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Improvement in Tweer Irons for Forges.

A hot blast with a cool tweer face are points so apparently irreconcilable, that at first it would seem impossible to combine them except by means of a complicated device. But it has been accomplished in the device shown in the accompanying engraving, the simplicity of which is equaled only by its efficiency and durability, it having for two years been in successful use both in this country and England.

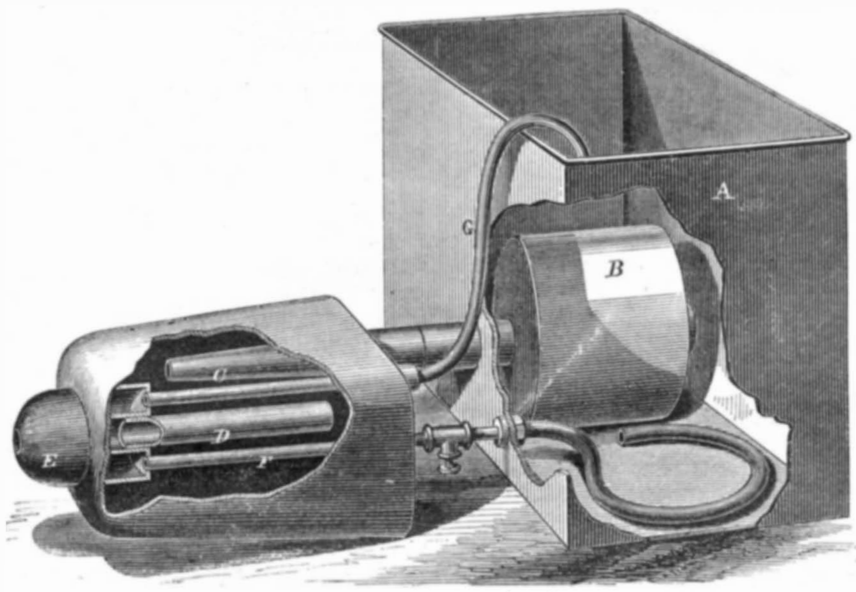
We gave an illustrated description of a tweer on a similar plan, in No. 26, Vol. XV, of the SCIENTIFIC AMERICAN, but since that publication it has been greatly improved by the inventor. The advantages of a hot blast in the working of iron and steel are too well known to be questioned or described; we will therefore confine ourself to a description of the implement itself.

A is a tank, either of plate iron, zinc, or of wood, of any convenient form (a barrel will do), placed back of the forge, or in any convenient situation, so the level of the water it contains is above the tweer. The length of pipes connecting with the tweer is not material. The blast enters the drum, B, and passes through the pipe, C, impinging on the face of the tweer and reaching the fire through the pipe, D, and nozzle, E. This nozzle is a hollow casting, as seen, and is filled with water from the tank by means of the pipe, F. The steam that is generated in the nozzle is conveyed back to the tank by the pipe, G, and condensed. When the forge is to be left unlighted, as on nights, and Sundays, or holidays, and freezing is apprehended, the water may be drawn from the nozzle by means of the cock on the pipe, F, between the tweer and tank. In this case the flexible extension of the pipe, F, seen coiled on the floor of the tank, is raised and its end allowed to hang over the edge of the tank, so that no more water can pass from the tank to the tweer. A jointed pipe of iron may be used instead of the flexible pipe, if desired.

It will be seen that the water entering the tweer nozzle is kept in a constant state of circulation by means of the steam created by the heat, and the face of the tweer nozzle is kept cool while a hot blast is passing through it. The tweer box is about fourteen inches long, ten wide, and eight deep, giving an ample chamber for the heating of the air before it reaches the fire.

The London *Ironmonger*, of Sept. 30, 1868, speaks in very high terms of the actual working of the device. It has also received the unsolicited commendations of a large number of practical smiths in this country and England. All concur in the statement that the iron can be heated in one third the time usually required, with a corresponding saving of fuel, and that the heat is softer and more "suant," not burning the surface before the interior is reached.

Patents for the United States were obtained through the Scientific American Patent Agency, Aug. 7, 1866, Sept. 17, and reissued Dec. 17, 1867. Letters patent for Great Britain, France, and Belgium, have also been obtained by John Bayliss, who may be addressed at the corner of Lexington avenue and Fifty-fourth street, New York city, where the tweer may be seen in constant operation. Orders may be also addressed to Hollis, Kirkup & Co., No. 24 Dey street, New York city.



BAYLISS' PATENT IMPROVED TWEER.

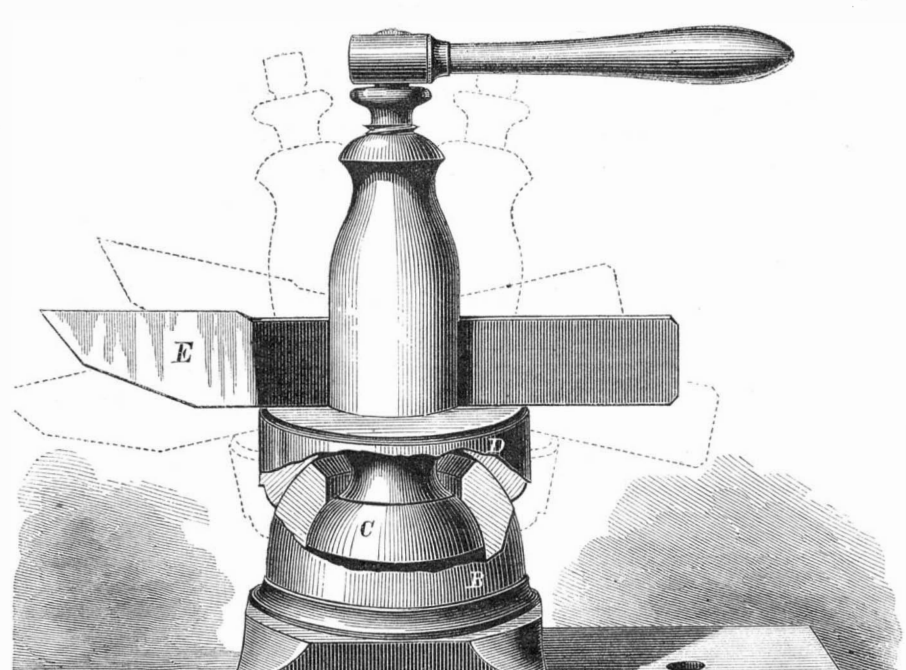
Adjustable Lathe Tool Post.

