, but he has lost the power of looking downwards unconcernedly from a "giddy" hight, a power belonging to all savages, and, as we suspect, from some facts observed among Hindoos, to all men who neither eat meat nor drink alcohol. At all events, Hindoos untrained to the work will walk unconcernedly along walls thirty feet high to inspect workman, where any white man similarly untrained would turn sick and fall. A wild beast would not have an easy prey of an animal who could run a short distance as fast as an ordinary horse, who could climb like a squirrel, and who could swim as no other land animal can.

Nothing not amphibious swims like a man, not even a Newfoundland dog. Kanakas have been met fifteen miles out of sight of land, and can keep in the water six hours at a time, and there is at least a strong probability that a naked race, living, say, by a great lake, would acquire the facility which the South Sea Islanders under the same circumstances even now display. We suppose we must not urge the idea so strongly pressed by Hawthorne, in that astonishing exhibition of genius and weakness, *Transformation*, that man in his natural state would attract instead of repelling many animals—that dogs, for instance might have been friendly, and not hostile—for no such instance of alliance is known among the higher mammals, and there is doubt if the marmot and owl of the prairie are as friendly as they seem to be; but still we do not quite see why the mammal Homo should not have survived in the contest for existence as well as the monkey, who flourishes indifferently well in jungles frequented by the tiger, the boar, and the boa constrictor. He must be allowed on any fair theory to have at least a beast's intelligence, and that would teach him to combine for many purposes as monkeys, and wolves, and beavers do, to attend to any signal of danger as a stag does—for though man has no scent, he has an intense capacity of hearing—and even to set sentinels, a "faculty," whatever its origin, which belongs, it is believed, to many animals, and is exercised every day, as all naturalists will testify, by rooks. To deny to man as an animal the faculties of a rook is a gratuitous depreciation of his rank in nature not warranted by any evidence. We do not quite see either how scientific speculators should deny him so absolutely a right to use a weapon. He must have had a hand to hold one, and why deny him the instinct to use it?

The Duke of Argyll says that no animal save man ever employs an instrument to realize any object, but that is not the case. The only animal with a hand, so to speak, the elephant, will break off a branch to switch himself with when annoyed by insects. The idea, again, that in his early struggles man must have been liable to assault by much bigger animals than any now in existence may be true, but if true, is not germane to the speculation. The imaginative horror of that situation would not strike an animal, and the mastodon is no larger in proportion to man than the elephant in proportion to the little monkeys who, nevertheless, live in the jungle with him very comfortably.

Then it is argued that the extreme length of the period of childhood in man must have greatly enfeebled him in the struggle, and no doubt the length of that period is one of the most curious of many distinctions between man and all other mammals. He is not the longest-lived of them, but he takes much the longest time to grow. But in practice, we imagine, conceiving as far as one can the position of the human being without intellect, the effect of that sort of weakness would only be this—that the female's whole work in a natural state would be the care of her young, a necessity not imposed on any other animal, and accompanied apparently by this peculiarity, that in man almost alone—not quite alone—is the female decidedly the inferior of the male in strength and courage. We suppose our friends of the women's rights movement will allow that, even though they may think the inequality curable; but at all events, that is found to be the fact in all extremely savage races, with the possible, and only possible, exception of a single negro clan. It would almost seem, therefore, as if this kind of weakness had been met by a provision which counteracted it at the cost of a certain diminution of the defensive power, the female being comparatively useless in combat, a diminution, however, true of at least one other species which has lived—the stag. The similar weakness at the other extremity of life is not peculiar to man, and would make but little difference in the struggle, being equivalent, in fact, at the worst, to a universal deduction from natural longevity. The human race would die at fifty instead of seventy, and would even then be among the longest-lived of the mammalia. The want of clothes or of fitting food, which seems to the civilized writer so dreadful, is apparently no reason for extinction. An immensely large section of humanity, probably a clear half, does not wear clothes in any way conducive either to health or protection. The waist-cloth of the Indian peasant is assumed from motives of decency, not of hygiene; the naked castes, faquirs, muhunts, etc., do not suffer in health; and the negro, who wears nothing, is supposed by many observers to be exceptionally long-lived. Two races at least, the Tasmanians and the Fuegians, face severe cold without clothes, and it must not be forgotten that in tropical climates cold seems to strike as severely as in the temperate zone. The fall in the thermometer is comparatively as great and the suffering as acute. The question of food is more puzzling, but is not quite insuperable. Half the difficulty would disappear if man had no disgusts, which as an animal he would not have. If we suppose him remaining in the mild climates as long as he could, he would have fish, and the flesh of small animals and birds, and berries and fruit and some leaves, and may be credited with instinct equal to that of the dormouse, which lays in a stock against bad weather. That he could multiply enormously under such conditions is of course not possible; but then it is not a thick population, but a population which science desires to prove. It would not, it must be remembered, on this hypothesis, be diminished by disease any more than any animal population: it might not be seriously menaced by attack, for there are whole regions, like Australia, without wild animals, which—as we may see by the example of Palestine—do not multiply merely because of the absence of men; and it would not be thinned off much by war. War is said to be a natural state, but if we are to suppose man merely a gregarious animal, we must assign him the instincts of his kind, among which war in any true sense of that word cannot be counted. A horse will fight a horse, but he does not attack him persistently because he is a horse; and the only animal believed to make war on human principles, that is, in combination and for territory, the dog of Constantinople and Alexandria, leaves off the moment his adversary quits the special dominion he has invaded.

We rather doubt if man's weakness as an animal is a sound argument against development, and we do not see that it is needed. It is far easier and more satisfactory to fight the battle upon higher ground, and call for evidence to explain upon any materialist theory the unique position of man as the only being with accumulative intelligence. Where and when, if he ever was an animal, did he part company with his kind? as it is acknowledged by all observers that he has parted company; and why is there no trace of any other animal who has made a similar advance, if not in degree, then at least in kind? The true argument against the development theory is not the impossibility of the development of a hand, but the total want of evidence for the development of a mind—the admitted existence of a chasm between the lowest savage and the highest brute which even the imagination is unable to cross.

RESEMBLANCES AMONG ANIMALS.

[From Wallace on "Natural Selection."]

There is a general harmony in nature between the colors of an animal and those of its habitation. Arctic animals are white, desert animals are sand-colored; dwellers among leaves and grass are green; nocturnal animals are dusky. These colors are not universal, but are very general, and are seldom reversed. Going on a little further, we find birds, reptiles, and insects, so tinted and mottled as exactly to match the rock, or bark, or leaf, or flower, they are accustomed to rest upon—and thereby effectually concealed. Another step in advance, and we have insects which are formed as well as colored so as exactly to resemble particular leaves, or sticks, or mossy twigs, or flowers; and in these cases very peculiar habits and instincts come into play to aid in the deception and render the concealment more complete. We now enter upon a new phase of the phenomena, and come to creatures whose colors neither conceal them nor make them like vegetable or mineral substances; on the contrary, they are conspicuous enough, but they completely resemble some other creature of a quite different group, while they differ much in outward appearance from those with which all essential parts of their organization show them to be really closely allied. They appear like actors or masqueraders dressed up and painted for amusement, or like swindlers endeavoring to pass themselves off for well-known and respectable members of society.

What is the meaning of this strange travestie? Does nature descend to imposture or masquerade? We answer, she does not. Her principles are too severe. There is a use in every detail of her handiwork. The resemblance of one animal to another is of exactly the same essential nature as the resemblance to a leaf, or to bark, or to desert sand, and answers exactly the same purpose. In the one case the enemy will not attack the leaf or the bark, and so the disguise is a safeguard; in the other case it is found that for various reasons the creature resembled is passed over, and not attacked by the usual enemies of its order, and thus the creature that resembles it has an equally effectual safeguard. We are plainly shown that the disguise is of the same nature in the two cases, by the occurence in the same group of one species resembling a vegetable substance, while another resembles a living animal of another group; and we know that the creatures resembled, possess an immunity from attack, by their being always very abundant, by their being conspicuous and not concealing themselves, and by their having generally no visible means of escape from their enemies; while, at the same time, the particular quality that makes them disliked is often very clear, such as a nasty taste or an indigestible hardness. Further examination reveals the fact that, in several cases of both kinds of disguise, it is the female only that is thus disguised; and as it can be shown that the female needs protection much more than the male, and that her preservation for a much longer period is absolutely necessary for the continuance of the race, we have an additional indication that the resemblance is in all cases subservient to a great purpose—the preservation of the species.

In endeavoring to explain these phenomena as having been brought about by variation and natural selection, we start with the fact that white varieties frequently occur, and when protected from enemies show no incapacity for continued existence and increase. We know, further, that varieties of many other tints occasionally occur; and as "the survival of the fittest" must inevitably weed out those whose colors are prejudicial and preserve those whose colors are a safeguard, we require no other mode of accounting for the protective tints of arctic and desert animals. But this being granted, there is such a perfectly continuous and graduated series of examples of every kind of protective imitation, up to the most wonderful cases of what is termed "mimicry," that we can find no place at which to draw the line, and say —so far variation and natural selection will account for the phenomena, but for all the rest we require a more potent cause. The counter theories that have been proposed, that of the "special creation" of each imitative form, that of the action of "similar conditions of existence" for some of the cases, and of the laws of "hereditary descent and the reversal to ancestral forms" for others—have all been shown to be beset with difficulties, and the two latter to be directly contradicted by some of the most constant and most remarkable of the facts to be accounted for.

The important part that "protective resemblance" has played in determining the colors and markings of many groups of animals, will enable us to understand the meaning of one of the most striking facts in nature, the uniformity in the colors of the vegetable as compared with the wonderful diversity of the animal world. There appears no good reason why trees and shrubs should not have been adorned with as many varied hues and as strikingly designed patterns as birds and butterflies, since the gay colors of flowers show that there is no incapacity in vegetable tissues to exhibit them. But even flowers themselves present us with none of those wonderful designs, those complicated arrangements of stripes and dots and patches of color, that harmonious blending of hues in lines and bands and shaded spots, which are so general a feature in insects.

It is the opinion of Mr. Darwin that we owe much of the beauty of flowers to the necessity of attracting insects to aid in their fertilization, and that much of the development of color in the animal world is due to "sexual selection," color being universally attractive, and thus leading to its propagation and increase; but while fully admitting this, it will be evident from the facts and arguments here brought forward, that very much of the *variety* both of color and markings among animals is due to the supreme importance of concealment, and thus the various tints of minerals and vegetables have been directly reproduced in the animal kingdom, and again and again modified as more special protection became necessary. We shall thus have two causes for the development of color in the animal world, and shall be better enabled to understand how, by their combined and separate action, the immense variety we now behold has been produced. Both causes, however, will come under the general law of "utility," the advocacy of which, in its broadest sense, we owe almost entirely to Mr. Darwin.

A more accurate knowledge of the varied phenomena connected with this subject may not improbably give us some information both as to the senses and the mental faculties of the lower animals. For it is evident that if colors which please us also attract them, and if the various disguises which have been here enumerated are equally deceptive to them as to ourselves, then both their powers of vision and their faculties of perception and emotion, must be essentially of the same nature as our own—a fact of high philosophical importance in the study of our own nature and our true relations to the lower animals.

DYEING HORN BLACK.—According to C. Burnitz, of Stuttgart, horn may be dyed black by a cold process in the following way: The horn is first to be soaked in a solution of caustic potash or soda, until the surface is a little dissolved, and feels greasy. Then the article is to be washed and treated with Lucas' aniline black, after which it is to be slowly dried and again washed. By exercising a little care, we read that combs with fine teeth may be dyed in this way. The articles look of a dark brown color by transmitted light, but seen by reflected light they are deep black.

THE phosphorescent light of the sea is caused by a microscopical animal (the *noctiluci*) smaller than a needle's point.

Improved Portable Steam Engine.

Few things in the history of invention are more interesting than the manner in which specific improvements in working details, pushed forward in one direction by one man, and in other directions by others, meet at length, and cross and interweave, till at last the perfected invention embodies, in a form more or less modified, all real improvements, however diverse, or even apparently irreconcilable.

In adapting the power of steam to the numberless requirements of industry, ideas the most various have held the leading place in the minds of successive designers and inventors.

In stationary engines, strength of framing, perfection, and permanence of alignment, nice compensation for wear, and noiseless performance of work have been attained in a wonderful degree. In the locomotive engine, lightness, elasticity, efficiency, convenience of access and detachment for repairs, with total disregard of stability, have been carried to a remarkable extent.

In large engines, refinements of valve gear, for economical use of heat, have been introduced with admirable results. In small, portable, and self-contained engines, efficiency per pound in the weight of the machine, has been pushed almost as far as in the locomotive, but often with too little regard to efficiency per pound of fuel. There seems to be an effort, now, to combine these two qualities, which have hitherto been considered incongruous, if not adverse; but which will prove, we do not doubt, not only reconcilable but co-ordinate.

There is but one absolute condition: Simplicity.

All complication must be avoided. Promise what it may, yield whatever advantage it may be found to yield in larger engines, all complex mechanism is excluded here.

Better 600 pounds of coal per day in a 10-horse engine which a boy can run almost without possibility of derangement, than 300 pounds in an engine of similar power requiring the constant attendance of a skillful engineer, and perpetual repairing.

This condition observed, all improvements in economy of fuel are also improvements in efficiency compared with weight.

Several such improvements appear to us to be combined in the novel and interesting machine represented in the two illustrations accompanying this article.

We learn from a pamphlet sent us by the builders, Messrs. J. C. Hoadley & Co., that "an attempt is made in this engine to superheat the steam, mildly, yet effectually, and to secure all the advantages of a steam jacket around the cylinder, with the utmost simplicity and increased economy. The principal means employed are:

"*First.* Surrounding the cylinder by the waste gases, the products of combustion, on their passage from the smoke-box to the smoke-pipe; securing thus a 'smoke-jacket' instead of the well-known 'steam-jacket.'

"*Second.* Placing the feed water heater in the smoke-box, below the cylinder, so as to reduce the temperature of the gases to a safe point before they reach the cylinder.

"*Third.* Conveying the steam from the governor-valve, which is located within the steam dome, through the steam space, the whole length of the boiler to the flue-sheet, and thence by a curved pipe through the smoke-box to the steam-chest; by which means it is safely yet thoroughly dried and slightly superheated."

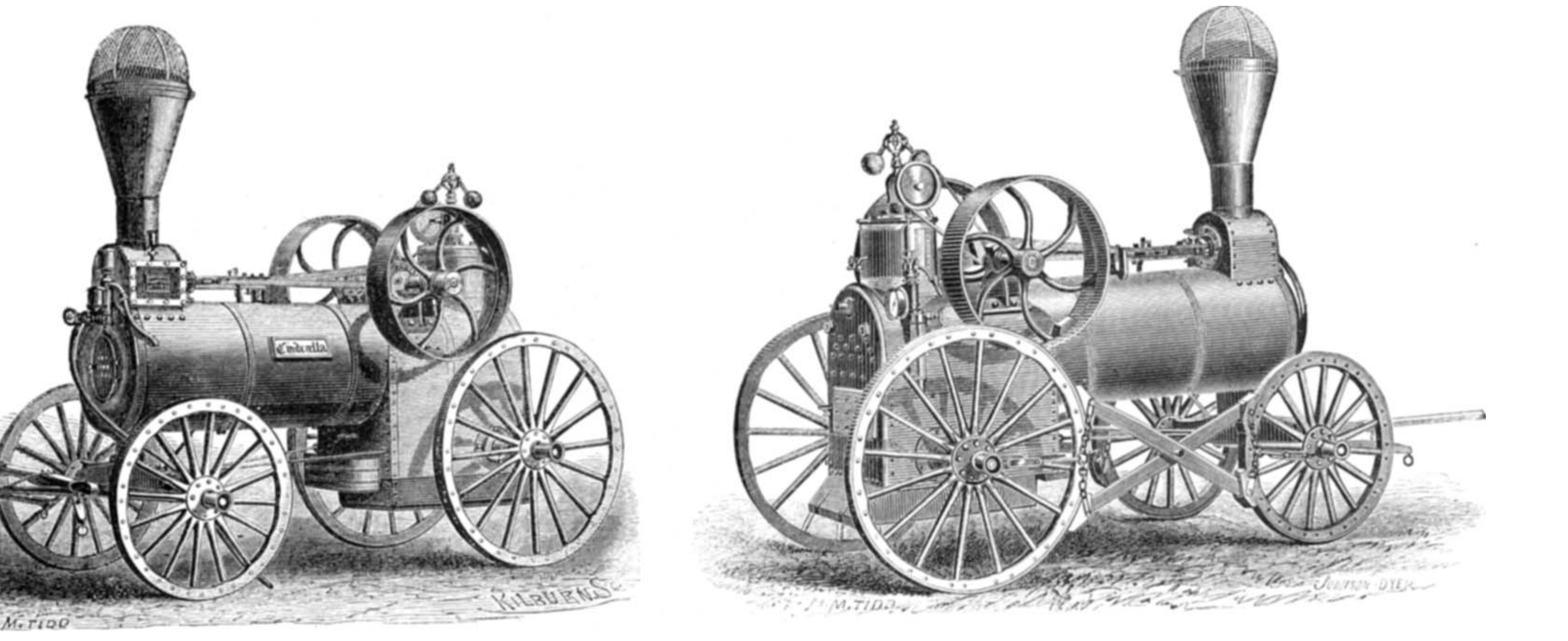
These objects seem to us to be attained in this engine, which has seven inches diameter of cylinder and ten inches stroke, weighs, exclusive of running gear, 4,500 pounds, and is capable of exerting permanently and economically 15-horse power. Indeed, it is said to have been run for several weeks to drive the machine-shop of its builders, which, with other work driven by the same water-wheel, is known to require from 25 to 33-horse power; a very creditable performance for an engine usually rated at 10-horse power.

The boiler is lagged with wood, and cased in sheet iron, with brass bands. This practice, universal in England where engines of this class are much more extensively used than in this country, has not been generally adopted, hitherto, by American engineers.

It adds something to the bulk of the boiler, a little to the weight, and considerably to the cost; but it adds in an equal or greater degree to its efficiency.

If a penny saved is as good as a penny earned, so a pound of steam saved is as good as a pound of water evaporated, or every thermal unit retained in the boiler by diminished radiation is equivalent to a thermal unit added to the evaporating power of the boiler, considered merely as to its efficiency. Perhaps the money expended in lagging the boiler adds as much to the steam supplying capacity of the boiler, as the same sum would add, if expended most judiciously, in enlarging the heating surface. The advantage in economy of fuel is wholly on the side of the lagged boiler.

The engine herein described was exhibited at the fair of the Massachusetts Charitable Mechanic Association in October last, and received a gold medal and high encomiums. The designers and builders, Messrs. J. C. Hoadley & Co., of Lawrence, Mass., are well known as among the earliest, if not the very earliest, designers of portable and self-contained steam engines in the United States, having started the business in 1857. During this long period of thirteen years, although they have made many minor improvements in matters of detail, they have preserved the general form of their engines almost unchanged. We are glad to see such a decided effort for improvement in this quarter, and such evidence that they intend to unite the refinements of scientific design to the sterling qualities for which their engines have been so long and so highly valued.

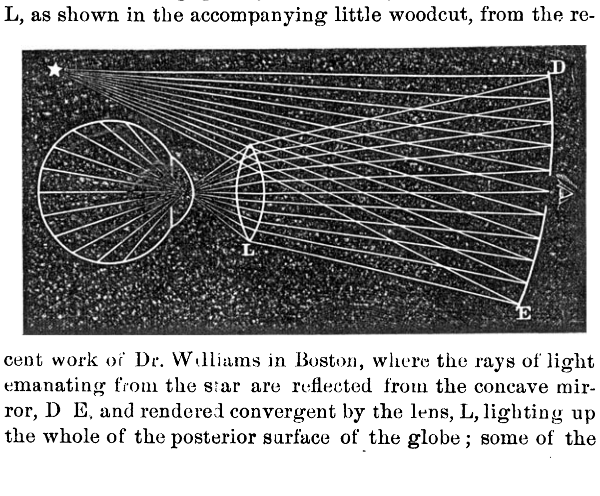


PORTABLE STEAM ENGINE.

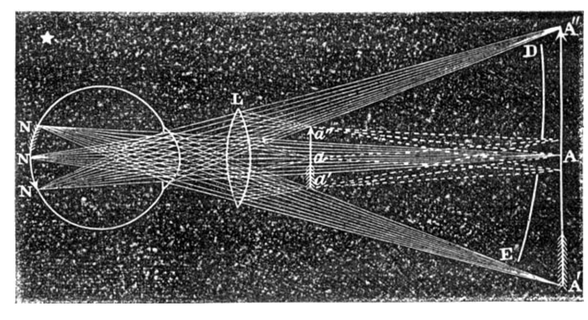
A New Form of Ophthalmoscope.

