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THE PNEUMATIC DESPATCH SYSTEM IN THE WESTERN UNION TELEGRAPH BUILDING, NEW YORK.

We have recently examined, with considerable interest, the pneumatic system of transmitting telegraphic messages between the operating and receiving rooms in the newly constructed building of the Western Union Telegraph Company, in this city. In such an immense edifice, comprising eleven stories, it would obviously involve great delay to maintain the necessary communication by means of messenger boys, and consequently the apparatus which we describe and illustrate herewith has been introduced, with remarkably successful results. In the large engraving, Fig. 1, sections of several of the stories are represented, showing the manner of leading the numerous tubes through which the necessary current of air, which propels the packages, is maintained.

Those of our readers who have had occasion to send a telegram at the central office above named may remember that, after they had delivered the writing to the clerk, that functionary rolled the paper in a little parcel and inserted it in a wood and leather case, of the manner and form shown in the upper portion of the illustration, Fig. 1. He then dropped the case into an open tube, leading up through his desk, at A, and perhaps announced that the packet had reached the operating room, in the seventh story, almost before the curious watcher of his proceedings had had time to draw a second breath. The packet appeared to be sucked into the tube, and so in fact it is, and in about two seconds it is drawn up almost to the top of the great building. After leaving the clerk's hand it passes down through the wide curve in its conduit, at B, and thence ascends the straight portion of the same, until it jumps forth from the end of the tube in one of the compartments of the receptacle, C, in the operating room. A section of a portion of this receptacle is shown in Fig. 2, in one compartment of which a packet is seen emerging from its tube. The compartments, C, Fig. 2, are entirely cut off from the main portion of the case, being constructed within the same, so that above them and extending over all is a large empty chamber, E. With the latter, however, each compartment communicates by an orifice, F, which is provided with a cover opened or closed at pleasure, thus, as will be seen further on, throwing any tube into or out of action, or moderating the air current therein. In the center of the receptacle and opening into the upper chamber, E, is a large tube, D, which, as shown in Fig. 1, extends down beside the pipes, B, and connects with a blower in the cellar. Regarding this blower we have, on other occasions, had considerable to say, but a word with reference to it here may not be amiss. It is a positive blast rotary blower, invented and constructed by the well known firm of P. H. & F. M. Roots, of Connersville, Ind., represented in this city by Mr. S. S. Townsend, general agent, No. 31 Liberty street. The machine has long been in use in iron founderies, machine and blacksmith shops, pork-packing and other establishments, and, besides, has met with extensive employment for ventilating purposes in buildings, ships, mines, and other localities. It will be understood that, in the present instance, the blower forces the air out beneath, so that the current is drawn down the tube, D, through the chamber, E, in the receptacle above, thence through the orifices, F, and compartments, C, and finally up through the pipes, B. Thus used as an exhauster, and at the slow speed of 120 revolutions per minute, it draws down five cubic feet of air per revolution, or 36,000 cubic feet per hour, thus propelling the packets, and at the same time (by removing the last mentioned aggregate quantity of air from the atmospheres of the rooms with which the pipe orifices communicate) serving as an excellent and efficient ventilating apparatus.

After a packet arrives in the upper story, the person stationed at the receptacle lifts a little window in the compartment which it enters, takes out the case, extracts the paper therefrom, and passes the message at once to the proper operator, who immediately telegraphs its contents to their destination. The case is then returned to the first story by dropping it into the open tubes, G, through which it falls by its own gravity, landing in the box, H, whence it is again taken out to be filled and started back on its journey.

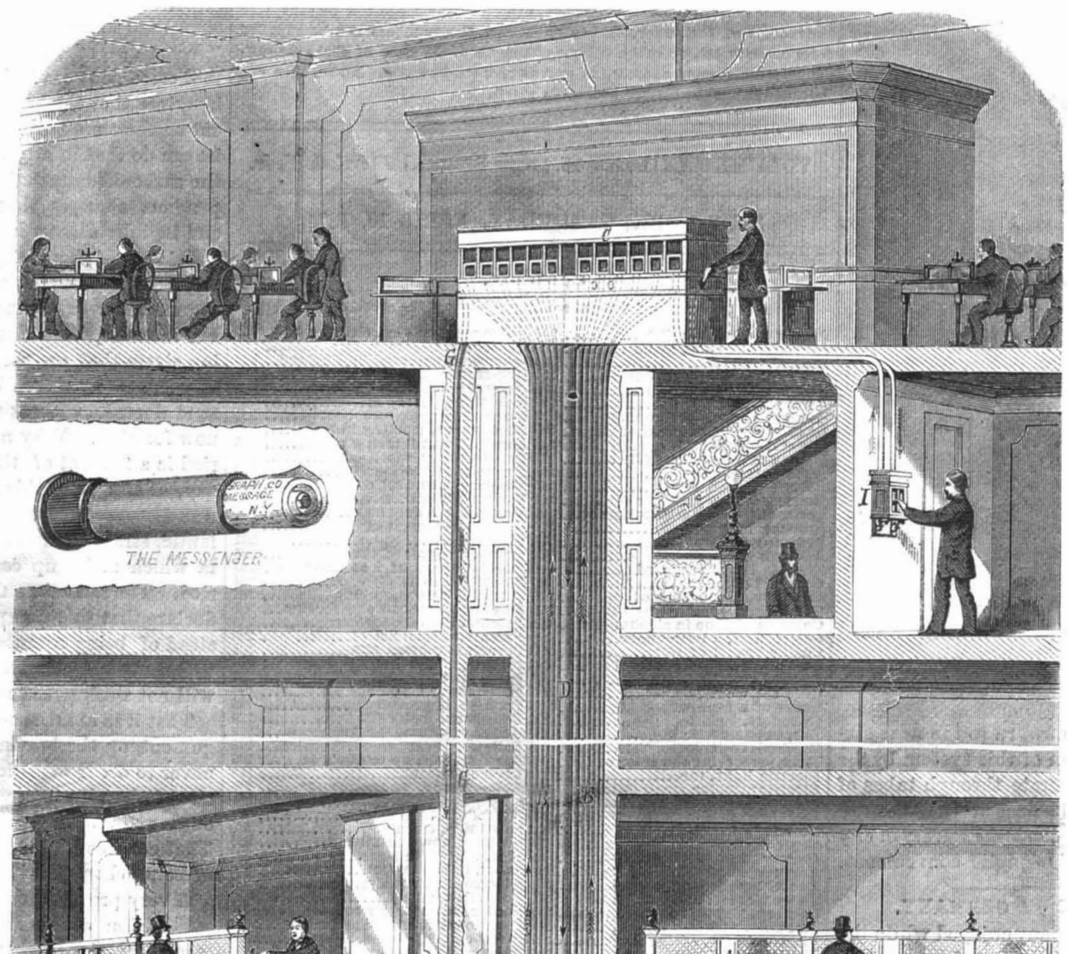
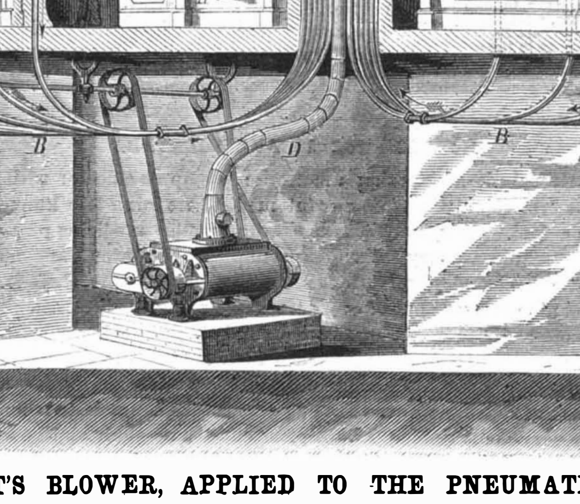


Fig. 1.—ROOT'S BLOWER, APPLIED TO THE PNEUMATIC DESPATCH.

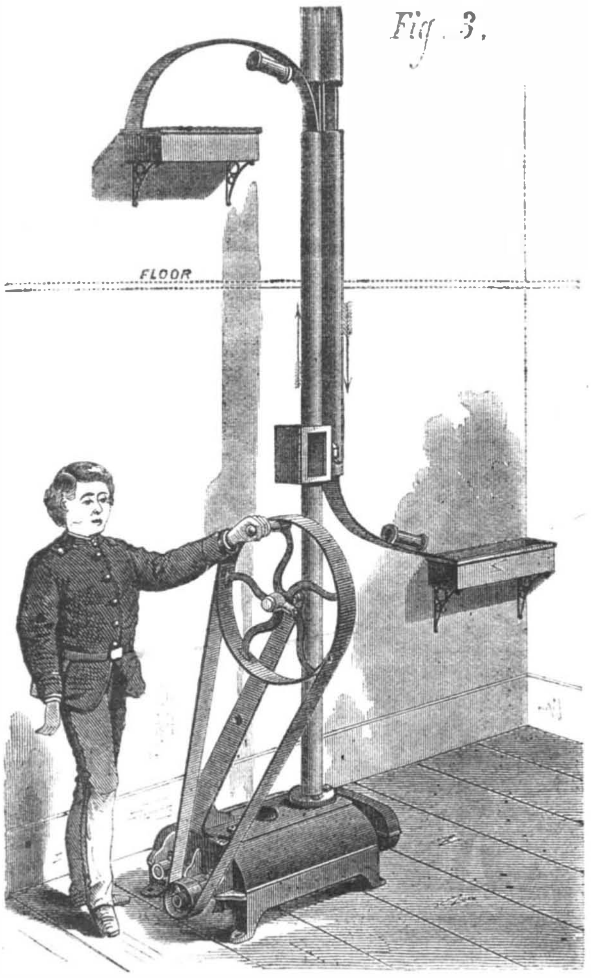
Fig. 2,



Of course there is a large number of the conduit pipes, B, as one opens before every desk at which telegrams to be despatched are received. The whole system, however, is so arranged as to be readily accessible, through movable panels placed in the walls at points traversed. Beside the general set of pipes there are auxiliary circuits, in some of which lateral tubes lead to the offices of the President, the General Superintendent, the Treasurer, and the Associated Press. In each of these rooms is a small case, I, provided with glass windows to be raised for interior access, similar to those in the large receptacle in the operating room. This case is divided vertically into two compartments by a wire gauze partition, and into each a tube enters, one tube leading to one of the compartments in the main receptacle above, the other being merely a drop pipe for return messages or empty cases. No explanation is needed to show that a constant suction, by the means already described, is maintained in one of these tubes, so that the officer wishing to forward a message has only to insert the packet, which travels, as before, to the operating room, and the answer to his question, from a station perhaps on the other side of the world, within a few minutes drops back in the opposite compartment. It will be noticed here that this return is accelerated along the lateral pipe by the exhaust from the first conduit acting through the former, through the wire gauze partition in the box.

The entire apparatus is quite ingenious, and for such extended use presents perhaps some advantages over the older application of the Root blower to the same purpose, illustrated in Fig. 3. This arrangement was employed in the old Western Union building, and as seen is operated by hand. The principal point of difference lies in the fact that in this case the packets are driven up by a blast instead of drawn up by suction. The cases are inserted in the receptacle shown near the hand wheel, and thence are blown upward until they strike a curved guide, which causes them to enter a box placed for their reception. In returning, they simply fall through the tube and slide into a suitable receptacle. This plan may be operated with horizontal or perpendicular pipes, with a single pipe, or with a series of tubes leading throughout a building.

The method which has been put in operation in the Western Union Telegraph building is similar to the design of Mr. A. E. Beach, of the SCIENTIFIC AMERICAN, for pneumatic postal transmission, which was first put in practical operation on the premises of the Broadway Underground Railway Company, corner of Broadway and Warren street, in 1870–1, and has heretofore been described in our columns. In that example a Root blower was employed in the same manner as here illustrated in Fig. 1, to exhaust the air from a general receiving box, with which the pneumatic transmitting tubes communicated. The latter curved about in various directions through the premises; and when letters or parcels of any sort were dropped into the tube, they were instantly carried forward into the receiving box. The latter was so arranged as to permit the removal of the contents at will. The successful operation of this method attracted much attention. Even the smallest bits of thin paper, pennies, envelopes, handkerchiefs of visitors, newspapers, and packages of considerable weight were unerringly transmitted and delivered. The highest velocity of transmission was between 40 and 50 miles per hour, the pipes being six and eight inches in diameter. This general design of postal transmission consists in having tubes of about eight inches in diameter, laid under the streets and made to communicate with the various lamp post letter boxes. These pipes radiate, in lengths of a half mile, in various directions from a postal station, where they communicate with receiving boxes in which an exhaust is maintained by Root blowers, as shown in our engraving. Thus, whenever letters are dropped in at the lamp posts, they fall at once into the pneumatic tube and are instantly carried forward, on the wings of the wind, to the nearest station, and thence delivered, or by the attend-



ant dropped into the tube that leads onward to the next station, and so on. The general adoption of this system by the post office, allowing that it will operate through tubes of half a mile length as effectively as it does at the Western Union office, would expedite the collection and delivery of city postal matter, and greatly promote the public convenience.

THE INDUSTRIAL CONDITION OF GERMANY.

The delusive prosperity which Germany enjoyed while the French indemnity was passing into the country has resulted as disastrously as the similar condition of things consequent to our war did with us. At the close of hostilities there was much to be done, money was plentiful, and wages high. Everybody believed that a new era had dawned for Germany, and that the speedy development of its resources could receive no check. A feverish energy of achievement took the place of sober calculation, and wild extravagance in every form of enterprise was mistaken for substantial business growth. The stolid German became as speculative as if he had been transported to America, and with precisely the same result so far as national prosperity went.

Describing the industrial and financial experience of the past five years in Germany, a *Tribune* correspondent pictures a condition of things very easily understood in this country:

"The abundance of capital gave rise to a reckless prodigality in all sorts of private enterprises. New railways were undertaken, great manufacturing companies were established to rival Krupp, and shipyards to compete with the Lairds were organized. Above all, new and costly houses sprang up in all parts of Berlin and almost every other city. The most popular sort of investment was in stock companies, and the multiplication of stock companies in 1871 and 1872 was marvelous. Money was plenty, wages were high, and hod carriers drank champagne at their daily work. But this did not last, and could not last. First the stock companies began to totter, and at length there was a general crash. Then wages began to fall, while the necessaries of life were stationary. The fortresses were completed, and thousands of workmen thrown upon the market. People began to leave Berlin on account of high prices until the evil spread and distributed itself throughout the country. The stock companies went to pieces one after another in all the chief cities, until that sort of organization became another name for everything unstable and treacherous. The new palaces of Berlin stood unoccupied, and fewer new ones were of course begun. In short, a complete transformation has taken place; and in spite of the five milliards, it is today very difficult to raise money, and still more difficult to realize it on investments. Now it will help no emigrant's fortune to return to Germany, even if he escape impressment into the military service."

Multitudes of great manufactories are unable to keep up operations, and wholesale discharges of hands are the result. The reduction in wages has been twice as severe as in this country, with a proportionally larger number out of employment. As an instance, the fact is mentioned that, in Berlin, last winter, it was difficult to get street laborers at two dollars a day, while this winter an indefinite number could be had at one third that price.

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Contents.

(Illustrated articles are marked with an asterisk.)

HOW SCIENCE IS ANNIHILATED.

Everybody admits that a man who sets up as a doctor without first submitting to a careful medical training is a knave or a fool. Everybody admits that to practise medicine properly requires a very thorough preliminary education, and no little practical observation of the ills that flesh is heir to. Yet nine persons out of every ten stand ready on all occasions to offer advice in case of sickness; and those who know least of medicine are least conscious of their unfitness to prescribe.

It is very much the same in Science. To be able to read a book of Science, or even floating paragraphs about it, is taken by very many people as evidence enough of their ability to criticise it, especially if they happen to have some little right to speak in some other department of thought. Unmindful of the fact that the errors of scientific theory have always been discovered by scientific men only, the unscientific and antiscientific hold themselves ready at all times to point out the mistakes in the deductions of men who have spent a laborious lifetime making themselves acquainted with the facts of the case, meeting the cautious suggestions of men like Lyell or Darwin with a confident assurance that would be justified by nothing short of infallibility. As a rule, we smile at these volunteer champions of ignorance, and let their vaporings pass. Now and then, however, they afford typical illustrations of antiscientific reasoning too good to be slighted.

Of this character was the lofty rebuke to Science administered the other day by a somewhat prominent Doctor of Divinity, in a morning paper; a rebuke, we may add, which has been the source of great consolation to more than one dear soul alarmed at the spread of knowledge, in proof whereof we have, in a subsequent issue of the same paper, letters of rejoicing in regard to the Doctor's championship.

The special science which falls under the Doctor's condemnation is geology—if, indeed, it is in any way worthy of being called a science. Particularly is it rebuked for talking of periods of time more protracted than the Hebrew scriptures provide for. Facts of its own finding condemn its assumptions. For instance, one of the remote periods of geology is the cretaceous, or age of chalk. Between that time and this, incalculable ages have come and gone, say the geologists. Sheer assumption, says the Doctor, for deep sea soundings prove that chalk is now being deposited in the Atlantic ocean; today is the chalk age, and your long drawn periods of time are pure myths!

Again, the geologists set the carboniferous epoch so far back that the six thousand years of Hebrew history dwindle to insignificance. All that time is wiped out with a paragraph, a floating paragraph which the Doctor has discovered going the rounds of the country newspapers, to the effect that the wooden supports used in certain of the Hartz mines have been converted into lignite since they have been put in, only a few centuries ago. See! cries the Doctor: a thousand years at most suffice to convert wood into coal; how dare you, in the face of such evidence, presume to say that sixty centuries would not suffice for the production of your carboniferous strata?

"What will geologists say to that?" asked an excellent lady, after reading the Doctor's triumphant overthrow of their science—"falsely so called."

We could not say, though we modestly surmised that, if compelled to notice the indictment, they would probably say: "What of it?" What has chalk to do with the antiquity of the cretaceous era? Who that knows anything of geology imagines that the age of a coal seam is in any way dependent on the time required to turn wood into coal? The chemist can do that in a few hours. Shall we say, therefore, that the carboniferous period was yesterday, and that all the stupendous changes that have since taken place in the earth and its inhabitants, happened last night?

Besides, if that is the line of argument, why stop halfway? Any geologist will willingly furnish the Doctor with arguments ever so much more sweeping than those he uses. For instance, in the South Seas, the corals of today are forming strata that are the exact counterparts (fossils excepted) of—say—the Trenton limestones. In other parts of the world sand deposits, such as composed the Potsdam sandstones, are now forming. Why not say, therefore, that the silurian period is a figment of the imagination: that it is now, yesterday, or any time this side of Adam's day? Still worse: it was discovered last year that, in the deeper parts of the Atlantic, strata of mud are now forming, precisely like the strata which make up certain slates of the so-called azoic period. The next time the Doctor demolishes geology, let him declare that this fact proves that the Laurentian period, instead of being countless ages old, is altogether modern! It will make his case seem much stronger to the ignorant, and will not weaken his argument in the least.

That it is at all necessary to comprehend a theory or an argument, or the bearing of known facts upon either, seems never to occur to critics of this sort. Indeed, the first requisite of an anti-science critic would rather appear to be a thorough and radical misapprehension of what Science teaches. That enables him to mispresent Science boldly, with no risk of being charged with a wilful perversion of truth.

A very pretty, though very mild, case of a scientific misapprehension occurs in an editorial in the last issue of the *American Garden*. It would not be noticeable in a strictly evangelical family paper, but seems a trifle odd in a publication devoted to a department of natural science.

The editor, very properly, dubs the article "Scientific Vagaries." Its subject is a paragraph from a recent lecture by Sir John Lubbock, upon the natural relations of insects and flowers. After mentioning the observations of Sprengel and Darwin, Sir John remarks that it is to insects that we owe the beauty of our gardens and the sweetness of our fields, and that the flowers owe to them, not only their scent and color, but their very existence in their present form. "Not only have the brilliant colors, the sweet smell, and the honey of the flowers been gradually developed by the unconscious agency of insects, but the very arrangement of the colors—the circular bands and the radiating lines, the form, size, and position of the petals, the arrangement of the stamens and pistils—all have reference to the visits of insects, and are disposed in such a manner as to insure the great object which these visits are destined to effect."

This, says our critical editor, scornfully, is a fair sample of the errors and vagaries into which intelligent men may be led—men who see things from only one point of view, and "endeavor to twist and bend every fact or circumstance in Nature to make it fit the theoretical structure of which their preconceived notions suggest the plan."

"No doubt," our critic adds, "the color and scent of flowers attract insects to them for the purpose of aiding or bringing about the fertilization and consequent fructification of the seed for the continuation of the species--this latter being the end and aim of all physical life." [What if Darwin had said that?] It is freely admitted, also, that the intricate and wonderful arrangement of floral appendages are often peculiarly striking, and apparently throw in the way of the fertilization of the flowers obstacles that can be counteracted only by the aid of insects. But—and this is the culmination of the argument, "but the idea that insects, ages and ages ago, went to work, consciously or unconsciously, to develop the various scents, the multitudinous shades and combinations of colors, and the marvelous structure of flowers (and this last as an obstacle to their own labors) is—what? We should say a curiously stupid misreading of very plain English; but the critic suspects nothing of the sort, boldly pronouncing it "something absurd and overtasking the credulity of man"!

"Is it not," he asks, "more easy to believe that there is an intelligent Creator, First Cause, or Primal Cause (as men have variously expressed it), who has created things as they are?" etc., etc.—as though easiness of belief had anything to do with the matter. Then he winds up with this ingenious double question: "Are not the ideas of Sir John Lubbock as here expressed, most illogical? And is this not a good specimen of '"Science, falsely so-called?'"

True, O *Garden!* Very true—"as here expressed." Fortunately, however, Sir John entertains no such ideas; and we may set it down as a rule that, when men outside the ranks of Science—the foremost ranks at that—essay to demolish Science, it is usually their own "bogus" Science, as in the instances we have noted, that comes to grief.

HOW A PIECE OF COAL BURNS.

There is no mistaking the words of a genuine thinker. His subject may be most difficult, but what he says is sure to be "understandable of all men." No matter what Priestly wrote about, his sentences were transparently clear. Franklin's English was uniformly direct simple, and precise. Men may quarrel with Darwin's opinions, but they have themselves alone to blame if they mistake his meaning. Huxley's style of speech and writing is as idiomatic as Mark Twain's. Faraday's lectures conveyed the latest discoveries of Science in sentences which children could comprehend. When our own Professor Young speaks to a popular audience, they wonder how astronomy can be called abstruse: the exploration of the sun seems as easy as a trip to Jersey. Professor Meyer will illustrate the mysteries of sound or magnetism so simply and clearly that his non-scientific hearers never suspect the ingenuity of his way of putting things, or how easily a less exact thinker could make a mist of the whole matter. In Professor Barker's hands the spectroscope seems as simple as a child's toy, the analysis of the Universe with it as intelligible as the adventures of Robinson Crusoe; and Oliver Wendell Holmes will illuminate a social or metaphysical problem so happily that the average reader never dreams how keen is the intellect that sparkles so playfully about it, or how many duller men have broken their heads over it.

But it is needless to multiply examples. The least discerning reader can tell when a man knows what he is writing about, whether he has anything to say, and—"What has all this to do with the combustion of coal?" Do you ask? Not much directly, we admit. Still it may help us to intimate indirectly the scientific rank of the ambitious author of "The Sun and Earth as Forces in Chemistry," a work that aims at nothing less than a revolution in chemical science This is how coal burns, according to his system

"Carbon combines with oxygen, leaves its solid shape for a gaseous one forming carbonic anhydrid gas, and this greatly because of carbon's own heat constitution; and, further because of the intense nearness of the oxygen to carbon and our earth's comparative distance; this because also of the excellent heat capacity of oxygen itself; and thus carbon with oxygen leaps up into carbonic anhydrid gas, earth loosened into the highest sun forms, approaching that of oxygen itself, for the heat capacities of carbon are near those of oxygen; but the oxy-terric struggle for carbon is arduous; our earth has greatly in her favor her immensity, but then she is far off, and her forces decrease with distance; but even so, for freeing carbon from our earth's control, oxygen requires always, as we know, the further assistance of heat on carbon; we always for oxy-carbonic combination, have to set fire to carbon."

Nice and easy, isn't it? It's a wonder nobody ever thought of it before!

UP OR DOWN IN RAPID TRANSIT?

The clash of systems and the wreck of—plans, for rapid transit in New York, betokens great activity in the development of the question, if not an approaching settlement of it.

Eight years ago the State Senate Commission appointed to investigate this matter received for consideration five plans for underground railways, as many for mixed depressed and underground systems, and about twice as many for elevated roads. The Committee of the American Society of Civil Engineers, appointed last fall, found the number of projects increased to seventeen for underground roads, eight for depressed, and fifty for elevated. The latter style seems especially attractive to ingenious architects with little to do, and consequently the "elevated" devices put forth are out of all proportion to the rest. Speculative minds cannot but be attracted by speculative projects, the absence of demonstrated facts and known experiences leaving room for a free play of the imagination; besides, the opportunities for architectural invention afforded by elevated ways are so much more inviting than the severe simplicity of tunneled structures, to men naturally desirous of putting their work where it can be seen, that the temptation to make pretty plans and pictures of such roads seems all but irresistible. How far this preponderance of plans for roads above ground assisted the known original bias of some at least of the members of the Committee, in leading them to look most favorably upon the elevated system, it is not our purpose to enquire; it is enough to say that the adequacy of the reasons they give for reversing the decision of the Senate Commission will be questioned by very many able engineers.

It may be well at this point to recur to the conclusions arrived at by the Senate Commission, and notice how completely the judgments expressed by them have been justified since that time.

Their first position, that commercial, moral, and hygienic considerations all demand an immediate and larger addition to the means of travel in the city, needs no argument; it is admitted by all. Their second conclusion, that, if every avenue lengthwise of the island were to be occupied by surface rails, the relief afforded would be inadequate, has been substantially demonstrated. Every avenue, save Fifth avenue, has its line of street cars; yet it is true, as predicted, that "the pressure, with all its accompanying annoyances, inconveniences, and dangers," is as great as it was eight years ago, in fact much greater.