No machinist can deny the advantage of such a tool post to his lathe or planer as will allow the cutting tool to be presented to the work at any desired angle, without the necessity of "blocking up," or a resort to similar make-shifts. Such a one is certainly presented in the accompanying engraving. We have been much gratified in an examination of the model; it seems to meet every requirement, except the positions of hight and forward and back movement, and even these it partly compensates for.

The tool stock, A, is bolted to the carriage in the usual way, and is moved forward and back, and raised and lowered in the ordinary manner. The rise, B, of the stock is bored from the under side, leaving a semicircular seat, as seen, for the reception of the bottom, C, of the tool post, turned to fit the seat. This arrangement constitutes a ball-and-socket joint. The washer, or flange, D, plain on its upper surface as that on any common tool post, is hollowed on its under side to fit the semicircular apex of the rise of the tool stock, making another ball and socket joint. The set screw serves, as usual, to hold the tool in any position; and the dotted lines show various positions of the post, C, and tool, E. No machinist can fail to see the great advantage this adjustable tool post has over those ordinarily used, either for the lathe or the planer. There can be no doubt about the holding of the cutter in any position, as the frictional surfaces present a very large area, and if they had a bearing only of simply a circular line, we think no resistance the tool at its point would meet would be sufficient to overcome it. It can be applied to any lathe or planer now in use, and we are so favorably impressed with this device, that if we were in our old business, we should not hesitate to give it a fair trial.

By a careful examination of the device every progressive machinist will see that it is one of the simplest as well as one of the most useful of contrivances yet presented to his attention.

Patented May 12, 1868, by Wm. H. Leach, assignor to himself and Bradford Stetson. Orders should be addressed to the agents of the patentees, Horace McMurtrie & Co., 80 Milk st., Boston, Mass.



LEACH'S PATENT TOOL POST.

PRODUCTION OF BEAUTY IN ART.

Mr. Richard Westmacott, R.A., in a recent lecture upon the above subject, said that the production of beauty in art depends much upon truth of proportion, and truth of proportion is governed by certain fixed laws, which, within certain limits, cannot be violated. For instance, there are certain proportions between parts of the bones in all human beings, which are, practically speaking, always the same, though masked more or less, sometimes, by the fleshy covering. He would illustrate this by first drawing a circle and bisecting it by a line. Then he would divide this line inside the circle into three equal parts, denoted by the ends of lines 2, 3, and 4. In drawing a well-proportioned face, 3 would be the line of the eyes, 2 of the parting of the hair, and 4 of the end of the nose. By this rule the eyes always come at the center of the egg-shaped outline, between 1 and 5. This canon law of art holds good in the best of Grecian faces, and when it is departed from a little here and there, the faces will lose much of their ideal beauty, and look more like portraiture. The lecturer stated certain other rules as to the proportions of other parts of the human frame. He said that while in Rome, he and others devoted much attention to this subject of proportions, and talked it over at numerous meetings. Although every artist ought to know these rules, they should not follow them blindly, as it is impossible to produce fine works of art by mathematical laws alone. The sculpture of Egypt and Assyria was not fine art, for those who executed the work were bound down by such conventional rules that no improvement was possible. The early Greeks, who, so far as he could ascertain, did not in any way get their first lessons in art from Assyria or Egypt, did not recognize portraiture as a branch of sculpture. Their statues were all devoted to high religious and national purposes. Alexander the Great was the first to apply it to portraiture, and he did so out of personal vanity, in his desire to equal Jupiter Ammon. Until his time none but the features of the gods had been stamped upon the coinage, and he seemed afraid to interfere with the custom at once, for, the first time he altered the heads upon the coins, he stamped upon them a kind of confusion between his own head and that of Jupiter Ammon. From that time art steadily declined. The early Greeks first began art study 600 or 700 B.C., and in a little more than 150 years, made enormous progress, for, at about 450 B.C., in the time of Phidias, Grecian art was perfection. Some of the works of this period are now in the British Museum, and he wished that, at stated hours, a lecturer or other competent teacher were present there to point out the beauties of these works of antiquity. It is one thing for the public to possess art treasures, and another thing to be able to appreciate them. The grand and noble school of Phidias, which was "perfection," was succeeded by that of Praxiteles, whose figures were life itself, but who gave art a sensuous direction. He first introduced the partly draped female figure, but, under considerable fear that the priests or the government would interfere. But they did not, and soon the drapery disappeared altogether, though works of fine art were still used only for the adornment of temples and other high purposes.

Lastly, Alexander the Great, out of personal vanity, introduced portraiture, and from that time art declined, and has not altogether recovered since. Roman art was very poor, though, in all directions, Rome is and was rich in the finest art specimens, nearly all being the work of the Greeks. So little did the Romans understand the beauty of these works, that one of their emperors threatened, that if his subjects broke any of them in the carriage they should be compelled to make others like them. Had they attempted such a feat, the result would have been of a very distressing character.