The principal steps, says Professor Power in *Nature*, that have been made during the last twenty years in the knowledge of the healthy and of the diseased conditions of the eye have been effected by the employment of the ophthalmoscope—an instrument so simple, and yet so valuable that, like other discoveries, it is only remarkable that the knowledge of the facts on which its construction depends should have so long remained unfruitful. Under all ordinary circumstances, when we look into the pupil of the eye of another person, however widely dilated it may be, it appears of an intense black hue, because the degree of illumination is insufficient to render parts so deeply seated visible, the principal portion of the light being intercepted by the head of the observer.

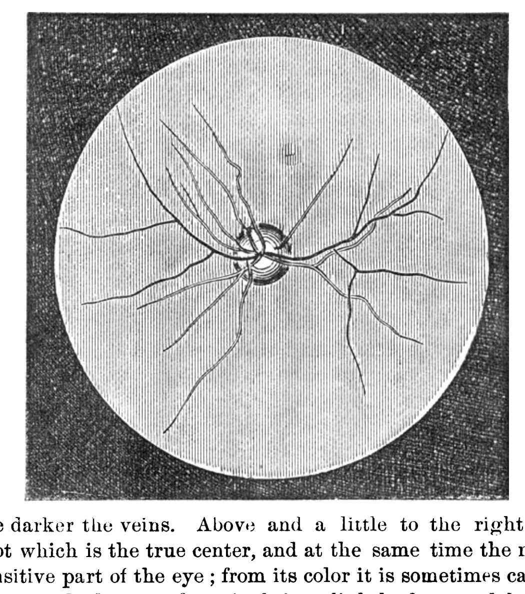
An exceptional instance, however, is sufficiently familiar to every one, in which a brilliant reflection may be observed to occur from the back of the eye. It is that of an animal crouching in the corner of a cellar, whilst the observer is standing at the door, or looking towards a window, to which the back of the observer is turned. The principle on which the ophthalmoscope is founded is identical with this, the eye under observation being illuminated by a pencil of light proceeding, as it were, from the eye of the observer. This is accomplished by placing a steady source of light at the side of, or above and somewhat behind the head of the person under observation, whilst the observer reflects its rays into the eye of the subject by means of a plane or concave mirror, the center of which is perforated by a small opening through which he looks. The back, or fundus of the globe, then comes into view, presenting a red, or grayish-red glare, the illumination being greatly increased by the use of a lens at L, as shown in the accompanying little woodcut, from the recent work of Dr. Williams in Boston, where the rays of light emanating from the star are reflected from the concave mirror, D E, and rendered convergent by the lens, L, lighting up the whole of the posterior surface of the globe; some of the rays returning from this pass through the opening in the mirror, and are seen by the observer at O. The precise mode in which the image is formed is shown in the second cut, borrowed from the same work. The rays returning from N, N′ N″, representing a portion of illuminated fundus, are brought to a focus by the convex lens, L, at A, A′ A″, and then form the inverted aërial image of the fundus, which is seen by the observer.



The image which comes into view under these circumstances, especially if, as is usual, the pupil be dilated by the employment of a little belladonna or solution of atropine, is represented in the third woodcut, which we have carefully drawn from a child of twelve years of age. The reader must imagine the general surface to be of an orange vermilion, or scarlet vermilion tint, though in the negro it is of a very dark vermilion; the color being produced by the reflection of the light from the capillary blood-vessels of the choroid.



In the center is a yellowish white spot, which is the optic disk, or point of entrance of the optic nerve. This is perforated by the branches of the central artery and veins of the retina, the lighter double lines representing the arteries, and



the darker the veins. Above and a little to the right is a spot which is the true center, and at the same time the most sensitive part of the eye; from its color it is sometimes called the *macula lutea*, or from its being slightly depressed below the surface it is termed the *fovea centralis*. The changes which the optic disk, the blood-vessels, and the retina undergo in disease can of course be readily followed, and may thus enable a positive opinion to be pronounced on cases which were formerly incapable of being distinguished even by the most acute observer. Nay, it has recently been suggested by M. Poncet to employ it as one of the most reliable means of ascertaining that *death* has really taken place. A great variety of forms of the instrument have been suggested, but the ordinary hand ophthalmoscope has proved the most convenient in practice, requiring only that the room should be darkened, and that there should be some steady source of light.

TO CLEAN BLACK CLOTH.—Dissolve one ounce of bicarbonate of ammonia in one quart of warm water. With this liquid rub the cloth, using a piece of flannel or black cloth for the purpose. After the application of this solution, clean the cloth well with clear water; dry and iron it, brushing the cloth from time to time in the direction of the fiber.

[For the Scientific American].

THE LANTERN FLY.

[By Edward C.H. Day, of the School of Mines, Columbia College].

We recant fully and without condition, our heretical doubts of the scorpion's suicidal performances. We have received ample proof that, when he finds escape impossible, the scorpion hurries himself out of existence by means of his own sting, and we give credence to the strangest fact of all, that he does so especially when under the influence of alcoholic liquors! J. Parish Steele, in the *American Entomologist and Botanist* for June, is our authority for the last statement, and he adds that the Tennessee boys know scorpions consequently as "Teetotalers." This must be deemed conclusive evidence of scorpionic fortitude and virtue. Good reader, forgive us for having expressed the doubt; we ourselves have never had the opportunity of tempting the scorpion in his native haunts, and were dubious on what we supposed good authority, deeming it better to state our uncertainty than to retail a story, the antiquity of which was no guarantee of its truth. In fact, it does not appear to us even now quite clear that the scorpion designedly shuffles off this mortal coil. May it not be that in mortal agony at the approaching flames, from which it sees no escape, or at the irritating effects of the alcohol, it strikes convulsively with its tail, and stings itself without intent. We are inclined still to acquit the scorpion of being a *felo de se*, but as only laboring under temporary insanity.

Be this as it may, the really interesting fact remains incontestably proved that its poison is death to the scorpion itself; a fact, however, that is implied in what we already knew, that it is fatal to its fellow scorpions. But what are we to say of the insect now before us—the Chinese lantern fly (*Pyrops candelaria*), or of its American representative, the great Surinam lantern fly (*Fulgora lanternaria*)? Are the odd-looking membranous extensions from the heads of these creatures really luminous? Or are the statements from which the above names are derived but the baseless fabrics of a strange delusion?

About one hundred and seventy years ago, an enthusiastic lady and her two daughters spent three years in the unwholesome climate of Surinam, drawing figures of the remarkable insects of that region, chiefly in illustration of their metamorphoses. "Crazy women," we fancy we hear some money-making old cynic remark. "Much better have done something useful." True, sir, these ladies probably did not make a good monetary speculation of the undertaking for themselves or for anybody else; but it is to such enthusiasts as these that the world is indebted for much of that natural knowledge which helps so greatly to elevate and purify the groveling, grasping tendencies of this too practical age. Such workers as these may be but the hod-carriers and bricklayers of science, but without such patient gatherers of facts, the architects, the great generalizers of scientific truths—such as Humboldt, as Faraday and Bunsen, as Tyndall, as Lyell, as Cuvier and Darwin—could not carry on the building of that glorious edifice of knowledge wherein we read each day more clearly the material works of the Creator by the light of the all-wise laws that control them. Therefore all honor to the name of Madame Merian and her daughters; and would that we had more such ardent admirers of nature and of its marvels and beauties!

On her return to Europe, Madame Merian informed the world that the lantern-fly gave such a brilliant light at night as to surpass the luminosity of all known fire-flies, circumstantially stating her own observations on it. Some subsequent and credible observers have confirmed the fact in terms as precise; others, however—and these, too, like Madame Merian and her corroborators, had lived in the regions where the insects occur—just as positively denied that the insects ever gave any light at all. Even the natives of the countries flatly contradicted each other on the point.

The Chinese species has had luminosity attributed to it, and it is represented as luminous in the accompanying engraving taken from Prof. Blanchard's work; but competent observers have not merely questioned, but have given the statement a distinct denial! One would imagine that these savans were medical experts giving evidence in a lunacy case! What are we to believe amid such conflicting statements? With Kirby and Spence, we agree, "that negative evidence ought not hastily to be allowed to set aside facts positively asserted by an author who could have no conceivable motive for inventing such a fable;" and we the more readily assent to this rule in this case because a far more incredible tale of Madame Merian's, after having been long discredited and positively denied, has, within the last few years, been confirmed by the disinterested evidence of living and most trustworthy eye-witnesses. We would rather suppose that these insects are only luminous at times or under certain circumstances, or, as others have suggested, that it is only one sex that is luminous, and that the ladies who originally made the statement had the good fortune to see a phenomenon which other observers have failed to witness, than believe that a number of respectable individuals have foolishly united in maintaining an unmeaning falsehood. We may ask, how many persons who have turned up out of the ground the grubs of our common fire-flies could tell us whether they were luminous or not?

The lantern flies, whether rightly or wrongly so named, are no relatives of the European glow-worm, of our own "lightning bugs," or of the larger tropical fire-flies; these all belong to the order of beetles, whereas the lantern fly is a bug in the strict entomologist sense of the word.

The bugs are subdivided into two groups, both characterized by a mouth adapted to both piercing and suction, but differing in the characters and arrangement of the wings. The squash bug (not the various beetles so miscalled, but the *Coreus tristis*) will give you an example of the one group; its anterior wings or "wing cases," when at rest, lie flat on the back and across each other; when spread out you see that the basal half is thick, opaque, and colored, while the outer half is thin and translucent. Hence the name of *Hemiptera* or "half-winged" applied to the whole order. In the second group notice the cicada, commonly called the locust; the wings here lie on the sides of the body, sloping like the roof of a house, and both pairs when opened are evidently translucent over their entire extent. Hence these are termed the *Homoptera*. Excepting the curious projection from the head of the lantern fly you will see that it is not unlike the cicada, and they are closely allied homopterous bugs. The cicadas are characterized in one sex by possessing a drum-like organ, by means of which they produce the well-known stridulating sound, "the so-called song," as Vander Hoeven quaintly remarks, "which is peculiar to the males, whence Xenarchus extolled the fortune of these animals, whose wives are dumb." In the lantern flies this drum is absent in both sexes, and if the auditory organs of these bugs have susceptibilities at all akin to our own, we suspect that the females rather rejoice in possessing silent husbands

Otherwise the cicadas and lantern flies are closely related families, in fact, some authors make them subdivisions of a single family. They are mostly inhabitants of the hottest climates, and the lantern flies are especially remarkable for their large size and striking coloring

The South American fulgora is between two and three inches in length, and its wings expand more than 5½ inches. It has a large yellow eye-like spot, ringed with black and white bands, on each of its hind wings. The Chinese species is a smaller insect, but still sufficiently conspicuous, and, wanting the eye-like spots, is marked with greenish bands spotted with black upon a yellowish-fawn ground; so that, even if it be not luminous, it must be a remarkable insect, from its grotesque form and peculiar garb.

THE CHINESE LANTERN FLY—*Pyrops candelaria.*

CURCULIO EXTIRPATION POSSIBLE.

Under the above heading, we recently copied from the St. Joseph (Mo.) *Herald* some details of a new method of catching curculios. We have since then seen a commentary on the same article in the *American Entomologist and Botanist* for June, in which the editor of that journal says: "We are really sorry to damp the ardor and enthusiasm of any person or persons when enlisted in such a good cause, but truth obliges us to do so nevertheless. Of course curculio extermination is possible, but not by the above method alone, as our Michigan friends will find to their sorrow. For a short time, early in the season . . . we have succeeded in capturing the curculio under chips of wood and other such sheltered situations; but we have never been able to do so after the fruit was as large as a hazelnut, and the little Turk had fairly got to work."

A passage from *Moore's Rural New Yorker*, of January 28, 1865, is furthermore quoted to show that the process suggested cannot be called a discovery. From all this and the general tenor of the article, we infer that it is of paramount importance to the community to have ably-conducted journals on such specialties as entomology; that, as a fact, the extirpation of the circulio is a possibility, and that the process suggested is a valuable aid to this desirable end; and that, if this be only a rediscovery, the fact that such men as Dr. Le Baron and Dr. Hule had not heard of it previously, proves that the original discovery had not attained the publicity it deserved, and we therefore cordially indorse the statement, that "in demonstrating that so great a number of the little pests can be entrapped in the manner described, Mr. Ransome has laid the fruit growers of the country under lasting obligation to him." Finally, we are delighted to hear, on such good authority, that "we are fast becoming masters of this scourge," and that there is at least one insect parasite that has taken up our cause against the foe. Labor on, good entomologists! and find out the secrets of these and similar little enemies of mankind, and we will heartily aid your cause by disseminating the knowledge you acquire as widely as we may, for we deem the subject of insect pests to be the most important question now before the agricultural community of this country.

The Astronomer Entrapped.

We find in a recent number of the *Eclectic* the following amusing anecdote, which occurred some years since at a celebrated observatory in the suburbs of London. A visitor was desirous of observing a celestial object which was nearly overhead, and having the run of the observatory at the moment, he directed the telescope towards the star, set the clock-work in motion, and placed himself on his back in the observing frame attached to the floor of the observatory. This frame is so constructed that the observer can fix the head rest in any position, and as the whole frame revolves round an upright in the middle of the observatory floor, it is easy to place the frame so that the observer can look in perfect comfort at any object on the celestial vault. In the present instance, as we have said, the observer lay on his back, the object being nearly overhead. But while the frame remained, of course, at rest, the clock-work was slowly driving the telescope after the star, and as the star happened to be approaching the point overhead, the eyepiece of the telescope was being brought continually lower and lower. Intent on observing the aspect of the star (a celebrated double) our astronomer failed to notice that this movement of the eyepiece was gradually imprisoning him. His head was fixed by the head-rest, and the eye-tube was beginning to press with more and more force against his eye. The telescope was a very heavy one, the very slowness of the movement made it irresistible, and the observer's position prevented him from helping himself. Fortunately his cries for assistance were quickly heard, the clock-work was stopped, the head-rest lowered, and the prisoner released; otherwise he would undoubtedly have suffered severely. He would, in fact, have had as good reason to complain of his telescope as the celebrated astronomer Struve had in the case of the Pulkova refractor, "which," Struve said, "was justly called a 'refractor,' since it had twice broken one of his legs for him."

IMPORTED INSECTS AND NATIVE AMERICAN INSECTS.

[From the Report of Charles V. Riley, State Entomologist of Missouri].

If we examine into the history of the imported currant worm and the native currant worm, we shall find a very curious state of things. These two insects both produce saw-flies, which are so closely allied to each other, that although they are referred to distinct genera by entomologists, it may be doubted whether the genus (*Pristiphora*) under which the native species is classified be not a mere subgenus of that under which the imported species is classified. Reasoning *a priori*, therefore, we should expect to find a very great similarity in the destructive powers of these two worms, especially as each of them infests the leaves both of the red currant and of the gooseberry. But what are the actual facts? On the one hand we see a native American species—which must have existed here from time immemorial, feeding on our wild gooseberries and perhaps on our wild red currant, and which yet has troubled our tame gooseberries and tame red currants so very slightly, that it cannot be proved with absolute certainty to have ever done so at all, except in Rock Island County, Ill., and in Scott county, Iowa.

On the other hand we see a species, only introduced into this country, from Europe, some twelve years ago, which has already almost put a stop to the cultivation of the gooseberry and red currant throughout a large part of the State of New York, the northern borders of Pennsylvania, and the whole of Canada West, and is slowly but surely extending itself in all directions from the point where it was originally imported. What can be the reason of such a wide difference in the noxious powers of two such closely allied insects, feeding on exactly the same plants, but one of them indigenous to America and the other imported into America from Europe? Nor is this the only case of the kind. We can point out at least three other such cases. The imported onion-fly (*Anthomyia ceparum*), is a terrible pest to the onion-grower in the East, though it has not yet made its way out West. On the other hand, the native American onion-fly (*Ortalis arcuata*, Walker), which is a closely allied species and has almost exactly the same habits, has only been heard of in one or two circumscribed localities in the West, and even there does comparatively but little damage. Again, the imported oyster-shell bark-louse (*Aspidiotus conchiformis*) is a far worse foe to the apple and certain other fruit trees than our indigenous Harris' bark-louse, (*Asp. Harrisii*), though each of them infests the same species. Finally, the imported meal-worm beetle (*Tenebrio molitor*) swarms throughout the whole United States, and is a great pest; while the native American species (*Tenebrio obscurus*), which has almost exactly the same habits, belongs to the same genus, and is of very nearly the same size, shape, and color, is comparatively quite rare among us, and is scarcely known to our millers and flour-dealers.

On a careful and close examination, it will be found that almost all our worst insect foes have been imported among us from the other side of the Atlantic. The Hessian fly was imported almost ninety years ago; the wheat midge about half as long ago; the bee moth at the beginning of the present century; the codling moth, the cabbage tinea, the borer of the red currant, the oyster-shell bark-louse, the grain plant-louse, the cabbage plant-louse, the currant plant-louse, the apple-tree plant-louse, the pear-tree flea-louse, the cheese-maggot, the common meal-worm, the grain weevil, the house fly, the leaf-beetle of the elm, the cockroach, the croton bug, and the different carpet, clothes, and fur moths, at periods which cannot be definitely fixed. Even within the last few years the asparagus beetle has become naturalized in New York and New Jersey, whence it will no doubt spread gradually westward through the whole United States, while the rape butterfly was introduced about a dozen years ago, and is rapidly spreading over some of the Eastern States. And only a year ago the larva of a certain owlet-moth (*Hypogymna dispar*), which is a great pest in Europe, both to fruit trees and forest trees, was accidentally introduced by a Massachusetts entomologist into New England, where it is spreading with great rapidity. It is just the same thing with plants as with insects. We have looked carefully through Gray's *Manual of Botany*, and we find that—excluding from consideration all cryptogams, and all doubtful cases, and all cases where the same plant is supposed to be indigenous on both sides of the Atlantic—no less than *two hundred and thirty-three* distinct species of plants have been imported among us from the Old World, all of which have now run wild here, and many of which are the worst and most pernicious weeds that we have to contend against. In the United States *Agricultural Report* for 1865 (pp. 510–519) will be found a list of ninety-nine of the principal "Weeds of American Agriculture," by the late Dr. Wm. Darlington. Of this whole number no less than forty-three, or nearly one-half, are species that have been introduced among us from the Old World. Among these we may enumerate here, as the best known and the most pernicious, butter-cups (two species), shepherd's purse, St. John's wort, cow-cockle, May-weed or dog-fennel, ox-eye daisy, common thistle, Canada thistle, burdock, plantain, mullein, toad-flax, bind-weed, Jamestown (Jimson) weed, lamb's quarter, smart-weed, field garlic, fox-tail, grass, and the notorious cheat or chess. And to these we may add the common purslane, which, through some strange oversight, has been omitted in Dr. Darlington's catalogue.

It will be supposed, perhaps, since there are about as many voyages made from America to Europe as from Europe to America, that we have fully reciprocated to our transatlantic brethren the favors which they have conferred upon us, in the way of noxious insects and noxious weeds. It is no such thing. There are but very few American insects that have become naturalized in Europe, and even these do not appear for the most part to do any serious amount of damage there. For example, on one or two occasions single specimens of our army-worm moth (*Leucania unipuncta*) have been captured in England; but the insect has never spread and become ruinously common there, as it continually, in particular seasons, does in America. Our destructive pea-bug (*Bruchus pisi*) has also found its way to Europe; but although it is met with in England, and according to Curtis has become naturalized in the warmer departments of France, Kirby and Spence expressly state that it does not occur in England "to any very injurious extent," and Curtis seems to doubt the fact of its being naturalized in England at all. Again, the only species of white ant that exists within the limits of the United States, (*Termes frontalis*), has been known for a long time to be the guest at the plant-houses of Schönbrunn, in Germany; but is not recorded to have ever as yet spread into the surrounding country. As to our American meal-worm (*Tenebrio obscurus*), Curtis states that it has been introduced into England along with American flour, and that it is sometimes abundant in London and the provinces; but Kirby and Spence say not one word about it, and it seems to be confined to the English sea-ports, and the places where American flour is stored, without spreading into the adjacent districts.

A very minute yellow ant, however, (*Myrmica molesta*), which is often very troublesome with us in houses, has, according to Frederick Smith, "become generally distributed and naturalized" in houses in England; and Kirby and Spence state more specifically, that "it has become a great pest in many houses in Brighton, London, and Liverpool, in some cases to so great an extent as to cause the occupants to leave them." As to our chinch bug, our curculio, our plum gouger, our two principal apple-tree borers, our canker-worm, our apple-tree tent-caterpillar, our fall web-worm, our peach-tree borer, and our other indigenous pests among the great army of bad bugs, nobody ever yet found a single one of them alive and kicking on the other side of the Atlantic. And with regard to plants, the only two American plants that we know to have become so firmly established in Europe as to be a nuisance there, are an American aquatic plant, the common water-weed (*Anacharis canadensis*), which has choked up many of the canals in England, and our common horse-weed, or mare's tail as it is called in the West (*Erigeron canadense*), which has spread from America nearly over the whole world.