The third point, that the steam roads upon the surface, then in use, should be removed, has been largely complied with by the Harlem Improvement and the diversion of the principal trains of the Hudson River road to the east side of the city. That a central line alone would not suffice to meet the requirements for increased facilities is also admitted. The conclusion that elevated railways erected on supports in the middle or on the sides of the *present* streets cannot be *fully* adapted to the transportation of freight, and had not been tested in any practical way so as to warrant an unconditional recommendation of them for transportation of passengers, is but partially offset by the limited success of the Greenwich Elevated Railway in the transportation of passengers. The objections to a system of railways running wholly through blocks are urged as strongly by the Committee as by the Commission. That the growth of the city will soon demand, if it has not already, the construction of several lines of railways is also admitted on all sides. The only point directly combated by the Committee is the final conclusion of the Commission that underground railways passing under streets present the only speedy remedy for the present and prospective wants of the city in the matter of safe, rapid, and cheap transportation of persons and property Let us see how well the position of the Committee is sustained by their own showing

They claim, in the first place, that a prime condition of success with rapid transit in New York is that the roads be capable, as statistics clearly show, of accommodating a larger passenger business than is now done upon any steam railroad in the world, save the underground roads of London. The capacity of underground roads having thus been demonstrated, and their profitableness as well, it is difficult to see why a different plan should be experimented with, especially when, as the Committee justly observe, "rapid transit in New York is so nicely balanced between financial success and failure, that it cannot afford to pay for mistakes, either of principle, policy, or material detail." Another point urged by the Committee is that the required roads must not only be "absolutely safe, but appear so." As far as experience has gone the west side elevated railway is much safer than the surface roads; but it does not "appear so." Consequently multitudes of passengers take the surface roads in preference. This is true, even of those who live along the line of the road and thereby become familiar with its operation. Transient travelers, and in a city like this their number is very large, are still more doubtful of the safety of rapid transit on stilts. The underground road would be still safer, and what is more to the point, would appear safer. Besides, when the Harlem Improvement is complete, and the tunnel under the Hudson receives, as it necessarily will, the bulk of the travel from the South and West, the majority of the transient visitors to the city will of necessity make a large part of their suburban journey under ground; to complete the passage to the heart of the city in the same manner will be a matter of course, whatever the relative safety of possible routes may be. A road that has brought one safely four miles is not likely to be alarming for two or three or four miles more; and no comparison is forced with surface roads, as there would be were passengers compelled to leave the tunnel and choose between the street car and one twenty feet above the street.

Another condition of rapid transit, say the Committee, is that heavy trains shall not run over the lines. To our minds a very essential condition is that they shall be able to do so. If the wants of the city are to be adequately met, the rapid transit roads, the central ones at any rate, must be able to take up and convey the loads of passengers and freight brought in by the regular lines of railway leading to the city. To make elevated railways capacious and strong enough to perform the service is, we admit, impracticable: yet the work must be done. Unbroken transit is desirable for passengers and essential for freight. There must be as little breaking of bulk as possible. The superior advantages of underground roads (in connection with the Harlem Improvement and the Hudson River Tunnel) in this respect are immense: for freight could then be passed through the city, or from without to the centers of trade, with no change whatever.

Another condition insisted on, and very justly, by the Committee is that the interests of the public and of property owners along the line shall be thoroughly protected during the location, construction, and operation of rapid transit lines. "Some sacrifices (they say) are required of them, and they must suffer some inconveniences; the public must give the right of way upon two, or perhaps eventually four, avenues; the dwellers upon them must take the chance of some annoyance from passing trains, and the property owners, the risk of a possible depreciation of their property." And again they say: "Invasion of privacy is a part of the price which must be paid for rapid transit." The "cheekiness" of these assumptions—there is no other word for it—is amazing, when we call to mind the well established fact that the right of way *under* the streets already belongs to the city; that there is relatively no interference with private property or vested rights in the construction of underground roads; that there is no possible invasion of privacy below the pavement; that the annoyance of passing trains underground is found in London to be practically *nil*; and that every road beneath the streets adds a new thoroughfare without reducing the already limited space above ground, and thereby helps to free the city of one of its most serious obstacles to individual comfort and freedom of outdoor travel, on foot or in private conveyances. The Committee also observe, with charming *naïveté*, that "the great obstacle to cheap rapid transit lies in the avenues," owing to their great width. This is certainly an unfortunate circumstance, if true, inasmuch as the avenues constitute the chief extension of the streets of the city in the direction of the greatest travel. It is consoling to think, however, that the objection applies only to elevated roads. The great width of the avenues fits them for underground roads peculiarly well.

It must not be inferred from anything we have said that we are opposed to elevated roads in principle. As temporary expedients in certain parts of the city, especially when traversing streets of little importance, they are undoubtedly a convenience. That they can be countedon for fully and permanently meeting the needs of the commercial and traveling community is quite another affair. Their alleged superiority on the score of cheapness holds only, if at all, when light structures for light service are taken into account. To compare in all cases slender elevated roads with broad and substantial underground ways, in point of cost, may be clever, but it is not convincing. As for the appearance of the elevated roads, the best the Committee can say is that they "need not be hideously ugly." No more need telegraph poles and telegraph wires; yet, with increasing public improvement in the matter of taste, the demand becomes more urgent that the poles be cut down and the wires run underground. How long could we count on public tolerance of elevated roads, though at first they might seem to be endurable?

A few words—in closing an article already too long—about the action of the Society of Engineers in maintaining as a society, a noncommittal policy touching the different projects for rapid transit now under discussion by the public. *The Engineering and Mining Journal* intimates that, in declining to publish the report of the Committee as an official expression of the Society's opinion, the Society stultified itself and jeopardized its hitherto well deserved reputation for honesty, independence, and impartiality. Still further, it is complained that, owing to the slim attendance at the meeting at which the report was received, a few members were able to compromise the Society in refusing to commit it to the line of policy which the *Journal* favors. To an unprejudiced mind, it would rather seem that the twenty-five gentleman who received the report acted with great discretion in avoiding any expression of opinion whereby the four hundred and twenty-five absent members would be involved, especially when it is well known that very many of those absent members favor other views than those arrived at by the Committee. To say that simply printing, on the cover of a report published by a society, a courteous resolution, to the effect that the society did not, as a body, endorse the views of the Committee, was a shirking of responsibility, or an endeavor to "smooth" or "ignore" the report, is simply childish

PROPOSED TUNNEL UNDER NEWARK BAY.

In approaching Jersey City from Newark, the tracks of the New Jersey Central Railway are carried across the marshes and over the broad waters of Newark Bay, on an elevated railway resting on wooden piles. The constant decay of this structure, especially that portion which spans the water, involves the practical rebuilding of the work once in about five years, and there are times, particularly in winter, when the concern is unsafe. It is at all times a source of expense, care, and trouble. "This," says the New York *Tribune*, "has led the Central Railroad to seriously consider the practicability of building a tunnel under the waters of the bay from Elizabethport to Bergen Point. Prominent engineers consider the project an easy one to accomplish, owing to the general flatness of the bottom of the bay and the solid condition of the earth to be found there, the driving of piles having demonstrated that little sand is to be met with, and that for only a short distance out from the Bergen Point beach. A rough estimate places the cost of a tunnel for double tracks, extending a distance of two miles and a half, at $6,000,000, and which, if built, would last for a century. The bay bridge has cost the company fully thrice its original cost, as the Chief Engineer estimates that it has been rebuilt three times since its first completion. An iron structure across the bay would be little improvement over the old bridge, whereas the building of a tunnel would leave the waters of the bay free to navigation. The matter will, in all probability, assume a definite shape within a year."

Another Trial of the Bessemer Steamer.

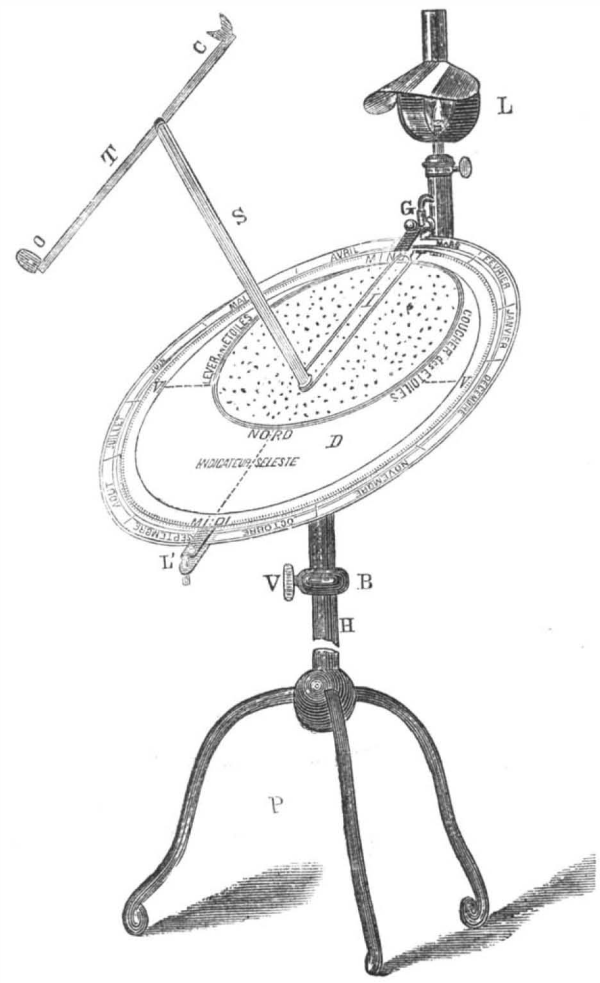
The Bessemer saloon steamer arrived at London, at the beginning of March, having made the passage from Hull in a heavy sea. The *English Mechanic* states that the hull rolls moderately and easily, and scarcely pitches at all. The machinery is believed to be capable of controlling the oscillation of the saloon; but the man employed to work, it being of course inexperienced at the task, was not up to time in handling the levers. The vessel will be ready for Channel traffic in a few days.

DR. J. E. GRAY.—John Edward Gray, for many years the chief naturalist of the British Museum, recently died in London, aged 75. He published nearly 130 works during his connection with the Museum, the zoölogical collections of which were much increased, improved, and popularized under his care.

GENERAL GARIBALDI has brought forward a project for the improvement of the Roman Campagna. The general proposes to construct a canal in a straight line from Rome to Ostia. The canal is to be available for navigation and irrigation purposes. The cost of construction is estimated at $6,000,000.

A NEW STELLAR INDICATOR.

The annexed engraving represents a new and simple device for distinguishing the stars, which has lately been introduced in France. It consists of a suitable pedestal on which is placed a celestial chart, the latter being a projection of



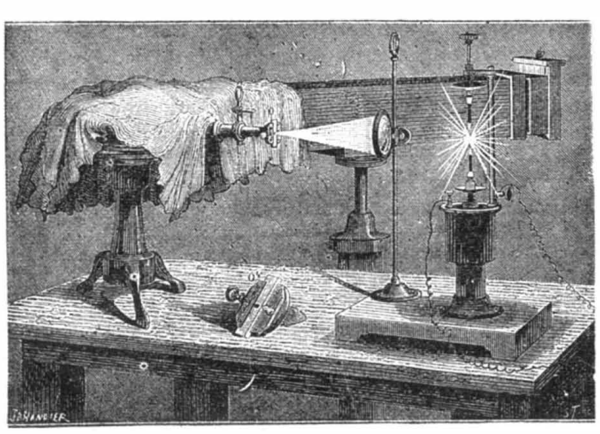
the heavens of the observer. It differs from ordinary charts in that the student is not obliged to hold it over his head and look up, in order to clearly define the positions of the stars; in other words, it is very much as if the sky were all reflected into a mirror, were such possible. Beneath the chart is an apparatus by which it may be oriented, the pole star serving as a guide.

When properly placed it suffices to regard the star, the name of which it is required to know, through the eye piece, O C, when it will be found on the chart between the branches of the alidade indicator, I. In the same way, inversely, by first settling the indicator, any star desired may be found in the heavens. The supporting card is marked around its circumference with the names of the months, and on an inner ring with the hours, midnight being above and noon below. From the portion devoted to the star map included between the branches of the indicator may be seen the aspect of the heavens at any day and hour, and also the hours of rising and setting of stars, of their passing the meridian, etc.

A small lantern gives sufficient light to illuminate the device without distracting the eyes of the observer.

SPECTROSCOPIC QUANTITATIVE ANALYSIS.

The spectroscope, through the discoveries of Mr. Norman Lockyer, is now successfully used as an instrument, not merely for qualitative but also for quantitative analysis. It has been found that the breadth and length of the spectroscopic



bands vary in proportion to the abundance of the simple bodies entering into the composition of any alloy. The variations being previously studied in alloys of known composition, a means of comparison is obtained whereby ingredients of a metallic compound can be determined instantly, thus saving the time and labor necessary to reaching a like result through ordinary chemical analysis, and at the same time with as great a degree of exactness. The appearance of the lines or bands used as standards, as well as of those to be examined, is permanently fixed by photography, so that careful study can be made of them by the observer at his leisure.

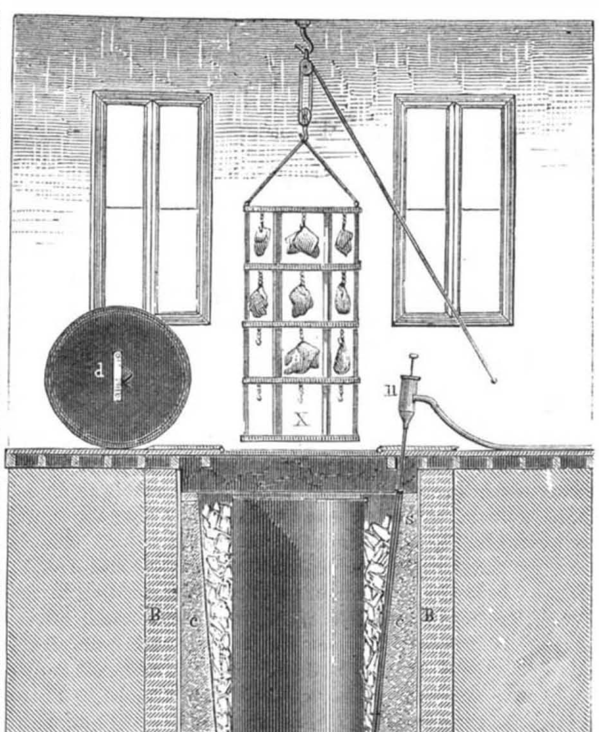
Mr. Lockyer has employed this method in testing alloys of gold and silver in the English Mint, in London, and the apparatus used by him is represented in the annexed illustration. It consists of an electric lamp, in the lower carbon of which a recess is made to form a little crucible in which to vaporize the alloy to be examined. This takes place very soon after the current is established, when the spectrum of the substance is thrown on a screen in a closed box, from which a photographic picture is at once taken. The slit in the spectroscope through which the light, after traversing a condensing lens, is admitted to the instrument is provided (O') with a movable cover which may be adjusted very accurately by means of a delicate scale. Three, four, or five spectral images may thus be photographed one under the other, so that the coincidence of corresponding lines may be rigorously compared. During day time sunlight is used instead of that of the electric lamp. The latter, at night, is operated by thirty Grove elements.

An Improved Poultice.

At a recent meeting of the *Académie de Médecine*, Paris, M. Le Fort read his report on a substitute for the ordinary linseed meal poultice, invented by M. Lelievre. It is prepared by saturating two superimposed layers of wadding with a solution of *fucus crispus*, or Carragheen lichen, and drying them in a stove after they had been submitted to strong pressure. In this way a sheet of the consistence of cardboard is produced, a portion of which is cut off when wanted, and soaked in hot water for fifteen or twenty minutes; this swells it out and fills its tissue with a mucilaginous fluid. It has been tried in several of the hospitals, to the great satisfaction of both patients and attendants. It can be prepared in large quantities beforehand, and will keep for a long time without undergoing any alteration. MM. Demarquay, Gosselin, and Verneuil pronounce it to be far superior to the linseed poultice; it keeps moist for more than sixteen or eighteen hours; it does not slip, is inodorous, does not readily ferment, nor does it soil the linen or bed of the patient. The new poultice is destined to render great service in hospitals and ambulances, and above all on board ship, where it is difficult to keep the linseed in a good state of preservation.

UNDERGROUND REFRIGERATOR FOR BUTCHERS.

The novel arrangement of a refrigerator for butchers' use, represented in our illustration, will perhaps be found convenient in that it admits of economizing space in a shop, and also of saving ice which would be preserved longer owing to the uniformly cool temperature of the soil. The de-



vice consists of a bricked cistern, B, lined with isolating material, C, and containing an iron tank between which and the isolating substance ice is packed. The meat is hung on a rack which is lifted in or out of the vessel by a suitable tackle. A small hand pump, *n*, serves to remove the water due to the melting ice, and *d* is a cover to the tank.

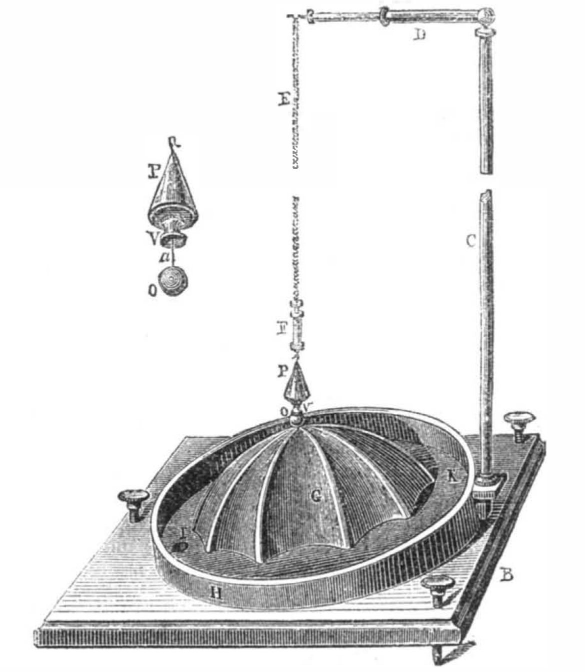
A Bear under Chloroform.

One of our Colorado exchanges gives a graphic account of an attempt to transfer a large cinnamon bear from a cage to an enclosure outside, that he might have greater scope for exercise; but a kindness he did not appreciate. The work of removing him from the cage was undertaken. It was first necessary to secure the bear so that a collar, with chain attached, could be put on him. Ropes were finally got around his legs, but he resisted violently, and it became a serious matter whether he could be secured at all. Once or twice he came near breaking away from his captors, and the surrounding crowd fled, panic-stricken, in all directions. Finally a happy thought struck some one, and a bottle of chloroform was sent for. To an application of this kind, the bear soon succumbed, and was secured in good shape.

It is not uncommon for beasts in cages to become wild with rage at times; and this incident suggests that possibly chloroform may be effectually used in producing quietude in all such cases.

THE EARTHQUAKE INDICATOR.

Count Malvaria, of Bologna, Italy, has recently devised an ingenious instrument for giving warning of earthquakes, and also for registering the direction of vibrations of the same. The construction will be understood from the annexed engraving. The table is adjusted level by the set screws, which serve as feet. Upon it is a circular inclined plane, K, surrounded by a rim, H, and carrying in its center a reversed hemispherical cup, G, the surface of which is divided into eight channels which are placed so as to correspond with the eight principal points of the compass. The summit of the cup is provided with a metal point which enters a shallow indentation in a ball, O. The ball is maintained in place by the concave lower portion, V, of a weight, P, resting upon it. The weight is sustained by the chain, E,



THE EARTHQUAKE INDICATOR.

which is supported by the standard, D C, and adjusted by the screw, F.

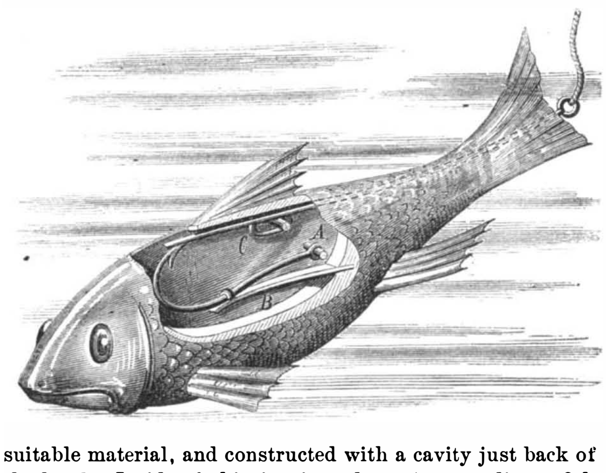
To set the apparatus, it is arranged as depicted in the engraving, the weight pressing upon the ball just sufficiently to hold it on the apex of G. The instant, however, a trembling of the earth occurs, the ball rolls from under the weight, down a channel in G, and thence to the inclined plane, K, through an aperture, L, in which it falls, striking spring mechanism, and so firing a gun, or else acting upon a clock so that the latter is caused to stop, thus registering the exact moment of the shock.

In order to determine the direction of the vibrations, a fine hole is made, from bottom up, in the weight, P. In this a needle, *a*, is placed so that its end rests upon the ball, although its body is then pushed up into the weight aperture. When the ball falls, the needle drops also, but is held by its enlarged head, so that it cannot escape from the weight. It rests, however, in the groove on the cup, G, down which the ball has rolled; and as this groove must be opposite in direction to that pointing to the course of the impulse of the soil, the true bearing of the vibration is at once determined.

The instrument is said to possess great accuracy, and, doubtless, will serve important ends in localities subject to earthquakes.

A NOVEL DECOY FISH.

Messrs. David Huard and Charles M. Dunbar, of Ashland, Wis., are the inventors of an ingenious device for trolling or still water fishing, which is quite certain to become a favorite with anglers. It is a decoy fish, made of wood or other



suitable material, and constructed with a cavity just back of the head. Inside of this is pivoted, at A, an ordinary fish hook, and beneath the latter is a spring, B, which tends to draw its barbed end up through a slot in the back of the fish. C is a piece of wire, pivoted as shown, but bent so as to slide longitudinally on its pin. This, when pushed forward, catches over the point of the hook, and therefore holds it down against the spring. The wire extends clear through the fish, and terminates with a little rubber plug which closes the rear aperture. An eye on the end of the wire serves for the attachment of the line.

The device in the illustration is represented as set, and the plug then tightly closes the rear opening. When a fish seizes the decoy, the jerk given causes the line to pull out the plug and, at the same time, to carry the wire, C, to the rear The hook, then freed, springs up through the slot and holds the fish. This was patented May 26, 1874.

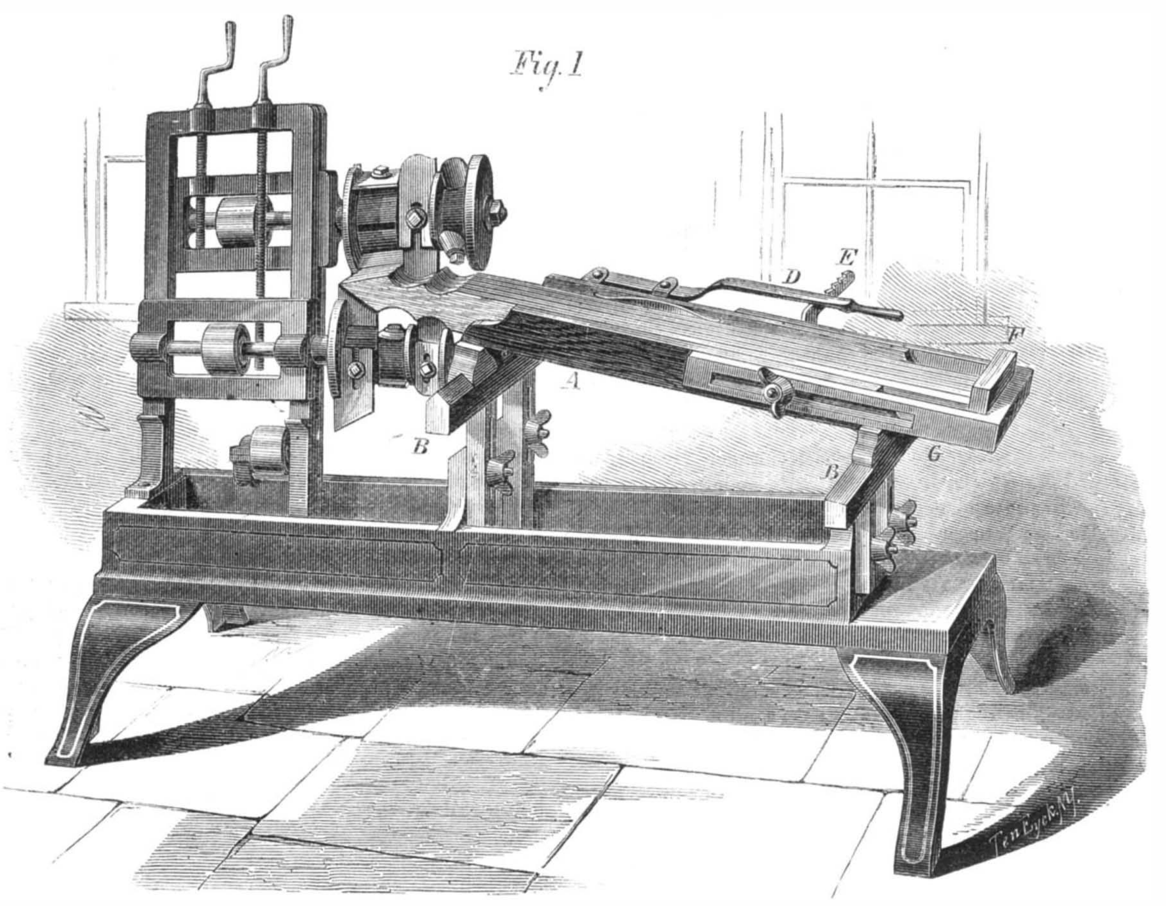
MACHINE FOR MAKING FENCE PICKETS.

The object of the machine illustrated in the annexed engravings is to dress and shape the heads of pickets or palings. The novel feature consists in the sliding or reciprocating table which, by suitable attachments, supports and clamps pickets of different lengths, for presenting the same to the action of the revolving cutters. In Fig. 1 is given a perspective view of the machine, and in Fig. 2 a plan of the improved table.