The lecturer said that, although native Roman art was always at a low ebb, it would not be fair to omit the statement, that several individuals in that nation gave encouragement to art. Among these were Cæsar and Hadrian, the latter of whom tried to introduce Egyptian religion and sculpture into Italy. When, after the time of Alexander, art began to decline in Greece, the sculptors migrated into other parts of Europe. In the year 323 Constantine carried the seat of his empire, and a taste for art along with it, to Constantinople, and ornamented that city in a manner almost beyond conception. But Alaric, and other invaders, overthrew the empire, and destroyed most of the beauties of Constantinople. After the time of Alexander, the

Great, art declined all over Europe. It never revived; for what is commonly called the revival of the fine arts in Europe, was, in reality, a new birth. The early Christians, in their works of art,had a strong and obstinate prejudice against imitating, in any way, the beauty of form displayed in the works of the pagan Greeks, and they had neither the taste nor the ability for the accurate imitation of nature. Hence, 300 years after Christ, art in Europe was in a much lower state than it had been 300 years before his time. At last a quarrel broke out between the Eastern and Western Churches respecting the introduction of beautiful works of art into their temples. The Eastern Church objected to the innovation, and to this day, the art displayed in the Greek Church is of the most barbarous description. The Latin Church, however, gradually improved, and possessed specimens of very good art workmanship in the eleventh and twelfth centuries. These works are now plentiful in Italy, at Pisa and Florence. About the twelfth century Gothic architecture was introduced, but had not sufficient vitality, from intrinsic imperfections, to last more than 250 years. An attempt is now being made to reintroduce it into England, but the idea the lecturer thought to be as absurd as an attempt to bring ancient Assyrian art into fashion. An idea prevails in the minds of many people that the Gothic is an essentially Christian style, whereas, it was completely unknown till Christianity had been in the world for 1200 years. Its figures are usually absurd and grotesque, representing busts supporting brackets and roofs, and water spouts carved to resemble monks or nuns. Its recumbent figures have their drapery arranged in straight lines like organ pipes,and the folds are just the same in the prostrate as in the standing figures. People speak of the "purity" of the Gothic, but the fact is that many Gothic carvings in old English churches are so blasphemous and indecent that the wood has had to be re-screwed in its place,face downward,or against the walls, and sometimes the representations have had to be planed off or plastered over. He did not care about giving names, yet could mention many English churches wherein these works can now be seen. As a milder specimen of grotesque Gothic carving, he called attention to a picture upon the wall of a pew door from a church. It represented a bishop with the head of a fox watching birds and nondescript animals, while below his feet was a monkey roasting a sucking pig. No modern church would ever disgrace itself by such works of art. It fact, it is scandalous to say that, in these days, we must go back to the Goths to learn what art should be, and if people have a passion for imitating ancient art,they need not choose a bad school to copy, but go to the Greeks, who had a good one. St. Peter's,and other churches in Rome, abound with very interesting specimens of ancient art, but the subjects are such as, in many cases, should never be introduced into a place of worship. They are not of a religious character, and he was glad that, in England, churches are not now adorned with similar figures to those prevalent in churches in the south of Italy.

MANUFACTURE OF PARAFFINE.

From All the Year Round.

Few persons who are accustomed to use the pure white candles, delicate as wax in their hue, and known popularly by the name of "composites;" and the clear oil, almost as transparent as water, which is called "paraffine;" have any idea that both are produced from a dull, compact coal, totally devoid of the luster which gives to that mineral the appellation of the "black diamond." And yet this seeming miracle is achieved by the aid of chemistry—that strange science which changes and transmutes substances and reveals properties, hidden and mysterious, at the will or instigation of the student. The process by which the change is effected is complicated and laborious; but, freed from its technicalities, it may be easily explained.

The coal yields four different articles, all of which are largely employed in daily life, and have given rise to a considerable commerce. There is, first, the paraffine oil for burning, at present manufactured by thousands of gallons, which, in many parts of England, where gas is still unknown, is the staple commodity of illumination. Then a second quality of the same oil, considerably cruder and coarser, which, on account of its cheapness and general aptitude, is largely employed for lubricating machinery. Naphtha comes next upon the list—a light volatile fluid, much used by traveling showmen to light up their stalls and tents. Lastly, there is solid paraffine—a pure, white, shining, tasteless substance, scarcely distinguishable from wax, which is manufactured into candles. These substances, though widely differing in color, properties, and consistency, are all manufactured by nearly the same process, the difference consisting merely in the number of times that a particular operation is repeated.

Boghead mineral is the name of the coal employed in the manufacture of paraffine; and this is conveyed from the pits direct into the heart of the works, by means of branch lines of railway. Arrived here, the coal is passed through a huge iron crushing machine, and broken into small pieces, to facilitate the labor of subsequent stages. The first result to be achieved is to extract the crude oil from the coal. This is effected by means of retorts, into which t e mineral is put, and the oleaginous matter extracted by burning. These retorts may, for our purposes, be described as huge upright iron pipes passing through furnaces. The coal is filled into the pipe or tube by the top, which is then closed with an air-tight valve; and the bottom of the pipe is led into a pool of water to prevent the entrance of air from below. A low red heat of uniform temperature is maintained constantly in the retorts. As the coal is acted upon by the fire, it descends gradually in the tube and becomes entirely decomposed. The essential or oleaginous property of the mineral passes off in vapor, and the refuse falls through the bottom of the pipe into the pool of water, and is raked away. The vapor or steam, as it is generated by the decomposition of the coal, is carried off by a pipe in the side of the retort. This pipe again communicates with a series of pipes placed upright in the open air, and arranged on the same principle as the bars of a common gridiron, after the fashion that prevails in gasworks. The vapor, in traveling through this labyrinth of pipes, cools, is condensed into liquid, and is run off into an immense reservoir sunk into the ground. The crude, oily liquor thus collected is a thick, black, greasy fluid, not unlike tar, which moves with a sluggish motion when stirred, and gives off inflammable vapors at the usual atmospheric temperature. This coarse oil, both in its properties and appearance, closely resembles natural petroleum, and is equal to the rock oil, which, as we have seen, was obtained in Derbyshire.