Since then, it can be demonstrated by hard, dry facts, that American plants and insects do not become naturalized in the Old World with anything like the facility with which the plants and insects of the Old World are every day being naturalized in America, there must be some cause or other for this singular state of things. What is that cause? It is, as we believe, a simple fact which is pretty generally recognized now as true by modern naturalists, namely, that the plants and animals of America belong, as a general rule, to an old-fashioned creation, not so highly improved and developed as the more modernized creation which exists in Europe. In other words, although this is popularly known as the New World, it is in reality a much older world than that which we are accustomed to call the Old World. Consequently, our plants and animals can no more stand their ground against European competitors imported from abroad, than the red Indian has been able to stand his ground against the white Caucasian race. On the other hand, if by chance an American plant or an American animal finds its way into Europe, it can, as a general rule, no more stand its ground there against its European competitors, than a colony of Red Indians could stand their ground in England, even if you gave them a whole county of land and an ample supply of stock, tools, and provisions to begin with. For throughout animated nature, as has been conclusively shown by Charles Darwin, there is a continual struggle for existence, the stronger and more favorably organized species overpowering and starving out from time to time their less vigorous and less favorably organized competitors. Hence, it is as hopeless a task for a poor puny, old-fashioned American bug to contend against a strong, energetic, highly-developed, European bug, as it would be for a fleet of old-fashioned wooden ships to fight against a fleet of our modern iron-clads.

Let not "Young America," however, be altogether discouraged and disgusted at hearing, that our animal and vegetable creation is more old-fashioned than that of what is commonly known as the Old World. The oldest geological formations, in which the remains of mammals occur, contain the remains of such mammals exclusively (*Marsupialea*) as bring forth their young only partially developed, and carry those young about with them in a pouch, till the day of complete development and physical "second birth" arrives. In America we have a single genus—the opossums—that belongs to this antediluvian type. In the three ancient continents they have absolutely none at all. But if in this respect America is more old-fashioned than Europe, Australia is still more old-fashioned than America; for there almost all their mammals possess this remarkable peculiarity; so that if the American creation is somewhat old-fogyish, that of Australia is the very concentrated essence of old-fogyism itself. Consequently, if Europe crows over us as altogether "behind the times," "Young America" can take its revenge by crowing over Australia, as the land of the kangaroo and the wombat and other such exploded absurdities of the Mesozoic epoch.

Professor Seely on Ammonium Amalgam.

The *Mechanics' Magazine* contains the following criticism on Professor Seely's recent papers upon this subject: "We referred so many times to Mr. Graham's experiments on the absorption of hydrogen by palladium, and his views on the metallic nature of hydrogen, that we may give a passing notice of the latest objections to Mr. Graham's theory. Professor Seely, of New York, has made some experiments with the so-called ammonium amalgam, and has come to the conclusion that it is no amalgam at all in the ordinary acceptation of that term, but merely a froth produced by the entanglement with the mercury of the mixture of ammonia and hydrogen set free on the decomposition of chloride of ammonium. The strongest evidence in favor of the correctness of this view is to be found in the fact, that when the so-called amalgam is subjected to pressure, its volume changes apparently in accordance with Marriotte's law of gaseous volume. Thus, at all events, it must be considered as proved, that admitting the existence of ammonium in the amalgam, it is neither a solid nor a liquid, but a gas. Professor Seely contends that the expansion of palladium on the absorption of hydrogen is analogous to the swelling of the mercury on the absorption of the two gases named; and that if the particles of palladium were as free to move as those of mercury, a palladic froth would be produced. There may be something in this objection, which does not, however, touch Mr. Graham's strongest point. In another sentence the American Professor goes decidedly wrong when he asserts that oxygen is more readily absorbed by metals than hydrogen, and yet no one has a theory of oxygenium. Mr. Graham found that oxygen was less readily absorbed; and he distinctly announced his belief in the existence of the metal oxygenium.

Transformation of Cast Iron.

"Transformation of Cast Iron, Wrought Iron, and Steel by means of the Vapors of Alkaline Metals." Such is the title of a patent taken in France by MM. Charles Girard and Jules Poulain (date 17th August, 1869, No. 86,784), the particulars of which we extract from our excellent cotemporary, the *Moniteur Scientifique:*

"In order to cause the vapors of sodium and potassium to act on cast iron in fusion, we heat one of the former metals in an iron retort to 392° or 482° under a pressure of five or six atmospheres. When this heat is reached we direct the vapor thus obtained into the heart of the iron in fusion; the mass swells, and an alloy of the iron is the result. These alloys, although very hard, are malleable, and may be forged and welded. They oxidize rapidly in air or water, and are easily decomposed if a current of air, steam, or carbonic oxide is injected into them when in fusion. By these compound effects of the vapor of sodium and of air, for example, the whole of the metalloids in the iron are attacked, and the final result is pure wrought iron that can be hammered and welded with ease. Under certain circumstances the metal resulting from the operation may present the properties of steel. Finally, to facilitate the production of the metallic vapors carburets rich in hydrogen may be added to the sodium or potassium in the retort.

"In place of sodium or potassium an alloy of the two may be used, as, for instance, one composed of four parts of potassium (melting at 122°) and 2·5 parts of sodium (melting at 194°). This mixture, which has the appearance and consistency of mercury, has its point of solidification at 47·4°, and is consequently liquid at ordinary temperatures. It is prepared under naphtha

"It has been remarked that, besides the direct transformation of cast into wrought iron or steel, by means of the metals, their action produces other advantages; they allow of the employment of cast iron, which, although containing manganese, are reputed as bad, and cannot be converted by the Bessemer process, on account of the quantity of carbon, sulphur, or phosphorus which they contain. It is, in fact, now proved that the Bessemer process, far from eliminating the sulphur and phosphorus, tends rather to augment the proportion of these metalloids.

"The cast irons known as *chaudes*, and which contain silicium and magnesium, owe a part of their superiority to the calorific power of the silicium (7800), the produce of the oxidation of which, silica, requires but little heat to disengage it, so that the liquefaction becomes more complete. On the other hand, carbon, under the same conditions, gives rise to the disengagement of masses of sparks produced by the gases carbonic acid and carbonic oxide, which traverse the mass; these take from the molten matter a considerable quantity of caloric, and are thus unfavorable to liquefaction.

"In our process this latter inconvenience is partly dispelled, for the gases produced by the combustion of the carbon, sulphur, and phosphorus, combine with the soda or potash are mechanically carried through the mass of metal by the oxidation of the sodium of potassium. The direct action of the sodium or potassium, in the form of vapor, on the melted iron, may be replaced by adding to the mixture of ore, fuel, and flux, either chloride of sodium, carbonate of soda, a corresponding salt of potash, or a mixture of these.

"Acting thus on any given ore, and using coke or coal as fuel, a result analogous to that obtained with charcoal under the ordinary system is obtained. We must add, however, that in the former case the current of hot or cold air should be longer maintained than when charcoal is used; this prolonged application of hot or cold air in the blast furnace may present inconvenience, which may be avoided by directing the alloys of cast iron with sodium or potassium into a converter, in which they may undergo the final action of the current of air; with this process the working of the blast furnace is the same as in ordinary cases.

"We arrive practically at an assimilation of the coke or coal with alkaline salts corresponding to those furnished by wood charcoal, either by watering the fuel with the alkaline solutions above-mentioned, and then allowing it to dry in sheds by introducing the salts into the mass of molten iron, or, lastly, by pouring a concentrated solution of the various salts on the fuel or the ore at the moment of charging the furnace. "We intend to continue our experiments on the alloys and combinations of sodium and potassium with most of the other metals."

A CHILL ROOM IN A MEAT PACKERS' ESTABLISHMENT.

We condense from the N. Y. *World* the following graphic account of a mammoth ice room in a meat packers' establishment in this city:

Yesterday afternoon, about four o'clock, while the rest of mankind hereabouts were weltering and sweltering in perspiration, the writer spent one minute—only one minute, that sufficed—in a place that was so cold, that struck such deadly chills through him, that it would have taken four pretty strong men to have held him there one minute longer. This fearsome place was the "chill room" of a large pork-packing establishment.

As the writer sauntered up one of our very uninviting north-running streets, in the scorching sun, it seemed impossible to conceive that there could be a really cold place this side of the North Pole. Entering the great building to which he had been directed, he was referred to the very intelligent foreman as being the person best able to give the desired information.

Owing to the present high prices of ice the packing of pork in this city has nearly or quite ceased, and the entire ice supply of the establishment was contained in a room. It is 20 by 40 by 10 feet, and capable of holding 100 tuns. On opening the heavy door, it was found to contain ice to the depth of three feet. It is customary to keep these receptacles completely full, but the firm have stopped "cutting up" for fear they should be caught with a house full of meat and no ice to chill it.

R.—"Well, how does the ice help you to pack pork? I see no meat here."

F.—"We send a current of air through the ice, which is then carried down into our chill-room beneath. This place is not very cold, neither is any common ice house. But if you went down in our chill-room you would not want to stay long."

R.—"I would like to try it."

F. (to a laborer).—"William, take him down. Don't let him stay there over a minute. That will be a dose for him."

THE CHILL-ROOM.

Thus warned, the inquirer, who is making it his business to see "what becomes of all the ice," descended into the cellar. One whole side of the vault—60 by 60 by 10—was inclosed like the ice house above. His guide pushed open a door and let him into the dimly-lighted room, not venturing in himself. Two men, dressed as heavily as Esquimaux were there. They greeted him, dressed as he was in a linen suit, with warning voices: "You can't stay here long. It will kill you." "Oh; bring him on," said the other. "Show him the best of it."

The place contained some 300 hogsheads of pork in double tiers. The reporter walked swiftly forward, determined to see what he could in a minute. He folded his arms, gathering his scant raiment closely about him, for he felt as if he had "fallen overboard" into an icy river. Dante's description of the ice hells he visited, in company with Virgil, would not do justice to his sensations. The ice fiends seemed to be feeling their way into his vitals. His clothes, dampened by perspiration, seemed stiffening with frost. Everywhere was a sound of dripping water. When he reached the place which the men at work considered the coldest spot, his sensations were so alarming that he turned and hurried towards the heavy door. He kicked it open with all possible vim, and without any very ceremonious leave-taking. The upper air, which had before seemed unendurably hot, was "just right" with him the rest of the afternoon. He felt the effect of that ice bath until sundown.

The colloquy with the foreman was resumed.

R.—"What is all this freezing for? Are you afraid your pork will spoil before you can get it into the brine?"

CHILLING MEAT.

F.—"Did you never notice that farmers, when they 'put down' their barrel or so of pork, do it in the winter? Meat cannot be cured thoroughly unless all the animal heat is removed before the brine is put on; and the brine itself must be cold. The meat is cut up on this floor; the hogsheads are put empty into the chill-room, and filled there, one tier at a time. The work of the men you saw is to keep changing the meat from one hogshead to another, that every portion may be thoroughly chilled, and that the pickle may reach every fiber. A piece is sometimes moved six or seven times before the pickling is pronounced perfect. You observe that the same men do not work inside and outside the chill-room at random. No employer who values his good men or the lives of his men will ask this of them. A man who tries it seldom lives a year. The heat of puddling furnaces is a trifle compared with this cold."

R.—"How do small dealers chill their meat? They have no such apparatus as this."

F.—"They simply pound up ice and mix it with the meat."

R.—"Is this one of the largest packing houses?"

F.—"No; there are some whose ice houses hold 200 tuns. Some of these have a cellar and a sub-cellar. They begin the curing in the sub-cellar and finish in the upper one."

IMMENSE CONSUMPTION OF ICE BY PACKERS.

R.—"How much ice do you use a week?"

F.—"About 75 tuns. Say under 2,000 tuns a year."

R.—"I do not understand how that fearful chill is created."

F.—"I will explain. The floor under the ice room consists of timbers two inches apart. Beneath them are the 'dripping shelves'—which look like mammoth gutters—four feet wide at the top, and placed at intervals of four feet. But the real gutters hang beneath these—they being open an inch or two at the bottom. The water flows through the gutters to the sewer. Here we have then the greatest possible surface of freezing water for the air already chilled by the ice (and for that reason passing down through the open floor) to encounter. It was when standing directly under these dripping shelves that you felt that intensest cold. There is a large opening at the back of the ice-room, up which the warm air is always passing, to be brought down again by the chill of the ice and the great surface of ice-water on the shelves."

A Catholic Scientist on Vital Correlation.

The lecture by Professor Barker on the "Correlation of Vital and Physical Forces," published on page 48, Vol. XXII., of the SCIENTIFIC AMERICAN, has, according to the Yale College *Courant*, received the honor of being translated in full and published at length in three consecutive issues of *Les Mondes*, a weekly record of science, including its application to the Industrial Arts, by the Abbe Moigno. According to that journal the Abbe is a scientific authority and was for some years editor of *Cosmos*; he is at the same time a Catholic of unquestioned orthodoxy, which last act adds significance, both to his publishing this work of our Professor, and more especially to the following notes addressed to his readers, which precede and follow the text of the lecture. We translate:

"This American lecture will seem to many to take very advanced ground; those of our readers who do not sufficiently reflect upon it, will see in it too many concessions to materialism; we do not hesitate to publish it, however, because, on the one hand, it is a very remarkable lecture, and on the other, it is in spirit (*au fond*) truly orthodox. Man is not, as the ultra-spiritualistic school would make him, an intelligence served by organs, like the archangel Raphael, the companion of young Tobias; his mind is not simply united to his body, it has the form of the body, it is completed by the body as it completes the body; everything which acts upon the body reacts therefore upon the mind, as all which acts upon the mind, may react upon the body. It is then in no wise astonishing, it is on the contrary very natural and necessary that the operations of the mind, thought, will, joy, fear, should interpret themselves in the body by a physical or physiological effect which can be estimated, and which becomes, up to a certain point, the measure, or at least the expression of the psychical phenomenon. Do not separate that which God and nature have united. Man is, at once, a physical, physiological, and psychical being."

At the close of the article he makes the additional remarks:

"As I said at the commencement, although in appearance hazardous enough, yet in spirit, this American lecture is entirely orthodox: certain expressions, however, are incorrect and should be modified. Instead of *vital force, thought-force,* it should say *physical force acting in the phenomena of physiological life,* or *physical force acting in the phenomena of thought or psychological life.* It is perfectly certain that the forces in action in physical phenomena, are also at work in physiological and psychological phenomena. But beyond this physical world extends the world of thought, of will, of free agency, which no reasonable intelligence can disregard, or can disregard only through self-deception."

In view of the antagonism developed in some quarters against scientific investigation as tending to infidelity, these expressions of one confessing a faith so conservative, are of interest. The grounds upon which Christian scientific men can stand secure, were admirably stated by Professor Dana in his recent lecture before the seniors, in which the subject of Darwin's theory was considered. In the course of his remarks he stated that belief in a development theory was not atheism. That the facts of science clearly indicate some plan of development; that Darwin's book was a work of great merit, and that his theory accounts for the origin of some species. As for genera and higher groups there will probably be found other laws to account for them. Let no one fear scientific investigation, for its results were only another name for God's truth. If atheists discovered *facts* in science, the facts were still God's truth, and to be revered and accepted as such. As for atheism itself, give it no quarter! It is death to man's highest hopes. There is no limit to scientific investigation, and there need be no fear in prosecuting discoveries. Such belief, enunciated by distinguished men of science whose position as men of Christian faith is unquestioned should calm the fears of those who tremble before every new discovery, and show no faith in the strength and majesty and unity of truth.

Malleable Properties of Chinese Bronze.

The *Journal of Applied Chemistry* thinks the unsuccessful attempts made to manufacture Chinese gongs and bells in Europe and the United States, are due to the mistake that was made of hammering the Chinese alloy at the ordinary temperature, instead of working it at a high temperature according to the recent discovery made by Professor Riche, of Sorbonne, who has been perfectly successful in his experiments made on a large scale at the Paris Mint.

The different analyses have shown that the Chinese alloy was formed of a certain proportion of tin and copper, in the proportion of 20 parts of tin to 80 of copper. Ingots of bronze were cast containing 21·5, 20·0, 18·5, per 100 of tin; these were afterward submitted to the action of the hammer, at temperatures varying from the ordinary temperature to a red heat. At the ordinary temperature the metal was as brittle as glass, but approaching 300° to 350° Centigrade a sensible amelioration was noticed. At a dark red heat it appears that the condition of the metal is quite different, as this alloy can be worked as easily as iron or bronze of aluminum.

The metal flattened without cracking, under the most powerful blows of enormous hammers, and can be reduced without the slightest difficulty to sheets of one millimeter thickness. These sheets have exactly the appearance of the Chinese bronze, and possess great flexibility.

The action of the laminating is more striking, because, under the hammer, the metal is so soon cooled; that is, it has to be reheated from time to time, which operation complicates the work; in using a laminating machine the work is done with extreme rapidity, especially if care is taken to heat the alloy to a red heat. At an ordinary temperature a single passage under the laminators would break the sheet in thousands of pieces. This alloy can be cut at a high temperature like iron and steel, and presents the fine and homogeneous grain of the latter; it is soldered without difficulty with the ordinary jewelers' solder.

The following tests will demonstrate that the density of the bronze suffers very little modification by the hammering or laminating process:

Chinese Bronze.	Density after Smelting.	Density after Hammering
Bronze at 21·5 per cent tin,	8·938	8·929
Bronze at 18·5 per cent tin,	8·882	8·938
Bronze at 20·0 per cent tin,	8·924	
Bronze at 20·0 per cent tin,	8·918	8·920
Bronze at 20·0 per cent tin,	8,912	

FACTS AND RECIPES.

To Septimus Piesse, the celebrated London chemist and perfumer, we are indebted for the following recipes and facts, received by last steamer. The distinguished source from which they come is guarantee of their reliability:

TO CLEAN GILT JEWELRY.—Take half a pint of boiling water, or a little less, and put it into a clean oil flask. To this add one ounce of cyanide of potassium, shake the flask, and the cyanide will dissolve. When the liquid is cold, add half a fluid ounce of liquor ammonia, and one fluid ounce of rectified alcohol. Shake the mixture together, and it will be ready for use. All kinds of gilt articles, whether Birmingham ware or "Articles de Paris," which have become discolored, may be rendered bright by brushing them with the above-mentioned fluid.

TO HARDEN A POKER.—The fire poker, by constant use, becomes soft, and is generally more or less bent. This arises from its being left in the fire and becoming red hot, then being put on the fender, where it slowly cools—an operation which softens even the best steel. When a poker has thus become soft and bent, it may be again hardened by making it hot two or three times, and plunging it every time that it is hot into a pail of cold water. The rapidly cooling of steel makes it again hard.

INK ON BOOKS.—To remove ink-stains from a book, first wash the paper with warm water, using a camel's hair pencil for the purpose. By this means the surface ink is got rid of; the paper must now be wetted with a solution of oxalate of potash, or, better still, oxalic acid, in the proportion of one ounce to half a pint of water. The ink stains will immediately disappear. Finally, again wash the stained place with clean water, and dry it with white blotting paper.

LAUNDRY PAPER BLUE.—This is a new and useful invention by M. Binko, which will supersede the well-known blue bag of the laundry. A piece of the paper blue being put into water, colors it rapidly to the required rinse tint. Thus the trouble of keeping a blue bag from one wash to another will be avoided, as well as some expense saved.

A TEST FOR COLORS.—M. Nickles has found that fluoride of potassium will discharge a Prussian blue color, and not affect the indigo and aniline colors. This information will interest calico printers and dyers. A fact of more general interest is, that fluoride of potassium will remove ink stains from cloth.

A SEA weed, found abundantly on the coast of France, is now used in that country for clarifying beer, as being much more economical, and better suited to the purpose than gelatin. The weed referred to belongs to the genus *Chondrus crispus*, that is, the Irish or Carrageen moss.

THE brittlewort, or single cell plants, visible only by the microscope, are so numerous that there is hardly a spot on the face of the earth where they may not be found.

IT is estimated that America, when her productive power is fully developed, will be able to feed four times as many persons as there are now on the face of the earth.

ALL other conditions being the same, the vigor and richness of vegetation are proportionate to the quantity of light and heat received.

ONE pound of coal in the hands of a good chemist can by its consumption be made to evaporate, or convert into steam, 14 pounds of water.

THE first gas meter was invented by Mr. Samuel Clegg, in 1815, and was used at the Gas Works in Westminster, Great Britain.