The carriage, A, upon which the pickets are placed, travels upon ways, B, which are vertically adjustable to alter the inclination. The pickets are arranged side by side, and are secured by the pressure of the spring, C, Fig. 2, said spring being adjusted by the lever, D, connected therewith by a pivoted bar. The lever is held at any adjustment by means of the ratchet bar, E.

The rear extremities of the pickets rest against the end piece, F, of the carriage, by which they are so gaged to the saw that they are all cut in uniform lengths. The piece, F, is rendered adjustable, in order to suit different sized work, by the slotted side pieces, G, which are provided with clamping bolts, as shown. The cutting mechanism consists in two revolving heads, the bearings of which are adjusted in the frame to vary the space between them for wide or narrow pickets, by an independent screw for each. They are driven by a single belt which passes over both pulleys and over a guide pulley on the bed of the machine. Each head carries two molding cutters, a pointing cutter, and a saw, which are formed in the outline of the edges to cut the pickets alike on both sides when the latter are presented obliquely through the inclination of the carriage. By this arrangement the cutters are enabled to shear or draw out the wood, and thus to work smoother and easier than when operating crosswise the grain. The saws serve to remove the feather edge left by the pointing cutters.

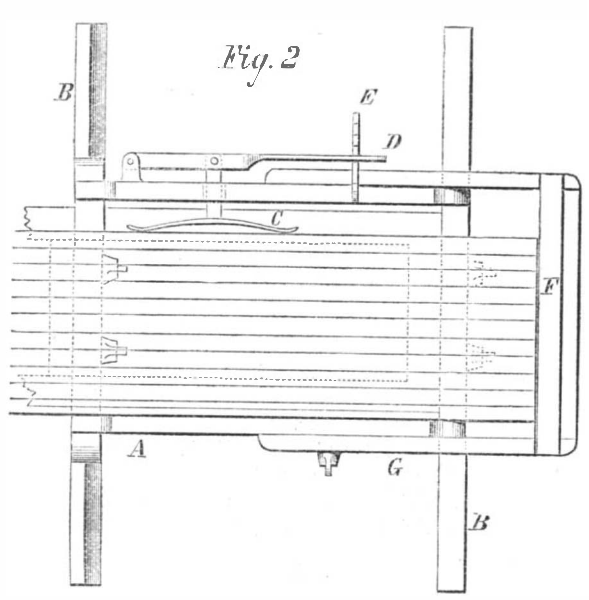
Fig. 1



MACHINE FOR MAKING FENCE PICKETS.

The device can easily be attended by a single man, and, it is claimed, can cut 5,000 pickets per day. From the adjustability of its various parts it is capable of executing a large variety of work, leaving the same in condition fit for immediate use. It is equally suitable for the purpose above described or for a tenoning machine, by simple adjustments of the cutter heads and carriage; and by suitable changes of the knives, picket heads of any desired patterns may be formed. The machine, we are informed, is the first which

Fig. 2



has been devised for producing the picket heads in complete state.

It was patented through the Scientific American Patent Agency, December 29, 1874, to Mr. Isaac Levy. For further particulars address the owner of the patent, Mr. A.M. Lewin, Room 1, 302 Broadway, corner Duane street, New York city.

Kalsomining.

This is the time of year for house cleaning, and, *apropos* to the season, comes the following, from a correspondent of the *Country Gentleman:*

To kalsomine a good-sized room with two coats, take ten pounds of whiting, dissolved in hot or boiling water; one fourth of a pound of glue (which should have been put to soak in a pint of water the night before) may now be melted slowly on the back of the stove, stirring frequently. To color a beautiful tint, get two ounces of ultramarine blue and one ounce of Venetian red; mix separately with cold, soft water, and strain through a stocking or thin cloth, each in a separate vessel. The whiting may now be stirred well; if too thick, add more hot water, and strain through a flour sieve into a good-sized pot. Add some of the blue and red, alternately, till you get the desired shade, which may be ascertained by putting a little of the mixture on a piece of paper and drying by the fire. When your color is determined, pour in the glue; and after mixing well, apply the wash hot to the walls, brushing in any direction, as it mixes better than if put on too carefully. On white walls two coats are necessary; but after the room is once done, one coat is sufficient. Should the ceiling have to be done, put on the whiting alone first, then reheat the wash and add the paints and glue, the latter to be light colored, if the walls are to be white. Common glue will answer for a painted wall. A paper border finishes the room perfectly—makes any room neat and pretty. Should the second coat not be put on till next day, heat the mixture, as the glue will not mix with the other ingredients unless pretty warm.

Chemical Constitution of the Brain.

At a recent meeting of the Chemical Society, London, Dr. Thudicum delivered an interesting address on this subject. He said he thought the best way would be to explain the table of the constituents of the brain, which was hanging on the wall, comprising twenty-one compounds, besides fats and fatty acids. This subject, which was one of great difficulty, had occupied him many years, and he had found that it was quite useless to work on the small scale, in fact, before anything could be done, 1,000 brains had to be subjected to chemical examination. Of the constituents of the brain, nearly all the albumen present was in the insoluble form, and the sub-group of the phosphorized principles, to which he had principally directed his attention, consisting of the kephalins, myelins, and lecithins, all contained phosphorus. There were also present nitrogenized principles, oxygenized principles, inorganic matter, and about 80 per cent of water. The water is very difficult to remove from the brain matter, but it can be done by slicing it thin and soaking it in successive quantities of strong alcohol. The dried product is then finely divided, and rubbed through a sieve. Heated to 103° Fah., with alcohol, it leaves a white matter, consisting of the albumen, most of the phosphorized principles, all the nitrogenized, and much of the cholesterin. The alcoholic solution, when concentrated, deposits the lecithins, and, by further evaporation, the fatty ethers. The constituents of the white matter may be separated by treatment with ether, which extracts the kephalins; on concentrating the solution, and adding alcohol, these are precipitated. The myelins are only slightly soluble in ether, but may be dissolved by absolute alcohol, which leaves the cerebrin, phrenosin, and kerasin.

All the phosphorized principles are soluble in water, but the kephalins, as a class, are characterized by the property of oxidisability, turning brown in contact with ether; while the myelins, on the contrary, possess great stability, and are, therefore, readily obtained colorless and crystallized. Hydrochloric acid, or any salt, readily precipitates the phosphorized compounds; but when dialyzed these are removed, and the compounds again pass into solution, affording an excellent method of purifying them. The phosphorus is always present as glycero-phosphoric acid.

The author then explained his theory of the constitutional structure of the various compounds; after which he shortly noticed the members of the nitrogenized group, of which phrenosin, $C_{34}H_{67}NO_8$, may be considered as the mono-amidated form of a fatty acid, whilst cerebrin, $C_{34}H_{68}N_2O_8$, is the di-amidated form; kerasin, $C_{46}H_{91}NO_{91}$, the third on the list, is a colorless crystalline substance. All these compounds give a most magnificent purple color when treated with sulphuric acid and sugar, by Pettenkofer's reaction. Stearoconote has the same composition as cerebrin, and can easily be converted into it by boiling with hydrochloric acid and benzine; cerebrin can also be reconverted into stearoconote.

The amount of these principles is considerable, the phosphorized and nitrogenized compounds, with the cholestrin, constituting 5 per cent of the brain.

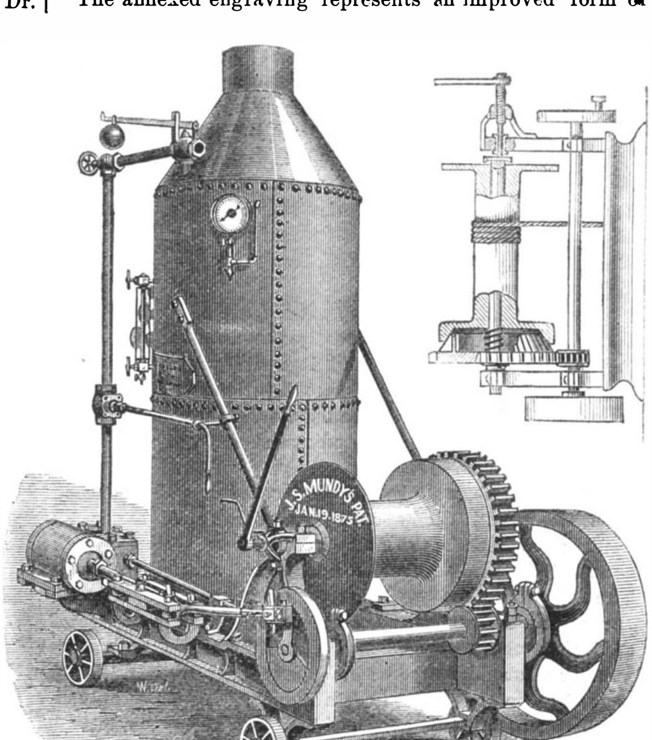
In answer to a question by Dr. Wright, Dr. Thudicum replied that the examination was conducted on the normal brains from human subjects, controlled by experiments on the brains of oxen. In softening of the brain, he had found free glycero-phosphoric acid and fatty acids.

The Electric Light.

It has long been known that the carbon electric light is not due to a direct luminous effect of the electric current, but merely to the property which this current possesses of heating the conductors which it traverses, and that with the greater intensity the more resistance they oppose to its passage. The intensity of the ordinary electric light (with carbon points) arises from the circumference that the stratum of air, a bad conductor, which is found between the two charcoal points, is heated to an excessive degree by the passage of the electric current, and thus produces indirectly the combustion of the coke or charcoal electrodes, heated to whiteness. It has also long been known that solid bodies may also be heated to whiteness without the presence of gaseous matter. Thus, slender platinum wires have often been heated by the current. The light from this source is more fixed and constant than that of the luminous arc between the carbon points; but it is too feeble and too costly. M. Ladeguin replaces the wire by slender rods of carbon (coke), hermetically sealed in a glass receiver, from which the oxygen has been removed.

IMPROVED HOISTING MACHINE.

The annexed engraving represents an improved form of



hoisting engine, the principal feature in which is a novel arrangement of friction attachment in connection with the drum. The device obviates the necessity of brakes and allows of the load being raised, lowered, or held suspended, with great ease. The diagram on the right of the engraving shows the drum loose upon the shaft while the driving gear is keyed firmly thereon. In the side of the large gear on the drum shaft, wood is dovetailed and turned off to receive the flange of the drum, which is forced thereon by means of a steel screw and pin, operated by the hand lever shown. A slight pressure of the hand on the lever causes sufficient friction between the flange of the drum and the gear to cause the lifting of from two to sixty tuns, according to the size of the engine.

This machine has been in use by the Department of Docks of this city for the past year, and has been principally employed in pile driving. The raising and letting fall of the hammer is readily effected by manipulating the governing lever. A testimonial signed by the engineer-in-chief of the department expresses satisfaction with the working of the engine, and pronounces the same superior to other devices, in which clutches are used.

The engine has also been used for some time at the marble yards of Messrs. W. B. Smith & Sons, of this city, and we learn from a letter of that firm that a weight of 30 tuns was there easily lowered a distance of 23 feet, with one hand of the engineer managing the lever.

In the construction of boiler and machinery, the best materials are employed, and improved devices by the same inventor added, which increase the general efficiency of the working parts. The boiler is extra large in size, compared with the engine, so as to afford an ample steam supply. In general, the machine is excellently adapted for dock hoisting, pile driving, dock building, and for employment in quarries, mines, warehouses, and similar localities. For further particulars address the patentee, Mr. J. S. Mundy, No. 7 Railroad avenue, Newark, N. J.

Correspondence.

Extinguishing Fires on Shipboard.

To the Editor of the Scientific American:

In view of the inefficiency of the methods at present in use for extinguishing fires on board ship, and particularly in sailing vessels, I propose to make use of carbonic acid gas in a manner which, I believe, has not hitherto been proposed. The plan is to have, in some convenient locality, a flask or flasks, each about 3 feet in length and 1 foot in diameter, containing about 100 lbs. of the gas in a liquid state. From the top or upper side of the flask, a small iron pipe is to be permanently fitted along the water ways (or just under the deck), throughout the entire length of the ship. From this main pipe, at suitable intervals, are branch pipes, at right angles to the main, passing down next the skin, to every storeroom and hold of the ship; so that each compartment of the vessel shall have its own pipe, or pipes, reaching from its bottom to the main pipe at the spar deck. There is to be a cock in the main pipe near the gas flask and one in each branch pipe near the main, any one of which can be turned from the spar deck.

On the alarm of fire, the hatches are to be battened down; the cock in the branch pipe leading to the compartment where the fire is discovered is to be opened, and also the cock in the main next the gas flask. The liquid gas, which is under a heavy pressure in the flask, passes out through the pipe in the form of vapor, as soon as the pressure is relieved by turning the main cock, and is driven in an instant, by the great pressure behind it, to the compartment to which it is admitted. Arrived at this point, and being 1½ times as heavy as air, it fills the compartment from the bottom up, without being diluted with the air, and producing intense cold by its expansion at the same time; while the pressure with which it enters forces it into all interstices in the cargo, driving out every particle of air, which will all escape from the top, as no compartment on board ship is absolutely airtight. Knowing then the cubic contents of any compartment and the cubic space occupied by the cargo in it, sufficient gas can be admitted as to render it absolutely certain that no fire can exist there, without the necessity of opening the hatches to see if the fire is out until such time shall have elapsed as to render it perfectly safe to do so. By shutting the cock in the main pipe, the remainder of the gas is kept from vaporizing until such time as it may be required. On arriving in port, the flask is disconnected from its pipe, and can be refilled in a couple of hours, and then set up and connected in its usual place.

Should no fire occur, the apparatus can remain intact for an indefinite time, except occasionally to see that the cocks are in working order. The liquid is entirely non-corrosive in its character and the vapor is not injurious to any class of cargo; while it is, I think, the only substance that will permanently suppress the most advanced state of combustion in a cargo of coal.

It is, of course, well known that carbonic acid gas is the agent employed in the Babcock extinguisher and others of like nature; but in these the gas is produced on the spot by the action of an acid on marble dust or bicarbonate of soda. The objections to such an arrangement are that the apparatus is somewhat cumbersome and complicated, and the supply of gas is rather limited unless a great number of machines are used. Moreover it must all be expended when once generated; and before a fresh supply can be obtained from any one machine, the apparatus must be cleaned out and the requisite materials rearranged; while in consequence of the moderate and varying pressure of the gas produced, a permanent system of pipes cannot be employed to carry the gas to any great distance from the generator. What I propose is simply to carry on board ship the gas itself in its most condensed form, the liquid, of which 1 lb. is equal to a trifle over 8 cubic feet of pure gas, to be contained in vessels capable of withstanding the great pressure necessary to keep it from vaporizing at any temperature.

U. S. Torpedo Station, F. M. BARBER.
Newport, R. I. Lieut., U. S. N.

Drive Wells in Minnesota.

To the Editor of the Scientific American:

The city of Minneapolis recently purchased two steam fire engines for the protection of property situated beyond the reach of the city water works. A few cisterns for holding a supply of water for the steamers have been constructed, but they are expensive, are liable to leak, and require constant attention. Mr. Winn Buckett, Chief Engineer of the Fire Department, tried the experiment of sinking four drive wells of 2½ inch pipe, situated thirty feet apart or fifteen feet from a center, and brought together at the top, where the suction hose of the engine is to be attached. A trial was made on March 17; the engine threw a continuous stream, from a 1⅛ inch nozzle, to a distance of 185 feet for one hour. When the cap was removed, there was found to be 9 feet of water in the wells, the same amount as when they commenced.

Minneapolis, Minn. C. E. EASTMAN.

Loss of Life at Sea.

To the Editor of the Scientific American:

I see that there has been an official investigation into the loss of the steamer Cospatrick, and according to that report only three out of five hundred were saved. Something of course should be done to avert such calamities; but as long as steamers are built as they now are, there is no remedy. While steamers depend on small life boats to save four hundred or five hundred passengers in case of accident, we must expect what has happened so frequently in the last few years. It is strange that, with all the inventive talent in our country, some plan has not been thought of besides furnishing steamers with life rafts and boats, when it is so easy to make the steamer itself the life boat. There is not a steamer now afloat that could save five per cent of her passengers in case of accident; in fact, we may load the steamer with the best life-saving apparatus now in use, and, in case of accident, a panic follows invariably, and nearly all are lost. Why not build a steamer in which fire, leaks, striking rocks, or going on shore would not endanger the life of a single passenger? In order to do this, the freight and passenger business must be measurably separated, the life steamer carrying only the mails and other safe freight. It may be said that this would not pay; but let the public once understand that it is as safe to cross the ocean as it is to stay at home, the travel would double in less than a year, and the voyage could be made in much less time than now. D. WINER

Lockport, N. Y.

New Cure for Wounds.

To the Editor of the Scientific American:

I wish to publish the following cure for punctured wounds for the benefit of all who may need it:

As soon as such a wound is inflicted, get a light stick (a knife or file handle will do), and commence to tap gently on the wound. Do not stop for the hurt, but continue until it bleeds freely and becomes perfectly numb. When this point is reached, you are safe; all that is then necessary is to protect it from dirt. Do not stop short of the bleeding and the numbness, and do not on any account close the opening with plaster. Nothing more than a little simple cerate on a clean cloth is necessary. I have used and seen this used on all kinds of simple punctures for thirty years, and never knew a single instance of a wound becoming inflamed or sore after the treatment as above. Among other cases, a coal rake tooth going entirely through the foot, a rusty darning needle through the foot, a bad bite by a sucking pig, several instances of file shanks through the hand, and numberless cases of rusty nails, awls, etc.; but I never knew a single failure of this treatment. S. W. HEMENWAY.

Lansing, Iowa.

Government Licenses for Pleasure Boats.

To the Editor of the Scientific American:

I see it stated in your paper that a steam launch or other small steamer, intended and used for pleasure only, is not subject to United States inspection. Last October, I took a launch, 28 feet keel by 6 feet beam, to Florida. On arrival, I was notified not to get up steam until the boat had been inspected. After a delay of ten days or more, the United States Inspectors came to Palatka, and passed the boat. Inspection of hull and machinery cost $25. I was then required to have a regular engineer and also a pilot: cost of license for each, $10. After complying with all the regulations as regards fittings, life preservers, etc., I had hardly room left for myself and gun. I am not alone in this thing. It might be well for parties to know this, so as to save themselves trouble. I have a copy of the United States law, and I do not see how I can get rid of this tax each year.

Titusville, Pa. H. R. LYLE.

Underground Railway at Constantinople.

A telegram from Constantinople announces the opening of the Pera and Galata underground railway. The station of Galata is situated between the Koumrou and Sevoud streets, and that of Pera, which is not yet completed, in the Rue Nadir. The tunnel is ventilated by two shafts, one of which is 80 feet in depth, and the other 65 feet. This railway is worked by a fixed engine, the carriages being hauled by a rope at the rate of 11¼ miles per hour; the trains are run at intervals of five minutes. The difference of level between the two stations is about 200 feet, so that the average gradient is about 1 in 10. It is estimated that the number of passengers carried daily will be 30,000.

The American Railway System.

The total length of the railways in the United States is nearly seventy-five thousand miles, or over three times the diameter of the earth. It would occupy a passenger five months' time, traveling night and day continuously, at an average speed of 20 miles an hour, to go once over all of our railways. At the average speed of the fastest ocean steamers it would require over eight months' time.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to students. M. M.

Mercury.

Mercury was at its greatest elongation west of the sun on the 28th of March, at which time it could be best seen. But it must still be in good position, and will be up to the middle of April, and should be looked for in the early morning.

On the 1st it rises at 4h. 54m., A. M., and sets at 3h. 57m. P. M. On the 30th it rises at 4h. 44m. A. M., and sets at 5h. 58m. P. M.

Venus.

Venus is less brilliant than it has been, and its apparent diameter is smaller; but it is still a very conspicuous object in the morning.

On the 1st Venus rises at 4h. 10m. A. M., and sets at 2h. 42m. P. M. On the 30th Venus rises at 3h. 40m. A. M., and sets at 3h. 38m. P. M.

Mars.

The apparent diameter of Mars is increasing, but it is still very small; it rises very late, and is low in altitude when on the meridian. It may be known by its ruddy light and by being some 18° east of Antares, among the small stars of *Ophiuchus*.

On the 1st Mars rises at 0h. 23m. A. M., and sets 9h. 25m. A. M. On the 30th Mars rises at 11. h. 12m. P. M., and sets at 8 the next morning.

Jupiter.

Jupiter is now the most conspicuous planet, and, notwithstanding its low altitude, is the best situated for observations. Even with a telescope of small power, the movements of the satellites can be followed; and their eclipses, by going into the shadow of the planet, or their disappearance, by being behind the planet, as in occultations, or by passing in front of the planet, as in transit, can be noted. The largest of the moons of Jupiter is the third in distance from the planet. It will not be seen for several hours on the evening of the 5th of April, being behind the planet and in its shadow. On the 9th the second satellite in distance from Jupiter, which is the smallest, will not be seen for some hours of the evening, because it is in transit, or in front of the planet: and only very good telescopes will enable observers to distinguish it from the planet. On the 19th the same will happen in the case of the first satellite, or that nearest to Jupiter. For two hours in the evening it will be between the earth and Jupiter, and seemingly projected upon the face of the planet. On the 27th and 30th similar phenomena can be seen. On the 27th the first satellite is not seen for some hours, being behind the planet, and on the 30th the third is not seen because in front of the planet.

On the 1st Jupiter rises at 7h. 43m. P. M., and sets at 6h. 33m. the next morning. On the 30th Jupiter rises at 5h. 30m. P. M., and sets at 4h. 30m. the next morning.

Saturn.

It is of little use to attempt observations on Saturn at present. It does not rise until morning at the 1st of the month and being far south, the diurnal path is only 10 hours above our horizon.

On the 1st Saturn rises near 4 A. M., and sets at a little after 2 P. M. On the 30th Saturn rises at 2h. 10m. A. M., and sets at 26m. after noon.

Uranus.

Uranus continues to be in good position for evening observers, but requires a good telescope. It is among the small stars of *Cancer*, and can be known from a star by the fact that even a small telescope will show a disk. It rises on the 1st at 1h. 7m. P. M., and sets at 3h. 23m. in the morning. It rises on the 30th at 11h. 13m. A. M., and sets at 1h. 29m. the next morning.

Occultations.

A star is said to be occulted by the moon when it is hidden from us by the orbital motion of the moon, a motion, when the moon is on the meridian, from west to east. When such an occultation occurs before the moon is full, it is a very pretty sight, as the star suddenly disappears behind the dark limb of the moon. Astronomers determine the longitude by observations of occultations.

According to the *American Nautical Almanac*, on the 12th the moon will occult two stars in *Cancer* at 9h. 57m., and at 10h. 43m. Washington time. A small instrument is sufficient to show these stars, as they are not much below the 6th magnitude.

Sun Spots.

The large spot, which was mentioned in the last report as having just appeared, crossed the sun's disk nearly in a line with the equator. Photographs were taken of it on the five days during its passage, showing it to be a large and very black spot, surrounded by a broad and distinct penumbra. On March 17 a large spot appeared in about the same position; and as exactly twenty-seven days had elapsed since the appearance of the other, it is without doubt a return of the same spot. It appears somewhat smaller, and not so intensely black as at its first appearance, but is still very large. It will probably be visible for about twelve days longer. Besides the large spot, several small ones in groups and pairs have crossed the disk during the last month, and faculæ have been observed several times. On the 10th of March two spots, one upon the eastern limb and the other on the western, were seen surrounded by strongly marked faculæ; and remote from any visible spot, a luminous chain of the same appearance extended, from the edge, nearly one third across the disk.

Bronzes Incrustes.

This is the name given to a new style of bronze or copper work ornamented with gold and silver, and manufactured by Christofle & Co., in Paris. The ornamentation is produced by etching and electro-plating, and consists, according to Dr. Meidinger, in the following operations: After the object, which may be of massive copper or bronze, has received the desired form, the drawings are made with water colors, the body of which is white lead. If several pieces are to have the same design, it may be printed on as in porcelain and faience painting. Those portions of the surface not painted are covered with varnish. The article is then placed in dilute nitric acid, whereby the paint is dissolved and the surface of the metal is etched to a certain depth. When the etching is finished, the article is washed with water and immediately placed in a silver or gold bath, and a layer of the precious metal deposited by electricity on the exposed portions. When the latter operation is finished, the varnish is perfectly removed and the whole surface ground or polished, so that the ornamented portion is just even with the remainder of the surface. The contours are quite sharp. The surface is then bronzed, which does not change the color of the gold or silver. A specially fine effect is obtained by producing a black bronze of sulphuret of copper on portions of the surface between the silver ornaments. A copper vessel then has three colors, black and white drawings on a red brown ground of suboxide of copper.

This new process for ornamenting metals has been devised at Christofle's works since the Paris Exposition of 1867. Specimens exhibited at Vienna in 1873 show the high degree of perfection to which it has already been brought. Unfortunately, these goods are so expensive as to be only accessible to the few, although much cheaper than those in which the engraving is done by hand, and the gold or silver inserted by mechanical means. The production of an incrustation requires a high degree of manual skill and patience, but no costly machinery; indeed, every brass foundry contains all the necessary tools for the mechanical operations.—*Iron.*

THE STORAGE AND HANDLING OF FLUIDS.