The raw material thus prepared by simple burning is kept stored in the tank, and is only drawn off when required. To the observer nothing seems stranger than that this heavy, black, tarry liquid should produce oil as pure as water, and solid paraffine as white as marble. And yet the marvel is wrought daily, and on a scale which supplies distant markets of the world with oil. It is a mere question of refining. The black liquor is, as it were, boiled, washed, and bleached, reboiled, re-washed, and re-bleached, until the last particle of its darkness and impurity is purged away. The first step in the work of refinement is in some respects similar to the previous process of decomposition. The crude tarry liquid is put into stills, which we may call huge boilers of gigantic strength, with movable doors or lids. When the stills have been filled, the doors are closed, and the joints are stuffed with clay, so as to render the interior perfectly air-tight. Fires are then lighted in the furnaces below the boilers, and kept up to a steady heat, till the fluid inside distills over and is transmitted again into vapor. This vapor, as in the former instance, permeates through another series of condensing pipes, and, during its transit is re-transmuted into liquor, and flows into a second reservoir. Collected in this tank, the oil shows abundant evidence of the severity of the ordeal through which it has been put. It passed into the stills black and of the consistency of treacle; it has come out of a dark-green color and of the consistency of pea soup. A large portion of the coal-black has, in fact, been boiled out of it, which is now to be found in the bottom of the boilers in the shape of a lustrous compact residue resembling coke, for which it makes a very good substitute.

The next stage in the process of purification is of a different character. The dark-green liquor is transferred to tanks, and a certain quantity of strong sulphuric acid is added. The acid is employed in order still further to bleach the oil, and purge it of some more of the impurity with which it is so largely impregnated. To effect this object it is essential that the oil and the acid should be mixed up or assimilated as much as possible—a work of some difficulty, on account of the tendency of the former to float on the top, by reason of its lighter specific gravity. This tendency is neutralized by the action of a revolving stirrer fitted with blades, which, when put in motion, beats and agitates the two liquids, and causes them to mingle equally. For four hours is this operation continued, until, under the biting influence of the acid, the dark-green oil changes to pale-green, and gives token of having parted with much of the grosser substances that had rendered it dull and opaque. The stirrers being at length stopped, the liquor is allowed to settle, and the organic impurities that have been separated from it by the action of the vitriol, collect in the bottoms of the tanks. The lees in this case assume the shape of a coarse acid tar, which is also used as a substitute for fuel.

The oil, thus far cleansed of its foulness, is now transferred to clean tanks, mixed with a strong solution of caustic soda, and again subjected to the beating of the stirrers. The action of the alkali extracts a good deal more of the coloring matter, and changes the pale-green to yellow. At the end of a second period of four hours the liquor is allowed to settle, is drawn off from the lees as before, is pumped into the stills and is redistilled, and is again brought back to be put through the acid and alkali bleaching process; the result being its assumption of a clear, pale, yellow color. When in this stage of its preparation the oil contains the elements of no less than four different products, each valuable as articles of commerce, to separate which is the next care of the manufacturer.

The separation is effected merely by distilling the oil at various temperatures. At the lowest temperature the lightest and most volatile parts of the oil pass off in the shape of vapor. Upon being cooled, by passing through pipes, this vapor yields a liquid which, upon being distilled by itself, gives a light, transparent, inflammable fluid known by the name of naphtha, the specific gravity of which is considerably less than that of the naphtha derived from coal-tar. This naphtha is largely employed as a substitute for turpentine in india-rubber works, where it is employed to dissolve the materials used in that branch of manufacture. At the temperature next to the lowest, those parts of the oil that are next to naphtha in point of volatility are taken off, distilled, and condensed, and yield paraffine or lamp oil. The processes of purification and distillation are repeated with this oil till it has assumed the requisite degree of purity, and become transparent and almost free from smell. A gallon of this oil weighs about eight and a quarter pounds, and is, in point of illuminating power, nearly equal to one gallon and a quarter of American petroleum. A yet higher temperature than that which is necessary for the production of the burning oil produces a thick, heavy, lubricating oil, used in vast quantities in the Lancashire factories for oiling the machinery, and also by watch and clock and philosophical instrument makers. This oil, when it comes from the still, is largely impregnated with solid paraffine, and when it cools it assumes the consistency of grease, the paraffine having coagulated into crystals. Before the lubricating oil can be made available for what it is intended, these crystals must be separated from it; and here again another operation, but one of a simple nature is requisite. The oil is poured into thick canvas bags, which are placed in hydraulic presses. Pressure is then applied with such force that the oil is squeezed out of the bags, leaving the crystals within. The oil thus squeezed out is the lubricating oil, and is ready for the market; the crystals are the paraffine in embryo which has so often been admired in the shape of candles.

When turned out of the bags the paraffine is in its coarsest state, and is of a dirty yellow color. This hue is the result of the quantity of oily matter which the substance, in spite of its frequent purgings, still retains. Its perfect and final purification is effected by the repetition of a single process, continued till the requisite clearness is obtained. The paraffine is dissolved in heated naphtha, and is kept in solution for a considerable time, after which it is allowed to cool and again assume its crystalline form. The process of squeezing in the press is repeated, and when shaken out of the bags this time the paraffine is seen to have changed from yellow to dirty white, and is consequently so much purer. The operations of dissolving and straining are repeated till perfect pureness and whiteness are obtained. This result achieved, the odor of naphtha which clings to the substance is driven off by steam, and the paraffine, in a liquid state, is run into molds, which form it into thick round cakes. In this shape it is sent off to the candlemakers.

Engineering under Ground.

We learn from the *Artizan*, London, that a new length of the line of the underground railroad of that city has been completed at a cost of $3,500,000 per mile,the bulk of which has been applied towards compensation for damages. The length of new line is nearly three miles, and has six stations—one at Westminster bridge; one in the Broadway, at St. James's park; one at Victoria, where it joins the Chatham and Dover line; one at Chelsea, near Sloane square; one at South Kensington; and one in the Gloucester road, West Brompton. Of the whole length of line about one-third is tunnel and the rest open cutting.