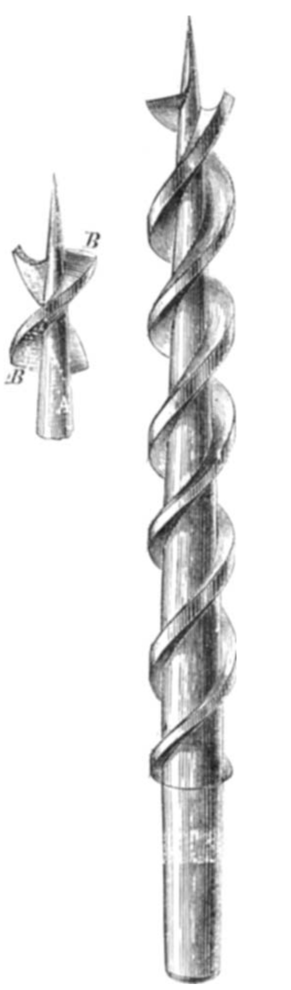
ABOUT 15,000 tuns of ammonia-alum are made annually in England. It is principally consumed in the dye works of Manchester and Bradford.

GRAHAM ascertained that the rate of diffusion of gases is inversely as the square root of their densities. Dr. Piesse was a pupil of Graham.

SO many kinds of steel are now manufactured that an exact and permanent nomenclature for them is needed. Dr. Wedding, of Berlin, has endeavored to supply the want. He classes all kinds under two heads, "Raw Steel" and "Fine Steel." Of the former he distinguishes five varieties; while fine steel has a much larger number, each of which is named according to its mode of preparation, or after its inventor.

KELLY'S LASTING MACHINE BORING BIT.

We illustrate herewith an improvement calculated to secure a great saving in the expense of bits for machine boring. It will, however, be seen that the principle is capable of extension to bits designed to be used in the brace as well in boring machines.



The ordinary bits for boring machines are capable of being worn only from about one sixteenth to one eighth of an inch, when they become useless, and have to be laid aside. This bit, on the contrary, may be worn four inches or more, before it is thrown aside as useless, according to the length of twist. The advantages of this construction are so obvious that we need not dwell upon them.

The bit is particularly adapted to car-manufacturers' use, and for agricultural implement, furniture, carriage, sash and blind manufactures, etc., and will supply a want long felt.

The bit, it will be seen, consists of a central shaft, A, around which are formed the spiral blades, B. The lower point of the shaft, A, is pointed, as shown, and the opposite end is made to fit and be held by a boring machine chuck. The lower ends of the spiral blades carry cutting edges essentially like the ordinary center bit, a lip on one and a cutter on the other.

In sharpening, these edges of course retreat, but always maintain their relative distance from each other.

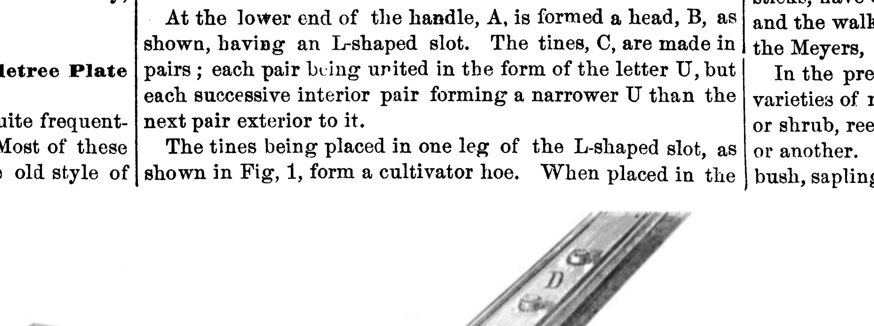
The spiral blades give also much greater rigidity to the bit, so that higher speeds may be employed. Specimens of its work have been shown us, and it is of the most satisfactory character. Patented, May 10, 1870, by Daniel Kelly, whom address at Muskegon, Mich.

Adams' Improved King-Bolt and Whiffletree Plate for Vehicles.

Our readers have had their attention called quite frequently of late to improvements in draft vehicles. Most of these have been real and practical advances over the old style of construction. The one of which we herewith give an engraving also merits attention, and has, we think, the advantages claimed for it by the inventor, of which we give a summary below.

A is the axle tree; B, the bolster; C, the sway-bar; D, the reach; E, the king-bolt; F, brackets through which the king-bolt passes; G, the iron plates on the bolster and axle-tree through projections in which the king-bolt also passes. The plates, G, are secured by clips and parallel ledges which fit against the front and back of the bolster and axle-tree respectively, and the one which is attached to the axle-tree has a semi circular groove made in its upper surface, in which a corresponding ledge formed upon the plate attached to the bolster fits, so that the draft is sustained by these plates, and the king-bolt is subjected to very little strain.

The king-bolt is placed, as shown, in front of the axle, so that the full strength of the axle is retained, instead of being bored through as in the old method.



ADAMS' KING-BOLT AND WHIFFLETREE PLATE.

The inventor claims that by this construction the plates, G, receive the whole draft, leaving the king-bolt free at all times. The plates are so attached to the axle as not to weaken the wood work. Greater strength and less friction are secured than in any method hitherto employed. The improvement is adapted to all wagons, whether light or heavy.

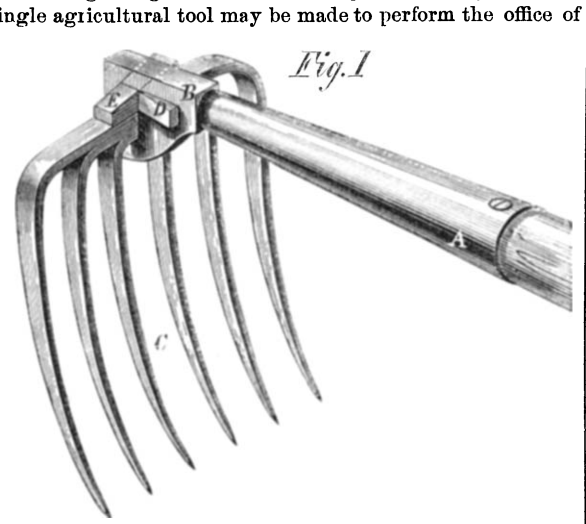
Patented, through the Scientific American Patent Agency, October 20, 1868, by Levi Adams. Address for further particulars J. Adams & Sons, Amherst, Mass.

A New Theory of Sleep.

Dr. E. Sommer has contributed to the *Zeitschrift für Rationelle Medicin* for 1869, a paper in which he promulgates the doctrine that sleep is nothing else than the result of a *de-oxygenation* of the organism. According to this theory, the blood and the tissues possess the property of storing up the oxygen inhaled, and then supplying it in proportion to the requirements of the economy. When this store of oxygen is exhausted, or even becomes too small, it no longer suffices to sustain the vital activity of the organs, the brain, nervous system, muscles, etc., and the body falls into that particular state which we call sleep. During the continuance of this deep repose fresh quantities of oxygen are being stored up in the blood, to act as a supply to the awakened vital powers. Rest produces, though in a less degree, the same effect as sleep in reducing the expenditure of oxygen.

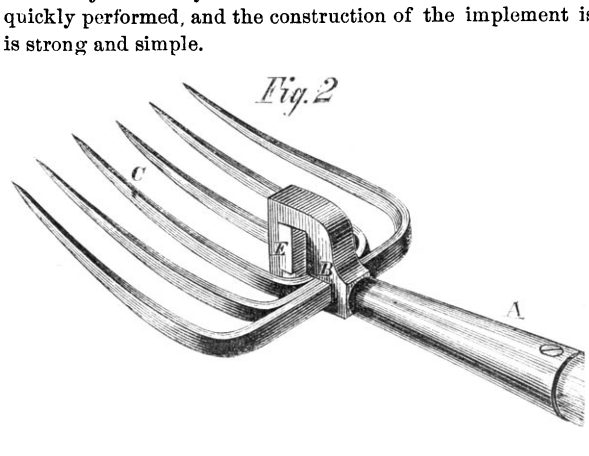
FOSTER'S CONVERTIBLE CULTIVATOR, HOE, FORK, RAKE, AND SPADE.

Our engravings illustrate an improvement by which a single agricultural tool may be made to perform the office of



several extensively-used and useful implements—namely, a cultivator, hoe, potato hook or rake, and a fork for handling manure, and for forking or spading up garden beds, etc.

The adjustment by which the transformation is effected is quickly performed, and the construction of the implement is is strong and simple.



At the lower end of the handle, A, is formed a head, B, as shown, having an L-shaped slot. The tines, C, are made in pairs; each pair being united in the form of the letter U, but each successive interior pair forming a narrower U than the next pair exterior to it.

The tines being placed in one leg of the L-shaped slot, as shown in Fig, 1, form a cultivator hoe. When placed in the other leg they form a fork. In either position they are firmly held in place by a metallic block, D, which fills the vacant part of the slot, and a wedge, E, which firmly secures the tines.

This implement was patented, through the Scientific American Patent Agency, August 17, 1869, by John H. Foster, of Charlottesville, Va. Address as above for further information.

Fallacies of Statistics.

Archbishop Whately remarks upon the overrated importance of statistics:

"Increase of a thing is often confounded with our increased knowledge of it. When crimes or accidents are recorded in newspapers more than formerly, some people fancy that they happen more than formerly. But crimes, especially (be it observed) such as are the most remote from the experience of each individual, and therefore strike him as something strange, always furnish interesting articles of intelligence. I have no doubt that a single murder in Great Britain has often furnished matter of discourse to more than twenty times as many persons as any twenty such murders would in Turkey. Some foreign traveler in England is said to have remarked on the perceptible diminution in the number of crimes committed during the sitting of Parliament as a proof of our high reverence for that assembly; the fact being, as we all know, that the space occupied in the newspapers by the debates causes the records of many crimes to be omitted. Men are liable to form an over-estimate of the purity of morals in the country as compared with a town, or in a barren and thinly-peopled as compared with a fertile and populous district. On a given area, it must always be expected that the absolute amount of vice will be greater in a town than in the country, so also will be that of virtue; but the proportion of the two must be computed on quite different principles. A physician of great skill and in high repute, probably loses many more patients than an ordinary practitioner; but this proves nothing till we have ascertained the comparative numbers of their patients. Mistakes such as this (which are very frequent) remind one of the well-known riddle, "What is the reason that white sheep eat more than black ones?"

About Canes.

Since 1851 commerce in ordinary walking sticks has more than quadrupled. In Hamburg, Berlin, and Vienna—the present central depots for export—the manufacture employs many thousands of work people. Its control is in the hands of the Jews. A writer in *Harper's Magazine* for July says that the Meyers, members of one family of German Hebrews, are at its head in Austria and Germany proper, and by management peculiar to their race have absorbed all competition. First gaining ascendancy at home by the style and cheapness of their wares, they next assailed foreign markets. In Bombay they undersold the Chinese dealers. Scattering thin light bamboo rods along the overland route to India, the native productions in Egypt and Arabia gave place to the more convenient Viennese manufacture. The French occupation of Algiers introduced their graceful walking sticks to the Moorish gentry of Northern Africa. Paris began to adopt them. Madrid, Naples, and even London followed. They drove the English canes out of the Brazils, and on the Western coast of South America, where Belgian manufactures had enjoyed immemorial monopoly, they found a demand which it taxed all their resources to supply. Curiously enough, California, in the use of the Viennese walking cane, preceded the Eastern States. Mine explorers and gold diggers of the Sierra Nevada country gave *ton* to fashion in New York and Chicago. The importation of the Meyers' cane at the present time into the United States has swallowed up, like Aaron's serpent, all other. They are found everywhere. No Jew clothes man fails to keep them among his stock of goods. Light French ratans, heavy English crab sticks, curiously carved Brussels thorns, and even the choice Alcasian orange sticks, have disappeared. The Jew specialty always succeeds and the walking stick, manufactured now for thirty years by the Meyers, millionaires, furnishes no exception.

In the present manufacture of canes great quantities and varieties of materials are consumed. There is scarcely grass or shrub, reed or tree, that has not been employed at one time or another. The black thorn and crab, cherry tree and furze-bush, sapling oak and Spanish reed (*Arundo donax*), are the favorites. Then come supple-jacks and pimentoes from the West Indies, ratans and palms from Java, white and black bamboos from Singapore, and stems of the bambusa—the gigantic gross of the tropics—from Borneo. All these must be cut at certain seasons, freed from various appendages, searched to discover defects, assorted into sizes, and thoroughly rid of moisture. A year's seasoning is required for some woods, two for others. Then comes the curious process of manufacture. Twenty different handlings hardly finish the cheapest cane. The bark is to be removed after boiling the stick in water, or to be polished after roasting it in ashes; excrescences are to be manipulated into points of beauty; handles straightened and shanks shaped; forms twisted and heads rasped; tops carved or mounted, surfaces charred and scraped, shanks smoothed or varnished, and bottoms shaped and ferruled. Woods, too, have to be studied, lest chemical applications that beautify one might ruin another kind. Some are improved under subjection to intense heat, others destroyed. Malacca canes have frequently to be colored in parts so that stained and natural surfaces are not distinguishable; heads and hoofs for handles are baked to retain their forms; tortoise shell raspings are conglomerated by pressure into ornamental shapes, and lithographic transfers, done by hand, are extensively used upon walking sticks for the Parisian market.

INSECTS OF MISSOURI.—We are in receipt of the "Second Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri," made to the State Board of Agriculture pursuant to an appropriation for the purpose from the Legislature of the State. The report was prepared by Charles V. Riley, State Entomologist, and is an able and instructive document. We give an extract from the work on another page.

CHOCOLATE BLANC MANGE.—A quarter of a pound of sweet chocolate, two ounces of gelatin, one quart of milk, one teacupful of sugar candy. Put it all into a jug, set it in a saucepan of water, and let it boil an hour. When nearly cold turn it into the mold.

Scientific American,

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.

☞ "The New York News Company," 8 Spruce street.

☞ Messrs. Sampson, Low, Son & Marston, Crown Building 188 Fleet st. Trubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill, London are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

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VOL. XXIII., No. 3 . . [NEW SERIES.] . . *Twenty-fifth Year.*

NEW YORK, SATURDAY, JULY 16, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

GAS STOVES FOR ORDINARY DOMESTIC USE.

In a recent article we took occasion to show that, for steady use, either for domestic purposes or for the generation of steam for motive power, gas could not compete with coal in economy, but that, in summer, when fire is only needed, while temporary culinary or other domestic work is in progress, the fact that gas can be instantaneously kindled or extinguished, enables it to compete with coal on the score of economy, while, on the score of cleanliness, comfort, and convenience, it is vastly superior.

We are greatly surprised to see the loosest statements upon this subject in journals that ought to know their assertions are not based upon fact.

Thus, we find in an English engineering paper, the statement that gas may be economically used for the production of steam. Another scientific English journal broadly asserts, that "the economy of a coal fire is *far outbalanced* by the economy which results from the use of coal gas, *both for warming and cooking*." Has the author of this absurd statement ever heard of the axiom that "a part cannot equal the whole?" It would seem not.

Nothing is more certain than that the perfect combustion of a given weight of an element produces a constant amount of heat. Gas consists of only a portion of the combustible elements of the coal from which it is distilled, and this portion costs more than the total weight of the coal from which it is obtained. If, then, it be more economical in constant use, than coal, it must be because a much greater proportion of heat generated from the combustion of gas is utilized than is the case with coal. There may be some difference in favor of the gas in this particular, but we unhesitatingly assert, that nothing like such a difference as will make good the difference in cost per heat unit, in these materials, exists.

The assertion above quoted, in regard to the superior economy of gas, occurs in an introduction to a description of a gas stove, which will do cooking for one thousand persons, recently made by a London firm for a charitable institution. This stove is "sixteen feet in length, six feet six inches in hight, and two feet six inches in depth, and weighs about three tuns. It is divided into twelve compartments, in two tiers of six each, being only half the width of the four central compartments, although of the same hight. The top range consists of a roasting or baking compartment at each end, the four central compartments—which, however, only appear to be four from the outside, having four sets of doors—form one spacious hot closet. The lower range consists of six roasting compartments around the bottom of which the gas burners are placed; they are simply gas tubes with perforations, from which the jets of gas issue. At the top of each compartment is a sliding frame, from the bars of which the joints are suspended. The dripping falls into a pan below, which slopes from all sides toward the center, where there is an outlet, through which the dripping runs into a trough beneath, which is withdrawn and emptied as required, without lowering the heat of the oven. The doors are fitted with sight glasses, through which the progress of the cooking and the state of the burners can be observed without opening the doors and thus letting down the heat."

No provision is made for boiling or steaming, as there is already an apparatus for that purpose at the institution for which the stove was built.

The gas is used admixed with atmospheric air, the arrangement for that purpose being placed beneath the apparatus. It is calculated to consume 150 feet of gas per hour, which is very small considering the size of the apparatus and the work done. The hot chambers, forming the upper row, are heated by the waste heat from the ovens beneath, and have no direct supply of gas. The products of combustion and the fumes of the cooking are conveyed away by flues at the back of the stove to a common flue, and thence to the outer air.

The journal referred to asserts, that "from a variety of experiments, made from time to time, it has been definitely settled that—apart from the advantages of superior cleanliness, economy, and convenience—gas stoves effect a saving in weight of eighteen lbs. against thirty-four lbs. on 184 lbs. of meat, as against cooking by coal fires."

We do not consider this as definitely settled. On the contrary, we believe it a crude statement, without a shadow of of basis in fact. If such a saving has been effected, it depends upon the construction of the apparatus, and not upon the nature of the fuel, although we grant that the use of gas *may* render possible a form of oven whereby meats may be cooked with less waste than can be the case when coal is used. We do not, however, regard this as by any means demonstrated.

The fact is, that a large majority of gas stoves sold and used in this country do not bake meats at all, or, at least, very imperfectly. At least, we are so informed by those who sell these stoves, and to whom we have recently applied to obtain one for this purpose.

The reason is quite evident. The greater number of such stoves are made of thin sheet iron, and have not the power to distribute the heat with sufficient equality throughout the oven space, to do such work, or to bake properly, even a loaf of bread, although some of them will bake pastry or biscuits quite well.

It is obvious that if the plates be made of sufficient thickness, then a loss of heat must take place whenever the gas is extinguished by the radiation from the plates of the heat accumulated in them, so that a gain in efficiency, obtained in this way, would be attended by a lessened economy.

The problem then is this: to devise some way of equally distributing and confining heat in the ovens of gas stoves without the use of thick plates of iron, soapstone, or other material. The inventor who solves this problem, in a cheap and effective manner, will stand as good a chance to make money from his invention as by the production of any other improvement in present demand.

STATICS AND DYNAMICS OF FRICTION.

That mere pressure is not power seems a truth hard to be generally understood. Of course a general assent to the proposition will be given by nine out of every ten mechanics; the tenth—being at heart a perpetual-motion man on principle, or on what he considers principle—will perhaps deny that there is any distinction between the terms. But while most will admit the fact that mere pressure cannot perform work, and is therefore not mechanical power in the sense in which the latter term is generally used, it is obvious to the careful observer that, in their reasoning, the majority of men fail to keep the distinction in view, and thus arise a great number of popular errors.

Among these errors stands most conspicuous that in the belief in the possibility of the so-called perpetual motion, in the pursuit of which many minds and fortunes have been wrecked.

When one body rests upon another body, a certain force or weight is required to move it or to overcome the friction. This weight or force is found to be independent of the extent of surface, or the rate of motion, and is called the co-efficient of friction. This would seem a plain law and easily understood, yet few men, comparatively, are clear upon the subject. They say "the greater the velocity the greater is the expense of power in overcoming friction," forgetting entirely the relation which the meaning of the word "power" has to space and time, and that the word "power" as well as "velocity," involves the ideas of space and time. Velocity is motion through a definite space in a definite time. Mechanical power is the overcoming of a definite resistance through a definite space in a definite time, when it is considered as a mathematical quantity expressed in units of work.

A body moving at inconceivable velocity through space, and meeting no resistance, exerts no power, but the power it is capable of exerting should it meet a resistance may be computed from its velocity and its mass or weight. A body of sufficient weight moving at a velocity inconceivably small, may exert an enormous power, but one thing is certain, it must move. Power is inseparable from the idea of mass motion. No matter what may be the weight of a body or what may be the static pressure it exerts, it will develop no mechanical power till it moves as a mass.

Now let us apply these conceptions of power and velocity to the consideration of friction. The co-efficient of friction is a constant, for a given pressure, and is independent of extent of the surface of the bearing, or its velocity, but this does not imply that the expenditure of power to overcome friction does not increase with the velocity where the latter *is maintained through a given time*, as many seem to think. On the contrary the expenditure of power will increase directly as the velocity increases, and this not in spite of, but *in consequence* of the fact that the co-efficient of friction is a constant.