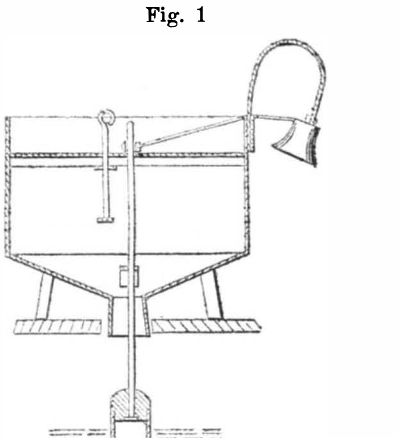
We propose, in this and in subsequent issues, to lay before our readers, from time to time, short articles descriptive of a large variety of mechanical tools and apparatus now in use in the industrial arts and processes. These papers will be illustrated by a series of excellent engravings, selected from the pages of Mr. G. H. Knight's "American Mechanical Dictionary," a very valuable and exhaustive work, which has for a long time been in preparation, and which has just been issued from the publishing house of Messrs. J. B. Ford & Co., in this city. The advantage of our proposed plan to the reader is that, besides his attention being called to a large number of very useful inventions, he will find the same presented in connected form. That is to say, instead of his being obliged to run over a whole volume to collect the component portions of a certain process, series of processes, or operations upon like articles, all will be carefully gathered together, arranged in an interesting and instructive group, and accompanied by explanation, as a rule, much more compendious than necessarily could or does exist in the original work. The subjects are not all new or novel inventions, and many of those described are in actual employment. For this reason, however, they are none the less interesting to the generality of readers unacquainted with each special branch of art or trade, while, at the same time, they become especially useful to inventors, as indicating the present status of any industry or any species of mechanism or process, upon which improvements or in which discoveries may be meditated.

Subjects as far as possible will be treated and grouped under general headings as pertaining to the shop, to the household, and to various callings. In some cases, which can be brought under no definite head, articles relate to each other will be arranged together in connected form. We begin with operations relating to the preservation of fluids; and from the various paragraphs in the dictionary before us on such subjects, we select the most interesting illustrations relating to bottling and kindred topics.

ALARM FUNNEL.

A useful apparatus, which gives warning when the liquid in a barrel has risen to a certain point (in filling), will be found in Fig. 1, which is an alarm funnel, The funnel being placed

Fig. 1



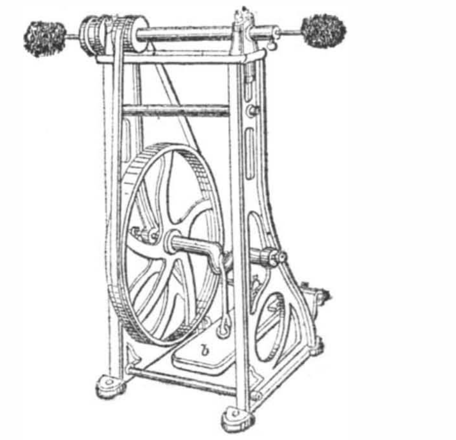
Alarm Funnel.

over the bung hole of the barrel, the liquid raises the float which, in turn, detaches the button in the upper casing from a stop. This frees the spring of the alarm bell, causing the latter to ring.

BOTTLE CLEANING.

For this purpose a bottle brushing machine is shown in Fig. 2. The brushes, fixed on a rotating shaft, are insertep

Fig. 2.



Bottle-Brushing Machine.

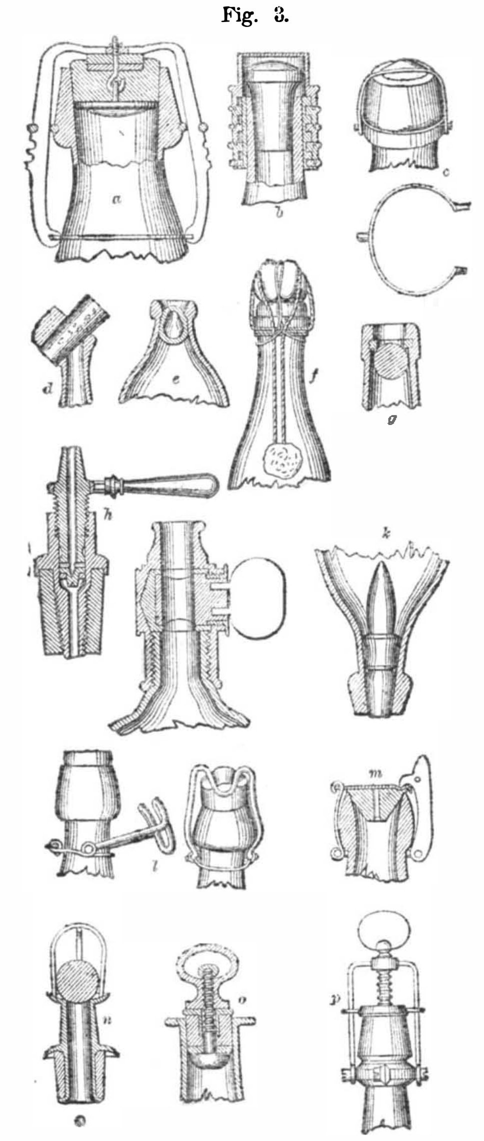
into the bottles, and rotation is imparted to them by means of the treadle, *b*. The operator can take one bottle in each hand, and thus cleanse two at once.

In Fig. 3 is represented a variety of

BOTTLE STOPPERS—SUBSTITUTES FOR THE ORDINARY CORK.

In diagram *a*, the stopper is attached to a bail. Spring arms, which are permanently fixed in an annular recess in the

Fig. 3.



Bottle-Stoppers.

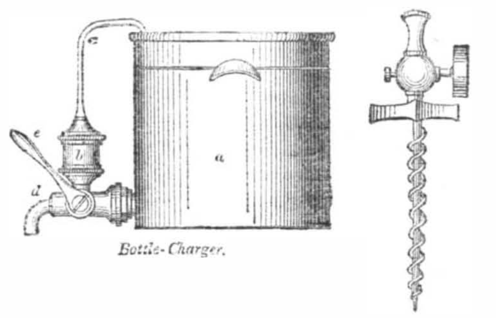
swelling of the bottle neck, catch into notches of the bail and hold it and the stopper securely in place. Diagram, *b*, shows a permutation lock, which is set on a given combination and serves to hold a cap over an ordinary cork or similar stopper. In diagram, *c*, a ring, represented separately, is divided so as to be easily slipped around the neck of the bottle. This carries a hinged bail which is forced over the cork. A peculiar-shaped bottle is required in diagram, *d*, the opening through the neck of which is diagonal. The pressure of the gas is upon the side of the cork, and does not tend materially to expel it. The cork may be ejected with a push, without a corkscrew. Diagram, *e*, represents a simple rubber ball driven by the pressure of gas inside the neck. It is removed by the pressure of a rod when it floats upon the liquid. The mode of tying champagne corks is represented in *f*. Diagram, *g*, is similar to *e*. The neck of the bottle is molded with an interior annular recess, filled by a packing ring against which a glass ball is sustained by pressure of the gas. The screw faucet in diagram, *h*, has a packing against its lower end, and is depressed into a seat. Another locking device is shown in *i*, which represents a simple one-way cock, opened by a key made to fit its indentations. Diagram, *k*, shows a glass rod which carries a packing around its enlarged head. One of its tapering ends guides it into the neck of the bottle, where it is held, when the latter is turned upright by the pressure of the gas. The stopper shown in *l* is a hinged wire bail, bent into U form so as to be swung up on to the cork while the same is held by the plunger of the bottling machine. Two views of this device are given. In diagram, *m*, a rubber stopper hinged on one side is held on the other by a simple metal catch, secured to a ring which encircles the neck. Another arrangement of a glass ball, very commonly used, is represented in *n*. The ball is restrained from falling off when the bottle is tilted by a cage. In diagram, *o*, a stopper of rubber is compressed between two disks which are brought together by a screw, and thus expanded against the inside of the neck; and in *p* a bail is hinged by a collar around the neck, and is provided with a screw which compresses a rubber-faced cap

Fig. 4 shows a

BOTTLE CHARGER

for charging bottles with a liquid under pressure, as, for instance, with air containing carbonic acid and with a graduated amount of sirup. *a* is the vessel containing the aerated water, *b* the sirup cup, *c* a pipe equalizing the pressure in the

Fig. 4.



Bottle-Charger.

vessels, *a b*. The size of the opening leading from the cup, *b*, to the nozzle, *d*, is adjustable, and *e* is the handle of the faucet, by which the liquid is discharged. Beside Fig. 4 is given a simple form of bottle faucet, the hollow stem of which is threaded. The latter is forced in through the cork. The device serves as a useful means for drawing soda water or other effervescent fluids.

That Odious Postal Law.

Complaints reach us from all directions at the act of our late Congress in imposing upon the people the new postal law, increasing the tax upon publishers, seedsmen, merchants, and all others having occasion to send newspapers or small parcels to their friends and customers. The nearest express offices to the homes of the majority of persons residing in the country are three to five miles distant, and the carrying of transient matter, newspapers, seeds, plants, books, and other light parcels through the mails is a great convenience, and a saving of time and trouble to many. The delivery by the post office in rural districts is quicker and more certain than by express, particularly to persons not generally known.

The public generally are aware that the last session of Congress made a partial revival of the franking privilege. Somebody must pay the Congressman's postage. So the same Congress which put a free frank on the public documents, which nobody reads, raised the price of postage on all transient newspapers, books, etc., one hundred per cent. This now prevents the people from sending many articles by post, and forces that traffic into the express offices, in whose interest the law, at the last hours of Congress, was enacted; and it withdraws from the postal revenue a large portion of its former receipts. The indignant public will have to wait till next meeting of Congress before relief can be afforded them, when we expect to see such amendments made as will reduce the rate of postage on newspapers and small parcels lower than it has ever been.

Models by Mail.

Persons sending models or other articles by mail should not be unmindful that the full postage of one cent an ounce, instead of one cent for two ounces, as formerly, must be prepaid at the office when mailed, to insure the sending. If a model is sent in a box, the cover must not be nailed or screwed to the sides; if sent in a paper or cloth wrapper, the bundle must not be pasted, sealed, or otherwise secured so that the officials cannot readily examine the contents by simply cutting or unfastening a string. In New York and other large post offices, there is a special department for examining all parcels on which postage has been paid on what is known as Third Class matter; and if any writing is found concealed, or if the package is so made up that these officials cannot readily gain access to the contents, full letter postage is demanded on the entire weight.

Free Lunch Suspended.

In consequence of the increase of postage and the necessity of prepayment, we are obliged to decline sending odd numbers or specimen copies of the SCIENTIFIC AMERICAN free, as has been our custom for a quarter of a century.

Hereafter persons desiring specimens or any special numbers of the paper will please to remit, for each copy ordered, ten cents.

NEW subscribers to the SCIENTIFIC AMERICAN will hereafter receive the papers from the time of our receiving the order, unless they specify some other date for commencing. All the back numbers from the commencement of the volume (January 1) may be had if requested at the time of sending the order, or on request, after receipt of first number.

PARIS EXHIBITION, 1875.—An International Exhibition, in which great prominence will be given to all matters connected with marine and river industries, is to be held in Paris, from July to November next. The building selected is the well known Palais de l'Industrie, in the Champs Elysées, where the Exhibition of 1855 took place.

IMPROVED CIRCULAR SAW TABLE.

There are two excellent improvements in the saw table represented in the illustration, which will at once bespeak for it the favorable consideration of woodworkers. The first is the simple and novel mode of raising and lowering the saw, and the second the system of squares and gages by means of which work can be cut to exact lengths, squared, or beveled without previous lining or marking. Besides these advantages, which are essentially prominent, there are others of nearly equal importance, among which may be especially noted the means of adjusting the table to a bevel, and the mounting of the saw mandrel so that it runs without jarring or rattling. A perspective view of the machine is represented in the engraving.

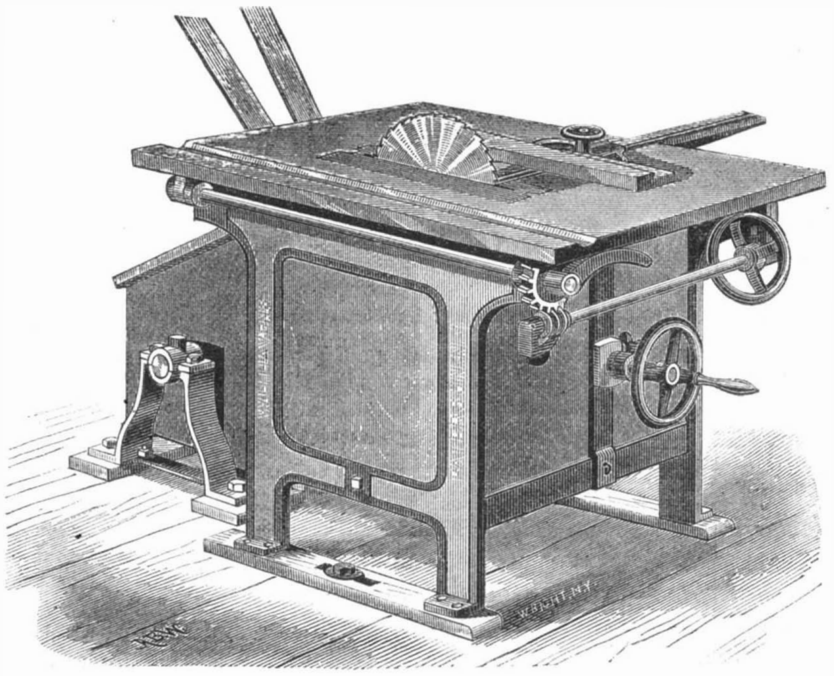
The saw blade is attached to a mandrel, which is journaled in an inclined frame. The latter, with a horizontal frame beneath, forms a kind of bell crank, with which a vertical toothed segment is connected. In the teeth of said segment engages a worm, which is rotated by means of the hand wheel shown in the side of the machine. The effect of turning the segment is to cause the upper part of the bell crank frame to slide down or up inclined ways, and thus correspondingly to move the saw. This mechanism is in a compartment partitioned off from the space immediately beneath the saw, so that the dust does not come in contact with the working parts to clog them. The driving pulley is on the saw mandrel; and as the latter is moved up or down, the belt is maintained uniformly tight.

The aperture in the iron table for the saw is lined with detachable pieces of wood, so that all danger of the teeth coming in contact with the metal is obviated. The bearing of the mandrel to the frame contains Vs, which, entering one within the other, prevent sideways motion and rattling. The blade is readily removed from the end of the mandrel, the latter being steadied by a wrench passed down through a small aperture in the table, and grasping a nut portion of the mandrel.

The hand wheel and shaft shown in front and under the edge of the table operate a worm which, engaging in segments, raises arms from a horizontal to an upright position. These carry the side of the table up with them, and thus dispose the latter for cross beveling. On the surface of the table will be noticed a longitudinal groove; another channel of somewhat different section is also provided at right angles to the plane of the blade. These serve to hold the squares and gages by which the work is adjusted to the saw. A flat piece of iron slips into the longitudinal groove, and to it is attached at right angles a straight edge. Against the latter the side of the board is placed, and the work is thus brought squarely up to the saw. The gage which traverses the other channel has a V which enters one part and a nut which slips into another portion of dovetail section of the groove. By turning a clamping wheel the nut is caused to bind, and thus to hold the gage at any desired point. The upper portion of the metal part of the device has an opening into which a high or low gage may be fastened by a simple wedge attachment; a bevel gage, tenoning machine, or any other suitable fixture may be quickly inserted and held. Other simple attachments in the grooves at once convert the device into an excellent miter table.

From our examination of the machine in operation, we believe that its use will tend to save both time and material, while ensuring accuracy in work. It will saw fillets or corner pieces, large or small, with rapidity, cut the edges of logs and ends of cants of any circle to a joint, saw chipping pieces with edges beveled at the same time, saw up or cross cut from the least draft on a pattern to an acute angle in very many kinds of work, and prepare the same ready to put together. For pattern makers, cabinet makers, carpenters, organ and stair builders, the machine is especially useful. It will cut up stair steps, drawer stuff, etc., into exact lengths with square ends, and will miter the ends of risers. For shelving, desk, and similar work, a dado head may be substituted for the saw, when the machine will groove crosswise the stuff with perfect accuracy, and without lines of measurements after the first cut.

This machine is the invention of Mr. W H. Havens, of 132 Broadway, Paterson, N. J., to whom letters for further particulars may be addressed.



HAVEN'S CIRCULAR SAW TABLE.

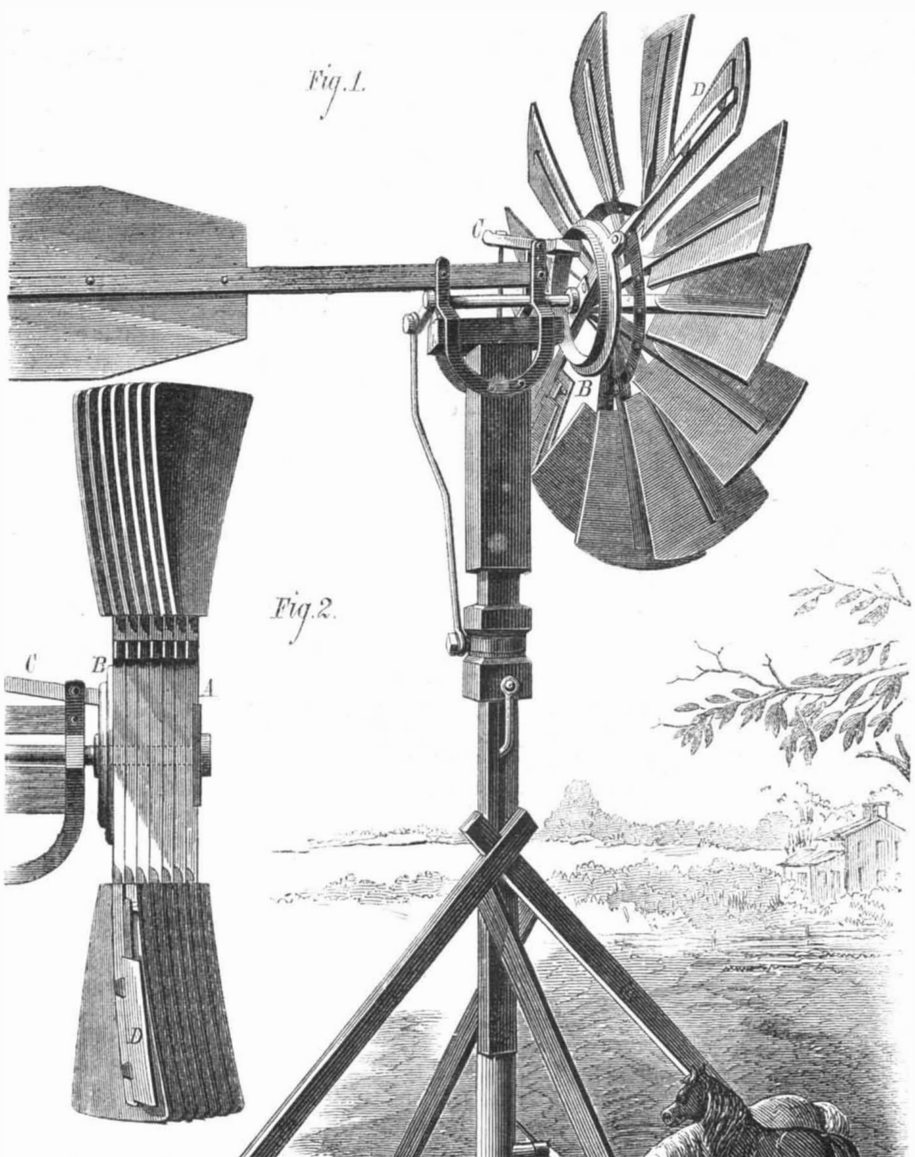
IMPROVED WINDMILL.

The novel windmill represented in the annexed engraving is from its simple construction and capability of self-adjustment, according to the strength of the wind, excellently suited for raising water for cattle, supplying water to houses, driving churns and other agricultural machinery, or to perform a number of the various duties for which a cheap and light motor may be required. The new features to which attention is directed are the mode of connecting the arms bearing the sails, so that an excess of wind tends to fold up the latter, and also a brake wheel, whereby the motion may be retarded.

The engraving shows the manner of constructing the device for adaptation to farm purposes; and on the left, the arms are represented as folded. In the latter figure the outer arm, A, alone is connected rigidly to the shaft, the other arms being free to revolve thereon. The sails, however, near their extremities, are connected by leather straps which allow the wheel to spread out only to its full size. The rear end of the shaft has a crank arm, and this communicates with the pump rod. On the rear of the rear arm the brake wheel, B, is secured, in contact with which is the pivoted brake, C, governed by a rod leading down the standard, which supports the box for the shaft. The tail board serves, in the ordinary manner, to cause the wheel to turn in whichever direction the wind may be blowing. When the wheel begins to revolve, and power is thus applied to the crank arm, the front arm, A, being rigidly fixed to the shaft, is retarded. The other arms, however, are free to spread out and complete the wheel, transmitting all their power through the straps to the front arm, A.

In order automatically to govern the speed in case of storms, the auxiliary wing, D, is applied to a sail of the rear arm. This wing is slightly held by a spring, and opens out when the wheel is in high motion, so as to form a plane at right angles with the sail proper, thus retarding the movement sufficiently to fold the wheel but not to stop the same. To obtain very slow motions, the brake is employed as already indicated. A weight on the end of the brake rod may be employed to hold the wheel when the latter is not required to revolve; or instead of the weight, a float may be used, resting on the water in the well, and so arranged as to allow the wheel to pump only a certain quantity of water before the brake is put on.

The device was patented May 5, 1874, by Mr. Elijah S. Smith, of Good Hope, McDonough county, Ill., who may be addressed for further particulars relative to sale of rights, etc.



SMITH'S IMPROVED WINDMILL.

Animal Wonders.

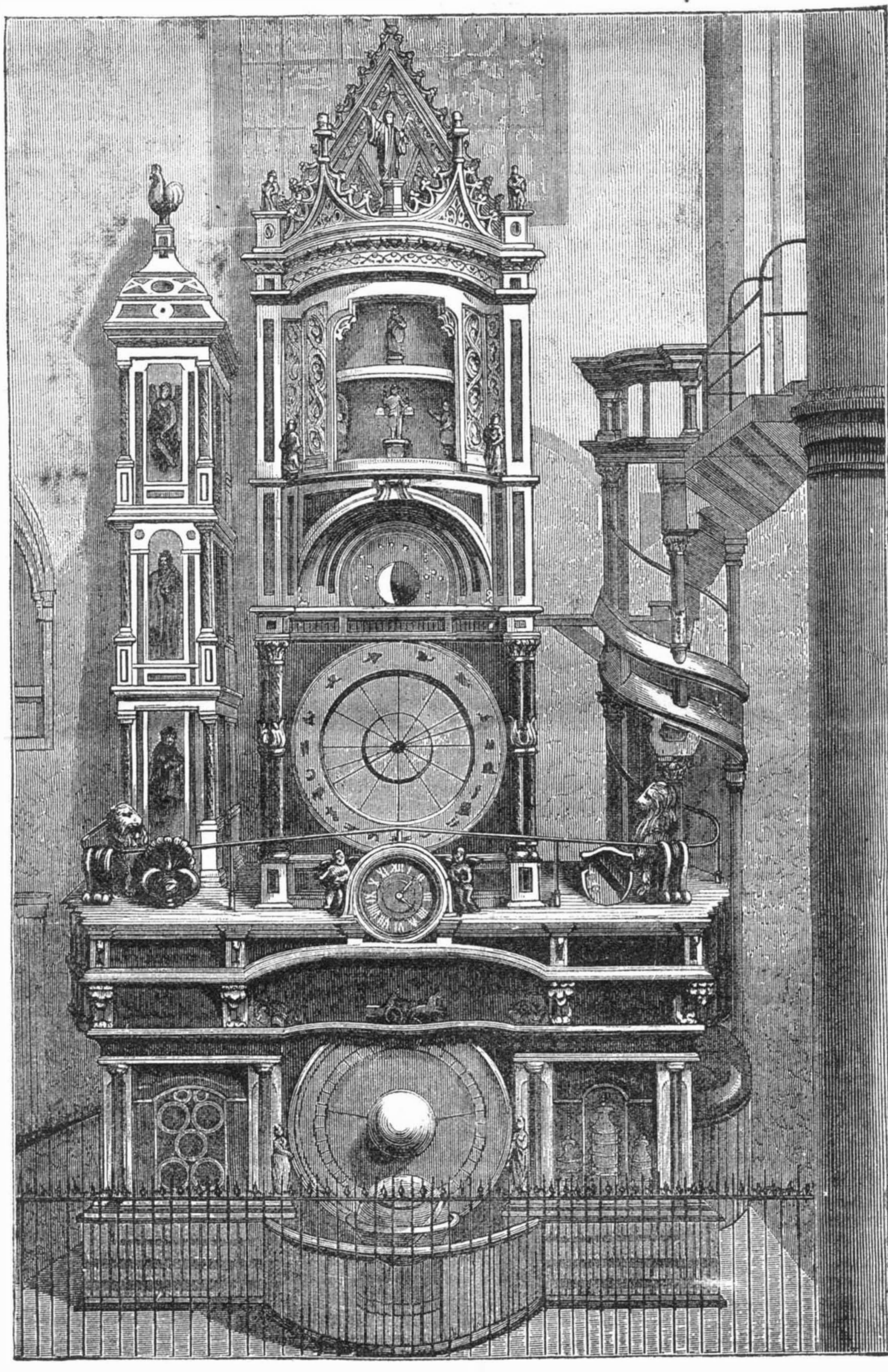
In each grain of sand, there are marvels; in every drop of water, a world. In that great spectacle called Nature, every being has its marked place and distinct *rôle;* and in that grand drama called life, there presides a law as harmonious as that which rules the movement of the stars. Each hour removes by death myriads of existences, and each hour produces legions of new lives. The highest as well as the lowest created organism consumes carbon and water to support life and its duties, and it is not uninteresting to glance at the food, the habits, and the ways and means, peculiar to some of the inferior animals. From their petrified ejections we know what such fossilized reptiles as the plesiosaurus, etc., are, and may some day be able to discover the fish and crustacea they hunted down. Animals, when not living by their own respectable efforts, are either parasites or dependents; many would seem to have positive trades, or are connected with branches of industry. There are miners, masons, carpenters, paper manufacturers, and weavers, lacemakers even, all working first for themselves, and next to propagate their kind. The miners dig into the earth, form natural arches and supports, remove the useless soil: such as the mole, the chinchilla of Peru, the badger, the lion ant, as well as certain worms and molluscs. The masons build huts and places according to all the rules of architecture, as the bees and tropical ants: there are fish that construct boats that the waves never can upset, and Agassiz has drawn attention to a fish which builds its nest on the floating sea weed in the middle of the ocean, and deposits therein its eggs. The wasps of South America fabricate a sort of paper or pasteboard. Spiders are weavers as well as lacemakers; one species constructs a diving bell, a palace of lace. When the astronomer has need of the most delicate thread for his telescope, he applies to a tiny spider. When the naturalist desires to test his microscope, he selects a certain shell of a sea insect, so small that several millions of them in water could not be visible to the naked eye, and yet no microscope has yet been made sufficiently powerful to reveal the beautiful variegated designs on the atomic shells! Aristotle remarked, and he has since been corroborated, that a variety of plover enters the crocodile's mouth, picks the remnants of food off the animal's tongue and from between its teeth. This living toothpick is necessary, as the tongue of the crocodile is not mobile. The Mexican owl, when enjoying a siesta, puts itself under the guard of a kind of rat, that gives the alarm on the approach of danger. Parasites are everywhere, depend on no peculiar condition of the body, and are as abundant in persons of the most robust as of the most debilitated health. They are at home in the muscles, in the heart, in the ventricles of the brain, in the ball of the eye. They are generally either in the form of a leaf or a ribbon, and are not necessarily, as was once supposed, confined to a special animal. The parasites of fish have been detected living in the intestines of birds; and there are some that, for the purpose of development, must pass into the economy of a second animal.