No very special engineering difficulties were met with in the construction of the line except the continued presence of water, as some parts of the works are below low-water mark. The greatest depth below the surface to the rails is not more than 32 ft., the quickest curve is 440ft. radius, and the greatest incline 1 in 250ft. Considerable difficulty was experienced during the construction of the line, from water, both from the sewers and from the surface drainage. On one very wet day in the early summer no less than six sewers burst at once, and gave the pumps enough to do to keep their contents, with the surface drainage, from flooding all that was then built of the line. To this day, and as long as the line is in use, there must always be permanent pumping stations for the mere surface drainage, there being no outlet toward the river without raising it to a higher level. This water difficulty, however, is very ingeniously met by Messrs. Fowler and Johnstone, the engineers of the line. The side walls both of the arched tunnels and open cuttings are made of extra thickness, and, above all, are connected beneath the ground by an inverted arch of concrete nearly three feet thick. This effectually prevents the water rising up through the floor of the line, and equally prevents the surface water from draining off. For this surface drainage, therefore, special provision is made, by means of pipes laid in the center of the line, which carry the water on to the pumping stations, where it is raised and sent away into the Thames. Passing under the middle of the Broadway the line is carried, not in a tunnel, but in a broad, lofty, square chamber, with a flat roof, on massive wroght-iron girders. This is a beautiful piece of work, both in its design and finish,and is of the most unexceptionable character from beginning to end. While passing along the Broadway special precautions were taken to guard against any possible vibration affecting Westminster Abbey. The walls on the Abbey side are here made seven bricks thick. Behind this comes the Victoria sewer in a tube of iron, and behind all a bed of peat seven feet thick. The peat checks all vibration, but as the nearest point at which the line passes is more than 90ft. from the Abbey walls, its deadening properties are scarcely required.

After Westminster bridge the first station is St. James's park, and leaving this the line continues in an open cutting to Buckingham row, where it enters a tunnel of about 500 yards in length. Here the water occasioned so much difficulty that engines had to be kept going night and day, pumping at the rate of nearly 4,000 gallons a minute. The tunnel at this point passes but a few feet below the surface of the ground, yet it forms the foundation of the brewery belonging to Elliot, Watney & Co. above. This building is now carried on a series of girders, but the work had to be done with great care, for the superincumbent weight was immense, and the soil below poor and treacherous. After finishing this portion of the line a fresh difficulty arose with the King's Scholar's Pond sewer, the largest sewer next to that of the Fleet in London. This had to be entirely diverted and reconstructed in an iron tube, 11 feet wide by 14 feet high. So very limited was the space at command that this sewer had to be built over the up and down line in a deeply arched form in order to make room for the funnels of the locomotives. This most difficult of all the tasks on the line has been admirably executed by Mr. T. A. Walker, the resident engineer, who has had charge of the works throughout. A few yards from this point is the station at Victoria, which, like all the others on the line, is open, or rather only closed in with light glass and iron roofs. From this point the line passes on to Sloane square, a wide and lofty station, but the architectural effect of which is much marred by the Ranelagh sewer being taken in a huge cylinder of cast iron right across its very center at the springing of the arches. Continuing westward, the next station is near the site of the Exhibition building of 1862, and to this a new road will be made by a continuation of the Exhibition road from Kensington. The last station is at Gloucester road, West Brompton, where the junction is effected with the Metropolitan Extension. The District line then branches to the south and forms a double junction with the West London, by means of which a communication is gained with most of the southern lines.

American and European Woolen Manufactures.

BY E. R. MUDGE, U. S. COMMISSIONER TO THE PARIS UNIVERSAL EXPOSITION OF 1867.

We cannot be said to occupy a national position in the woolen manufacture except in card or clothing wool fabrics, our success in other departments being exceptional. Our work has been in the direction demanded by the prime necessities of our people and the peculiar character induced by the nature of our raw material. Our peculiarly national wool manufacture is comprised in the production of all the varieties of card-wool tissues from flannels inclusive to the finest-faced broadcloths, which are only exceptionally included. Within this range, comprising plain, fancy, domet, and opera flannels, blankets, woolen shawls, satinets, the infinite variety of fancy and silk-mixed cassimeres, sackings, repellants, tricots, beavers Esquimaux, escredons, cloakings, our success has been complete, and our progress within the last five years truly astonishing. In nearly all these productions we can vie with any nation in excellence, soundness, and taste of manufacture, and in some of them in cheapness. These goods, it must be remembered, furnish all the absolutely necessary card wool-clothing for our population, and all that the great majority of our people are inclined to wear at any time, a very small part of the population of the cities wearing occasionally, only, the fine and high-priced black cloths. A small part of our population, it is true, prefer to purchase cloths of foreign make to distinguish themselves from the masses, but they are of the same class who in France, under the empire, when cotton stockings were prohibited, preferred smuggled cotton stockings to silk, because they could be only obtained at double the cost of the latter. Fashion all over the world demands the use for common wear of the medium mixed and fancy cloths in place of those of high finish. These we can produce from the admirable medium wools grown upon our own soil, and thus the American clothing-wool manufacturers and wool-growers are able to perform their part in one of the first duties of a nation, that of clothing its own people. In the class of goods referred to there is no need whatever of foreign supply, and none would be sought abroad if there were among us that national sentiment in favor of home production which prevails among the nations of Europe. Not withstanding the freedom of exchange among European nations, the national sentiment is found to be the most efficient encouragement of domestic production. The lustrous German cloths so freely sold here find no sale in England. The London tailors who visited the Exposition reported that there was nothing on exhibition which would compare with the cloths of England. How different is the practice with the tailors and retail dealers in this country who persistently foster the unpatriotic prejudice in favor of foreign goods, because they can obtain larger profits on the foreign article than on the domestic, as the cost and quality of the former are less generally known than of the latter.