Suppose the weight of a body to be one thousand pounds, and that its co-efficient of friction is five per cent of its weight when resting upon a surface of given material. Five per cent of one thousand pounds is fifty pounds. The friction is therefore a constant resistance of fifty pounds to motion at any velocity, but as velocity implies space traversed, and as every foot of motion, through which the fifty pounds of frictional resistance are overcome, requires an expenditure of fifty foot pounds, for two feet accomplished there would be one hundred foot-pounds expended, and so on. But velocity implies more than mere space traversed; it implies definite space traversed in definite time. If, then, the velocity be doubled the space traversed in the same time will be doubled, and the expenditure of power to overcome frictional resistance through this increased space will also be doubled.

The frictional resistance expressed by the co-efficient of friction is static, but when it is overcome through space the power required to perform the work must be estimated according to the laws of dynamics.

The principle of all dynamometers is, that they measure the static pressure of a resistance, which is considered in connection with the distance through which that resistance is overcome in a definite time. Hence friction of machinery may be—and is best—measured by one of these instruments and when thus determined the co-efficient of friction for a particular combination of mechanism may be found by describing the power expended per minute by the number of foot-pounds of work expended in overcoming it.

The friction of any machinery, however, is increased while performing work, and will be a varying quantity so long as the work is not constantly uniform in its resistance; so that while the friction due to machines when running idly may be accurately measured, their friction when performing work can be only determined as an average of the varying friction during a given time.

THE DARIEN CANAL SURVEY.

The U. S. Government expedition sent to survey the Darien Isthmus has returned. Owing to unavoidable causes the expedition did not reach the Isthmus till about April 1st. They immediately landed at Caledonia Bay and made a careful exploration of the route proposed by Dr. Cullen. They found the lowest mountain pass to be over 600 feet about the sea lével. About the 1st of May the party proceeded to explore the San Blas route from Mandinga Bay, on the Atlantic, to Chepo, at the southern end of Panama Bay on the Pacific. This route, Com. Selfridge thinks, is available. The rainy season commenced before he landed at San Blas, and all the country was flooded with water, yet from his reconnoissance he thinks that a careful survey will develop a route whereby a canal can be made with only twenty seven miles of cutting. We are pleased to see that he is already ordered to re-organize his expedition for a renewal of the survey next winter. The route favored by Com. Selfridge is the narrowest point of the whole Isthmus. It is said that the tidal waters of the two oceans there come regularly within seven miles of each other, and it is there that the tradition exists that the Indians and buccaneers drew their canoes across. It was there, too, that Vasco Nuñez di Balboa landed, and journeying toward the Pacific first saw the waters of that ocean from the hights south-east of Panama. The harbors on both sides are good. This route was brought before the public by Mr. Oliphant in a lecture before the British Geographical Society. It was reconnoitered for F. M. Kelly, Esq., of New York, in 1864, and, while having many favorable points, was reported against on account of a proposed tunnel. The engineers at the same time stating that they believed a better route could be found.

One of the great objections urged to this part of the Isthmus has been supposed unhealthiness. Com. Selfridge reports his men had good health, and only one died. This from a crew numbering fully 600 men does not indicate a very unhealthy climate.

As Com. Selfridge is to proceed again to the Isthmus next winter, and we suppose not only make a thorough survey of the San Blas, but also of the Panama route, some definite information may at last be expected as to an American interoceanic canal. Then, too, we notice that Congress is about to appropriate $35,000 for the survey of the Tehuantepec line. Let the work be placed in hands of such a man as Selfridge, and it will be executed without fear or favor, and a result reached of which Americans may be proud.

A DENUNCIATION OF WATER METERS.

We were about to entitle this, "Arguments Against the Use of Water Meters," but the article, the fallacy of which we propose to show up, and which we find in the *Baltimore Underwriter*, has so much more the character of denunciation than of argument, that we changed our minds and chose the above heading as more appropriate.

The article in question commences with the following bit of rhetoric: "The latest iniquity of the political economists who manage our system of tax gathering is the determination manifested in some of our large cities to impose unwarrantable charges upon the use of water by the introduction of meters into private households as well as into hotels and manufacturing establishments."

Then follows an enumeration of the great benefits of water in general and particular, a subject so trite that we will not weary our readers by a review of this part of the article—the burden of which is to show, what needed no showing, that health and good morals greatly depend upon an ample supply of water, but we cull a couple more specimens of rhetoric, which will serve us as texts for what we have to say upon this subject.

"Next to air and light, no element of primal necessity is so indispensable to the sanitary condition and comfort of society as water, and any restriction upon its use is an injury to the public health, which calls for severe condemnation.

"The value of life is highest wherever sanitary regulations are best and social evils fewest, and no municipal management that would sanction impediments to the public health can escape censure."

One might suppose from these expressions that the adoption of meters would engender malaria, or that the annual rainfall upon the water sheds from which our cities derive their supplies would be greatly decreased by their use. We can assure our readers, however, that the writer of the quotations only means that the water will cost more to the consumers, and that consequently they will go unwashed, and take their whiskey straight rather than incur the increased expense.

Let us see what foundation there is for these fears.

First, the water furnished to any city costs a given amount, which aggregate cost will not be increased by the use of meters, except upon the money invested in them, and their depreciation, a mere trifle, scarcely worth considering in comparison with the entire cost, provided meters can be found having the proper degree of durability.

The aggregate cost of the water is provided for by taxation, which always falls directly or indirectly upon consumers. This taxation is at present notoriously unequal upon individuals when compared with the amounts they respectively use or waste; and what is more, it is equally notorious that those who are best able to pay, really do pay least in proportion to the amounts used.

Large manufactories, breweries, livery stables, hotels, etc., probably, on the average, pay less than half the price per cubic foot for the water used, than private establishments, under the present system. Meters, instead of increasing the aggregate taxation, would distribute it equally, so that the tax would fall lighter upon the poor than it now does, and the water instead of being made dearer would actually become cheaper to them.

As it is, the provident now pay for the wasteful, and the smaller consumers contribute to pay for what is used by the larger, an injustice so great that did the public appreciate its magnitude it would clamor for meters as the plain and obvious remedy.

In a question of simple purchase—for such it really is—it would seem there could not be two opinions as to whether the commodity purchased should be "sold by the grab" or accurately measured; and all the talk about the great value and utility of water only makes this more evident. If air or natural light had to be obtained by purchase the same rule would apply; but as these things do not cost money, and as they cannot be wasted, the comparison of water supply to the supply of air and light, is simply an absurdity. How would the public tolerate the general taxation plan in the distribution of gas? Yet that would be no more absurd than our present system of distributing water in cities and making the poor pay for what the rich consume.

No amount of blind denunciation can alter these facts, and no argument against the use of meters, except the fact that none in market have been found to answer the requirements of general use, can be brought forward, that does not equally apply to the use of weights and measures generally.

A GLANCE AT AERONAUTICAL SCIENCE---REVIEW OF A PAPER READ AT A MEETING OF THE AERONAUTICAL SOCIETY IN LONDON, BY W. CLARE.

If it be true that all sound knowledge is attained with difficulty, and that human progress is of necessity slow, certain it is that in the science of aeronautics—if it be yet proper to use the term science in this connection—this truth finds a remarkable illustration. It takes, it would seem, a very long time for mankind to get fledged. So far, every time he has attempted to try his wings, either their immaturity or his want of skill has rendered his attempts to fly unavailing.

If words and theories could take the place of wings, we should long ago have been disporting in the air like swallows; but the truth is that the fine spun theories which form the bulk of what is said and written upon this subject, lead rather towards failure than success. We are of those, however, who believe in the utility of the "study of failure," and there are few intelligent minds that can review the long list of devices, proposed or experimented with to enable man to navigate the air, without benefit.

But our purpose was to review a paper recently read by Mr. W. Clare, before the Aeronautical Society, in London, and to give in condensed form an expression of his opinions rather than our own upon this subject.

Passing over a somewhat lengthy introduction, in which he sought to prove that the problem of flight had occupied the attention of mankind from remote ages, we pass to a consideration of the errors which, according to that gentleman's statement, have hitherto prevented success, and the avoidance of which he is confident will insure the success of an apparatus of his own devising.

The first error which he points out is the supposition that heavy wings or heavy machinery must necessarily retard or render flight impossible. He thinks there is very little difference between flight in water and flight in air, and that such difference as exists, is purely a mechanical one. All that is necessary to flight is that our wings shall displace sufficient air in proportion to the weight of the apparatus, and there need be no apprehension of making them too heavy. In birds, the amount of wing surface, in proportion to weight, decreases as the weight increases.

The second error which, according to Mr. Clare, inventors are entertaining, is that air cells help the flight of birds. Upon this we will quote his own language.

"If, as is reasonable to suppose, these cells are fitted with an extremely rare gas, a power of buoyancy would of course be the result; but what a power! under the most favorable circumstances bearing something like the enormous ratio of ¼ per cent (·025) to the weight. Were, however, a bird thus buoyed up, as many still suppose, flight would be rendered impossible by that very buoyancy, as impossible as the flight of a balloon—by flight I mean of course controllable flight. This air-cell business is by far the weakest argument yet brought forward."

Models are denounced by Mr. Clare, who thinks pure theory can alone solve the problem of flight, and claims that most valuable discoveries and improvements have been made without their aid; a statement which we think he fails to substantiate.

He does not believe in steam as a motor for flying machines, and regards the steam engine as far too wasteful a machine ever to meet the requirements of aerial navigation. On this head he remarks:

"Birds feel the air and seem to guide their flight by nervous sensation; machinery, I fear, will never accomplish this, though man undoubtedly will. Dr. Smyth, in his experiments with the wings of a pigeon dried in an extended position, found that, however cleverly and closely he imitated the motions of a pigeon by means of a spring, he could raise no weight except very occasionally, and then by jerks, which proves that great power is not required so much as a successful manipulation of a small power.

"Will it be considered superfluous here to remind you that, though birds of the struthious or ostrich order do not fly, weight is by no means the cause of their failure? You will perhaps allow me to quote in a parenthesis the quaint old naturalist Buffon's contrary opinion on this subject. He says, 'The ostrich is generally considered as the largest of birds, but its size serves to deprive it of the principal excellence of this class of animal—the power of flying. The medium weight of this bird may be estimated at 75 lbs. or 80 lbs., a weight which would require an immense power of wing to elevate into the atmosphere; and hence all those of the feathered kind which approach to the size of the ostrich, such as the cassowary, the dodo, neither possess, nor can possess, the faculty of flight.'"

Mr. Clare regards this explanation of Buffon as very unsatisfactory, and says he has been unable to reach any satisfactory reason why ostriches and some other large birds cannot fly.

He thinks the cause of the stand-still in the Aeronautical Society is that men do not consider the subject of "aerostation" or "aviation" to be a real science, but bring forward wild, impracticable, unmechanical, and unmathematical schemes, wasting the time of the society, and causing it to be looked upon as a laughing stock by an incredulous and skeptical public.

Somewhat inconsistently he thus gives a description of an apparatus as impracticable as any yet reported as having been exhibited before the Society, in the use of which men shall be taught to fly by suspending them at the end of long ropes.

Finally, he exhorts the brethren with still greater inconsistency (after having maintained that theory was equal to all emergencies) to *do something*, and not let another year pass in "dreamy speculation and unprofitable theorizing;" which advice we hope they will be able to follow, and that the personal risk which their efforts entail may not largely thin the ranks of the Aeronautical Society.

THE HISTORY OF A DEFUNCT HORSE.

A young gentleman just out of college, once remarked that it was exceedingly insalubrious to inhale the obnoxious effluvia arising from the cadaverous carcass of a defunct horse. He was undoubtedly right, and science has found a way of remedying the evil. They now make so many things out of the dead body of a horse that the animal must be a remarkably fine one if he is worth as much when alive as he is in the retorts and kettles of the chemist. As soon as the horse is dead, his blood is sought by the manufacturers of albumen, and by sugar refiners, and by the burners of lamp black. Not a drop of it is allowed to go to waste.

The mane and tail are wanted for hair cloth, sieves, bow strings, and brushes. The skin is converted into leather for cart harness, for boots and shoes, and strong collars. The hoofs are used for combs, horn work, glue, and in old times were the chief source of the spirits of hartshorn, now obtained from the gas house. The flesh is boiled down in the rendering vat, and much oil and fat is obtained from it. Some of the choice bits may find their way into cheap restaurants, and play the part of beef steak, or help to enrich the hasty plates of soup of those establishments. The flesh left after all has been extracted from it that is of any service, is sometimes burned to be used as a manure, or is worked up into nitrogenous compounds such as the cyanides, to be used by the photographer for taking our pictures.

The stomach and intestines make valuable strings and cords for musical instruments, and out of the bones so many useful articles are manufactured that it is almost impossible to make out a complete list of them. Among them are buttons, toys, tweezers, knife handles, rulers, cups, dominoes, balls, and the residue from all these things is burnt into bone black to be used by the sugar refiner, who thus puts in a second claim upon the dead horse; and some part of the bone black is burned white to be used by the assayer in testing for gold; and when the refiner and assayer have finished with it, it is converted into super-phosphate to serve as a valuable manure on our land. The teeth are used as substitutes for ivory; and the iron shoes if not nailed up over the door to ensure good fortune to the household, are worked up into excellent wrought metal. Some portion of the bone black is converted into phosphorus for the manufacture of matches, and lately a valuable bread preparation is made of the phosphate, and medicines are prepared for the cure of consumptives.

ICE BY MACHINERY.

The excessive heat of the present season and the enhanced price of ice invite attention to a subject that has been frequently discussed in these columns, but which does not appear to have been practically settled by the companies who have undertaken to manufacture ice by machinery. The question is, Can ice be made artificially in a northern climate so cheaply as to come into competition with the natural crop of the winter? We believe that it can, and in this belief are sustained by the opinions of all scientific men who have studied the subject as well as by the facts and figures of actual application. The reason why we have not refrigerating machines as common as stoves, and as cheap as cast-iron can make them, is that there has been no demand for them and consequently no regular manufacture. Stoves are a necessity, and we have as many patterns and varieties as there are days in the year; and yet patents on them have not ceased, and will not cease to be taken out as long as man continues to heat his house or cook his food. But cooling stoves, if we may be allowed the expression, are not an absolute necessity and have not therefore been so generally studied and improved upon as our heating apparatus.

It is not necessary for us to report what we have frequently published concerning the various methods resorted to for the artificial production of cold, but we can confine ourselves to what appears to be the most successful machine of any thus far invented. The production of cold by the liquefaction of a gas and the subsequent absorption of that gas by the action of chemical affinity, is the most philosophical of any method thus far proposed. The gas that fulfills both these conditions is ammonia. It is easily converted into a liquid at seven or eight atmospheres of pressure, and it has such an affinity for water that it is rapidly absorbed without the necessity of any further application of heat. It is only necessary to heat aqua ammonia in one end of a closed U-shaped apparatus to soon find the other limb filled with the liquid gas; and as soon as this takes place, if the heat be removed the gas returns to its original water so rapidly as to produce intense cold. The particular machine by which this result is accomplished was exhibited in Paris in 1867, by M. Carré, and has been largely imported into this country. Dr. Barnard, the learned President of Columbia College, says of this invention that a machine of the annual productive capacity of thirteen hundred thousand pounds of ice can furnish ice at less than a quarter of a cent a pound. "It is here assumed, however, that the manufacture will be carried on in the country, where the rent of premises will not be a heavy charge, and the expense of distribution is not allowed for. One thousand tuns of ice may therefore be manufactured at an outside expense, loss and waste being included, of ten thousand dollars or less; and this may be delivered to customers at twenty dollars per tun, or one cent per pound, with an annual profit of ten thousand dollars." This estimate of Dr. Barnard's covers all of the necessary outlay for rent, wear and tear of machinery, and permanent investment, and still leaves an ample margin of profit for the company. The agent for the sale of the Carré apparatus in this country, M. Bujac, states that at the Louisiana Ice Manufacturing Company's Works at New Orleans, six No. 1 machines are now producing from 72 to 76 tuns of ice daily at a cost of $3·00 a tun, and at the works of Messrs. J. P. Morris & Co., Philadelphia, by improved machinery it is calculated that eight pounds of solid ice can be made for one cent. We thus have the testimony of experts. and the actual results of practice, going to show that, by the ammonia process, ice can be made at a cost far below the price at present demanded by our monopolizing ice companies. Why is it, with these facts so prominently presented to us, that so few capitalists have been found to place their money in an enterprise that would confer a great boon upon the community while it at the same time yielded a handsome profit upon the capital invested. Ice has become a necessity, and there is no reason why we should not have it in unlimited quantity and at a reasonable price.

SCIENTIFIC INTELLIGENCE.

NAPHTHALINE AND ITS USES.

Naphthaline is one of the products of the distillation of coal tar. It is commonly associated with anthracene, and until recently there were not sufficient uses known for it to render its manufacture and preservation worthy of notice. Now that its associate anthracene is likely to come into demand, more attention is bestowed upon napthaline, and the inquiry arises for what uses is the substance applicable. We have on a previous occasion spoken of a fine dye that is made from it, and we hear that this pigment is meeting with much favor. Naphthaline is a pure white substance similar to alabaster. It crackles like sulphur in the hand, and also becomes negative electric when rubbed with silk. It can be used as a solvent for indigo and for the sulphides of arsenic, tin, antimony, also for phosphorus, sulphur, iodine, benzoic and oxalic acids. This property can be taken advantage of for the purpose of adding these substances to other mixtures and may be applicable to india-rubber, collodion, etc.

Even when purified, naphthaline possesses a strong persistent odor, recalling the smell of coal tar creosote, and this has suggested its use as a disinfectant and as a remedy against the ravages of moths and other insects among woolens, plants, and objects of natural history. Where its somewhat disagreeable odor does not stand in the way it can be very advantageously substituted for camphor.

Now that we are likely to have this interesting substance in larger quantities than formerly it will probably be applied for the preservation of meat, very much as has been done with paraffine. Its melting point is too low for candles, but mixed with other hydrocarbons it may possibly be used as a source of light. When burned in its pure state it gives rise to copious clouds of fine lamp-black.

ARTIFICIAL INDIGO.

We have mentioned the discovery of a method for the artificial production of the madder dye, alizarine, from a coal tar product known as anthracene. There is now talk of a way of making indigo by the action of chloral on aniline. The preliminary steps have been taken, and enough has been learned to admit of the taking out of a caveat, but the dye itself is not yet in the market. We shall watch with interest the development of this new industry, and shall not fail to communicate the results to our readers.

NEW USES OF COLLODION.

Collodion is now used as a substitute for india-rubber for the setting of false teeth. The solution of gun cotton in alcohol and ether is poured out in thin layers until it sets, and while still moist the impression for the mouth is made with it. It is colored in imitation of flesh by organic dyes, thus avoiding the poisonous mercury salts usually employed for that purpose.

Sets of teeth mounted upon collodion are said to be more agreeable to the mouth on account of the lightness of the material. They are also as permanent as any made from india-rubber.

Collodion is also used in the manufacture of billiard balls, and of a variety of toys. For this purpose the gun cotton need not be made of such expensive material as is required in photography.

Now that gun cotton is used for so many purposes it may be well to caution manufacturers against the dangers of explosions. Recently at a billiard manufactory in Albany the establishment was destroyed by the ignition of the cotton by mice nibbling some matches that had been carelessly left near it. There is also danger of the spontaneous decomposition of the gun cotton.

It is somewhat curious that, although gun cotton has been in use a good many years, our knowledge of its properties is still quite limited, and from recent researches it appears that what we call collodion is a complex body capable of further subdivisions by water and other agents, so that its various constituents will hereafter be sought out and adapted to their various uses. Such researches are now going on, and will add to the value of collodion in photography.

THE CULTURE OF THE TRUFFLE.

There is a curious natural production about which very little is known, and to which we give the name of fungus, which appears to grow spontaneously among the roots of certain oaks, its existence being detected by the grubbing of the pigs that run wild in the forests of France, and is a favorite appetizer among Paris gourmands. It was at one time thought to be disappearing, but of late years, in Perigord and other departments of France, methods have been found to cultivate it, and it is becoming a valuable article of export. As many as 3,000,000 pounds of truffles were raised last year, weighing from a few ounces to two pounds.

The proper variety of oak is planted, and in the course of eight or ten years the truffle reaches its most perfect state. It will not bear rich soil or any interference, and reaches maturity in the winter, at which season the crop is gathered. We are not aware of the occurrence of the truffle as indigenous in the United States or of its having been anywhere cultivated in our country.

VASSAR COLLEGE.

This institution, located at Poughkeepsie, N. Y., is devoted to the education of young women, who, in accordance with the will of the founder, the late Matthew Vassar, receive instruction equal to that bestowed upon young men in the best of other colleges. A regular collegiate course of four years is followed at Vassar, with professorships filled by some of the ablest persons in the country. The college is also supplied with a fine collection of scientific instruments and apparatus.

The classes bear the usual names of Freshman, Sophomore, Junior, and Senior. The buildings are numerous and extensive; everything about the college is conducted in the most systematic and excellent manner. During the past year nearly four hundred students have attended. At the recent annual commencement the poems, essays, and other exercises by the young ladies were highly creditable.