THE removal of foreign substances from the ear may be often accomplished by doubling a horse hair in the form of a loop, and, placing the patient upon the side, passing the loop into the ear as far as it will go, then turning it gently. The substance will generally come out in the loop after one or two withdrawals. The application will do no damage if the hair be carefully used

STRASBOURG CATHEDRAL AND ITS CLOCK.

We publish a view of the interior of the celebrated cathedral at Strasbourg, a city which suffered the horrors of bombardment in the late war between France and Germany; but the cathedral enjoyed almost complete immunity, and the renowned clock altogether escaped injury.

The view is taken from the north aisle, looking across the nave into the south transept. The great flight of steps in the foreground leads up into the choir, under which is a crypt, the most ancient portion of the existing edifice. In the south transept are seen the upper part of the clock and the celebrated Angel Column, a beautiful example of thirteenth century sculpture. The clock was completed in four years by Herr Schwilguè, to replace the one constructed in 1570, which had been itself preceded by the clock of Bishop Berthold. The maker of the first clock, according to the legend, was blinded by his fellow-townsmen lest he should construct a similar work for some other city. The second clock was designed by Conrad Dasypodius, Professor of Mathematics at Strasbourg, in conjunction with the Brothers Habrecht, mechanicians of Schaffhausen. The decorations of the case were due to the painter Tobias Stimmer, a native of the same town. This clock stopped in 1789, and in 1838 Herr Schwilguè undertook the task of restoration. The mechanical part of his work is completely new, and far superior to that of his predecessors. The old decorations and the general design of the former clock have as far as possible been preserved. The whole consists of an edifice of three stories, with a tower to the left, in which the weights are contained. In front of the bottom story is a celestial globe adjusted for the latitude of Strasbourg, and behind it a perpetual calendar with a dial in the center, on which the eclipses of the sun and moon are calculated. On either side are compartments giving the Dominical letter, the solar and lunar cycles, the true and mean time, etc. Above is the clock dial with two genii, one of whom strikes the first note of the quarters while the other marks the hour by inverting a sand glass. In the second story is an orrery on the Copernican system, a dial plate on which the phases of the moon are depicted in black and gold, and the group of the four ages of man, one of whom strikes the second note of each quarter, while Death in the center marks the hour. Above these in the third story the Savior waves the banner of redemption and blesses the twelve Apostles, who pass before him every day at noon, after which Death strikes the hour, the Genius below inverts his glass, and a cock upon the weight tower crows thrice in memory of the temptation of St. Peter. The procession of the puppets is as great an attraction to ordinary tourists as is the complicated mechanism of the works to scientific visitors.



INTERIOR OF THE CATHEDRAL AT STRASBOURG.

Bronzing Cast Iron.

By the process of Gaudion, Mignon, and Bouart, of Paris, the copper is said to be thoroughly adherent to iron; there is nothing between the two metals; and they are so completely united that, if an accident happens, the cast iron will sometimes scale off with the copper. It is said, moreover, that the deposit of copper is perfectly even, not thicker on salient parts than in hollows or under cuttings. A number of large statues have been covered with copper at Val d'Osne, and among other works, two bulls, larger than nature, presenting each a surface of at least one hundred and thirty-two square feet, and on vases, candelabra, and decorative castings of all kinds, and with invariable success. Some of these objects have been exposed to the air during one summer and two winters without suffering any injury. The copper deposited on the works is never less than 1-100 of an inch in thickness. The cost of the works is not more than doubled by this application, and the copper, when carefully treated by a French bronzist, presents an appearance very little inferior to true bronze. The same process is applicable to the tinning of copper or cast iron vessels, the adherence of the two metals is complete, and the coating of tin may be laid on any desirable thickness. The process consists in first scouring and then dipping the articles that are to be coppered into a bath of melted chloride or fluoride of copper and cryolite, to which chloride of barium is added.

Saving is Wealth.

One great cause of the poverty of the present day, wisely says an exchange, is a failure of our common people to appreciate small things. They do not realize how a daily addition, be it ever so small, will soon make a large pile. If the young men and women of today will only begin, and begin now, to save a little from their earnings and plant it in the soil of some good savings' bank, and weekly or monthly add their mite, they will wear a happy smile of competence when they reach middle life. Not only the desire but the ability to increase it will also grow. Let clerk and tradesman, laborer and artisan, make, now and at once, a beginning. Store up some of your youthful force for future contingency. Let parents teach their children to begin early to save. Begin at the fountain head to control the stream of extravagance—to choose between poverty and riches. Let our youth go on in the habits of extravagance for fifty years to come as they have for fifty years past, and we shall have a nation of beggars, with a moneyed aristocracy. Let a generation of such as save in small sums be reared, and we shall be free from want. Do not be ambitious for extravagant fortunes, but seek that which it is the duty of every one to obtain—independence and a comfortable home. Wealth, and enough of it, is within the reach of all. It is obtained by one process, and one only—saving.

Oil Fuels.

At a recent meeting of the Scientific and Mechanical Society, at Manchester, England, a paper on the "Combustion of Oils for the Generation of Steam," was read by Mr. Wm. Gadd, who said: "My special object is to describe to you an apparatus, which I believe successfully accomplishes the purpose, and from the use of which I hope to render the combustion of oils for the generation of steam a practical reality.

"The means employed in this method are of almost the simplest character possible, and consist of, first, an open vessel, by preference flat-shaped, composed of cast iron or fire clay, or any other suitable material, which is placed upon, and covers, the fire bars in any ordinary furnace. In and upon this vessel are formed projections, of a conical or other shape, as many as are found to be necessary; which projections have holes passing completely through them, so as to allow of a free passage of atmosphere, for the supporting of combustion in all parts of the fire or flame. A range of steam pipes of small dimensions (half inch gas pipes are quite sufficient) is laid along the bottom of this vessel, having fine holes pierced therein, at the required intervals, for the emission of numerous small jets of steam. This range of pipes is put in communication with the boiler, and regulated by means of a valve, or stop tap. Another pipe is in communication with the cistern or reservoir of oil, and another with the water supply. The oil supply is made self-acting by means of a ball tap, which gives at once mechanical stoking of the simplest and most perfect character possible.

"Upon proceeding to start this apparatus, I first let into the vessel a little water, and then as much oil as will nearly bring the liquid to the top of the range of steam pipes, or, in other words, to the depth of three eighths or half an inch; but either a greater or less depth will act about equally as well. I then light the oil, and when it is fairly started I turn on the steam; and according to the force and quantity will be the intensity of the flame produced, giving a very perfect combustion at all pressures. Of course, in starting a boiler when cold, it becomes necessary to borrow steam from another boiler for a short time, or to raise a few pounds of steam at the expense of a little smoke. The use of the water, which to some may seem strange, is of great service with the very heavy hydrocarbons, in assisting to produce perfect combustion, and acts, as far as I can ascertain from prolonged observation and thought, in this way: The oil being the heaviest substance, the water rises to the top, and thus retards the combustion of the oil, until it escapes through the water in the form of gas, or at any rate until it assumes a much lighter form than it originally had; furthermore, the constant influx of atmosphere to all parts of the flame, produced by the action of the steam, has such a cooling effect on the surface of the liquid as to prevent the same from boiling, no matter how hot it is above. This retardation, I believe, assists very much the economical consumption of the fuel. But with some oils the water is not needed. In fact, the particular details of this method may be varied according to the character of the oils desired to be used. Thus I find it capable of adaptation to the light, as well as to the heavy, hydrocarbons.

"My experiments, as yet, have not been made on such a scale, or for a sufficiently protracted period, to enable me to give you any tables or exact calculations, either as to temperatures under the various conditions, or the evaporative capabilities of the fuel. But I will give you one clearly determined result, which was obtained in the open air, without the aid of a flue or draft, and which will enable you to form an approximate idea of the value of these fuels used in this manner. A quart of oil, the cost of which was a little under one cent, was put into the vessel along with water, and lighted, and, by means of the steam jets, was caused to produce a flame 3 feet long by 2 feet 3 inches wide, and 3 feet high, which continued to burn fiercely, at those proportions, for very nearly thirteen minutes, Now you will readily form a notion of the amount of flame, and the length of time it will burn, which can be derived from the combustion of a quantity of coal purchasable by one cent.

Useful Recipes for the Shop, the Household, and the Farm.

In hardening and tempering steel, a clean charcoal, anthracite, or coked bituminous coal fire is required; such as is fit for taking a welding heat on iron is entirely unfit for hardening purposes. The sulphur contained in the coal combines with the steel to form sulphuret of iron, and ruins its texture.

The employment of cyanide of potassium in electroplating and other arts often results in painful ulcers on the hands of the workmen. Protosulphate of iron in fine powder, rubbed up with raw linseed oil, is the best remedial application.

When a cork gets pushed down into the neck of a bottle, insert a loop of strong twine and engage the cork in any direction most convenient. Then give a strong pull, and the cork will generally yield sufficiently to be withdrawn.

In case a finger ring becomes too tight to pass the joint of the finger, the finger should first be held in cold water to reduce any swelling or inflammation. Then wrap a rag soaked in hot water around the ring to expand the metal, and lastly soap the finger. A needle threaded with strong silk can then be passed between the ring and finger, and a person holding the two ends and pulling the silk, while sliding it around the periphery of the ring, will readily remove the latter. Another method is to pass a piece of sewing silk under the ring, and wind the thread in pretty close spirals and closely around the finger to the end—that below the ring—and begin unwinding.

The easiest way to hold pearls, in order to drill or otherwise cut them, is to fit them loosely in holes bored in a piece of wood. A few drops of water sprinkled about the aperture cause the wood fibers to swell and hold the gems firmly. When the wood dries, the pearls fall out.

The best mode of oiling a belt is to take it from the pulleys and immerse it in a warm solution of tallow and oil; after allowing it to remain a few moments the belt should be immersed in water heated to 100° Fah., and instantly removed. This will drive the oil and allow all in, and at the same time properly temper the leather.

A simple and usually successful mode of extracting a a needle or any piece of steel or iron broken off in the flesh is accomplished by the application of a simple pocket magnet. An acquaintance of ours had a little daughter who recently broke a needle off in her hand. A surgeon was called, who made several efforts to find the needle by probing and incision, but without success. After the surgeon had left, he mother conceived the idea of trying a magnet; one was procured, and after one or two applications of it the broken fragment of needle was discovered attached to the magnet. This idea will be of especial utility to workers in iron. Machine shop surgery is not the most delicate nor least painful, though men heroically undergo it rather than stand the loss of time due to an inflamed eye or festered finger. Iron filings have a way of imbedding themselves in the eye, which defies almost every ordinary means for their extraction. For their removal, a small, blunt, pointed bar of steel, well magnetized, will be found excellent, and we should recommend that workmen liable to such injuries keep such an instrument about them. It would be a good plan to insert such a bar in a penknife, in a manner similar to a blade.

An easy method of breaking glass to any required form is by making a small notch, by means of a file, on the edge of a piece of glass; then make the end of a tobacco pipe, or a rod of iron about the same size, red hot in the fire, apply the hot iron to the notch, and draw it slowly along the surface of the glass, in any direction you please; a crack will be made in the glass and will follow the direction of the iron. Round glass bottles and flasks may be cut in the middle by wrapping round them a worsted thread dipped in spirits of turpentine, and setting it on fire when fastened on the glass.

To clean and restore the elasticity of cane chair bottoms: Turn the chair bottom upward, and with hot water and a sponge wash the cane; work well, so that it is well soaked; should it be dirty, use soap, let it dry in the air, and it will be as tight and firm as new, provided none of the canes are broken.

Guns and rifles may be easily cleaned from lead by the following: If a muzzle-loader, stop up the nipple or communication hole with a little wax, or if a breech-loader insert a cork in the breech rather tightly; next pour some quicksilver into the barrel, and put another cork in the muzzle, then proceed to roll it up and down the barrel, shaking it about for a few minutes. The mercury and the lead will form an amalgam, and leave the barrel as clean and free from lead as the first day it came out of the shop The same quicksilver can be used repeatedly by straining it through washleather; for the lead will be left behind in the leather, and the quicksilver will be again fit for use.

All light woods may be dyed by immersion. A fine crimson is made as follows: Take 1 lb. of ground Brazil, boil in 3 quarts of water, add ½ oz. of cochineal, and boil another half hour; may be improved by washing the wood previously with ½ oz. saffron to 1 quart of water; the wood should be pear wood or sycamore. Purple satin: 1 lb. logwood chips, soak in three quarts of water, boil well an hour; add 4 ozs. pearl ash, 2 ozs. powdered indigo. Black may be produced by copperas and nutgalls, or by japanning with two coats of black japan, after which varnish or polish, or use size and lampblack previous to laying on japan. A blue stain: 1 lb. of oil of vitriol put in glass bottle with 4 ozs. indigo; lay on the same as black. A fine green: 3 pints of the strongest vinegar, 4 ozs. best powdered verdigris (poison), ½ oz. sap green, ½ oz. indigo. A bright yellow may be stained with aloe; the whole may be varnished or polished.

A good way to clean black kid gloves is to take a teaspoonful of salad oil, drop a few drops of ink in it, and rub it over the gloves with the tip of a feather; then let them dry in the sun.

The White Streak in Silk.

For a number of years the silk manufacturers of this country have been troubled by the appearance of what is commonly called a "white streak" in dyed silk. This name describes the appearance about as well as any other term we can apply, and has been adopted for lack of any more positive information respecting it. It makes its appearance, principally, on black silk after it has been wound on the spools ready for use on the sewing machines. It is not however confined to black machine twist, but is visible in many of the other dark colors.

It has the appearance of a slight roughness or fuzz on the side of the thread as it lies on the spool. It is invariably white and easily recognized, especially when it occurs in the black silk. We, as manufacturers, have not been exempt from this troublesome difficulty. The combined talents of the silk manufacturers and dyers in this country have been employed during the last few years to discover some method of overcoming the white streak, either by varying the process of manufacture, or by covering it in the dye. As yet all efforts have failed to be completely successful. Various theories have been proposed to account for its appearance; much time and money have been spent in the study of the question, without arriving at any certain knowledge concerning it.

Some manufacturers believe that it is due to carelessness during the process of dyeing: that the silk is not thoroughly washed from the soap suds in which it is boiled, leaving particles of soap adhering to the silk. Others stoutly affirm that it is due to the dead wood which the silk takes on as it passes over the wooden rollers of a machine known as the stretcher.

The Nonotuck Silk Company's present theory is that the streak is due in some way to the process of adulteration to which the silk is subjected as it is wound on to the reel from the cocoon. They think it possible that the cocoons when wound may be soaked in warm water to which a quantity of rice starch has been added, thus making a kind of rice water or thin paste, which the silk takes up as it is wound, thus adding a cheap weighting material to the silk.

That this theory does not account for the appearance of the streak is evident; since some of our brands of silk, we are confident, are perfectly free from any adulteration, but yet the streak occurs abundantly in them. A careful examination with the microscope and chemical reagents, for the purpose of obtaining some definite idea of its nature, soon settled the fact that it is a vegetable substance of some kind; but exactly of what nature, I was unable at once to determine. This slight clue enabled our dyer to apply a dye that would partly cover it. This new process of dyeing, however, was attended with many objections. It was more expensive, while it took a much longer time to dye the silk. Our greatest objection to this method of dyeing was that it increased the weight of the silk with the dye stuff, thus injuring its quality, and affecting its strength. We could ill afford to sacrifice the strength of the silk for the sake of covering the streak, so we sought to avoid the difficulty by using another brand of silk. I finally became convinced by careful examination that it was of the nature of a parasite, or a fungus growth on the raw silk. All of my researches tended to confirm this theory.

I have lately submitted samples of the streak, which were found both in the raw silk and in the dyed silk, to Professors Verrill, Eaton, and Johnson, of Yale College, New Haven, who all confirmed the theory of its being a fungus growth on the silk. An eminent naturalist of Boston, whom I consulted on the subject, also confirms the theory, and thinks that we may find that this growth is connected with the disease with which the silk worms of Europe have been troubled for so long a time.—*C. A. Burt, Oneida Circular.*

DECISIONS OF THE COURTS.

United States Circuit Court.--District of Massachusetts.

PATENT LATHE.—SPRING *et al.* *vs.* PACKARD.—SAME *vs.* HOWARD.

[*In equity.—Before* LOWELL, J.—*October*, 1874.]

LOWELL, J.:

The plaintiffs are the inventors and owners of a valuable and ingenious improvement in Lathes for Turning Irregular Forms, for which a patent was issued to them in May, 1859, but which they testify was completed in the summer of 1857. They describe the machine with fullness and accuracy in their specification. Its principal application was intended to be, and is, for turning sewing machine needles and similar articles, which are to be brought to a point; and the claim is for—

The combination of a griping chuck, by which an article can be so held at one end as to present the other free to be operated upon, with a rest preceding the cutting tool, when it is combined with a guide cam, or its equivalent, which modifies the movement of the cutting tool, all operating together, for the purpose set forth.

There is no doubt, upon the testimony, that the plaintiffs were original and meritorious inventors of an improvement over the machines then in general use for turning sewing machine needles. But a machine was brought forward by the defendants, which one Pernot swears he made in New York in 1853, and operated there for thirteen consecutive years in turning needles in great quantities, for several of the principal manufacturers of sewing machines, and which appears to contain all the elements of the plaintiffs' combination, working together in the same way, and producing the same results. The dates are proved by Pernot and by another witness, and corroborated by circumstantial evidence, and might have been disproved if untrue, because the manufacturers could have testified concerning the needles which they are said to have bought of Pernot. No such contradiction is given. This machine has the griping chuck, the rest, the cutting tool, and instead of a guide cam, a pattern, which, so far as this case is concerned, papears to be an equivalent; and, as we understand the testimony, it is that a fixed pattern was, generally speaking, a well known equivalent for a cam pattern or guide in machines of this kind, at the date of the patent. (Waters, p. 110.)

It has been argued that Pernot's machine had no adjusting screw. It had a screw which it is insisted should be called a set screw, and which was no doubt less useful, in some respects, than the adjusting screw of the plaintiffs' machine. The plaintiffs however, do not claim the adjusting screw as part of their combination. Mr. Waters, being asked whether it is part of the combination, say —

"Hardly that—that is to say, hardly an element. I regard as essential that the organization should be such as to admit of the convenient use of a screw; and that that screw should make a part of the organization I regard as essential as an adjunct to the combination—so essential that, as I have said, I would not give a sixpence for any one of them, for the purpose of turning sewing machine needles, without it."

It is then an important adjunct, rather than an essential element, and Pernot's screw was a sufficiently good adjunct to enable his combination to work successfully in making needles in the way of his business; and the difference in the screw would have been no defence if his machine had been later in date than the patented one.

It is further said that Pernot did not turn his needles to a point in the machine. He gives reasons for not doing this work, but says that he did turn points for a carding machine; and that his lathe needed only a change of pattern to make it applicable to turning the points of needles. This is obviously true, and as the particular form of pattern used was not of the essence of the invention, we are of opinion that Pernot's machine contains the whole patented combination.

It is not denied that all the elements of the combination were old and well known before 1857; it is only contended that the precise combination was new, as it undoubtedly was to the trade generally, and to the patentees themselves; but we are obliged to say that Pernot's machine, which was not patented, and was somewhat guarded from view, perhaps for the very purpose that its mode of operation might not be generally known, was yet, by the law, such an anticipation of the plaintiffs' combination that they were not the first, though they were original, inventors thereof.

Bill dismissed with costs.

[*George E. Betton*, for complainants.
James B. Robb, for defendants.]

United States Circuit Court.---District of Connecticut.

PATENT LOCK.—THE RUSSELL AND ERWIN MANUFACTURING COMPANY *vs* THE P. & F. CORBIN MANUFACTURING COMPANY AND FREDERICK H. NORTH.

[*In equity.—Before* WOODRUFF *and* SHIPMAN, J J.—*April*, 1874.]

The claim of the letters patent granted to Rodolphus L. Webb, December 31, 1867, for an "Improvement in Reversible Locks and Latches"—namely, "The combination of a lock and latch when the latch bolt and its operative mechanism are arranged in a case or frame independent of the main case, and constructed so that the latch bolt may be reversed, substantially as described, without removing the said independent case from the main case," is infringed by the combination of a lock and latch in which the latch bolt and its operative mechanism are arranged in a skeleton frame within an outer or lock case, which operates to preserve the proper relations of the yoke and tumbler while being moved forward and backward, although it does not so operate when the latch and latch mechanism are removed from the outer or lock case.

Infringment is not avoided by the fact that, when the patentee's latch bolt is drawn forward for the purpose of reversing it, the case or frame moves forward with it in a straight line, and that the defendants' frame, when the latch bolt is drawn forward, moves in a curved line.

Nor is infringement avoided by the fact that the defendants introduce a catch and spring to hold the latch and its mechanism in position, after reversal until the knob spindle is inserted. This superadded device may improve the aggregate structure, but it has no effect whatever upon the functions or mode of operation of the patented devices, nor does it justify the defendants in appropriating them to their own use.

The word "independent" in the claim does not mean that the latch and its mechanism operate without any contributory aid from the main case or adjuncts thereto. All that it imports is that there is an outer case and a separate inner frame or case in which the latch mechanism is arranged and held in position.

A decree must be entered for the complainant, agreably to the prayer of the bill of complaint, with costs to the complainant.

[*Charles E. Mitchell* and *Benjamin F. Thurston*, for complainant.
Charles R. Ingersoll and *Charles F. Blake*, for defendants.]

United States Circuit Court.---Southern District of Ohio.

JAMES F. TRADER, SAMUEL R. COLLIER, AND GEORGE VLEREBOME, PARTNERS, AS TRADER, COLLIER, & VLEREBOME, *vs.* A. L. MESSMORE AND JAMES COULTIS, PARTNERS, AS MESSMORE, COULTIS & CO., ROBERT M. BOWMAN, AND W. H. BOWMAN.—PATENT SEED PLANTER.

[*In equity.—Before* SWING, J.: *January*, 1875.]

Where complainants had used their device for thirteen years without ascertaining that their patent covered such a device as that which formed the alleged infringment, and this latter had become the subject of a patent and possessed superior utility to that of complainants: Held, that the patent sued on should be interpreted strictly.

It becomes important, in interpreting the language of a patent, to know what construction the patentee himself placed upon it; and to this end recourse may be had to the files of the application, to ascertain what changes were made in the original specification and claims, and the significance of those changes as revealed by the history of the case.

The patent of William Blessing, December 13, of 1859, for "an improvement in seed planters," must, in view of the application record, be narrowly interpreted, so as to limit the invention to a particular arrangement of a particular top with particular openings, so that the chaff may be removed in a particular way.

Thus constructed, it does not control a device in which there are no lateral chaff openings in the periphery of the distributer, through which the chaff is worked by the vibrations of the feed bar, but in which, instead, the chaff falls directly to the ground,

While patents are to be construed liberally, they should not be so construed as to enable patentees to reach out and cover every improvement of invention which, after seeing the same, they conclude they might have embraced within their patent, but which was not so embraced and included,

Complaint dismissed

[*Wood* and *Boyd* for complainants.
Fisher and *Duncan*, for defendants.]

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From March 1 to March 6, 1875, inclusive.

ARTIFICIAL FUEL.—D. F. Packer, Mystic River, Conn.
BOTTLE STOPPER, ETC.—N. Thompson (of Brooklyn, N.Y.), London, Eng.
CARTRIDGE HOLDER.—H. Metcalf, Springfield, Mass.
FURNITURE CASTER.—J. Crist, New York city.
GAS, ETC., REGULATOR.—H. W. Shepard, Brooklyn, N. Y., *et al.*
GENERATING STEAM, ETC.—D. F. Mosman, Chelsea, Mass.
MULE AND SHUTTLE SPINDLE.—J. H. Le Moyne, Boston, Mass.
MUSICAL MOUTHPIECE.—C. G. Conn, Elkhart, Ind.
PUMP.—G. G. Hartwick, Jersey City, N. J., *et al.*
SMELTING COPPER, ETC.—S. L. Crocker, Mass.
SNAP HOOK.—F. C. Nye, New York city. (Two patents.)
SPOOLING THREAD, ETC.—J. W. West, Boston, Mass.
TREATING FARINACEOUS MATTERS.—W. Adamson, Philadelphia, Pa.
VALVE.—T. Shaw, Philadelphia, Pa
WATER CLOSET.—W. S. Cooper, Philadelphia, Pa.

Recent American and Foreign Patents.

Improved Car Spring.

Andrew Jackson Culbertson, San Andreas, Cal.—The centers of bent metal bars are connected with the body frame by king bolts. The ends of the bars are attached to blocks, which are placed in recesses in the truck frames. To the blocks are attached rods, the upper ends of which are attached to springs. The lower parts of the springs rest upon seats attached to the truck frames. To the cross spring are attached the longitudinal springs, which are interposed between the cross bars of the frames and the truck frames, and diminish the rocking of the car body.