To specify more minutely the comparative qualities of American goods: In the whole range of fancy cassimeres, including the mixed goods of silks and wool, in style, taste, perfection of manufacture, and strength of material, we excel the English, and nearly approach the manufactures of France. The same may be said of the whole range of flannels, colored and plain, and of the Esquimaux and Moscow beavers, which we have imitated from the Germans. In the low cost pilots, used as substitutes for the beavers, sightly to the buyer, but trashy in wear, it must be admitted that we can hold no comparison with the English. In all the grades of woolen shawls which can be fabricated of American wool we successfully vie in fabric and cheapness of price with the Scotch, who are confessedly at the head of this branch of manufacture. In the class of all-wool goods of light weight, made in all varieties of colors, denominated sackings and cloakings, and largely sold for women's wear, the fabrics are now sold in this country, at prices reduced to a gold standard, cheaper than any similar fabrics are sold in Europe. Goods of this character, displayed in the American quarter of the Exposition, and marked at their net gold prices, attracted great attention for their cheapness, and constant applications were made for their purchase.

In some other branches of the woolen industry, beside that of card wool, especially those where we have equal facilities with the European manufacturer in obtaining raw material, our productions bear a favorable comparison. American carpets are fully equal, if not superior, to the English carpets of similar grades. In the American Brussels and tapestry carpets there is no inferiority in designs, colors, or texture. In fact they are woven here and in England by the same machinery. The American retail purchaser is invariably compelled to pay a higher price for a foreign carpet of the same grade; that is, he can purchase a better American carpet at the price of the foreign article. The American ingrain carpet, which is much more largely consumed, is unquestionably superior to the English. This is evinced by the fact that the yarns used in English carpets are not sufficiently strong to admit of their being woven in power looms, as is done in this country. There is a prevailing prejudice against American dyes in carpets as well as in other fabrics. No prejudice could be more unfounded. The same chemical agents and the same processes are used here as abroad. We have in our establishments the best dyers that the better prices of labor paid here can seduce from Europe. One manufacturer of opera flannels exhibits patterns of eighty different hues on one card. In the present state of the art of tincture in Europe and this country bad dyeing results not from want of skill, but the intentional use of cheap materials, and the risk of getting evanescent dyes is much greater in purchasing cheap imported goods than in buying the products of well-known American manufacturers, who only use inferior dyes when purchasers insist upon cheaper goods.

Imperfect Boilers.

Under the head of "Why Boilers Sometimes Explode," we compiled a statement from the *Locomotive*, published in Hartford, Conn., and published it on page 75 current volume. The statements there made were of a sufficiently alarming nature, but we copy the following in addition from the same publication for February:

"During the month of January, 275 visits of inspection were made, and 536 boilers examined—445 externally, and 166 internally—and in addition, 37 have been tested by hydraulic pressure. In these boilers 403 defects were discovered —51 of them being regarded as particularly dangerous. Furnaces out of shape, 21, and 1 dangerous. Fractures, 60, and 12 dangerous. Burned plates, 22, and 2 dangerous. Blistered plates, 48, and 6 dangerous. Cases of incrustation, 68, and 3 dangerous; the scale was so thick in these three cases as to keep the water entirely from the fire sheets, and they were consequently badly burned and weakened, and hence were positively dangerous. Cases of external corrosion, 53, and 6 dangerous. Where boilers are bricked in, we find this latter difficulty frequently, and if the joints of the steam pipes, running from and over the boiler, are not tight, the leakage dripping down on to and through the brick covering, silently, but surely makes trouble. Internal grooving, 7. Water gages out of order, 22. Blow-out apparatus out of order, 3. Safety valves over-loaded, 29, and 6 dangerous. Pressure gages out of order, 70, and 5 dangerous. Boilers without gages, 27—all of which we regard as dangerous; and one boiler is reported without either safety valve or gage!

"The comments made by our various inspectors are as follows:

"One says: 'The dangerous defects noted in my report were two safety valves—one of them the lever was corroded in the socket so fast that it could not be moved without bending or breaking, and the pin could be got out only by drilling. The other valve had, in addition to its own proper weight of 160 pounds, another weight of 90 pounds on the lever. The pressure of steam required to lift this valve would be 140 pounds to the square inch.'

"These safety valves were each put in good working order, and properly weighted. Another defect was a very bad blister over the fire, which was repaired at once; and three mud drums were found so far gone that the inspector could drive his hammer through in various places; these also were put in good order.

"Another inspector writes that, in his territory, he finds a great many low-water indicators out of order and inoperative. And further, that in some places so much reliance is placed upon them that the gage cocks are seldom used; and in many instances, have become entirely useless from corrosion.

"Now, we most emphatically advise all parties to see to it that their safety valves and gage cocks are in the very best condition—no matter how many patent attachments there may be—by no means fail to see that those most important appliances—steam gage, safety valve, and three-gage cocks—are in perfect working order.

"One inspector reports thirty-three steam gages incorrect; the variations are not large, except in two instances, where one indicated fifteen pounds, and the other twenty-one pounds less than the actual pressure carried.

"Our Home Office inspector contributes the following, which we commend to the careful perusal of paper manufacturers:

"'The proprietors of paper mills, as a general thing, pay too little attention to the condition of the check valves of their bleach boilers. Where these check valves are out of order, the pulpy matter passes over into the steam boiler. And we have sometimes found it at and about the water-line, in places three inches thick. The lime also, which passes over, is deposited in the form of scale upon the sheets and flues, rendering them liable to be burned, beside causing great waste of fuel from its non-conducting character. The valves must not be left until there are positive indications that they are in a leaky condition, but they should be examined frequently and be replaced by new ones, in case there is serious leakage. Never trust to grinding by inexperienced persons for a tight valve—there are very few who can grind in a valve properly, and in many cases the leakage will be greater after the attempt. We have not referred to the danger resulting from vitriol, used in bleaching, being carried over into the boiler, as it must be obvious to every user, that such a mixture cannot be otherwise than injurious. The only way to keep things in a good and safe condition, is to pay attention to all the parts and appliances about the boiler.'