It is a prevailing impression that young women are naturally unfitted to endure and benefit by the disciplinary courses of study which a first-rate education involves; but the result at Vassar conclusively proves the contrary. It would be difficult to find in any college for young men of equal numbers a greater amount of intellectual vigor and activity than is to be observed among the students at Vassar. Judicious attention is paid to physical cultivation. The young ladies are required to take considerable outdoor exercise, and by way of variety, they ride on horseback, roll nine pins, play base ball, row boats, and go through a variety of gymnastic exercises. Domiciled in the college they have little opportunity to form habits injurious to health, such as late hours, late suppers, rum and beer drinking, smoking and chewing tobacco, with other bad practices, not uncommon among young men collegians.

The Vassar students enjoy remarkably good health, although they are required to study hard. Their proficiency is excellent. The preparatory class of candidates for admission to Vassar must pass through a preliminary examination, which begins September 14th. They are examined in arithmetic, grammar, modern geography, and History of the United States.

Candidates for the Freshman class are examined in introductory Latin grammar, Cæsar (four books), Cicero (four orations), Virgil (two books), ancient history, Otto's French course, Williams' English into French (fifty pages), Fasquelle's Colloquial Reader, Robinson's Universal Algebra (to equations of second degree), Quackenbos' Rhetoric, and Physical Geography. It will thus be seen that girls must know a little something before they begin at Vassar. Many of them, after having passed through the ordinary private schools find themselves obliged to spend a year in the preparatory class before they are enabled to enter as Freshmen.

The entire charge at Vassar is $400 a year for each student, except the ornamental studies, such as piano, painting, etc. Education at Vassar is therefore not very expensive, but it is complete and thorough in every department.

John H. Raymond, LL.D., is the President of Vassar College, who should be addressed by those desiring further information.

A SEWING MACHINE-PATENT EXTENSION---AN IRATE OPPONENT.

In the SCIENTIFIC AMERICAN of June 25th, we published the fact, that the sewing-machine combination were endeavoring to secure the extension of the Bachelder Patent. It is hoped to accomplish this, either by direct action of Congress, or to have the case heard, upon evidence, by the Commissioner of Patents. A correspondent of the *Sun*, whose respectability is vouched for by the editor of that terrestrial luminary, charges that "the new Commissioner of Patents has been long known as a lawyer for the sewing-machine combination, and is using all his influence to get the Bachelder patent extended for ten years." He also states, that the Singer Sewing Machine Co., with a capital of $250,000, made, last year, upwards of $2,000,000. The Wheeler & Wilson made over $1,000,000. The Grover & Baker, no doubt, did as well as either of the above companies. The Howe, with a capital of $500,000, made over $500,000. He might mention others, but these suffice. Three of the above companies form what is now called the combination, which means, a combination not to exceed eight or ten men, against forty millions of American people.

Not content with his charge against the Commissioner of Patents the irate correspondent calls the Patent Office a "shaving shop, a flunkey's office, where evidence is prepared and manufactured regardless of truth, for the benefit of a few monopolists who want their patents extended from time to time," and Bachelder, the patentee, is set down in the low category of "a catspaw, poor devil," etc.

We are not aware upon what ground the *Sun* correspondent bases his charges against the Commissioner, but it appears to us that he is laboring under a fit of "black bile." His primary motive in this attack on the Patent Office is aimed against the extension of the Batchelder patent, and he writes like one who wants to make sewing machines without paying the "poor devil" for a right to do so. We are opposed to the extension by Congress or otherwise of the Bachelder patent. We regard it as an unjust measure, not intended to benefit the inventor, but to perpetuate and enrich a combination which seeks to control the entire sewing machine interest of this country.

We suggest, however, that abuse of the Commissioner of Patents, the Patent Office, and the inventor, is not the way to defeat the measure.

CORRESPONDENCE OF THE SCIENTIFIC AMERICAN.

The London Underground Railways—The Tower Subway—The Pneumatic Railway System—Railway Shifts and Signals.

LONDON, June 24, 1870.

Since my arrival here, I have visited several public works, and have been given every facility to inquire into the plans of construction, etc. In the office of Mr. Fowler, the Engineer-in-Chief of the Underground Railway, I was shown all the plans of the works.

Mr. Baldrey, Chief-Assistant, Mr. Baker, and Mr. Cooper, received me with the greatest cordiality. They were well posted in regard to the need of rapid transit in New York, and had read of the various propositions to meet it. They are constantly receiving calls from Americans visiting London for permission to examine their works, and they freely give every information to such as apply in the right way. Mr. Cooper good-naturedly informed me that some of the Americans who called were queer fellows; they pitched into everything, and could not find anything to please them. I told him we had Englishmen who visited New York and were just as bad, and that grumbling and bragging was a complaint to be found as much in one country as the other. I was taken by Mr. Cooper over the new line just opened. We got off at all the stations, and he explained to me the various methods employed in the works. At some of the stations the rail level is four feet below high-water mark. They have constructed drains to receive the water at certain points. There is no evidence of dampness or water collecting anywhere along the line, which, I should mention, commences at Blackfriars Bridge, running under and along the Thames embankment to Westminster Bridge, passing close to the Houses of Parliament and Westminster Abbey, and connecting with the line first opened on the north district.

At Victoria and other stations they have pumping engines and boilers in duplicate; they pump at Victoria a thousand gallons per minute; if the pumps were stopped five hours they would have water on the rail level, consequently they are prepared, in case of accident to one engine and boiler, to operate the others.

The stations are all very much alike in appearance and size, being very commodious, and having every convenience. The roofs are constructed of iron and glass, the iron being of the lightest and most elegant form, as also the supporting posts, which are very light in appearance, although capable of sustaining a great weight. On Whit-Monday the number of passengers carried was 217,000, and for the week over 1,500,000.

There are two underground railway companies—the Metropolitan and the Metropolitan District; but by a mutual arrangement they are practically one company. The same engineers and contractors have built the lines, but the money has been furnished by two organizations.

I find that the works of the underground railroad are constructed in the very best manner, and taken altogether reflect the highest credit on the engineers and contractors. While we in New York have been talking about the difficulties and expense of an underground road, they have here been constantly extending their lines without any more fuss than we would make to build a brown-stone house in New York. On telling Mr. Cooper, as we passed along the line, that I thought such and such parts must have been very difficult, he seemed to treat the whole work as quite a matter of course and nothing to boast about. I spent nearly a whole day in the office and on the works.

THE TOWER SUBWAY.

The Tower subway was recently opened for a short time under the Thames, and has been closed for the purpose of making some changes in the wire rope machinery by which the car is operated. A request to visit the works as a New Yorker was granted at once, and every facility given for examining it. The method of construction is almost identical with that of the pneumatic tunnel under Broadway; but they have tried to operate the car with a wire rope, and it does not work well; it is believed that they will have to adopt pneumatic propulsion, and that it will then succeed.

THE PNEUMATIC RAILWAY SYSTEM.

I called at the office of Sir Charles Fox & Sons, and was given every information in reference to the Whitehall and Waterloo Pneumatic Railway, which was commenced some time since, but is now languishing from want of funds, not from any want of faith in the principle. I have spoken to all the engineers with whom I have been brought in company, with a view to get their opinions on the pneumatic railway, and I find they all believe in it as the best system for underground transit, and that it only needs some company with means to build and put in operation a line two or three miles in length to get the pneumatic system the support of capitalists. Sir Charles Fox & Sons are well acquainted with the topography of New York Island, and believe that a pneumatic railway is the only one that will answer all our requirements.

THE GREAT WESTERN RAILWAY STATION.

I have visited the Great Western Railroad Station at Paddington, and find that an immense saving of time and labor is achieved by the use of hydraulic machinery for changing the cars from one track to another, turning the tables, hauling cars back and forth to make up a train, etc. The whole is worked by one engine, and by unseen machinery. When it is necessary to change the cars from one track to another a lever is inserted in a small hole, and car or truck moved bodily across; the cars are hauled up and down the station track by attaching a rope to them, giving a couple of turns of the rope round a capstan, and, touching a lever, the capstan flies round and pulls the cars in the direction required. Over three hundred trains a day arrive and depart from this station. The tracks are both broad and narrow gage.

The Station Inspector, Mr. Craig, who has been twenty-three years in the employ of the Company, took considerable trouble in showing me about the place and explaining the signal machinery, etc. By the way, on the lines that I have traveled, I find that all of the signaling, switching, and shunting of trains is done by telegraph and lever in covered signal boxes, in some cases one man works as many as sixty levers, besides the telegraph signals. JOSEPHUS.

A Sewage Phenomenon.

According to the *Engineer* a singular optical phenomenon has presented itself in connection with the purification of sewage.

On a day when the sea was calm and the sky was clear the effluent water from the "A. B. C." works at Hastings was seen to flow away like a dark current amid the general azure of the salt water. The appearance was somewhat as if a reef of rocks came within a few inches of the surface of the sea. To most persons the appearance was conclusive that some temporary failure had occurred at the "A. B. C." works, and that the sewage was flowing into sea in its original state of impurity. Even the parties who were conducting the works became perplexed. A boat was put off in order to investigate the state of affairs, and samples were taken from the black stream as well as from "the bright, blue sea." On examination it was found that the black water was the clearer. The fact was that the same phenomenon had been repeatedly witnessed before, but never carefully investigated. The eye of an intelligent observer would often perceive—particularly on such a day as that to which we now refer—that the sea on the verge of the horizon was of a deep indigo blue, tending to blackness, whereas near the shore the tint was much paler. The gradation of tints between the distant water and that which lay close to the shore diminished the effect of contrast. But the effluent water from the sewage works brought the deep blue into the midst of the light blue, so that the former looked most suspiciously dark.

The sea near the shore held particles of sand in suspension

These particles reflected the light, and gave the water a paler tint, in consequence of their own sandy hue. Far out, the sea was tolerably clear from this suspended matter, and therefore the pale reflection was absent. The more free from mechanical impurity, the less able was the water to reflect light. Hence an apparent darkness.

Every one knows how a dark room is often lit up by a passing cloud, simply because the cloud reflects more light than the sky. So in like manner cloudy water may at a distance look brighter than clear water. Thus it came to pass that the clear water resulting from the "A. B. C." process was unable to reflect so much light as the sandy fluid into which it was ejected, and consequently the clear stream appeared comparatively black. To the fishes gazing upwards the effect must have been reversed, the clear stream transmitting a greater proportion of light than the sandy sea.

The phenomenon was the same as that of Newton's rings. When one lens is pressed down upon another the eye gazing from above sees in the center a black spot. But if the eye gaze up from beneath, so as to catch the transmitted instead of the reflected light, the black spot becomes white.

It is hoped that the "local authorities" of our sea-coast towns are either acquainted with the laws of optics, or will take a few lessons in this interesting science, lest they should fall into the mistake of pronouncing water as black as ink which in reality is as clear as crystal. In the absence of the necessary scientific knowledge, these gentlemen will perhaps be ready to declare that our argument is an attempt to prove that black is white.

Statue of Professor Morse in Central Park.

The Commissioners of the Central Park are understood to have given their consent for the erection of the statue of Professor Samuel F. B. Morse upon the Mall, and an appropriate site will be selected. This is the first acknowledgment ever proposed by Americans to Mr. Morse for his great invention. From the sovereigns of Europe, however, he has received numerous honors. By the Sultan of Turkey he has been presented with the Order of Glory; from France, the cross of the Legion of Honor; from Italy, the cross of a Chevalier of the Order of St. Maurice and Lazarus; from Portugal, the cross of Chevalier of the Order of the Tower and Sword; from Spain, the cross of a Knight Commander of the Order of Isabella; from Denmark, the cross of a Chevalier of the Order of Dannebroge and Knight Commander; from Austria, Prussia, and Wurtemburg, the National Scientific Gold Medal; and from the Special Congress of ten nations in 1858 an honorable gratuity of 400,000 francs. It is proposed to unvail the statue on the 27th of April next, his eightieth birthday.

THE first medical degrees conferred in America were by Kings College, New York, in 1769. The first medical work published in America, was "A Brief Guide on Small-pox and Measles," by Thomas Thatcher, of Massachusetts, in 1667.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,357.—STEAM VALVES OR COCKS.—G. S. Redfield, E. A. Rock, and J. S. ill Ludlow, Vt. May 12, 1870.

1,361.—WINDOW FASTENER.—W. L. Clark, New York city. May 12, 1870.

1,383.—SEWING MACHINES.—E. G. Marshall, Rochester, N. Y. May 14, 1870.

1,393.—WASHING AND RINSING APPARATUS.—G. G. De L. Byron, New York city. May 16, 1870.

1,394.—RECOVERING SULPHURIC ACID USED IN REFINING PETROLEUM AND OTHER OILS.—M. Barrett, M. D., Toronto, Canada. May 16, 1870.

1,401.—BEARINGS, SLIDES, AND PACKINGS FOR STEAM ENGINES, ETC.—E. D. Murfey, New York city. May 16, 1870.

1,412.—SHUTTER HOLDER.—S. L. Loomis, South Byron, N. Y. May 17, 1870.

1,413.—STEAM PUMPING OR BLOWING ENGINES.—J. R. Maxwell and Ezra Cope, Cincinnati, Ohio. May 18, 1870.

1,417.—INKS.—Lewis Francis, New York city. May 17, 1870.

1,438.—CIGAR MACHINE.—American Cigar Machine Co., New York city. May 18, 1870.

1,428.—KNITTING MACHINES.—D. McC. Weston, Boston, Mass. May 18, 1870.

1,437.—LOOMS.—E. B. Bigelow, Boston, Mass. May 18, 1870.

1,451.—LAPPING COTTON, ETC.—R. Kitson, Lowell, Mass. May 19, 1870.

1,485.—MODE OF SUPPLYING AIR TO LAMPS.—J. H. Irwin, New York city. May 23, 1870.

1,491.—MACHINERY FOR SEWING SHOES, ETC.—C. Goodyear, Jr., New York city. May 23, 1870.

1,498.—PILES FOR ENGINEERING PURPOSES.—T. W. H. Moseley and F. A. Leigh, Boston, Mass. May 24, 1870.

1,557.—MODE OF PRODUCING ROTARY MOTION.—M. W. Robinson, New York city. May 27, 1870.

1,566.—CORRUGATING AND MOLDING SHEET METAL.—A. Johnson and W. Thornton, Brooklyn, N. Y. May 28, 1870.

1,569.—SOCKETS AND FERRULES.—R. Briggs, Philadelphia, Pa. May 30, 1870.

1,569.—APPARATUS FOR DRAWING TUBE SKELPS.—R. Briggs, Philadelphia, Pa. May 30, 1870.

NEW BOOKS AND PUBLICATIONS.

PROTECTION TO NATIVE INDUSTRY. By Sir Edward Sullivan, Bart., Author of "Ten Chapters on Social Reform." London: Edward Stanford, No. 6 and 7 Charing Cross. Chicago: Bureau Printing Co. New York: S. R. Wells, 389 Broadway.

This is an argument in favor of an English protective system, written by an Englishman, who, to use his own language, sees clearly that "protection to native industry is not a question of sentiment or theory, but of fact and common sense." It is evident that the policy of protection is daily gaining favor in England, and as an expression of this growing opinion, Sir Edward Sullivan's book will be sought for, and read with interest on both sides of the Atlantic.

THE PRESENT AND LONG-CONTINUED STAGNATION OF TRADE. Its Causes, Effect, and Cure: Being a Sequel to an Inquiry into the Commercial Position of Great Britain, etc. By a Manchester Man. Revised and Large Edition. Manchester: John Heywood, 141 and 143 Deansgate. London: Simpkin, Marshall & Co. New York: S. R. Wells, 389 Broadway.

CITY SUBSCRIBERS. — The SCIENTIFIC AMERICAN will be delivered in every part of the city at $3·50 a year. Single copies for sale at all the News Stands in this city, Brooklyn, Jersey City, and Williamsburgh, and by most of the News Dealers in the United States.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines. One Dollar and a Half per line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

H. A. S., of Me.—The U. S. Dispensatory gives the following recipe for phosphorus paste to kill rats. Triturate six parts of phosphorus and one part of sulphur with six parts of water till they liquefy Then mix in two parts of flour of mustard, eight parts of sugar, twelve parts of rye flour, and ten more parts of water, and stir to form a soft paste, which must be kept in pots thoroughly stopped. Oil of rhodium, and oil of anise, are sometimes used to scent phosphorus paste, as most animals are attracted by their odor. Care should be taken in its use, as there are instances of children being poisoned by it, on record. The antidote for it, should such an accident occur, is magnesia, given freely in sugar and water.

W. J. Y., of N. Y.—There is a market in New York for sumac. The kinds popularly known as the staghorn, and the smooth sumac, are the kinds most common in this country, affording marketable products. The parts of the tree which are gathered are the leaves, the peduncles, young branches, and panicles. They are dried, and may be sold in an unground state, but the market is uncertain for the product unless ground. Gifford, Sherman & Innis, 120 William street, New York, are dealers in this commodity, and will, we presume, give information to those who desire to find a market for it.

G. G. K., of Mo.—To sweeten and purify moldy casks, wash them thoroughly with hot water. Then dip linen or cotton rags in melted sulphur, set them on fire and put them into the casks, so that they will be suspended by the bungs when the latter are driven in. The burning will continue for a time after the bungs have been driven in, and will fill the casks with sulphurous acid gas. This will destroy all the germs of the mold vegetation, and effectually purify the cask. Remove the bungs after two or more hours, and rinse the casks with pure cold water, and the casks will be found perfectly free from all musty smell.

D. D. R., of Ca.—The arched form of the rainbow, as seen by any particular person, is due to his position, the hight of the sun above the horizon, the globular form of the refracting and reflecting drops, and the fact that all the rays by which vision is produced converge toward the eye of the observer. For a more perfect explanation of this phenomenon, we refer you to elementary works on physics, all of which discuss this subject fully.

A. A., Paris, France.—Mr. Charles Hodgson is the inventor of the wire rope tramway alluded to in your letter. By addressing him, to the care of the editor of the *Engineer*, 163 Strand, London, England, you will probably get full information. *Scientific Opinion* is published by Charles William Henry Wyman, 74 & 75 Great Queen Street, London.

P. C. G., of Me.—If your desire is to learn mechanical and geometrical drawing only, we recommend you to obtain the Cyclopædia of Drawing, published by D. Appleton & Co., of New York. If you wish to learn free hand sketching, you had better employ a skilled teacher, but next to such a teacher we believe Ruskin's Elements of Drawing the best work ever published upon this subject for a beginner.

S. H. K. sends us from Arkansas, a dried specimen of centipede, which is quite perfect, though of small size, being two inches long. It has nineteen pairs of legs and formidable nippers, double-hooked extremities, etc. Our correspondent states that he lately killed one in his bed that measured five inches in length. We wonder if such bed-fellows are common in Arkansas.

H. L. C., of Mich.—Your question cannot be answered as you put it. There is no constant coefficient as you suppose. You will find all the information you need in "Box's Practical Treatise on Heat," published by Henry Carey Baird, 406 Walnut street, Philadelphia.

R. C., of N. Y.—The valves of large marine engines are generally balanced, that is, some device is used to counteract the pressure to which they are subjected and reduce the friction that would otherwise result.

C. D. L., of Ohio.—To clean alabaster ornaments, take out grease with spirits of turpentine, then wash with soap and water, and rinse with clean cold water. Are you sure the ornaments are alabaster? From your description we think there may be a mistake.

J. R. M., of N. H.—Wash the red spots on your harness with soap and water to remove the oil, rinse and then wash them with a solution of copperas (sulphate of iron). This will turn the red spots black, after which the leather may be again oiled.

J. K. P., of Cal.—Gesner's "Practical Treatise on Coal, Petroleum, and Other Distilled Oils," published by Henry Carey Baird, 406 Walnut street, Philadelphia, contains the information you desire.

D. K. V., of Tenn.—Silica has been used for filling teeth. It was mixed with plaster of Paris iron filings and mastic or copal varnish. We don't believe any one uses it now.

J. A. C., of Mass.—The term "mudsill" is properly applied to the sills of bents which support the superstructure of wooden bridges.

C. H. S., of Pa.—Silver steel has in it a proportion of silver which ordinary cast steel does not have.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

STEERING APPARATUS.—C. M. Hayden, South Thomaston, Me.—This invention relates to a new and useful improvement in apparatus for steering marine vessels, whereby the power applied to the hand wheel is greatly increased by means of gearing, and the invention consists in the use of beve wheels, pinion wheels, and sector gears.

MILK CAN BOTTOMS, ETC.—T. M. Bell, New York city.—This invention has for its object to improve the means of securing the bottoms in milk cans, and the heads in metallic barrels, which shall be simple in construction, and will make said cans or corks strong and durable.