Improved Apparatus for Stamping Embroidery Patterns.

John McGavin, New York city, assignor to Isaac S. Van Deusen, Passaic, N. J.—The essential feature of this invention consists of a rotary and traversing brush for printing the patterns on the cloth through the perforations of the pattern sheet or plate; also, mechanism for revolving it, and at the same time moving it over the pattern and the cloth; and also a carriage for the roller, and the operating mechanism, combined with the pattern and cloth-holding table. Another feature of the invention is the table for holding the pattern and the cloth, provided with adjusting supports, having inclines by which the table can be raised readily from time to time, as the cloths to be printed (of which a number are put together, one above another) are removed; and another feature consists of an extension table for holding long or short cloths. There is also an extension frame for long or short patterns, and contrivances for detachably fastening and unfastening the patterns and the cloths readily.

Die for Forming Spring Shanks for Shoes.

Emil Briner, New York city.—At the uppermost part of the main casing is arranged rigidly a steel cutting plate, which has above the cutting edge a vertical guide frame, through which the piece of sheet metal from which the shank blanks are made is fed along the face of the cutting plate to projecting guide plates arranged at one side of the main casing, at such a depth below the cutting plate that the exact width of the shank is cut off therefrom by a plunger. The plunger is constructed with a top cutting plate, for the purpose of shearing off the blank gradually without cutting across its whole width at the same time. A sliding spring-acted bolt comes in contact with the punched-off blank on each stroke of the plunger, pressing the same, while receding against the face of the cutting plate of the plunger, and preventing the dropping of the blank. The shaping die of the plunger corresponds to the form of the spring shank to be produced, the curved part of the same being, however, curved to a greater extent than the shape of the finished shank, for the purpose of allowing for the elasticity of the metal. The correspondingly curved convex shaping die imparts the required degree of spring to the shank. When the shank is released by the return motion of the plunger from the shaping dies, the same springs forward toward a slotted recess for assuming its permanent curved shape, and drops through the same to the pan below.

Improved Device for Baling Cotton.

William Iler, Shreveport, La., assignor to himself and John W. Iler, of same place.—A lever has attached to its end a clamp which turns freely on a bolt. An arm comes in contact with the end of the lever, so that when the end of the band is between it and the end it may be securely clamped and held when the lever is operated. The draft bar passes through a mortise in the lever, so that it will turn freely on a pivot pin. At the other end of the draft bar is another clamp for clamping and holding the other end of the band.

Improved Car Coupling.

Albert A. Kellogg, Montgomery, Mich., assignor to himself and Miles E. Cartwright, of same place.—This is a drawhead with longitudinal top slot and swinging coupling hook, that is seated, when carried into downward position, into a bottom hole of the drawhead, locking thereby the coupling link. The coupling hook is attached to a lateral shaft, and swung, by a spring-acted lever frame provided with handles at the sides of the car, into raised position, being retained therein by the action of a bell-crank lever, with hook end, pivoted at the outside of the drawhead. A spring rod with broad front head slides in a guide recess of the drawhead, and connects with the other end of the dog, so that by the concussion of the drawheads the shaft of the coupling hook is released, and the hook carried down by the spring power of the lever frame for coupling the link.

Improved Sleeve Button.

Herbert N. Mason and Orville P. Richardson, Attleborough, Mass., said Richardson assignor to said Mason.—The shank which connects the shoe to the front portion of the button is attached to the back of the front, and also to the disk of the shoe, by fitting a tenon on the end through the plate, and heading it down.

Improved Thill Coupling.

Ephraim Soper, Brooklyn, N. Y.—A clamp is bolted to the shaft, and has a stud going through a mortise, and a pivoted cam lever, so as to force the clamp together and hold it fast. The safety trap is connected to the cam lever instead of the eye plate, so that, besides serving the purpose of the strap itself, it prevents the cam from working loose. An elastic cushion is made with a wide groove, and the eye in the eye strap clamp is contracted along the middle portion, so that the collars of the cushion are interposed between the ears and the eye strap, and thereby prevented from striking against the ears and rattling.

Improved Car Coupling.

George W. E. Row, Steele's Tavern, Va.—When any car is thrown off the track, so that thereby the relative position of the link and drawbars is changed, a retaining spring is arranged to give way and release the link, so as to uncouple thereby the cars.

Improved Dressing of Millstones.

John Williams, Dresden, assignor to himself and George J. Stonebreaker, Fayetteville, Tenn.—This consists of a metallic frame, having slides which run in grooves, moved by racks and pinions, and two guides which connect the slides, between which is confined the marker, which is moved in the guides at right angles with the slides. The object of the device is to cut the face strictly with the staffed face of the stone, and by so doing retain the true face.

Improved Miter Box.

Herman Hempel, Syracuse, N. Y.—The guide block of a miter box is constructed with a rotary base plate and sectional blocks, made right-angled in front and formed circular in the rear. The rapid adjustment of the clamps to the required mitering angle and the molding is effected by the simple pressure on the treadle.

Improved Process of Coloring Tobacco.

Oscar Knab, Newark, N. J.—This consists in treating tobacco leaves for imparting or restoring a dark color to the same by passing the leaves, in a soft and moistened state, through a solution of sesquichloride of iron.

Improved Method of Tubing Wells.

William T. Dobbs, Pana, Ill.—This invention consists of plastic tubing formed of cements to shut off caves, slides, or other formations of the earth that give way and slip down, causing a break in the walls of wells or other deep borings in the earth. The compound with which the cave in the wall is filled and crammed is perfectly soft and plastic, adjusting itself to the cavity. It undergoes a chemical change and hardens under water at any depth in a few hours, completely binding and securing all fragments and loose particles, so that being subsequently drilled through it will leave a solid and strong wall. The compound used is a mixture of gypsum, hydraulic cement, and fine sharp sand, in any proportion that will form a solid cement.

Improved Adjustable Cut-Off for Steam Engines.

Henry Webster, Cassville, Wis.—An oscillating toe piece works in the regular manner when rack pieces do not touch raised top rails; but as soon as the top rails are set to engage them, pawls are instantly released thereby from the shoulders of the toe piece, and produce, by the weight of the levers thereon, the dropping of the respective toe and lever, and the cutting-off of the steam. The nearer the top rails of the rack pieces are placed to the pivoted arms of the toe piece, the shorter will be the cutting-off action, and the quicker the speed of the engine.

Improved Folding Store-Shelf.

Minter P. Key, Waxahachie, Tex.—This store shelving is so constructed that it may be readily folded for convenience in removing it from the store, and for transportation. Each section of the shelving is divided into three equal parts. The lower part is occupied by drawers and a closet. The middle part is hinged to the lower part, so that it may be turned down. The upper part is hinged to the middle part, so that, as the middle part is turned back and down, the upper part may descend without changing from a vertical position. To the upper part are attached caster wheels, upon which the said upper part rests when the shelving is folded. The caster wheels, when the shelving is arranged for use, enter recesses.

Improved Corn Sheller.

William Smith Broyles, NolaChucky, Tenn.—A shelling cylinder is provided with teeth and made tapering in form, and is rotated either fast or slow by a crank. The teeth of said cylinder come in contact with the ears of corn, remove the kernels, and at the same time move the ears longitudinally through an adjustable shield. As the cobs reach the farther end of the shield, they enter an inclined spout, down which they slide into a receiver. The shelled corn falls upon the inclined screen and then upon an apron, hinged at its lower edge, so that it can be turned up into a vertical position when the corn is to be measured, to allow the corn to fall into the measuring pit, which is provided with a sliding top, which, when the pit is full, may be pushed in to prevent the entrance of any more corn until its contents have been drawn out.

Improved Cotton Harvester.

La Fayette K. Miller, Austin, Tex.—This invention consists in a system of revolving rods, so arranged as to be continually going down into and emerging from the cotton branches while in a vertical position. The whirling motion of the rods causes the fibers of the cotton, as soon as they come in contact with the rods, to take hold of said rods or pickers, wind round them, and remain attached till stripped off by clasps or strippers that slide down the rods after they come up from among the branches of cotton stalks, and scrape the cotton into a receiver below. The pickers are caused to turn by friction against broad bands that pass across the frame of machine. These bands are corrugated, so as to increase the friction, and are broad enough to act on the pickers and turn them during their descent from the top to bottom of cotton stalks. The bands work on rollers, each pair standing about forty-five degrees from a perpendicular, with base journals near each other, but at top standing inclined in opposite directions, giving the form of a trough. The strippers are cuffs that fit around the pickers loosely enough to slide upon them easily and work in two grooves, one on each side of the pickers, by which provision the cotton is the more easily removed. Presser levers or bars are arranged on each side of frame, arranged and connected so as to throw the strippers to points of pickers one or more times while passing the receiver. These levers are to work rapidly and with long strokes, causing two or three strippings to take place while the pickers are passing over the cotton box.

Improved Self-Regulating Gas Burner.

Duncan D. McMillan, La Crosse, Wis.—The invention consists of a gas burner with flexible diaphragm and valve. The lower chamber of the same is connected by suitable perforations with an annular channel concentric to the diaphragm, which channel conducts the gas to the delivery tube in any position of the tip section by means of two or more channels, the flow being regulated in the customary manner by the pressure of the gas on the diaphragm and the corresponding opening and closing of the valve.

Improved Thrashing Machine.

Theophilus Harrison and William C. Buchanan, Belleville, Ill.—A fan has a tapering blast channel, the latter under the thrashing concave. The blast thus strikes the wheat, chaff, and straw as they pass from the thrasher, hoisting the chaff through an opening. A hinged door at the outlet of the thrasher is made adjustable by a rod fastened to the top by a pin passing through one of its holes. This deflects the grain, and causes it to fall on the ordinary vibrator. A plate is hinged and pendent from the frame, for the purpose of preventing the ejection of loose grain. A trap door covers the chaff escape.

Improved Draft Equalizer.

Liberty J. Seely, Waldron, Ind.—This invention consists of a slotted clevis, secured by supporting braces and bars at the front end of the plow beam, at suitable distance toward the landside of the same. The clevis carries, in a sliding and adjustable draft eye, a draft rod with the usual three horse doubletree, being strengthened by draft and stay rods attached to a lateral cross bar and the rear and front part of the plow beam.

Improved Miter Machine.

Daniel A. Fisher, Allegheny, Pa., assignor to himself and O. Chambers, of same place.—This invention consists of a circular saw with mechanism for dropping it below the table, shifting it from one bevel to the other, and lifting it up through the table in regular succession for utilizing it to saw right and left bevels for miters without shifting the stick to be sawn.

Improved Saddle Horse Apparatus.

Adrian Hitt, Flora, Ill.—This invention consists in a stay strap extending from the crupper on each side of the horse, and connecting with the strap which supports the breast pulleys. The stay straps counteract the forward pull of the forked strap when the rider draws upon the reins, and prevents folding or wrinkling of the girth, or its being drawn forward toward or between the fore legs of the horse, as happens when the ordinary martingale attachment is used.

Improved Registering Machine.

Charles E. Rand and John T. Dupont, New York city.—This invention consists of two or more ranges of counters for special objects, combined with another range which counts the totals of the special counters, all so contrived that any one of the special ranges may be worked together with the range for totals independently of the others.

Improved Car Axle Box.

Charles A. Hussey, New York city.—The main feature of this invention is the provision made for keeping the bearing cool by means of a circulation of water or other liquid, or of air through the bearing in any direction. It will be found fully described and illustrated on page 166, vol. xxxii.

Improved Apron for Stock Cars.

Chapman R. Jones, Berlin, Ill.—This invention consists in the combination of the bails and the hooks with the apron, to enable it to be readily secured to and released from the door posts of a car, so that it cannot be displaced by the tramping of stock in passing into and out of the cars, or by the moving out and in, handling freight.

Improved Revolving Rack for Holding Stockings.

Daniel K. Wertman, Shenandoah, Pa.—This invention consists of an improved device for suspending socks, stockings, or other goods from a revolving rack. The stockings may be suspended in pairs or clusters of a dozen, with their size, quality, and price marked for the accommodation of purchasers. The said rack revolves on an iron pin in the base, and stands on the counter, or in any suitable position, for exhibiting the goods.

Improved Lamp for Lighting and Heating.

Edward A. Rippingille, Holborn, England.—The oil reservoir and cone plate can be slid into and out of position. The cone plate is formed to fit the body of the lamp, and thereby shut off air communication between the upper and lower sides thereof, except through the cone. The top of the lamp stove is formed of two plates in the lower one of which is fixed a short metal tube, while in the upper one is formed a hole to serve as a seat for a kettle or other article; and at one side is fixed a chimney. A space is left between the two top plates to allow the heat and products of combustion to circulate around the kettle. Openings are formed in the sides of the lamp to admit air freely to the under side of the cone plate, and to enable the wick to be regulated without disturbing any part of the lamp.

Improved Machine for Tinning Sheet Copper.

William Jenkins, Newark, N. J.—Sheet copper and other soft metals (as sheet brass and other composition metals) are usually tinned by "wiping" the fused tin or tin and lead with cloths or waste, no machinery being employed for the purpose. To spread the melted tin evenly by this hand process requires much care and skill, and a great waste of time. The present invention is a combination with a vat of two rolls, the former running in the molten metal within said vat, and provided with a surface that will cause the adhesion thereto of said metal, while the latter has a dead surface, or one that will not permit the adhesion of said metal, so that a sheet of copper may be tinned on one side.

Improved Spring Bolt Fastening for Tongues, etc.

Ethan H. Pettit, Twin Lake, Mich., assignor to himself and Dellamar Wade, of same place.—A semicircular plate on the end of the tongue has circular portions to receive a tongue yoke, which consists of a hook part and spring-held straight part combined, and their ends meeting, so as to form a flush joint. This leaves an open space for the introduction of the trace or other article to be secured.

Improved Whiffletree Hook.

Othniel J. Smith, Wauwatosa, Wis.—A hook is formed of a stationary part, having a downward extension at the end, and a pivoted correspondingly curved part is arranged to fold or lap thereon. The trace is first placed over the lower part, and carried back toward its rear end; the upper part is then brought down, and the trace placed over both, so as to lock them tightly together and prevent their opening. The trace is thereby not liable to be detached in going down hill, or by other causes, but is retained in the hook, without the use of a spring, in a strong and secure manner.

Improved Milk-Cooling Apparatus.

Orrin J. Stickles, Canton, N. Y.—In this device any desired number of pans and tubes may be arranged in a series, and connected by the same water pipe. Cold water or ice is allowed to flow into and stand in an inner tank. The milk in contact with the cold walls of the tank will become cold, will sink and be replaced by the warmer particles, thus establishing a circulation that will soon cool the entire mass of the milk, however large the tank may be.

Improved Carriage Curtain Fastening.

Henry Foster, Westerly, R. I.—That portion of the fastening which is attached to the curtain is a wedge-shaped slide having a shank extending through the curtain. On the under side of the wedge is a pin, forming the lock. The slide travels in a socket plate, which has a series of holes, into which the pin will rest when the curtain is drawn to the desired tension. When it is desired to unfasten or adjust the curtain, the operation is performed by tilting the wedge sufficiently to release the pin from its hold in the plate. This being done, the said wedge may be moved backward or forward.

Improved Step Ladder.

Robert S. Van Zandt, Williamsburgh, N. Y.—The standards of the ladder are made of the same width, and the adjacent ends of the side bars are hinged to each other, so that they may be turned into line with each other to form a ladder, turned at an angle with each other to form a step ladder, and turned parallel with each other for storage and transportation.

Improved Alarm Lock.

Jonathan Walton, Brooklyn, N. Y.—This device may be used as a lock, a latch, a bolt, and an alarm, as may be required. When the pin is held forward and a bolt pushed outward, the end of the bolt strikes against the head of the pin and pushes the catch outward, allowing the door to be opened. When the pin is left free, the outward movement of the bolt simply pushes the pin outward, and does not move the catch. A button is pivoted to the catch, so that it may be turned down over the pin to hold it, so that the outward movement of the bolt may push back the catch and allow the door to open. When the button is turned back, its free end strikes upon a projection, so that the catch cannot be pushed back, thus forming a double lock. The bolt is thrown into or out of gear with the knob spindle by means of a key. A gong, which serves also as a cap for the clock, is sounded by turning the knob.

Improved Car Coupling.

John B. Winters, Attica, Mich.—In this coupling a pivoted hook is arranged within a drawhead, and acted upon by a spring, which enables it to operate automatically for connecting with the coupling link. The lever for car coupling is connected with a cranked lever on the platform. Said lever is pushed to the left to uncouple, is held back by a pin when the hook is coupled, and is held forward to keep the hook raised for the escape of the link by like means.

Improved Check Box.

Somers Van Gilder, Knoxville, Tenn.—This is a contrivance of apparatus whereby the cash receiver of a store or other business place will exhibit to the customer the amount of his bill by means of checks presented to his view from the inside of a case, where they are placed by the operator by means of slides. The checks prevent the withdrawal of the slides after so exhibiting the bill, and fall into locked receptacles, where they record the amount for which the receiver is responsible.

Improved Reversing Link for Steam Engines.

John Simpson, of Meadville, Pa., assignor to Dick & Church, of same place.—This invention relates generally to valve gearing, but particularly to that shown in the patent No. 125,769. Two slotted links, having a large circular recess at each end of the slot, are bolted to a block, and also together at each end. One of the notched pivots of the eccentric rods is fitted in each end of the link, and a collar in the middle of each pivot is fitted between the two plates to hold the pivots in place, making a simple and cheap contrivance, well adapted for durability. The wrist pin of the valve rod works in the notched pivots.

Improved Cranberry Separator.

Daniel T. Staniford, New Egypt, N. J.—As the cranberries fall upon inclines, such of the perfect berries as are unobstructed bound upon the upper inclines and roll down aprons into a receiver, and are the marketable berries. The imperfect berries do not bound, but slide, down one incline to another, and, falling from the last incline into a receiver, are thrown away. The berries that fall from the last upper incline fall into a receiver, are called middlings, and are again passed through the separator.

Improved Compound Engine.

Jackson W. Bell, McKinney, Tex.—This invention consists of a series of engines for working the steam over by exhausting it from the first into the second, and so on, for utilizing the pressure lost when the steam is exhausted from a single engine into the air. The engines are all connected to one driving shaft at different points around the axis, and all connected by a revolving tube, which serves for supply and exhaust pipes and valves to all.

Improved Water Wheel.

William J. Thompson, Springfield, Mo., assignor of one half his right to Springfield Iron Works.—This invention applies more especially to a water wheel for which letters patent have already been granted to the same inventor; and the improvement consists in an improved mode of operating the gates; in a spring for each gate, to insure the simultaneous closing thereof; and in a three-chambered box around the main shaft, having an arm, which extends over the sector gears and supports the pinion shaft.

Business and Personal.

The Charge for Insertion under this head is $1 a Line.

Notes & Queries

W. H. G. will find directions for silvering mirrors on p. 267, vol. 31.—W. H. P. can make a battery for plating by following the directions on p. 202, vol. 32.—J. F. P. will find a recipe for black ink on p. 203, vol. 29.—J. C. can clean gilt frames by following the instructions on p. 27, vol. 31.—W.E. will find on p. 251, vol. 29, a formula for rubber varnish applicable to textile fabrics.—W. A. B. will find an explanation of the pyrometer, for indicating the fusing points of metals, on p. 171, vol. 32.—L. B. A. will find details of the threads to be cut in bolts of various sizes on p. 27, vol. 29. D. K. will find rules for ascertaining the strength of boilers on pp. 155, 186, vol. 32.—C. B. will find details of the process of making artificial butter on p. 246, vol. 29.—H. M. B. will find a description of nitro-glycerin on p. 283, vol. 30.—E. L. will find a rule for determining the curvature of the earth on p. 122, vol. 30.—H. M. A. will find a full description of the pantagraph on pp. 99, 179, vol. 28.—W. C. W. G. will find an article on steam on the Erie canal on p. 96, vol. 28.—F. W. P. will find directions for cleaning files on pp. 363, 379, vol. 28.—W. B. A. will find that iron can be softened by following the directions on p. 123, vol. 31, for steel.—P. McL. can cast Babbitt or other metal free from air holes by following the directions given on p. 409, vol. 31.—G. M. E. will find on p. 11. vol. 31, a recipe for a shellac varnish which will do for making leather airproof.—G. A. McL. will find that Greek fire is described on p. 267, vol. 30. The manufacture of starch from potatoes is described on p. 315, vol. 31.—J. M. S. and others will find a description of Hero's fountain on p. 59, vol. 29.—F. H. W. and C. S. P. will find directions for making rubber stamps on p. 156, vol. 31.—W. J. C. will find a recipe for cement for leather on p. 119, vol. 28.—J. K. and others will find full descriptions of tools for lathe work in the early chapters of "Practical Mechanism."—E. D. W. will find full directions for constructing a filter cistern on p. 251, vol. 31.—A. R. will find a recipe for laundry blue on p. 219, vol. 31.—G. A. B. will find directions for bluing steel on p. 123, vol. 31.—C. J. H. will find directions for bending timber on p. 26, vol. 31.—G. C. & S. and J. O. will find directions for casehardening wrought iron on p. 202, vol. 31.—M. K. W. will find complete instructions for coloring photographs for the magic lantern on p. 330, vol. 30.

(1) G. E. F. says: A machinist proposes the following: Three up and down saws (with two upright iron rollers), the sides of the rollers to be fluted so as to press against the deal and feed it to the saws. He thinks that the deal, however crooked, will be always straight between the pulleys. Would this answer the purpose? A. The principle is old. One of the upright rollers is stationary or fixed at any desired position, the other yielding to irregularities.—J. E. E., of Pa.

(2) C. C. D. and others.—A one inch objective ought to divide Castor, but no power of 100 should be used. One of 50 is better.

(3) L. C. H., of Heidelberg, Germany, asks: How can I become a good practical master mechanic of a railroad? A. You must commence in the shops, and make yourself acquainted with the theory as well as the practice of the profession, and work your way up by industry and perseverance.

(4) G. W. L. says: I am working on a boiler 36 inches in diameter by 20 feet long, of $\frac{5}{16}$ inch iron, with cast iron heads 1¼ inches thick, without flues, tubes, or braces. What is the safe working steam pressure to be carried? I asked a theoretical engineer, and he gave a rule of algebra that I cannot work out, as I have never went beyond the rule of three in arithmetic. Is there any book that gives rules for finding the strength of iron, distance apart of stay bolts, braces, and rivets in a boiler without algebra? I asked the above mentioned engineer also what rule there is for getting the proper distance apart of stay bolts in flat surfaces of a boiler of $\frac{5}{16}$ inch iron, to carry 70 lbs. steam in salt water. He gave the following:

$$\sqrt{\frac{5530}{70}} \times 9 = \sqrt{79} \times 0{\cdot}9 = 8.$$

This is all Greek to me. Will I have to learn algebra before I can get such a rule to work? A. You will find the information as to working pressure in the article on "Strength of Boilers," pp. 153, 186, vol. 32. Your remark about the formula being all Greek to you suggests that, in common with many others, you doubtless look upon algebra as a sealed book, entirely different from arithmetic. In a large measure, however, it is only a kind of shorthand for expressing rules, and we think that a few days devoted to the study of algebra would aid you greatly in your business. To illustrate how the use of algebraic expressions condenses an expression, we will translate the example quoted for you. $\sqrt{\frac{5530}{70}} \times 0{\cdot}9$ expresses that the number 5530 is to be divided by the pressure of the steam, and that the square root of the quotient is to be multiplied by $\frac{9}{10}$. A little practice will enable you to translate all similar expressions.

(5) A. M. A.—The inventor must sign and make affidavit to the papers. But he may use his middle name, with first initial letter; and may give only the temporary residence where he is when the papers are signed.

(6) R. E. B. says: I find that the fire pot in my parlor stove never has clinkers on it. It is of cast iron. Why would not cast iron answer in place of brick in a cooking stove, which in a few days becomes coated with a substance like slag, which has to be cut off, causing a great deal of trouble? A. Probably its form would have to be changed as well as the material, to prevent it from burning out.

(7) S. H. H. asks: I have been perplexed in hardening two draw plates for drawing wire. When tempered and cleaned off, I discovered cracks or flaws all over the plates, on the side where the holes were smallest, but not entering the holes. I have made a great number of plates of this kind, and never met such an accident before. What is the cause? A. The plates were probably made of a different quality of steel from that which you had been accustomed to use.

(8) P. R. B. says: 1. I propose to bring a stream of water through a siphon, from a pond on top of a hill to base, through a pipe 2 inches in diameter. The distance from pond to summit of hill is 30 rods; perpendicular hight from pond to summit, 25 feet. Distance from summit to base is 300 rods: perpendicular hight from pond to base, 150 feet. What would be the amount of water discharged with a 2 inch pipe? A. The pipe will probably deliver between 40 or 50 gallons per minute, or the water will have a velocity of 5 or 6 feet a second. 2. How heavy a pipe would be required to stand the pressure? A. Ordinary iron pipe will answer.

(9) E. H. R. asks: What is the best shape, size, and hight for a brick chimney for a stationary engine of 50 horse power? A. A general rule is to make the cross section of the chimney, which may be either round or square, from $\frac{1}{8}$ to $\frac{1}{7}$ of the grate surface, and the hight from 50 to 75 feet.

(10) H. D. W. says: 1. I have a small engine, with a cylinder 2 by 2½ inches stroke, to run a lathe jig saw. I intend making a copper boiler. Of what capacity should it be? A. From 10 to 12 gallons. 2. How much pressure could such a boiler stand if made of $\frac{1}{16}$ or $\frac{3}{32}$ inch copper? A. It will depend upon the diameter. 3. How much pressure would be sufficient to run the engine? A. Fifty or sixty lbs. 4. How much weight should I put on my safety valve? A. Determine it by means of a spring balance.