"Had we space, much could be said of other defects, detected by the month's work, but the record speaks for itself. Some persons have been disposed to intimate that the company has an object in 'making an array of alarming facts and figures;' but we can assure such that our monthly reports do not begin to show the actual facts in the case. Any person who will examine the correspondence which we have with our various agents and inspectors, will be convinced that our reports are far from being exaggerated."

The Phosphoric Light.

So far as principle goes, it is dependent on the fact that when ordinary wax-like phosphorus is burnt in air white and solid phosphoric acid is produced, and this combustion is attended by the production of an intense light. Every schoolboy knows that the light emitted when phosphorus is burnt in pure oxygen is still more brilliant. Mr Winstanley sought to utilize this fact with the design of obtaining a powerful light for photographic purposes, and carried out the idea in the following way: A quantity of the wax-like variety of phosphorus was placed in a suitable vessel; through this vessel a current of common coal gas was passed, the direction of the stream being so regulated that it could pass over the phosphorus and then escape through a jet fitted for the purpose. When the coal gas is passed over the phosphorus at ordinary temperature, and then ignited at the jet, it, of course, burns with its usual flame; but when the phosphorus is heated it commences to volatilize, the luminosity of the flame greatly increases owing to the combustion of the phosphorus vapour, and fumes of phosphoric acid are produced.

Mr. Winstanley pointed out that, though this phosphoric gas flame gave a light of much greater brilliancy than that of ordinary ignited coal gas, yet the intensity of the light could be greatly augmented by feeding the phosphoric flame with pure oxygen. When this was done, the report says: "The brightness of the flame was enormously augmented, and the ample room in which the experiment was conducted became brilliantly illuminated." We congratulate Mr. Winstanley on his ingenious and successful experiment, and hope that further results may flow from such well-directed efforts.

There are just two points that we must for humanity's sake touch upon here. Those of our readers who have not had much experience in the more dangerous class of chemical experiments little know what a disagreeable substance phosphorus is to manipulate with; and it is only good and careful experimenters like Mr. Winstanley who may venture to use this new gas flame. We must confess to a great antipathy to employ any more phosphorus than is actually necessary, as in our juvenile days we received a burn of such severity that the strong scar still remains to warn us when chemical proclivities would tempt us to forget our former experience and meddle with this dangerous body. We would, therefore, caution the more inexperienced of our readers against meddling with our new but treacherous ally.

Again: the product of the combustion of phosphorus with free access of air is a highly irritating acid, or, rather a white smoke, which becomes a powerful acid on coming in contact with the moisture always present in the air. A little of this smoke, when allowed to escape into the atmosphere of an apartment, gives rise to a most disagreeable choking sensation. This latter objection to the use of the phosphoric flame could of course be to a great extent removed by the employment of a suitable chimney communicating with the air external to the apartment. We may add that any disagreeable fumes escaping removal by the chimney can be quickly rendered harmless by a little liquid ammonia placed in a shallow dish near the apparatus.

Having said so much about Mr. Winstanley's plan, we now come to the suggestion of a friend, to try the effect of volatilizing magnesium by heating the metal very strongly in a stream of hydrogen, and then to ignite the gas as it issues from the vessel containing the heated metal. It was anticipated that in this way a brilliant magnesium light would be obtained, owing to the combustion of the metallic vapor along with the gas. It is obvious that zinc might be employed in the same way, since it is about as volatile as magnesium.

In the first instance, we placed some metallic magnesium in powder near the end of a tube of very hard and infusible glass, the portion of tube immediately beyond the metal having been drawn out to a fine jet. A current of hydrogen gas was then passed through the tube and ignited at the jet; of course the gas then burnt with its usual nearly colorless flame. The glass tube was now heated close to the jet so as to melt the magnesium; but the only difference observed in the flame was a tinging with yellow. The blast of a powerful gas table blowpipe was now brought to bear on the tube, and the temperature so raised as to render the glass tube very pliable; the gas flame had now become of a bright yellow color, with occasional flashes of bright white light—probably due to particles of the magnesium having been carried forward by the current of gas. The yellow color was found, on examination with the spectroscope, to be due solely to the presence of sodium. The amount of magnesium vapor which ultimately reached the flame was extremely small.

Having failed on a small scale, we repeated the experiment with the aid of a powerful wind furnace and a stout metallic tube, but the result we obtained was little superior to that already mentioned; so that, for all practical purposes, Mr. Winstanley's plan fails in the case of magnesium.

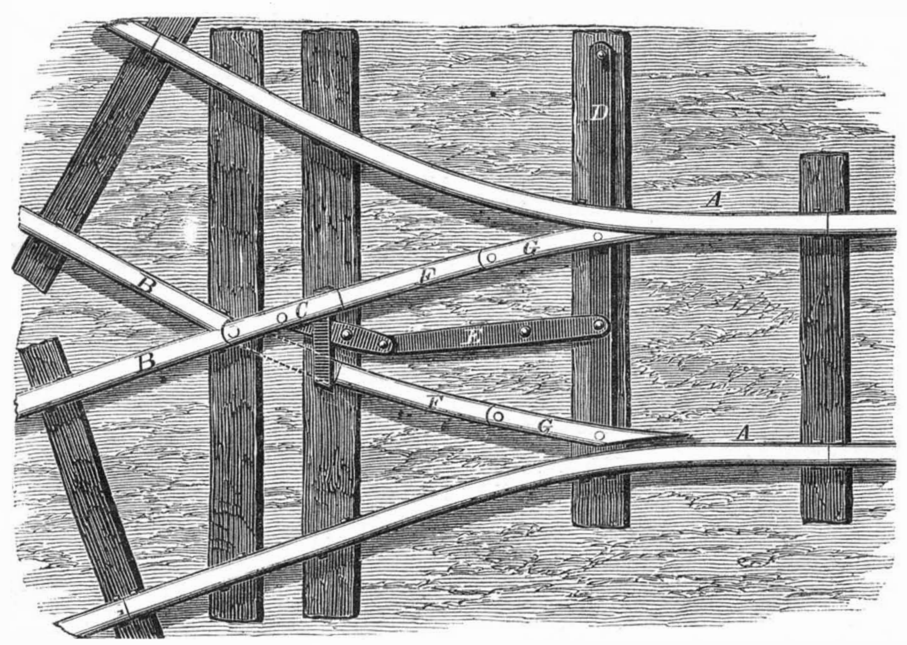
The principle of the method followed in the above instances has received less attention than it appears to deserve at the hands of those interested in the production of cheap and brilliant artificial lights, and we hope now to see it extended in some useful direction.—*British Journal of Photography.*