LIBRARY SHEARS.—Louis Prang, Boston, Mass.—This invention has for its object to furnish an improved library shears, which shall be so constructed as to serve as a shears, paper knife, eraser, letter folder, and seal, thus comprising within itself many of the tools that a librarian or clerk most frequently requires, and which shall be so constructed as to be as conveniently used for each of its uses as if that particular use was the only one for which it was intended.

STEAM HAMMER.—O. C. Ferris and F. B. Miles, Philadelphia, Pa.—This invention relates to certain improvements in the construction of the frame and valve gear of steam hammers, which are used in the original manufacture, and in the subsequent forging of iron and steel. The object of the invention is to simplify the construction, and at the same time increase the efficiency of the steam hammers, and to thereby facilitate the handling of the same in every respect.

HARVESTER RAKE.—C. B. Brown, Springfield, Mo.—This invention has for its object to furnish an improved self-raking attachment for harvesters, which shall be simple in construction, and effective and reliable in use.

COMBINED CART, WHEELBARROW, AND TURNIP-DRILL.—A. M. Newland, Olivet, Mich.—This invention has for its object to furnish a simple and convenient machine, which shall be so constructed and arranged that it may be easily and quickly adjusted for use as hand cart, wheelbarrow, and turnip drill.

CHURN.—Cyrus A. Maltby, Roland, Ill.—This invention has for its object to furnish an improved churn, simple in construction, and effective in operation, bringing the butter in a very short time; and which shall be so constructed that it may be conveniently taken apart to be washed.

MEAT CHOPPER.—J. H. De Poe, Boonton, N. J.—This invention relates to improvements in hand meat chopping, and consists in the arrangement of the meat holding vessel and the operating gear for the cutters on a platform side by side, and in working the cutter, which is mounted on a bent arm pivoted to the said platform, and the pawl for turning the meat holder by one crank on a short shaft provided with a balance wheel, and driven by a large wheel and pinion.

SAWING MACHINE.—F. Rhoad, Liberty Center, Ohio.—This invention relates to improvements in sawing machines for cross cutting logs or timber and consists in improved arrangements of feeding apparatus both for feeding the log lengthwise in front of the saw, and to or from the saw.

ROLLING STEEL, IRON, AND OTHER METALS.—James Horner, New York city.—This invention relates to a new and useful improvement in the process of rolling steel, iron, and other metals, more especially designed for steel in the round form, but applicable to other forms, whereby such steel or other metal is produced free from scale, in the most rapid manner, without the use of oleaginous or lubricating substances, as in the ordinary process pursued in rolling these metals.

COMBINATION LOCK.—William Kock, Cincinnati, Ohio.—This invention relates to a new combination safe lock, of that class in which a series of circular tumblers are hung upon a spindle, which is connected with an outer knob to be revolved by the same, the tumblers being carried around by a pin that projects from a disk on the spindle, so that, by regulating the motions of the knob in accordance with the figures or marks on a fixed dial notches in the tumblers may be brought in line with the locking lever, to permit the withdrawal of the bolt.

HAND SUPPORT.—Daniel A. Sanborn, Brooklyn, N. Y.—The present invention relates to a new and useful device for supporting and forming a rest for the hand while writing or drawing, and is also intended to be used in schools for the purpose of training or teaching persons to hold their pens in a proper position.

STEAM GENERATOR.—Joseph A. Miller, New York city.—This invention has for its object to largely increase the heating surfaces of steam boilers with a view of obtaining greater evaporating power in a boiler of comparatively small dimensions, and also to increase the evaporating surface of a comparatively small quantity of water.

SPOOL PRINTING MACHINE.—Gardiner Hall, Jr., South Willington, Conn.—This invention relates to a new machine for imprinting labels directly to the ends of spools. The invention consists chiefly in the employment of rotary printing blocks, which operate in conjunction with a spool guide, that carries the spools in a straight direction between the printing blocks.

AUTOMATIC WASH BOILER.—Henry R. Robbins, Baltimore, Md.—This invention has for its object to produce a circulation of the water within a wash boiler in a continuous current by means of a pipe placed underneath the boiler and opening at its ends into the same; and to keep such pipe always in contact with the fuel in the fire-box, whether the quantity of fuel be large or small.

SADDLES.—George Horter, New Orleans, La.—The object had in view in making this invention was the production of a very cheap and, at the same time, a very durable saddle, mainly for use in districts like the Southern and Southwestern parts of the United States where horseback riding is the chief means of locomotion, and where most of the inhabitants are very poor.

MECHANICAL MOVEMENT.—E. Melton, Flemingsburg, Ky.—This invention consists in an apparatus for communicating motion from a motor shaft to a driving shaft through the agency of an intermediate system of leverage instead of by direct circumferential contact of the wheels.

PLANTATION BRIDLE.—George Horter, New Orleans, La.—This invention consists in making the headstall check rein or any other part of a common plantation bridle, which can be so made of webbing instead of leather for the purpose of combining durability and cheapness.

PROPELLING VESSELS.—E. T. Ligon, Demopolis, Ala.—The object sought to be effected by this arrangement is to diminish friction, render the vessel more buoyant than she would otherwise be, and directly assist in her propulsion.

PINS FOR CURLING HAIR.—Paul Ceredo, Dusseldorf, Prussia.—This invention consists of a device composed of a short piece of ductile wire with a textile fabric envelope or covering to be used in place of pieces of paper in dressing the hair in curls. The ordinary way of dressing hair in curls, as is well known, is by pieces of paper formed in the shape of pins, around which the hair is wound; these are at once untidy, and disfigure the head of the user, and also being irregular in shape do not give that uniform and graceful bend of finish to the hair which the present invention is capable of.

CHURNING APPARATUS.—James Letort, Wytheville, Va.—This invention has for its object to furnish a simple, convenient, and effective churning apparatus, which shall be so constructed and arranged as to do its work quickly and thoroughly, and with a comparatively small outlay of power.

COTTON SEED PLANTER.—Jordan Riggsbee, Chapel Hill, N. C.—This invention has for its object to furnish an improved cotton seed planter, simple in construction and effective in operation.

COTTON AND HAY PRESSES.—Charles J. Beasley, Petersburgh, Va.—This invention relates to improvements in power presses for hay, cotton, and other like articles, and consists in an arrangement of jointed arms, cords, and pulleys, whereby the follower is made to move by the cords mainly, and at a quick motion at the beginning, and by the lifting action of the arms, and at a slower motion, and more powerfully at the latter part of the movement, when the resistance increases. The invention consists in an improved arrangement of the belt tightener for being automatically raised to let the belt slip and stop the motion when the follower is raised to the required hight, and also for action as a brake to regulate the fall of the follower.

ARBOR FOR TURNING CLOTHES PINS.—B. B. and A. J. Ockington, Stratford, N. H.—This invention relates to improvements in machinery for turning clothes pins, and consists in a hollow arbor with roughing cutters at one end for reducing the stick fed in thereat, and with a finishing and beading cutter arranged in a longitudinal slot in the side of the arbor, and provided with a spring to cause it to act on the stick, and a sliding wedge to throw the knife up for the discharge of the pin when finished.

BUNGS.—David M. Cumings, Newburyport, Mass.—This invention relates to improvements in bungs for beer and other casks, and consists in an arrangement for clamping the cover down upon a ring of packing placed on a flange at the bottom of a bush by a cam lever having journals let into grooves in the side walls of the bush. The invention also consists in providing a flange on the under side of the cover to confine the packing ring on the flange.

COTTON AND HAY PRESS.—Uriah Page, Ringgold, La.—This invention relates to improvements in presses for hay and cotton, and consists in the arrangement in a vertical frame with the packing case at the top of a vertically moving follower, having a strong stem projecting downward, and provided with gear teeth, connecting with a toothed pinion for operating it, which is placed on a horizontal shaft having a winding drum on one end and a cord for attaching it, a horse-power or other suitable means to which it is to be attached. The invention also comprises an improved and simple arrangement of the packing case at the top in which the pressing is effected; and also an arrangement of the journal boxes for the support of the shaft, and a presser roller behind the toothed stem of the follower.

ANIMAL TETHER.—T. N. Wheeler, Blue Earth City, Minn.—This invention relates to improvement in apparatus for picketing animals, and consists in an improved arrangement of means for maintaining sufficient tension on the cord to prevent it from getting around the legs or necks of the animals and yet permit them the full range of it.

GRINDING MILLS.—S. T. Eck, Taneytown, Md.—This invention relates to improvements in apparatus for discharging the meal or other ground substance from the space between the curb and the rim of the stone more firmly than is done at present by the frictional action of the periphery of the stone on the ground substance. The invention consists in the application to the periphery of the running stone of scrapers attached to a flexible or other belt stretched around the stone, or it may be scrapers attached to a wheel placed in the space and worked by a pinion on a shaft rising up through the floor and gearing by suitable means with the stone operated or other suitable drawing gear.

SELF-FEEDING FOUNTAIN.—E. Amende, Paris, Ky.—This invention relates to improvements in fountains, such as are operated by compressed air, impelling water which is returned and used over, and it consists in a novel arrangement with an air vessel, two water vessels, and the basin, of a system of flexible air and water pipes and stop cocks for the application of the compressed air to force the water alternately from one of the water vessels while it flows back to the other, and *vice versa*.

PRINTERS INK.—Marshall Turly and B. F. Thomas, Carmel Bluffs, Iowa.—This invention relates to a new and useful improvement in ink for printers' use.

WATER ELEVATOR.—M. S. McSwain, Pole Grove, Wis.—This invention relates to a new apparatus for elevating buckets in wells, and for carrying them to the open sides of the curbs.

HAND CIRCULAR SAWS.—John A. Wood, Far Rockaway, N. Y.—The object of this invention is to furnish a simple and effective machine for sawing timber in wood shops, and for joiners' work generally.

GRINDING REST FOR TWIST DRILLS.—Stephen A. Morse, Newark, N. J.—This invention has for its object to provide an adjustable rest, by means of which twist drills may be properly held against grindstones or grinding wheels, of suitable kinds.

FRUIT-CORING KNIFE.—A. L. Harris, Kent, Ohio.—This invention relates to a new and useful improvement in a knife for coring apples, and similar fruit, for drying or cooking, whereby time and labor, as well as fruit, are saved.

HOT-AIR FURNACE.—Edward Webster, Hartford, Conn.—This invention relates to a new hot-air furnace, which is so constructed as to provide for a complete circulation of the products of combustion, and also for a sufficient accommodation and circulation of fresh air to be heated.

SUBMARINE PLOW.—Amos Morrison and R. E. Rose, New Orleans, La.—This invention relates to a new construction of ships for removing the earth from the bottoms of rivers, banks in harbors, etc., and gathering it in suitable receptacles, or scattering it, to be carried away by the currents.

PHOTOGRAPHIC REFLECTOR.—Wm. Kurtz, New York city.—This invention has for its object to construct an adjustable shield, by means of which the light thrown upon articles that are to be photographed, can be absolutely controlled at pleasure.

FILTER SUPPORTER.—Frank C. Hughes, Frankfort, Ky.—The object of this invention is to provide a funnel-shaped supporter for filters, whereby the entire surface of the filter will be utilized, and the process of filtering consequently hastened.

RING FOR SECURING HOSE TO COUPLINGS.—August Schrader, New York city.—This invention has for its object to provide a ring or clamp by means of which hose of suitable kind can be secured to the metallic coupling, and the invention consists in the construction of a clamping ring, with grooved surface and projecting teeth or ears, whereby it will become entirely self-fastening, the ears being bent into the grooves for holding the ends together.

FOLDING CHAIR.—Martin Lechler, New York city.—This invention relates to a new folding easy chair, which is made entirely without complicated machinery, but so that it may readily be converted into a bed or lounge. The invention consists chiefly in such a construction of the frame, which connects the rear and front parts of the chair, that the said frame serves as a support for the arm rest of the chair, and as the middle standard of the extension bed.

OMNIBUS FARE BOX.—John B. Slawson, New York city.—It is the object of this invention to provide a box for the reception of passengers' fare on omnibuses, which shall enable the proprietors of those vehicles to dispense with the services of conductors, and thereby materially lessen the expense of running them, and it consists in certain sliding plates, stationary shelves, aud transparent plates, in a suitable box, so arranged as to receive and protect the fares, and detain them for the inspection of both passengers and driver.

GYMNASTIC APPARATUS.—C. H. Mann, Orange, N. J.—This invention relates to a new apparatus to be used for health exercise, and has particular relation to the construction and arrangement of a platform, so connected by means of a lever, or levers, to a cross bar or handles above the same, that a person standing upon the platform may, by pulling on said cross bar or handles, attain such an advantage over his own weight, the weight of the platform, and the additional pressure of his feet upon the platform, caused by his effort at lifting, as to lift himself and platform.

WARPING MACHINE.—Levi Abbott, Lewiston, Me.—The object of this invention is to construct a measuring and stop-motion attachment for a warping machine, whereby the operation will be arrested immediately after the requisite amount of thread has been wound upon the measuring roller, or by the breaking of a thread. This invention consists chiefly in the use of a peculiar cam, which is provided with a groove for adjusting a lever, by means of which the rock shaft that locks the shipper, and that is also under the influence of the drop wires, is moved to carry the belt upon the loose pulley.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING July 5, 1870.

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104,920.—WARPING MACHINE.—Levi Abbott (assignor to Lewiston Machine Company), Lewiston, Me.
104,921.—SELF-FEEDING FOUNTAIN.—Edward Amende, Paris, Ky.
104,922.—HAY AND COTTON PRESS.—C. J. Beasley, Petersburg, Va.
104,923.—INSTEP STRETCHER FOR BOOTS AND SHOES.—Moses Belding, Hartford, Conn.
104,924.—MILK-CAN BOTTOMS, ETC.—Thomas M. Bell, New York city.
104,925.—HEATING STOVE.—G. A. Blake and W. B. Taylor, Calais, Me.
104,926.—SEED SOWER AND CULTIVATOR.—George Bradley, Rockford Ill.
104,927.—HARVESTER RAKE.—Collins B. Brown, Springfield, Mo.
104,928.—CIRCUIT CHANGER.—Watkins L Burton, Richmond, Va.
104,929.—METHOD OF GRAINING.—John J. Callow, Cleveland, Ohio.
104,930.—MINNOW PROPELLER.—W. D. Chapman, Theresa, N. Y. Antedated May 4, 1870.
104,931.—MACHINE FOR FORGING THE HEADS OF WRENCHES—A. G. Coes, Worcester, Mass.
104,932.—FIFTH WHEEL FOR CARRIAGES.—W. A. Collins, Bloomfield, N. J.
104,933.—COVER FOR PAILS, FIRKINS, ETC.—T. F. Conklin, Fond Du Lac, Wis.
104,934.—AUTOMATIC WATER-ELEVATING APPARATUS.—H. H. Craigie New York city. Antedated June 29, 1870.
104,935.—BUNG.—D. M. Cumings, Newburyport, Mass.
104,936.—COTTON AND HAY PRESS.—J. G. Cummings, Columbus, Miss.
104,937.—COMPOSITION FOR PHOTOGRAPHIC PURPOSES.—Thomas Cummings, Lancaster, Pa.
104,938.—SPRING BED BOTTOM.—Lewis Cutler, Springfield, Mass.
104,939.—MANUFACTURE OF IRON BY THE ELLERSHAUSEN PROCESS.—Henry Davies, Newport, Ky.
104,940.—MEAT CHOPPER.—James H. De Poe, Boonton, N. J.
104,941.—PAVEMENT.—Andrew Dilger, St. Louis, Mo.
104,942.—STREET PAVEMENT.—Andrew Dilger, St. Louis, Mo.
104,943.—TABLE FOR DOVETAILING MACHINE.—Joseph Dill, Grand Rapids, Mich.
104,944.—SALT FOR BEDSTEADS.—A. S. Drisko and O. H. Drisko, Boston, Mass.
104,945.—JAR FOR WELL DRILLS.—W. W. Eastman and F. B. Marden, Meadville, Pa.
104,946.—GRINDING MILL.—S. T. Eck, Taneytown, Md.
104,947.—HAY UNLOADER.—Henry H. Ensminger, Buffalo, N. Y.
104,948.—STEAM HAMMER.—O. C. Ferris and F. B. Miles, Philadelphia Pa.
104,949.—LET-OFF MECHANISM FOR LOOMS.—L. N. Fletcher and Ira M. Page, Lowell, Mass.
104,950.—WATER METER.—Willard M. Fuller, New York city.
104,951.—MACHINE FOR PRINTING LABELS ON SPOOLS.—Gardiner Hall, Jr., South Willington, Conn.
104,952.—TRUSS.—E. B. Harding, Northampton, Mass.
104,953.—HARVESTER DROPPER.—David S. Harner (assignor to himself and W. T. Carey), Xenia, Ohio.
104,954.—FRUIT-CORING KNIFE.—Alford L. Harris, Kent, Ohio.
104,955.—STEERING APPARATUS.—C. M. Hayden, South Thomaston, Me.
104,956.—HEDGE TRIMMER.—William E. Horne, Decatur, Ill.
104,957.—METHOD OF ROLLING METAL BARS.—James Horner, New York city, assignor to himself and John Cox, Pompton, N. J.
104,958.—BORING TOOL.—Albert G. Hotchkiss, Wolcottville, Conn.
104,959.—FILTER SUPPORTER.—Frank C. Hughes, Frankfort, Ky.
104,960.—PAD FOR HORSES' FEET.—Jonathan Johnson, Lowell, Mass.
104,961.—PERMUTATION LOCK.—William Kock, Cincinnati, Ohio.
104,962.—HOT-AIR FURNACE.—Benjamine S. Koll, Pittsburg, Pa.
104,963.—PHOTOGRAPHIC REFLECTOR.—William Kurtz, New York city.
104,964.—PLOW.—John Lane (assignor to himself, C. P. Hapgood, W. B. Young, and G. H Laughton), Chicago, Ill.
104,965.—FOLDING CHAIR.—Martin Lechler, New York city.
104,966.—SPIKE EXTRACTOR.—Louis Lehman, Buffalo, assignor to D. W. Fish, Brooklyn, N. Y.
104,967.—HAND STAMP.—Louis Lehman, Buffalo, assignor to Daniel W. Fish, Brooklyn, N. Y.
104,968.—CHURNING APPARATUS.—James Letort, Wytheville, Va.
104,969.—TUBULAR ARCHED BRIDGE.—W. S. Levake, Cleveland, Ohio. Antedated June 2, 1870.
104,970.—CLAMP FOR MAKING WHIPS.—J. P. Luther and S K. Buck, Berlin, Wis.
104,971.—LAMP BURNER.—George R. Lyon, Waterbury, Conn.
104,972.—CHURN.—C. A. Maltby, Roland, Ill.
104,973.—LIFTING MACHINE.—Chas. Holbrook Mann, Orange, N. J.
104,974.—SASH HOLDER.—Alfred C. Manning, Norwich, Conn.
104,975.—MITER BOX AND MITER SAW.—Daniel McAllaster, Malden, Mass.
104,976.—WATER ELEVATOR.—M. S. McSwain, Pole Grove, Wis.
104,977.—MECHANICAL MOVEMENT.—Elijah Melton, Flemingsburg Ky.
104,978.—HARVESTER.—Henry Mews (assignor to J. W. Cutler), Binghamton, N. Y.
104,979.—STEAM GENERATOR.—Joseph A. Miller, New York city.
104,980.—DREDGING MACHINE.—Gove Mitchell, Philadelphia, Pa.
104,981.—SUBMARINE PLOW.—Amos Morrison and Rufus E. Rose, New Orleans, La.
104,982.—GRINDING REST FOR TWIST DRILLS.—S. A. Morse, Newark, N. J.
104,983.—COMBINED CART, WHEELBARROW, AND TURNIP-DRILL.—Albert M. Newland, Olivet, Mich.
104,984.—TAP FOR AND MODE OF CUTTING DIES.—William Newsham (assignor to Morris, Tasker & Co.), Philadelphia Pa.
104,985.—MACHINE FOR CUTTING DIES.—William Newsham (assignor to Morris, Tasker & Co.), Philadelphia, Pa.
104,986.—EJECTOR.—Joseph Nixon, Pittsburg, Pa.
104,987.—FILTER.—Joseph Nixon, Pittsburg, Pa.
104,988.—ARBOR FOR TURNING CLOTHES PINS.—B. B. Ockington and A. J. Ockington, Stratford, N. H.
104,989.—METHOD OF HANGING WINDOW SHADES.—H. W Olney, Pittsburg, Pa.
104,990.—FOLDING STEREOSCOPE.—Edwin K. Page, Havana, N. Y.
104,991.—PRESS FOR PRESSING COTTON OR HAY.—Uriah Page, Ringgold, La.
104,992.—SEED SOWER.—William Painter, Baltimore, Md Antedated June 23, 1870.
104,993.—HAY AND MANURE FORK.—R. A. Peet, Caledonia township, Mich.
104,994.—ARTIFICIAL LEG.—Luther F. Pingree, Portland, Me.
104,995.—LATHE CENTER.—Henry K. Porter, Boston, Mass.
104,996.—LIBRARY SHEARS.—Louis Prang, Boston, Mass.
104,997.—METALLIC LATH, AND BILLETS FROM WHICH THE SAME MAY BE PRODUCED.—Jacob Reese, Pittsburg, Pa.
104,998.—SAWING MACHINE.—Frederick Rhoad, Liberty Center, Ohio.
104,999.—PEGGING JACK.—Hubert Ricard (assignor to himself and G. F. Eaton), Haverhill, Mass.
105,000.—COTTON-SEED PLANTER.—Jordan Riggsbee, Chapel Hill, N. C.
105,001.—PENMAN'S HAND SUPPORT.—Daniel A. Sanborn, Brooklyn, N. Y. Antedated June 30, 1870.
105,002.—SUPPLEMENTARY PEDAL ATTACHMENT FOR PIANO-FORTES.—Gustav A. Scott and William B. Frisbee, San Francisco Cal.
105,003.—RING FOR SECURING HOSE TO COUPLINGS.—August Schrader, New York city.
105,004.—CHAIN LINK.—W. C. Short, Providence, R. I.
105,005.—FARE BOX FOR VEHICLES.—John B. Slawson, New York city.
105,006.—COTTON-SEED PLANTER.—Bartemus Smith, Hood Swamp, N. C.