(11) C. W. says: In an article recently published in your paper on combustion, the practice of admitting air to the top of a fire for the purpose of consuming the carbonic oxide is recommended. The theory of course is an old one, but is it a correct one in an economical point of view? In practice it is found, I believe, that, the more air you admit to a fire, the more rapidly is the heat evolved carried up the chimney. It is no use making the fuel give out more heat if we cannot retain that heat and utilize it. At the great factories at Mulhouse in Germany, a series of experiments was tried in relation to the combustion of smoke, with a view to the saving of fuel. The result was disappointing. When the necessary amount of air for the perfect combustion of the smoke was admitted to the fires, there was a loss of heat. The same result was described by practical engineers in London. At Mulhouse the practice now is to admit as little air as possible to the fires (¼ of the amount formerly admitted) and to "feed a little at a time and often." A. We do not think these matters are so definitely settled that a general rule can be given which will be applicable to all cases. We have known of a number of cases in which it seemed to us that there was an advantage arising from admitting air above the fire. We do not at present recall the experiments to which you refer, and would be glad if you would send us a record, in case it is convenient.

(12) G. M. E. says: 1. I wish to construct a boiler for a 2 inch cylinder engine to carry from 20 to 30 lbs. steam. What should be the size and thickness of boiler? A. It should be 20 inches in diameter and 3 feet high. 2. Would the engine be large enough to run a small round-bottomed boat, 4 feet long and 4 feet beam? A. Yes.

(13) W. H. M. asks: How can I make something to resemble snow, suitable for making a miniature winter scene? A. Use small pieces of paper.

(14) G. W. T. asks: 1. I am building a small engine, 1½x3 inches stroke. Will ports ⅛x¾ be too large to drive a small 6 inch foot lathe with 40 lbs. steam pressure? A. The engine will answer very well. 2. What weight of fly wheel would I want for such an engine? A. From 15 to 20 lbs. 3. Of what size should the steam pipe be? A. Use a steam pipe of about ⅜ of an inch in diameter.

(15) C. W. McC. says: I have water which I bring in a wooden conductor, of two inches bore and thirty rods long with fifty feet fall, using the same on a fifteen inch wheel to drive a churn. Would the power be increased by erecting a bulkhead at the lower end of the conductor 20 feet high, closed at the top and connecting the wheel with the bulkhead? A. We cannot see, from your description, how it could be.

(16) J. R. says: A plate is 10 feet long by 6 inches wide by 2 inches thick; 6 inches of its width is iron and 2 inches steel, welded together. At each end and in the middle, on both sides, I desire to weld on square pieces of iron, each piece 8 inches square and 2 inches thick. Can these six pieces be welded by passing them with the plate through the rolling mill in the same way as the plate was rolled, and welded at the last passage of the plate through the rolls? I suppose that the pieces could be welded by hand. A. There would be some difficulty in effecting the weld as you suggest, as it probably never has been done, so that the question could only be decided definitely by experiment.

(17) J. C. asks: 1. I wish to place a small engine in a boat 18x2 feet, and am told that it will be very dangerous to have an upright boiler, on account of the boat's rolling. Would it be so? A. It is very common to use vertical boilers in small boats. 2. What speed could be got from such a boat, drawing 8 inches water, with an engine 3x3 inches, and a boiler pressure of 50 lbs.? A. If the boat is well designed, you might get a speed of 6 miles an hour.

(18) C. H. P. asks: What is the difference between one square mile and one mile square? A. None.

(19) H. S. says: I am building a small steam engine 2x6 inches; the exhaust is ⅜x¾, and the steam ports ¼x¾. Do you think the exhaust is too small for the steam? What size of boiler will I have to get for the engine, and what pressure of steam will I have to carry to get the most power? This engine is a beam engine with side pipes and two steam chests, as on river boats, but I shall have slide valves instead of the usual poppet valve. Do you think they will admit it up to the Fair next year? I have only been at my trade two years. I designed and made my own drawings and my own patterns for the engine. A. The dimensions of ports will answer very well. A boiler 1 foot in diameter and 3 feet high will answer to run the engine, but not to do much work. The higher the pressure of steam, the more power you can obtain from the engine. You will have no difficulty in exhibiting your engine at the American Institute Fair. We should judge that you were doing very well at your trade.

(20) L. M. asks: Will a stack 30 yards high without artificial heat, ventilate upwards regularly? If so, what is the cause of it? A. It will, for the same reason that the products of combustion from a boiler pass up the chimney.

(21) H. H. C. says: 1. I am building a steamboat with 15 feet keel and 4 feet beam. She is 2 feet deep. She has an upright engine, cylinder 2 inches bore by 4 inches stroke. Her propeller wheel is 15 inches in diameter; boiler is horizontal, 25 inches long, with 11 two inch return flues working at a pressure of 100 lbs. Firebox is 30 inches long. How much weight will the boat carry? A. It would be necessary to make a calculation from the drawing of the boat, but you can easily settle the matter by experiment, either with the boat or a model. 2. How fast will she run? A. The boat will probably have a speed of from 6 to 7 miles an hour, under favorable conditions.

(22) S. D. asks: A few weeks since I saw, on exhibition in Chambersburg, Pa., a machine called a perpetual motion. It worked with levers and balls. It drives a balance wheel and several cog wheels. I could not see where the power to drive it was applied. The machine was placed on a boxed table that looked suspicious. How is it driven? A. We never heard of it before; but it reminds us of a story we once read of a wheel that started itself and neverstopped, but which did stop when the horse that was turning it got tired.

(23) F. D. asks: 1. Will water flowing from a hight of fifteen feet perpendicularly through a two inch tube, the lower end of which tube is gradually contracted to one inch in diameter, turn an overshot water wheel three feet in diameter with sufficient force to drive a small two gallon churn? A. It ought to drive a number of such churns. 2. What amount of water would flow through such a tube in an hour? A. From 300 to 400 cubic feet. 3. Could not more work be obtained from an overshot water wheel than from any other with the above conditions? A. We think it likely.

(24) T. R. says: I am desirous of discharging grain from the cars to a flouring mill at a distance of 350 feet. The discharging point can be a few feet the lower, if desirable. Can it be done through an airtight tube, by suction or otherwise, and would an exhaust fan produce a sufficient vacuum to do the work? A. We think a suction fan would answer very well. See our front page of this issue.

(25) E. W. P. asks: Is it true that the lateral pressure of water against a perpendicular surface of any hight is just the same when the water extends back only one inch, as it would be if it extended back twenty feet or any greater distance? A. Yes, it is true; and the reason is that the pressure of water is transmitted equally in every direction, so that it only depends upon the hight of the column and the area of the surface pressed.

(26) C. S. B. asks: What size of engine is necessary to propel an ordinary Whitehall boat, 18 feet long, at a speed of eight miles an hour? What should be the size of boiler and screw? A. Engine 2x3 inches; boiler 24 to 28 inches in diameter; propeller 22 to 24 inches in diameter, with 3 feet pitch.

(27) P. F. M. says: 1. Our fire engine has a 9 inch cylinder with 12 inches stroke; pump is 5 inches in diameter and 12 inches stroke, double acting. The boiler has about 165 square feet of heating surface. We have two checks on our air

chamber. Do you think we could throw any further by connecting a single line of hose to both of these checks, "Siamese" fashion? A. We think not. 2. The boiler foams badly; is it not better to blow from the surface than from the bottom, in case the foaming is caused by violent boiling of the water, and by changing from fresh to salt water? I do not mean to let the bottom blow remain idle altogether, but to use it occasionally. A. It does not make much difference in such a case, as it is necessary to blow very freely until the water is changed. 6. Is it necessary to blow at all, in case we are working fresh water? I think the water simply lifts but does not foam, and by working the engine slowly (say at 70 revolutions) I think the water would settle. A. If the water is perfectly fresh and clean, it is not necessary. 4. We experience great trouble with our engines when we feed with dock water. Can this be remedied? A. The only plan that occurs to us is not to use that kind of water. Fresh, clean water is almost indispensable for the satisfactory action and durability of an ordinary fire engine boiler.

(28) M. B. B. asks: How much power should I require to propel a boat 10 miles an hour against a current of 3 miles an hour, the boat being 15 feet long over all, with 12 feet beam, depth 4½ feet, width of bottom 9 feet, to draw 2½ feet of water? A. Probably from 25 to 30 effective horse power.

(29) P. R. S. asks: 1. I wish to put in a steam engine of 8 horse power. How many gallons water will it require? A. You will require from 8 to 16 gallons of water per horse power per hour. 2. I shall have to dig 20 feet to water and then get hard water. Would it not be better to put in a cistern and use rain water, and run the escape pipe 1 foot under the water, and condense the steam to use over again? A. If you introduce the exhaust into the well or cistern, it would be best to use a coil with holes in it through which the steam could escape.

(30) P. M. asks: Is the curve which a cannon ball describes a cycloid or a parabolic curve? A. It is neither, but a curve depending on so many varying elements that its general equation has never been precisely determined.

(31) J. T. L. asks: Will an expansion valve fitted to a steam engine economize fuel to any great extent? A. Probably. 2. How much space is generally allowed between grate bars used in burning wood? A. There is great difference of practice; from ⅝ to ¾ of an inch will answer.

(32) A. D. P. asks: 1. Is the plan of filling a boiler full of water and applying heat a safe and correct method of testing the strength? A. Yes. 2. In cleaning flues with steam, is it necessary for the bore of the pipe to be diminished at the end? A. No.

(33) L. S. G. says: I have a small telescope of about 15 inches focus; the object glass is 1⅛ inches in diameter, and the eyepiece is composed of 2 double lenses. If I get a new object glass of 48 inches focus, and use the old eyepiece, would it be any better for viewing objects at a distance? A. No.

Can I mold rubber and give it a red color? A. Dental vulcanite is made on royalty by patent process.

(34) W. C. B. says: It is supposed that oak timber will support a safe strain of 800 lbs. per cubic inch. If this is so when the bearings are placed 1 inch apart, what will it support when placed 12 inches apart? In what ratio does the strength diminish as the bearings are separated? A. The strength varies about in the inverse ratio of the distance between supports, so that it would be about $\frac{1}{12}$ as great in the second case as in the first.

(35) J. T. S. asks: Do the steam chest and cylinder of an engine require oiling? Some engineers contend that it is an injury, and causes priming. A. Generally it is best to use oil, but we have known cases in which it was not employed. It is certainly not advisable to use so much that it causes priming.

(36) J. A. B. asks: Could a worn cotton gin be made to cut straw, etc., by taking off the saw teeth and putting a hopper over the saw, the straw being fed to the cutter by its own weight? A. This would probably succeed, as this device, as we understand your description, is somewhat similar to straw cutters in common use.

(37) J. A. G. asks: What is the reason that boiler plate steel is straighter than boiler plate iron? A. We doubt if it is a fact, for similar grades of the metals.

(38) R. W. T. asks: I have two hot bed sashes, side by side; one was used last year, the other is new. The panes of the former are dry, while those of the latter are so clouded with moisture that I cannot see through them. There is one new pane in the old sash which is also clouded with moisture. Has the glass undergone any change from the action of the sun? A. Air has been admitted by some opening near the sash having no moisture. The right conditions for a hothouse are fulfilled when the moisture collects upon the under surface of the glass.

(39) J. C. asks: Who was the inventor of the fish joint on railway rails, and when was it first brought out? A. W. B. Adams, of England, 1847.

(40) H. C. B. asks: If arsenic (arsenious acid) is dissolved in water raised to the boiling point, will the water retain all the poison? If not, what proportion, and is there any residuum, if the arsenic is pure and sufficient water be used? A. Arsenious acid is soluble in 12 parts of boiling water. In order to form a solution of the acid containing 1 part of the acid in 12 parts of the water, it is necessary to boil an excess of it with the water; if 1 part of the acid be boiled with only 12 parts of water, a considerable quantity remains undissolved, even with 1 part of the acid to 50 or 60 parts of water.

Will chloride of lime impart its strength to alcohol the same as it will to water? A. Yes. Chloride of calcium is soluble in 0·25 parts water at 59° Fah., in 8 parts alcohol at 59° Fah.

(41) W. M. asks: Is there any preparation that may be put upon cast iron to prevent the action of dilute sulphuric acid? A. Yes, paraffin.

(42) W. S. W. asks: What elements are to be found in the onion? A. Onion consists of carbon, hydrogen, oxygen, nitrogen, and sulphur, combined into various bodies, one of which, the sulphide of allyl, gives to the onion its most characteristic properties.

Please name a few tests by which a soil can be analyzed. A. Soil cannot be analyzed by a few tests.

(43) N. S. B. Jr. asks: I have a fernery, the case of which is 1½ by 2½x2 feet; the tray to hold the earth (prepared by a florist) is galvanized iron, 6 inches deep. Why should the plants mold? They have been watered once a month and air frequently admitted, but the plants will mold and apparently decay. They look perfectly fresh, but break and fall when touched. A. The fernery must have plenty of strong sunlight at first. It must not be watered too often; the earth must not be too strongly impregnated with stimulants. You do not state what plants you have; they may not be proper ones. We do not know from your description what the cause of the mold is, and we cannot of course recommend a remedy.

(44) E. P. W. asks: What is celluloid? A. Celluloid is a compound of gun cotton and gum camphor. The processes used in its preparation and the quantities of the ingredients, etc., have not been made known.

(45) F. D. B. asks: 1. Can copper and brass be melted in small crucibles in a flame of common illuminating gas? A. No, although brass may be fused by gas furnaces of suitable construction. 2. 2. What is the cheapest way to build a small furnace for melting as above? A. Dr. Faraday described a small furnace used in the laboratory of the Royal Institution as follows: The exterior consists of a blue pot, 18 inches high, and 13 inches in external diameter at the top. A small blue pot, 7½ inches internal diameter, had the lower part cut off, so as to leave an aperture of 5 inches. This when put into the larger pot rested upon its lower external edge, the tops of the two being level. The interval between them, which gradually increased from the lower to the upper part, was filled with powdered glass blowers' pots, moistened with water, and pressed down into a compact mass. A round grate was then dropped into the furnace of such a size that it rested an inch above the inner edge of the lower pot; the space beneath it, therefore, formed the air chamber, and the part above it the body of the furnace. The former is 7½ inches from the bottom to the grate, and the latter 7½ inches from the grate to the top. A horizontal conical hole, 1½ inches diameter on the exterior, is cut through the outer pot, forming an opening into the air chamber at the lower part for receiving the nozzle of a pair of double bellows. The furnace must be perfectly dry before being used. The fuel is coke. The bellows are mounted on an iron frame, and the furnace is raised upon an iron stool, so as to bring the aperture of the air chamber to a level with the nozzle of the bellows. This furnace is sufficiently powerful to melt pure iron in a crucible in twelve or fifteen minutes, the fire having been previously lighted. It will effect the fusion of rhodium, and even pieces of pure platinum have sunk together into a button in a crucible heated by it.

(46) L. Y. L. says: I have a cistern constructed of brick, laid in mortar and cement; and the water is filtered through a brick partition. The water is very hard, so as to form an incrustation on vessels used for boiling it 6 or 8 times. Lime water has but little effect on it. How can I remedy the evil? A. The trouble probably is that you have not hit upon the right proportion of lime water per gallon of cistern water.

(47) T. K. says: I have green paper window blinds in my house. Are they injurious to health? I enclose a sample of the paper. A. We have examined and tested the sample of paper, and have discovered a minute trace of arsenic.

(48) J. R. D. & Co. say: We send you a portion of a bar of zinc which was put in our steam boiler and left there for ten days. Will you please analyze it, and let us know what has produced such a remarkable change in it? We are now building our third boiler in eight years, the other two having been entirely destroyed by the water we are compelled to use. A. An analysis shows that the interior of the zinc contains a great number of particles of sulphuret of iron, and has undergone decomposition by acid water. It would be impossible to say what the water contained without analyzing it, and what would be the best remedy to apply before knowing this.

(49) C. R. B. asks: The eggs of the *pelmatodytes palustris* (marsh wren), when blown and dried, fade from a dark mahogany to a light chocolate color. The eggs of the *melanerpes erythocephalus* (red-headed woodpecker) before being blown are of waxy, translucent appearance. After being blown, they are of an ivory white. What will make them retain their original color? A. Try varnishing them.

(50) J. H. B. asks: Can you tell me of a process by which I can alloy potash or other easily melting glass with metals? A. Mix the oxides of the metals in with your glass until the requisite tint is obtained on melting.

(51) H. M. H. says: Enclosed I send you a piece of silver ore from the celebrated Legal Tender mine at Clancey, Montana. You will see that it consists of zinc blende, galena, and ruby silver. What kind of varnish or preparation can I put upon such specimens to bring out and preserve the colors? A. A solution of clear shellac in alcohol is sometimes used for this purpose. We should be very happy to receive the other specimen of ore you speak of.

(52) F. D. S. says: Oil exposed to the air absorbs oxygen and becomes oxidized. Is there any substance or chemical agent which can be employed to arrest this tendency to oxidation, or prevent it altogether? A. Such a substance is not at present known.

(53) J. E. says: W. H. S. describes a cheap galvanic battery set up by one Baron: I made one in a 2 quart jar, 4¼ inches in diameter. I placed a round plate of rolled iron $\frac{3}{16}$ thick in the bottom, and soldered a piece of copper wire to the under side, long enough to come out from the top of the jar by a foot; then I took another piece of iron as above, and suspended it about 4 or 5 inches from the other plate, and about 2 inches from the top (and under) of the water, to which I also soldered a piece of wire, and connected the ends together. I then placed 1 lb. of blue vitriol on the top of the piece of iron at bottom, and then poured on sufficient clean rain water to cover the topmost piece of iron nearly two inches, and then allowed it to remain still for 72 hours. I put into the water ¼ oz. of sulphuric acid. At the end of this time I tested it, and found, when I passed the current through 2 coils of 3 inches long and 1 inch thick, there might be perhaps power sufficient to tickle the proboscis of a fly, but certainly not any more, for I could not with the end of my tongue feel any electrical commotion. Where is the difficulty? A. Two iron plates arranged as described would produce an electro-motive force of about one tenth of a volt, or about one tenth as much as a copper and zinc plate arranged in a similar manner.

(54) E. asks: 1. Can a magnet be constructed that will sustain a weight of 100 lbs. with one cell of a powerful battery? A. Yes. Bend an iron rod one inch in diameter and eighteen inches long into the form of a horseshoe, and wind around each leg 50 feet of No. 16 insulated copper wire. Use, for a battery, the largest sized Bunsen cell. 2. Would it attract 10 lbs. at a distance of 3 inches, provided that it moved without friction? A. No.

(55) O. C. says: I am making a machine which I want to start by the aid of an electromagnet acting on a lever, which in turn acts on a wheel. Where shall I place the electromagnet so as to get the most power at the end of the lever that disengages from the wheel? If the force of an electromagnet is inversely as the square of the distance, it seems to me that, the nearer I place my electromagnet to the fulcrum, the more power I will get at the end of the lever. A. You are right.

(56) W. M. asks: Can I construct an electrical machine or a dry galvanic battery that will occupy a space not exceeding one cubic inch, and that will produce a visible spark? A. You might make a miniature electric machine which would do it, using the form of the ordinary plate machine for a model.

(57) J. S. P. asks: How can two or more messages be transported over one wire? A. Probably you mean to ask how two or more messages can be sent on one wire at the same time. By so balancing the outgoing current that no effect is produced upon the receiving instrument at the sending station, while the instrument responds to the signal received from the distant station.

(58) T. E. B.—The alleged new motive power in Philadelphia that you allude to is doubtless the "Keely Motor," one of the perpetual motion humbugs, by which the owners claim to generate a great force out of nothing. Once in a while they have a juggling exhibition of the thing for the purpose of selling stock. Keely or one of his confederates is the operating juggler. The power "generator" is a combination of small tubes or cylinders, communicating by pipes. First they run water through, then air, to prove that there is nothing within, and that the show is "honest." Then Keely turns a faucet, and "now you see it." The pressure gage goes up. He turns again, and "now you don't" see it. The gage falls.

(59) J. L. L. asks: 1. Is it more difficult for an amateur to nickel plate than silver plate? A. No. 2. Do all metals require coating with copper before they are nickel-plated? A. Only iron and steel. 3. Does nickel require more battery power than silver? A. No.

(60) D. M. G. says: In your answer to my question as to the comparative strengths of gas pipe and solid rod, you made a misstatement. What I wished to know was this: Which would be best for supporting a weather vane on a church spire, 1½ inch gas pipe or 1½ solid iron rod, supposing both to be of equal length? A. The lightest would be the best, if it has sufficient strength. What was the misstatement?

(61) S. S. G. asks: Is there any cure for that disease which is shown by a purple color on the skin? A. This disease is called nævus, and includes the various affections termed mother's marks, vascular growths, etc., constituting an important section of surgical affections. The nature of the disease depends upon the predominance of the tissues affected, as the arterial, capillary, or venous elements predominate. From the description given by you, we would class yours under venous *nævi*, which is of a dark purple color, usually quite prominent and often forming into tumors. The first point to consider is whether the case is to be left to Nature, or if operative measures are to be taken. If it is small and does not show any tendency to increase, it should be left alone, as very probably it will shrivel up and disappear of itself, or turn into a mole. If, however, it is large, there are five principles of operation, which Erichson states as follows: 1, to excite adhesive inflammation in the tumors, and so to produce plugging and obliteration of the vascular tissue of which they are composed; 2, to destroy the growth by caustics; 3, to remove it by the galvanic cautery 4, to remove it with a knife; 5, to remove it by ligature. All the methods above stated should be performed by a surgeon, as delicate treatment is required. Your letter is not definite enough for us to decide which of the methods is best suited for you.

(62) L. S. H. asks: Does the weight of a body increase or decrease, the nearer it approaches to the earth's center? A. It decreases, because it is attracted towards the center by a less mass.

(63) C. A. P. asks: 1. Can a locomotive running in full forward gear at any speed be reversed to full backward gear without shutting any of the steam off? A. The chances are that some of the parts will give way. 2. How can it be known when a locomotive is priming? A. By looking at the glass gage, trying the gage cocks, or, in aggravated cases, by the pounding of the engine; also by the sound of the exhaust and the appearance of the exhaust steam. 3. Is it necessary to use both pumps in supplying a locomotive with water? A. Generally, no.

(64) F. T. D. asks: Last season I ran a side wheel boat, length 60 feet, beam 15 feet, draft 4 feet. The diameter of the side wheels is 6 feet, with 14 inches dip; rate of speed running light is 6 knots, laden about 2 knots. Would it be better to raise the shaft up 1 foot, thereby giving the wheels 2 feet more diameter, and about 4 inches more dip in the water? A. We doubt whether you would gain anything by the change. It seems to us it would be better to use feathering floats.

(65) W. T. H. asks: What shall I burn to make red or purple light, and how shall I burn it? A. If you have gas, surround the flame by the colored glass. A red fire can be made by intimately mixing 61 per cent chlorate of potash, 16 sulphur, and 23 carbonate of strontia. Dampen it, and drive it into a paper cylinder, and dry thoroughly for a week or more. Pink fire: 20 per cent sulphur, 32 niter, 27 chlorate of potash, 20 chalk, 1 charcoal. Purple light: 60 per cent chlorate of potash, 16 sulphur, 12 carbonate of potash, 12 alum. It must be borne in mind that the red and purple fires are liable to ignite spontaneously, and serious accidents have thus happened. These lights can be purchased much cheaper than you can make them, and will satisfy you much better.

(66) J. H. C. asks: In the tabulated results of the duties of English steam engines, what is the weight assigned to a bushel of coal? A. Ninety-four lbs.

(67) C. F. asks: We bought a second hand 2 horse railway power and thrasher, which are both gummed up, and I would like to know if there is any way to clean them without taking them apart. A. You will find it better to take the machines to pieces.

(68) A. R. C. says: I have invented an expansion steam engine, and I want to know the most successful method of jacketing the cylinder to keep down radiation. A. The most successful plan is to jacket the cylinder with live steam. The next best is, perhaps, heated air.

(69) C. P. M. asks: Will ports $\frac{3}{16}$ by $2\frac{1}{4}$ inches be large enough for a cylinder 3½ by 5 inches? A. Yes.

(70) G. C. B. asks: Using steam at a pressure of 60 lbs. per square inch, would a boiler and furnace combined, 5 feet high, 28 inches in diameter, so proportioned as to give 54 square feet of fire surface, be sufficient to run an engine 4½ inches diameter by 7 inches stroke? A. The boiler would be too small. 2. Would such an engine be powerful enough to run a 24 inch saw for sawing hard oak wood? A. The engine, with plenty of steam, will drive the saw very well.

(71) G. H. W. says: 1. I have built a model of a steamship 7½ feet long, 16 inches wide, and 9 deep. Please tell me the proper dimensions of cylinder, diameter and pitch of screw, and dimensions of boiler. A. Make an engine of ¾ inch diameter and 1 inch stroke; boiler 10 inches diameter and 18 inches high; screw 4½ inches diameter and 12 inches pitch. 2. What ought to be her speed? A. Probable speed, 2 to 2½ miles an hour. 3. Would small pieces of coal burn properly under boiler, fitted with 4 tubes, and give sufficient heat? A. Use charcoal for fuel.

(72) J. A. J. asks: How can I erect a furnace suitable for melting from 100 to 800 lbs. cast iron? A. The general principle of such a furnace is to have it lined with refractory material, such as firebrick, and to create a strong draft by artificial means.

(73) J. S. asks: 1. Will a double leather belt hug the surface of a pulley closer than a single leather one? A. We suppose your questions refer to the friction between the belt and pulley. If the tension is the same in each case, the friction will be the same with either a double or single belt. 2. Will a belt hug a smooth iron pulley closer than it will a leather-covered one? A. We are not sure that a pulley covered with leather is better than one with a smooth iron face. If any of our readers have any data in regard to this matter, we would be glad to hear from them.

(74) E. E. asks: Will soft water become hard by long standing in cemented cisterns? A. The hardening of waters is due to their taking up an increased proportion of lime. It is doubtful whether this would occur in the case mentioned, to influence the character of the water in a marked degree.

(75) L. B. S. asks: 1. Will a steam engine, with a cylinder 1½x3 inches stroke, be large enough to drive a boat 15 feet long and 4½ feet wide, flat-bottomed and sharp at bow and stern? A. The proposed engine will not answer. Use one three or four times as large, and connect directly to the paddle shaft. 2. Can I heat the boiler with a kerosene lamp? A. We doubt if you could make sufficient steam with any lamp.