105,007.—Machine for Turning Crank Pins.—H. S. Smith and W. D. Whitmore, Bloomington, Ill.
105,008.—Construction of Dental Impression Molds.—W. C. Smith, Warrensburg, Mo.
105,009.—Well Filter.—James P. Spaulding, Williamsport, Pa.
105,010.—Apparatus for Saving Mercury from the Washings of Gold and Silver Ores.—Wells Spicer, Summit Co., Colorado Territory.
105,011.—Medical Compound for the Cure of Fever and Ague.—O. M. Spiller, M.D., Akron, Ohio.
105,012.—Apparatus for Generating and Burning Gas.—Wm. Stewart, Steubenville, Ohio.
105,013.—Corpse Preserver.—James C. Naylor, Trenton, N. J.
105,014.—Printers' Ink.—Marshall Turly and B. F. Thomas, Council Bluffs, Iowa.
105,015.—Pipe-cleansing Apparatus.—J. Van Slooten, C. S. Hunt, and Wm. McCulloch, New Orleans, La.
105,016.—Spike Extractor.—Walter Ward, Mount Holly, N. J.
105,017.—Hot-air Furnace. — Edward Webster, Hartford, Conn.
105,018.—Animal Tether.—T. N. Wheeler, Blue Earth City, Minn.
105,019.—Distilling Pine Wood.—T. W. Wheeler (assignor to himself and E. W. Carpenter), New Berne, N. C.
105,020.—Candle Lamp.—T. S. Williams and F. A. Taber, Boston, Mass.
105,021.—Well Auger.—John Wilson and G. H. Baisly, Hamilton, Mo.
105,022.—Stop-motion Spring for Braiding Machines.—G. K. Winchester, Providence, R. I.
105,023.—Sawing Machine.—John A. Wood, Far Rockaway, N. Y.
105,024.—Stone Truck.—Jackson Wright and Green Wright, Morrisania, N. Y. Antedated June 30, 1870.
105,025.—Door Spring.—Warren Allen, Oswego, N. Y.
105,026.—Reversible Latch.—W. H. Andrews (assignor to Burton Mallory), New Haven, Conn.
105,027.—Valve.—Henry Belfield, Philadelphia, Pa.
105,028.—Bed Bottom.—Van Bell, Seville, Ohio.
105,029.—Tuning Scale. — Morris L. Bennett, Waverly, N. Y.
105,030.—Heel Press. — Horace H. Bigelow, Worcester, Mass.
105,031.—Rivet.—Alexander Boyd, Boston, Mass.
105,032.—Saw Frame.—Eben Moody Boynton, West Newbury, Mass.
105,033.—Machine for Making Nuts.—B. H. Bradley, New York city.
105,034.—Flour Bolt Knocker.—J. Washington Bradly, Rocheport, Mo.
105,035.—Double-acting Pump.—Martin Braun, Cape Vincent, N. Y.
105,036.—Steam Packing.—Wm. Brown, Hoboken, N. J.
105,037.—Beehive.—David S. Burget, Martinsburgh Borough, Pa.
105,038.—Apparatus for Treating Oils.—T. H. Burridge, St. Louis, Mo.
105,039.—Earth Closet.—R. A. Cannell (assignor to W. R. C. Clark), New Orleans, La.
105,040.—Signal Apparatus for Cars.—Charles Carr, Boston, Mass.
105,041.—Device for Curling and Dressing Hair.—Paul Ceredo, Dusseldorf, Prussia, assignor to himself and T. F. Miller, Montreal, Canada.
105,042.—Electric Battery. — Theophile Chutaux, Paris, France.
105,043.—Electric Battery. — Theophile Chutaux, Paris, France.
105,044.—File.—J. H. Clark, Washington, D. C.
105,045.—Earth Closet.—Wm. R. C. Clark, New Orleans, La.
105,046.—Railroad Car Ventilator.—Wm. Conard, Burlington, N. J.
105,047.—Fender for Plows and Cultivators.—J. C. Curryer and W. F. Curryer, Thorntown, Ind. Antedated June 30, 1870.
105,048.—Mouse Trap.—A. G. Davis and H. S. Frost (assignors to Davis & Woolson), Watertown, Conn.
105,049.—Former for Bending and Gluing the Cases of Grand Pianos.—David Decker, New York city.
105,050.—Hay Knife.—Casper Dittman (assignor to himself and G. B. Swope), Upper Leacock township, Pa.
105,051.—Coffeepot.—Johnson Dodge, New Orleans, La.
105,052.—Stamp Canceler.—H. W. Dopp (assignor to himself and J. E. Thomson), Buffalo, N. Y.
105,053.—Earth Closet.—J. A. Drake (assignor to W. R. C. Clark), New Orleans, La.
105,054.—Machine for Attaching Ornaments to Chain Links.—Virgil Draper (assignor to Oscar M. Draper, Attleborough, Mass.
105,055.—Tread Power.—J. H. Dull (assignor to Blymyer, Day & Co.), Mansfield, Ohio.
105,056.—Pump.—J. B. Eads, St. Louis, Mo.
105,057.—Egg Beater.—Timothy Earle, Smithfield, R. I.
105,058.—Breech-loading Fire-arm.—A. B. Ely, Newton, and E. C. Clay, Malden, Mass.
105,059.—Cornet and Other Wind Instruments.—W. C. Fietz, Boston, Mass.
105,060.—Telegraphic Printing Apparatus.—T. M. Foote and C. A. Randall, Brooklyn, E. D., N. Y.
105,061.—Mode of Securing Glass Vessels to Metal Bases.—Alonzo French, Philadelphia, Pa.
105,062.—Hay Press.—Franklin Frey, Liberty, Ill., assignor for three fourths to A. H. Butts, Jr., Wm. H. Meacham, and Charles J. Karney.
105,063.—Lamp.—G. P. Fuller, Humphrey, N. Y.
105,064.—Stave Jointer.—R. W. George, Boston, Mass.
105,065.—Whiffletree.—Arthur Green, East Kendall, N.Y.
105,066.—Grain and Seed Sieve.—N. S. Greenwood, Dorset, Ill.
105,067.—Gate.—I. H. Gustin, Middletown, Ind.
105,068.—Combined Boot and Shoe for Horses.—H. G. Haedrich and E. M. Haedrich, Philadelphia, Pa.
105,069.—Folding Bedstead.—J. C. Hall and A. C. Richards, Cincinnati, Ohio.
105,070.—Cotton Gin.—Samuel Z. Hall, Ossining, assignor to himself, S. W. Lewis, Sing Sing, N. Y., and E. B. Brown, Stonington, Conn.
105,071.—Apparatus for Signaling the Direction of Motion of Marine Engines.—A. R. Harris, St. Louis, Mo.
105,072.—Neck-tie Holder.—W. H. Hart, Jr., and H. H. Thayer, Philadelphia, Pa.
105,073.—Medical Compound. — John B. Haskins, Brooklyn, N. Y.
105,074.—Churn Dasher.—George Heliker and Abram Burlew, Greenwich, Ohio.
105,075.—Reversible Latch.—C. F. Herrick, Independence, Iowa.
105,076.—Awning Frame.—Henry Hilliard, Brooklyn, N. Y.
105,077.—Setting Clock Dials.—George Hills, Plainville, Conn.
105,078.—Steam Engine. — John C. Hoadley, Lawrence, Mass.
105,079.—Folding Chair. — Francis M. Holmes, Boston, Mass.
105,080.—Riding Saddle.—Geo. Horter (assignor to Horter, Petersen & Fenner), New Orleans, La.
105,081.—Bridle for Harness.—G. Horter (assignor to Horter, Petersen & Fenner), New Orleans, La.
105,082.—Machine for Fulling Cloth.—Rodney Hunt (assignor to Hunt, Waite & Flint), Orange, Mass.
105,083.—Lantern.—J. H. Irwin, New York city.
105,084.—Adhesive Compound for Preparing Pasteboard.—G. L. Jaeger, New York city.
105,085.—Trunk-handle Cap.—William S. Jessup, Newark, N. J.
105,086.—Clothes Rack.—Josee Johnson, New York city. Antedated June 30 1870.
105,087.—Embroidering Attachment for Sewing Machine.—W. T. Johnston and Allen Johnston, Ottumwa, Iowa.
105,088.—Device for Propelling Street Cars.—S. Jones and B. Terfloth, New Orleans, La.
105,089.—Compounding China Clay to Imitate Marble, Mother-of-pearl, etc. – Daniel Kaempfe and Carl List, Newhaus, Schwarzburg-Ru-dolstadt.
105,090.—Corn Planter.—Daniel Keethler, Mount Oreb, Ohio.
105,091.—Permutation Lock.—W. F. Kistler, Chicago, Ill., assignor to Hall's Safe and Lock Co., Cincinnati, Ohio.
105,092.—Veneer Cutter.—Geo. Koch, New York city.
105,093.—Magazine Fire-arm.—Julius Kraffert, Berlin, Prussia. Patented in Belgium, Jan. 20, 1868.
105,094.—Settee, Bed, and Table.—C. F. Kramer, Mondovia, Wis.
105,095.—Plaited Trimmings.—F. A. Kursheedt, New York city.
105,096.—Axle Box.—J. J. Lahaye and J. E. Wootten, Reading, Pa.
105,097.—Top Rest for Carriages.—James Lewis, Marengo, Mich.
105,098.—Propelling Apparatus.—E. T. Ligon, Demopolis, Ala.
105,099.—Paper Bag Machine.—Nicholas Lorton and John S. Davison, Cranberry, N. J.
105,100.—Circular Saw Mill.—J. R. Luce, Stevens' Point, Wis.
105,101.—Ice Chamber for Refrigerators.—J. H. Lynch, New York city.
105,102.—Permutation Lock.—Neil Macneale, Cincinnati, Ohio.
105,103.—Plow.—J. T. Mathis and G. W. Harrison, Kosciusko, Miss.
105,104.—Spring Catch Bolt.—Tyrus McCargar (assignor to himself and S. P. Peters), Masonville, Iowa.
105,105.—Lock for Pipe Couplings.—Geo. A. McIlhenny, Washington, D. C.
105,106.—Hydrant.—Alexander McKenna, John McKenna, and Thomas McKenna, Pittsburgh, Pa.
105,107.—Locomotive Smoke Stack.—William J. Mehary, Philadelphia, Pa.
105,108.—Saw Filing Machine.—H. H. Mellen, Boonville, Ind.
105,109.—Fruit Can.—John F. Merrill, Cincinnati, Ohio.
105,110.—Stave Bender.—Joshua Merrill, Boston, Mass.
105,111.—Cutting Apparatus for Harvesters.—Henry Mewes (assignor to John W. Cutler), Binghamton, N. Y.
105,112.—Machine for Making Sheet Lead. — James Millinger (assignor to himself, Thomas Woods, and B. F. Pine), Philadelphia, Pa.
105,113.—Needle Wrapper.—Victor Milward, Ipsley, assignor to Henry Milward, Redditch, England.
105,114.—Paper File.—T. E. Moore, Columbus, Ohio.
105,115.—Safety Valve for Dental Vulcanizers.—F. R. Moorhead, Chandlersville, Ohio.
105,116.—Water Closet Box.—Alexander R. Murray, New York city.
105,117.—Horse Hay Rake.—Lorenzo Myers, Ludlowville, N. Y. Antedated June 28, 1870.
105,218.—Tallying Register for Freight. — Frederick Nicholson (assignor to Peter Arndt and Richard M. Tunks), Warsaw, N. Y.
105,119.—Cut-off Gear and Valve.—George E. Noyes, Washington, D. C.
105,120.—Scroll Saw.—M. G. Ogden, Cincinnati, Ohio.
105,121.—Combined Bevel, Square, Rule, etc.—John D. Otstot, Springfield, Ohio.
105,122.—Adjustable Link for Water Wheel Gates.—Wm. A. Parmele (assignor to himself and P. P. Ahren), New Haven, Conn.
105,123.—Sewing Machine. — Truman W. Pepper, New York city.
105,124.—Hoop Skirt.—C. E. Pratt (assignor to himself, M. Cohn & Co., New York city, and the West, Bradley, and Carey Manufacturing Co.), Rahway, N. J.
105,125.—Paper for Bonds, Drafts, Checks, etc.—R. Price, New York city.
105,126.—Extension Ladder.—N. Pullman, New Oregon, Iowa.
105,127.—Suspended.
105,128.—Tank for Holding Compressed Air.—Franklin Roberts (assignor to New Orleans Pneumatic Propelling Co.), New Orleans, La.
105,129.—Reversing Valve for Steam Engine.—Thomas Rodda, St. Louis, Mo.
105,130.—Brush.—C. F. Ruset, Brooklyn, N. Y.
105,131.—Device for Manufacturing Brushes.—C. F. Ruset, Brooklyn, N. Y.
105,132.—Manufacture of Artificial Stone. — Carl Schaeffer, Elizabeth, N. J.
105,133.—Vapor Burner.—James Shay, Cincinnati, Ohio, assignor to himself and J. Q. Jaynes, Hamilton, Ohio.
105,134.—Plow.—Thomas Sheehan, Dunkirk, N. Y.
105,135.—Fountain Brush Holder.—W. A. Shepard, Chicago, Ill.
105,136.—Machine for Hulling Cotton Seed.—E. C. Singer, New Orleans, La.
105,137.—Window Sash and Fastener. — Elias Smith, Cedar Falls, Iowa.
105,138.—Pavement.—Andrew Stevens and Louis A. Cauvet, New York city.
105,139.—Harvester Rake.—Ole O. Storle, North Cape, Wis.
105,140.—Cigar-wrapping Machine.—G. W. Tanner and F. D. Bliss, Providence, R. I.
105,141.—Hay Spreader.—John F. Thomas and Daniel H. McLane, Ilion, N. Y.
105,142.—Application of Carbolic Acid for Preventing Decay and Mildew in Sail Cloth, Canvas, and other Fibrous and Textile Materials.—Wm. A. Torrey, Mont Clair, N. J.
105,143.—Fence.—D. M. Tyler, Union township, Ind.
105,144.—Bee Feeder.—C. C. Van Deusen, Sprout Brook, N. Y.
105,145.—Machine for Fluting Moldings.—R. Van Riper, Brooklyn, N. Y.
105,146.—Self-acting Lubricator for Axle Boxes.—E. Von Jeinsen, Omaha, Nebraska.
105,147.—Automatic Lubricator.—E. Von Jeinsen, Omaha, Nebraska.
105,148.—Metal-backed Combs.—E. E. Warner, J. W. Walton, and Robert Vine, Philadelphia, Pa.
105,149.—Baby Jumper.—E. L. Warner, Oxford, Conn.
105,150.—Tap for Liquid Packages.—A. Warth, Stapleton, N. Y.
105,151.—Nozzle for Cans and Casks.—Abel L. Webster, Cleveland, Ohio.
105,152.—Seam for Cans.—Abel L. Webster, Cleveland, Ohio.
105,153.—Caliper.—A. E. Whitmore, Boston, Mass.
105,154.—Signal for Railways.—Nelson Whitney, Bellingham, Mass.
105,155.—Low-water Indicator.—Daniel Wiehl, Cincinnati, Ohio, assignor to himself, P. W. Reinshagen, A. P. Lusk, and John H. Buckman.
105,156.—Apparatus for Cutting the Casings or Tubes of Oil Wells.—P. H. Lawrence, Petroleum Center, Pa.

REISSUES.

4,057.—Machine for Dressing Marble.—R. P. Bailey, Niagara, N.Y., for himself and P. D. Babbitt, assignee of R. P. Bailey.—Patent No. 65,990, dated June 25, 1867.
4,058.—Lamp Burner.—Abraham Burtis and Mary A. Van Alen, Brooklyn, and W. D. Ludlow, New York city, assignees of A. W. Browne.—Patent No. 74,793, dated February 25, 1868.
4,059.—Composition Pavement.—H. L. Cranford, Brooklyn, N. Y.—Patent No. 93,280, dated Aug. 3, 1869.
4,060.—Traveling Bag.—Fredrick Fischbeck, Chicago, Ill. —Patent No. 86,742, dated Feb. 9, 1869.
4,061.—Cooking Stove.—S. S. Jewett, Buffalo, N.Y. (assignee of Francis Ritchie), assignor to Jewett and Root.—Patent No. 91,968, dated June 29, 1869, antedated June 15, 1869.
4,062.—Farmers' Boiler.—A. N. Merrill, Batavia, Ill.—Patent No. 98,983, dated Jan. 18, 1870.
4,063.—Cooking Stove.—G. H. Phillips, Troy, N.Y.—Patent No. 83,790, dated Nov. 3, 1868.
4,064.—Windmill.—The United States Wind Engine and Pump Co., Batavia, Ill., assignee of Daniel Halladay.—Patent No. 11,629, dated August 29, 1854; extended seven years.

DESIGNS.

4,198.—Boot and Shoe Pattern.—J. M. Dutton, Rochester, N. Y.
4,199.—Picture Frame.—E. W. Haven, Brandon, Vt.
4,200.—Trunk Corner Clamp.—Wm. S. Jessup, Newark, N. J.
4,201.—Boxes for Tops of Bureaus.—Cheney Kilburn (assignor to Kilburn & Gates), Philadelphia, Pa.
4,202.—Trace-supporting Stud.—J. Letchworth, Buffalo, N. Y.
4,203.—Type.—Andrew Little, New York city.
4,204.—Bottle.—James Mackintire, New York city.
4,205.—Bottle and Cup.—James Mackintire, New York city.
4,206.—Brace for School Desk.—J. K. McCullough and F. W. Smith, Burlington, Iowa.
4,207 to 4,209.—Floor Cloth Pattern.—Charles T. Meyer, Newark, N. J., assignor to E. C. Sampson, New York city. Three Patents.
4,210.—Floor Cloth Pattern.—Victor Meyer, Lansingburgh, N. Y., assignor to E. C. Sampson, New York city.
4,211.—Tea Service.—William Parkin, (assignor to H. G. Reed, George Brabrook, and H. H. Fish), Taunton, Mass.
4,212.—Drawer Pull.—Albert P. Seymour, Hecla Works, N. Y.
4,213.—Type. — Richard Smith (assignor to Mackellar, Smiths & Jordan), Philadelphia, Pa.

EXTENSION.

Registers.—Edward A. Tuttle, of Brooklyn, N. Y.—Letters Patent No. 15,098, dated June 10, 1856; reissue 130, dated November 12, 1861.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

Hydraulic Brick Press.—Ethan Rogers, Cleveland, Ohio, has petitioned for an extension of the above patent. Day of hearing Sept 7, 1870.

Lubricators.—Norman W. Pomeroy, Meriden, Conn., has applied for an extension of the above patent. Day of hearing Sept. 7, 1870.

Harvesters.—William Gage, Buffalo, N. Y., has petitioned for the extension of the above patent. Day of hearing Sept. 7, 1870.

Cider Mills.—Tobias J. Kindleberger, Eaton, Ohio, has applied for an extension of the above patent. Day of hearing Sept. 14, 1870.

Ore Washer.—Samuel Thomas, Hokendauqua, Pa., has petitioned for an extension of the above patent. Day of hearing Sept. 14, 1870.

Coiled Springs for Railroad Cars.—Carlos French, Seymour, Conn., has applied for an extension of the above patent. Day of hearing Sept. 21, 1870.

Machine for Folding Paper.—Cyrus Chambers, Jr., Philadelphia, Pa., has applied for an extension of the above patent. Day of hearing Sept. 21, 1870.

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