(76) J. & D. N. ask: At what distance will two magnets attract each other? We have experimented with a small magnet, and we cannot find anything to place between the magnets to prevent them attracting each other. A. Magnetic induction takes place through all substances, independent of their character or composition. This induction decreases as the square of the distance.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

J. T. C.—It is plumbago.—C. A. L.—It is franklinite, a mineral consisting mainly of the sesquioxides of iron and manganese combined with the protoxides of zinc and iron. The attempts to work it for zinc have proved unsuccessful; but it is ground up to a dark paint, and can be used also as an ore of iron. The zinc is said to give increased tenacity to the iron.—N. H. S.—A number of specimens of black oxide of manganese have been received, and all have been reported upon; so if yours was not reported upon, it has not been received.—W. S. N.—It is a part of a trap column, the angle between two of the faces in the specimen sent being 120°, showing that it is hexagonal. It is a silicate of alumina, iron, magnesia, lime, potash, and soda. It is not valuable.—F. L. R. C.—It is iron pyrites, some of it in cubic crystals. Not valuable as an iron ore.—H. P. W.—It is prehnite, which is a silicate of alumina and lime (the greenish portion) in traps. It is not an ore. The magnetic action is due to a slight percentage of iron oxide in the mineral.—C. R. M.—It is a water-rolled mass of fragments of feathers of waterfowl and similar *débris*, mixed up with sand and saline matters.—L. A. A.—It is rock crystal. It is of little value except when in fine clear crystals. It is very common in many parts of the country.—S. N.—It is probable that the substance found is not quicksilver. Send a specimen.—J. W.—They are iron and copper pyrites, specimen No. 2 being richer in copper. The reduced metal is mostly black protosulphide of iron, together with some sulphide of copper and carbon derived from the fuel. The iron ladle is covered with metallic iron and a little copper.—D. O.—It is copper pyrites, and is composed of 35 per cent sulphur, 35 copper, and 30 iron. The white rock through which the pyrites is scattered is quartz.—D. W. D.—It is a mixture of iron ore, clay, and carbonaceous matter, not valuable as an iron ore.—M. McC.—It is very fine sand; it would not answer as a molding sand, although it might be employed for grinding, polishing, etc.—D. K.—This ore is sometimes also called purple copper ore, and is abundant at the copper mine at Bristol, Conn. It is found oftentimes with heavy spar and malachite, and is often contained in copper-bearing shales. Copper 63 per cent is a large amount, but it must be remembered that the percentage of a selected sample may be much higher than the average yield.—A. H.—It is pyroxene, a silicate of lime and magnesia with a small percentage of oxide of iron and manganese, but not sufficient to make it an iron ore.—W. W. B.—Ores cannot be analyzed without the use of chemicals, and no book describing such a process exists.—G. Y. R.—It is of the order *hemiptera*, family *aphidæ*, but the genus we cannot state positively. Aphides are found upon every part of plants. Some species which are wingless are found on the roots of plants, others on the stems of twigs; others roll up leaves, or form gall-like swellings on leaves.—*Packer*.—J. W. S.—Your liquid would require a long and costly analysis.

G. W. W. asks: How can I pulverize mica very fine in large quantities?—H. W. M. asks: How are glass pendants for lamps and chandeliers drilled?—E. C. asks: What is a good way of dyeing silk black, and for finishing and putting on the gloss?—S. B. asks: How can I soften a bird's skin after it has been dried?—C. R. asks: How can I restore the color to kid gloves, which I had cleaned and which then got damaged by water?—D. R. asks: Why do hens eat off each other's feathers? Is there anything that will prevent them from doing it?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Scale in Boilers. By C. L.
On Watch-Making Machinery. By A. P. B.
On Marriage. By B. F.
On the Language of Animals. By L. H. R.
On the Pendulum and the Elliptic Valves. By J.W.
On Freezing Fire Plugs. By J. L. K.

Also enquiries and answers from the following:

A. G.—R.—C. G.—J. M. W.—A. C.—T. W.—K.—T.—A. R.—A. V. H.—W. K.—P. M.—C.W.B.—G.—S.B.H.—B. F. S. Jr.—A. A. W.—L. D.—J. M.—W. H. P.—E. M.—J. J. W.—G.—B. F. P.—P. F. O'S.—W. H. W.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of enquiries analogous to the following are sent: "Who sells oil that is not affected by frost, suitable for clocks? Who makes aluminum spoons, etc.? Who makes the smallest portable engines? Who sells telegraph instruments? Which is the best lens for photographic portraiture?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week ending

March 9, 1875,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Alkali for soap, I. N. Stearn	160,726
Auger, earth, F. J. Clarke	160,648
Auger, earth, E. Whitney	160,632
Awls, needles, etc., bending, Mann & Boardman	160,533
Bag fastener, C. W. Harvey	160,591
Barrels, H. M. Fitzhugh	160,664, 160,665
Barrel rack, C. F. Rigby	160,716
Basin, wash, Kinsman & Smith	160,687
Bedstead, invalid, J. Goodwin	160,667
Bedstead, invalid, J. Michel	160,694
Bee hive, N. C. Mitchell	160,695
Bevel, try square, and dividers, W. Ascough	160,503
Bill file, F. B. Alderson	160,501
Binder, temporary, J. N. Hale	160,517
Boiler tube expander, O. Pagan	160,699
Boot, gaiter, C. Hersome (r)	6,328
Boot heels, etc., trimming, R. C. Lambart	160,529
Boots, crimping stiffening of, J. W. Hatch (r)	6,319
Bolting machine, F. T. Ryberg	160,720
Box, spice, G. B. Wheeler	160,631
Bracket hook, window, N. Plympton	160,710
Brick molds, sanding, D. O. Loy	160,532
Broom bag, E. D. Bronson	160,567
Brush, tooth, S. Stevens	160,552
Bucket, sheet metal, C. Hoff	160,674
Burner, lamp, J. Curzon	160,577
Burner, vapor, A. F. Gray	160,669
Burner, vapor, S. S. Gray	160,670
Butter worker, D. Sager	160,548
Button hole casing, V. V. Balmforth	160,504
Car brake, E. J. Roberts	160,717
Car coupling, D. L. Adams	160,635
Car spring, J. H. Pickels (r)	6,321
Car wheels, swaging, A. L. Blackman	160,566
Carbureter, J. F. and G. E. Lockwood	160,690
Carriage, shifting seat for, J. P. Cost	160,651
Cartridge belt, D. Taylor	160,730
Castings, chilling, E. A. Chubb	160,508
Chair, folding rocking, G. O. Wellman	160,629
Chair, opera, G. W. Borel	160,641
Chair, reclining, N. H. Hill	160,673
Chair seat, C. Brown	160,643
Chair, tilting, C. F. Spencer	160,624
Chimney cap, J. Gorton	160,668
Chimney staging bracket, P. Willard	160,736
Chimney, ventilator, J. Howes	160,523
Chinch bug gatherer, E. H. Marsh	160,606
Clay pulverizer, D. Rudy	160,618
Cloth pressing machine, W. Hebdon	160,594
Clothes pin, Farrington & Potter	160,661
Clothes sprinkler, W. Olson	160,698
Coffee urn, H. C. Wilcox	160,633
Column, wrought iron, J. B. Cornell	160,574
Cotton opener and lapper, Whitehead & Atherton	160,558
Crane, J. Dorman	160,513
Cuff holder, H. B. Adams	160,636
Cultivator, P. F. Landphere	160,602
Curling iron, J. M. Baxter	160,637
Curtain fixture, C. P. Rose	160,718
Cylinder relief valve, brake, Rider *et al.*	160,715
Dental plate, J. N. Clark	160,573
Dental plate, G. V. N. Relyea	160,714
Digging machine, potato, T. Head	160,593
Dish of pottery ware, J. Moses	160,539
Door hanger, W. Johnson	160,598
Dredging box, J. S. Field	160,663
Drill and planter, seed, L. L. Haworth	160,592
Dyeing wool on skins, A. Jack	160,677
Elevator, H. Pearce	160,515
Elevator or chain pump, water, O. A. Davis	160,578
Elevator, water, J. Keith	160,527
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Faucet for effervescent liquors, C. Greiner	160,589
Fence, portable, H. Prickett	160,711
Fire arm, breech-loading, E. Whitney	160,738
Fire arm, revolving, D. Smith	160,551
Fire arm ordnance chamber, T. Mac Neil	160,691
Fire box, water, J. De Butt	160,652
Fire place fender, J. Old	160,541
Flowers, sheet wax for, M. J. McColl	160,608
Fountain, perfume, E. Rath	160,713
Fruit dryer, L. A. Gould	160,587
Furnace, hot air, W. Burrows	160,644
Furnace, metallurgic, J. Feix	160,662
Furnace, ore roasting, J. H. Clark	160,649
Garden sprinkler, F. M. Gray	160,516
Gas retort, D. L. Mac Neill	160,740
Gear for shafting, driving, S. S. Hepworth	160,522
Goods on bias, cutting, S. Mayer	160,607
Governor for horse powers, J. D. Heebner	160,595
Governor, steam, D. L. F. Chase	160,572
Grain and straw lifter, D. Crane	160,576
Grain binder, C. L. Travis	160,732
Grain, implement for binding, W. A. Patterson	160,705
Grain thrasher and separator, D. Lippy	160,689
Grate, Swartout & Whedon	160,553
Grave cover and monument, R. H. Sipes	160,622
Grinding rolls, machine for, J. M. Poole (r)	6,323
Harvester, C. W. and W. W. Marsh (r)	6,329, 6,330
Harvester, wheel, G. D. Rowell	160,546
Hasp, Smith & Egge	160,723
Hat and cap, P. Goldmann	160,666
Hat box, G. L. Jaeger	160,680
Hay loader, L. Underwood	160,556
Hinge for safe doors, etc., W. R. Perry	160,616
Hoe, J. N. Burton	160,645
Hoe and plow combined, A. D. Simons	160,621
Horses, feed bag for, H. Engelbert	160,659
Horses, sun protector for, V. Henry	160,521
Horseshoe, T. B. Bishop	160,565
Horseshoe bars, bending, Hale and Johnston	160,590
Hose coupling, W. Painter	160,700
Hose, foot pipe for suction, W. P. Painter	160,704
Hose, hydraulic, J. D. Joslin	160,526
Hose to coupling, attaching, A. J. Morse	160,596
Hydrant, etc., non-freezing, H. I. Chapman	160,571
Ice former, S. Krauss	160,60
Ice making apparatus, W. Hood	160,596
Key, folding door, B. Erbe	160,660
Knit fabric, Kent and Leeson	160,684
Knitting machine, Kent and Leeson	160,685
Lamp, F. Kampfe	160,683
Lamps, supplying oil to, R. V. De Guinon	160,653
Lamp, hydro-electric, W. H. Zimmermann	160,739
Latch, gate, R. C. Bernard	160,639
Lathe for turning irregular forms, J. Beaudry	160,638
Lemon press, H. Newberger	160,697
Loom shuttle, J. H. Peasley	160,544
Measure, dry, D. M. Mefford	160,609
Measuring tank, J. Lessler	160,530
Metal bending machine, J. C. Chapman	160,647
Motor, J. M. Cayce	160,646
Needle blanks, beveling ends of, S. C. Kingman	160,686
Night soil, removal of, W. Painter	160,701
Night soil tanks, discharge for, W. Painter	160,702
Night soil tank indicator, W. Painter	160,703
Oil, safety tank for, J. H. Hayward	160,520
Oily matter, extracting, R. Scaife	160,550
Ordnance, projectile for, J. G. Butler	160,569
Ore feeder, J. Tullock	160,628
Organ key board, L. K. Fuller	160,515
Organ stop action, F. M. Brush	160,568
Organ tremolo, reed, J. R. Lomas	160,605
Overalls, J. Moore	160,537
Packing, hydraulic, J. F. Taylor	160,731
Pantaloon stretcher, J. D. Ryan	160,619
Paper feeder, pneumatic, S. Scholfield	160,721
Paper, etc., cutting, J. Ball (r)	6,324
Peg cutter, W. J. Squires	160,724
Pegging jack, J. J. Stewart	160,727
Petroleum storage apparatus, G. Des Georges	160,511
Piano stringing and tuning, W. F. Kearsing	160,600
Picture holder, S. Binney	160,564
Pin, toilet, A. N. Kellogg	160,523
Pipe for suction hose, foot, W. Painter	160,704
Planter, seed, H. E. Pennypacker	160,707
Plow, J. Lane (r)	6,320
Plow, side hill, C. H. Stratton	160,625
Pocket book, safety, E. G. Wheeler	160,630
Press, C. S. Swan	160,626
Press, hay and cotton, B. S. Day	160,579
Printer's galleys, A. T. De Puy (r)	6,326, 6,327
Printer's galley, A. T. De Puy	160,654
Pruning shears, C. H. Billings	160,563
Pulley, friction, T. F. Carver	160,570
Railway, elevated, J. B. Cornell	160,650
Railway rails, patching, Moore and Mills	160,536
Rake, horse hay, B. Mellinger	160,693
Range, cooking, J. Old	160,542
Reflector, B. Goetz	160,584
Register, air, G. Lawrence	160,688
Register, hot air, H. Fritz	160,514
Road scraper, McCall, Watkins, and Scott	160,585
Rubber dam tension weight, T. G. Lewis	160,604
Sash and blind fastener, J. Christie	160,509
Sash fastener, J. H. Husted	160,525
Sash holder, L. Quitman	160,712
Sash holder, J. Sweet	160,554
Sash holder, J. B. Wilford	160,735
Saw swaging machine, L. W. Pond (r)	6,322
Sawing shingles, machine for, W. Huey	160,524
Screw driver, W. F. Patterson	160,543
Screw tap, T. S. Wild	160,559
Seed drill and planter, L. L. Haworth	160,592
Seed dropper, E. M. Morgan	160,611
Seeders, slip teeth for, G. D. Rowell	160,547
Separator, grain, O. K. Wood	160,561
Sewing machine, A. S. Dinsmore	160,512
Shafting, driving gear for, S. S. Hepworth	160,522
Shirt bosom supporter, J. S. Edmunds	160,658
Shoe, ladies', G. L. Davis	160,510
Shoes, manufacture of, W. Froehlich	160,583
Shutter and blind fastener, C. B. Haynes	160,672
Shutter bower, J. B. Hand	160,671
Sinks, attachment for, J. Murdock	160,540
Sky light bar, J. Harney	160,518
Sower, seed, A. Walker	160,733
Spark arrester, locomotive, C. S. and E. Osborn	160,614
Spokes, tapering tenons of, W. M. Sharpsteen	160,722
Stencil cutter, P. L. O'Brien	160,613
Stereotype plate holder, A. Case (r)	6,32[illegible]
Stone, crushing, S. H. Johnson	160,682
Stove, cooking, J. S. Van Buren	160,557
Stoves, air chamber for, E. Hawks	160,519
Stud fastening, S. Zacharias	160,684
Sugar, making hard, J. O. Donner	160,656
Sugar cutting machine, J. O. Donner	160,657
Sugar machine, centrifugal, J. O. Donner	160,655
Sun protector for car horses, V. Henry	160,521
Surcingle, H. M. Witter	160,560
Table, extension, G. Ahrens	160,562
Table, folding extension, J. F. Birchard	160,506
Tackle block, G. Martin	160,534
Teeth, plate for artificial, B. J. Field	160,582
Telegraph apparatus, duplex, M. G. Farmer	160,581
Telegraph solution, chemical, T. A. Edison	160,580
Thill coupling, E. Jarrell	160,681
Thill coupling, G. F. Smith (r)	6,331
Thill coupling, S. M. Strader	160,728
Thill coupling, G. Wright	160,758
Tool handle, H. Staples	160,725
Trap, fly, Rukgabee and Clarke	160,719
Tyre shrinker, D. Strattan	160,729
Umbrella handle, E. Layman	160,603
Umbrella handle, etc., G. W. Tucker	160,627
Valve for street water mains, J. Bird	160,640
Vehicle end gate rod, W. J. Lewis	160,531
Vehicle fender, N. Jackson	160,679
Vehicle, spring, Phenix and Curtis	160,709
Vehicle spring and side bar, J. W. Gosling	160,586
Vehicle spring equalizer, N. Jackson	160,678
Vehicle torsional spring, C. W. Saladee	160,549
Vehicle wheel, J. H. E. Boykin	160,642
Velocipede, J. A. Crandall	160,575
Ventilator, chimney, J. Howes	160,523
Vest, bricklayer's, J. Moore	160,538
Vise, T. L. Baylies	160,505
Wagon, axle and thimble skein, I. L. Anderson	160,502
Wagon end gate, S. C. Myers	160,612
Wagon seat, W. H. H. Snellbaker	160,623
Walls, coping for, J. C. Wright	160,737
Washing machine, G. Huntington	160,597
Washing machine, T. Patterson	160,706
Watch case spring, J. Menegay	160,610
Watches, reversible pinion for, J. Gordon	160,585
Weather strip, E. C. Underwood	160,555
Weed cutter and hiller, J. Robson	160,545
Well strainer, drive, W. C. Macomber	160,692
Wind wheel, J. M. Kauffman	160,599
Windlass, M. G. Imbach	160,675
Windlass, F. S. Rowland	160,617
Windmill, A. and W. Graf	160,588
Windmill, Sheckler and Bolender	160,620
Wood planing machine, W. W. Carey	160,507

DISCLAIMERS FILED.

31,445.—LIME KILN.—R. Donaldson, Mount Nebo, Pa.
105,599.—CONCRETE PAVEMENTS.—J. Schillinger, N.Y. city.

DESIGNS PATENTED.

8,194.—DRAWER PULLS.—O. F. Fogelstrand, Kensington, Ct
8,195, 8,196.—MATCH SAFE.—O. F. Fogelstrand, Kensington, Ct.
8,197, 8,198.—CARPETS.—A. Heald, Philadelphia, Pa.
8,199.—COFFIN HANDLES.—W. Smith, West Meriden, Ct.
8,200.—WRITING PAPER.—H. Bainbridge, Brooklyn, N.Y.
8,201, 8,202.—BREASTPIN, ETC.—L. S. Beals, Astoria, N.Y.
8,203.—BREASTPIN.—L. S. Beals, Astoria, N. Y.
8,204.—INKSTANDS.—O. F. Fogelstrand, Kensington, Ct.
8,205.—PAPER WEIGHT.—O. Fogelstrand, Kensington, Ct.

TRADE MARKS REGISTERED.

2,275.—CIGARS, ETC.—Batcheler Bros., Philadelphia, Pa.
2,276.—FERTILIZERS.—H. N. Hooper, Dedham, Mass.
2,277.—CIGARS.—Roberts *et al.*, Philadelphia, Pa.
2,278.—WHISKY.—Torlina & Co., St. Louis, Mo.
2,279.—PERFUME.—S. C. Upham, Philadelphia, Pa.
2,280.—CARPET LINING, ETC.—Chipman & Co., Boston, Mass.
2,281.—ALPACAS.—Farr Co., Holyoke, Mass.
2,282.—GIN.—C. A. Hubbard, Haddam, Ct.
2,283.—HAMS, ETC.—Michener & Co., Philadelphia, Pa.
2,284.—FERTILIZER.—Patapsco Guano Co., Baltimore, Md.
2,285.—AXES.—Patrick & Co., San Francisco, Cal.
2,286. SPECTACLES, ETC.—Sussfeld & Co., New York city.

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CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA,

MARCH 6 to 10, 1875.

4,464.—H. C. Cutler, Minneapolis, Minn., U. S. Gang saw hangers. March 6, 1875.
4,465.—P. J. Ayres, Lindsay, Ont. Stump raising machine. March 6, 1875.
4,466.—E. C. Tozer and R. D. Southwood, Newcastle, N. B. Freezer. March 6, 1875.
4,467.—W. R. Wagoner, Syracuse, N. Y., U. S. Churn. March 6, 1875.
4,468.—K. Knott, London, Ont. Slaughtering, preparing, and packing meat. March 6, 1875.
4,469.—C. T. Cleaveland, Oldtown, Me., U. S. Joint for furniture. March 6, 1875.
4,470.—L. Coté, St. Hyacinthe, P. Q. Extension 1 of No. 526. Trimming and finishing machine. March 10, 1875.
4,471.—L. Coté, St. Hyacinthe, P. Q. Extension 2 of No. 526. Trimming and finishing machine. March 10, 1875.
4,472.—T. S. Elliott, Guelph, Ont. Washing machine. March 10, 1875.
4,473.—R. H. Hudgin, Whitby, Ont. Farm and carriage gate. March 10, 1875.
4,474.—R. N. Meriam, Worcester, Mass., U. S. Expansion gear for planer feed rolls. March 10, 1875.
4,475.—J. H. Stone, Hamilton, Ont. Milk can bottom. March 10, 1875.
4,476.—J. B. McCune *et al.*, Hamilton, Ont. Ramming and molding machine. March 10, 1875.
4,477.—J. S. Rood, Waterbury, Conn., U. S. Sewing machine caster. March 10, 1875.
4,478.—E. Wright *et al.*, Denmark, Iowa, U. S. Carriage spring. March 10, 1875.
4,479.—J. Hodgson, Toronto, Ont. Consuming smoke. March 10, 1875.
4,480.—R. G. Blamey *et al.*, Petersburgh, Ont. Churn. March 10, 1875.
4,481.—W. O'Hara *et al.*, Fall River, Mass., U. S. Non-conducting covering for boilers, etc. March 10, 1875.
4,482.—M. Deal, Bucyrus, Ohio, U. S. Scouring case for smutters and separators. March 10, 1875.
4,483.—E. Andrews, Williamsport, Pa., U. S. Attaching saw handles. March 10, 1875.
4,484.—A. A. Murphy *et al.*, Montreal, P. Q. Pneumatic fire extinguisher. March 10, 1875.
4,485.—J. H. Dorion, St. Anne de Tamachiche, P. Q. Improvement in architecture. March 10, 1875.
4,486.—J. L. Wilson, Woodstock, Ont. Setting device for stem-winding watches. March 10, 1875.

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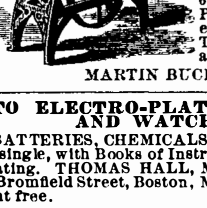

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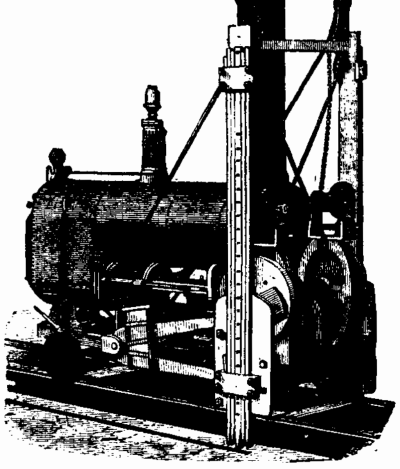

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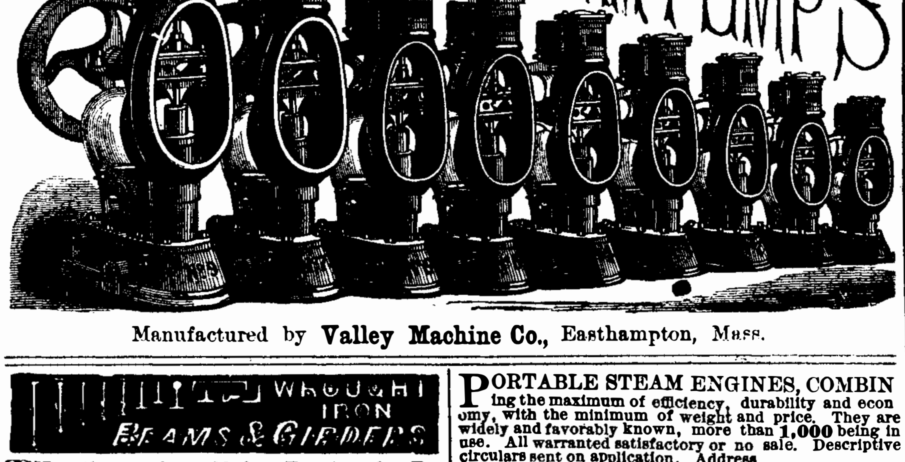

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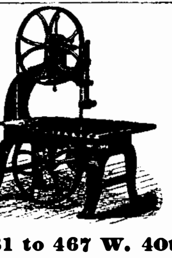

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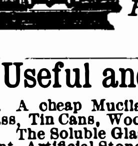

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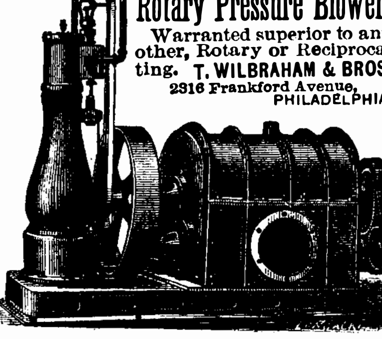

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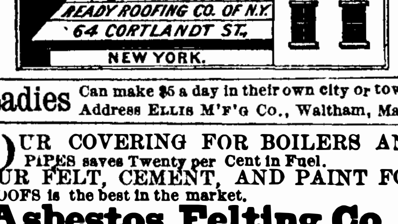

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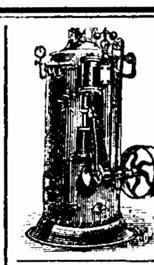

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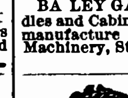

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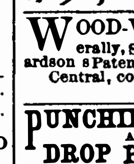

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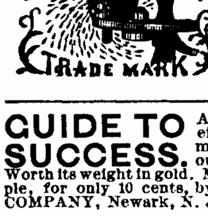

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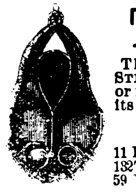

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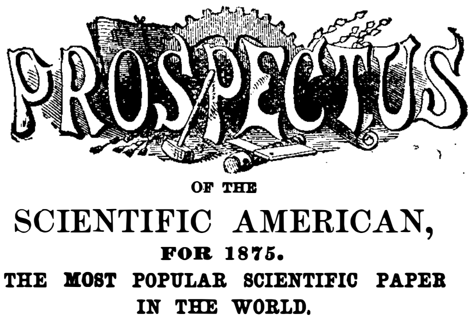

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