POISON FOR THE HEADS OF THE PEOPLE.—The results of an analysis of a new hair lotion described by its vender as "perfectly innocuous," shows that this precious mixture is composed of rose-water, sulphur, and sugar of lead, the latter in sufficient quantity to cause paralysis, or painter's colic. The directions were that a "dessertspoonful should be daily brushed in the roots of the hair, until the whole head was moistened!"

CONDUCT is at once the aim and test of all our learning, our thinking and striving.

Improvement in Railroad Switches.

The object of the invention herewith illustrated is to provide a combined switch and frog for railroads, the parts of which are operated simultaneously, and which offers a perfectly smooth track for the passage of trains. It may be easily explained and readily comprehended. A A represent the rails of a main line, so curved as to form the outer rails for two diverging branches. B, B, are the inner rails of the branch lines, having pivoted, at the vertex of their angle, a swinging frog or section of rail, C. This may be moved so as to make a connection with either of the branch lines by means of an ordinary switch, to which it is connected by the transverse sliding bar, D, and the intermediate jointed bar, E, as plainly seen in the engraving, which is a plan view. F, F, represent fixed sections of rail to which the points or switches, G, are pivoted, which are also connected with the sliding bar, D. It is evident that as this bar is moved the points and swinging frog must be simultaneously moved, insuring perfect connection with either branch from the main. The advantages, as claimed, are these: The wheels are not required to run upon their flanges, as in passing over the frogs ordinarily used, thus making the track much smoother, the wheels having a fair bearing on the tread as it has on other portions of the track, thereby lessening the danger of breaking them. As commonly made the frogs of a road wear out very fast. The connecting switch bar can be placed either above or under the sleepers as is that of the ordinary switch.



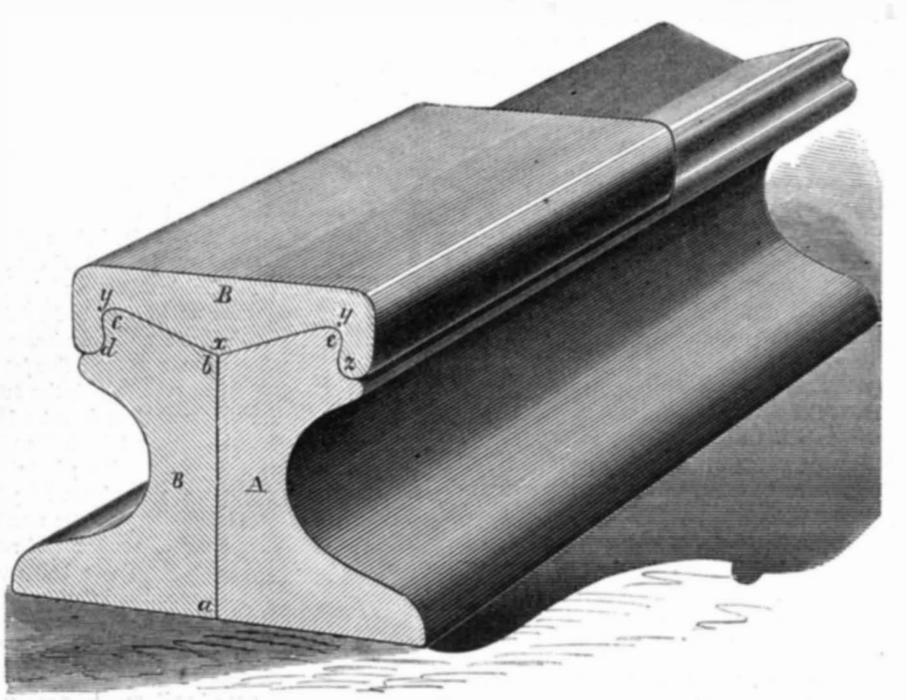
BELL'S PATENT COMBINED RAILROAD SWITCH AND FROG.

Patent pending through the Scientific American Patent Agency, by B. C. Bell, who may be addressed at Duncan's Mill, Sonoma Co., Cal.

Improved Capped Double Rail.

The following is the inventor's description of a novel rail which was patented January 5, 1869: The base of the rail is made in two parts, A and B. These two parts are exactly alike, having, each, one perpendicular side from *a* to *b* which are placed together. The upper side from *b* to *c* is beveled, the outer corner, *c*, being higher than the inner corner, *b*, so that, when the two pieces, A and B, are placed together, the center of the rail is depressed, the upper sides forming an angle. The outer corners, *c*, are rounded, and the sides of the rail bent inwards, forming a curved groove, *d*; the lower part of the base spreading out the same as an ordinary T-rail.

The cap, B, is made of such a shape as to conform to the shape of the base when put together; that is, the under side being beveled from the center, *x*, to near the sides, where are formed curved grooves, *y*, *y*, corresponding in size with the curved corners, *c c*, of the base-pieces A and B. The sides of the cap, B, are turned down and bent inward.



KING'S IMPROVED RAILWAY RAIL.

The rail is placed together in the following manner: One of the base-pieces is secured in its place, when the cap, or top, is placed on, the other base-piece inserted in the cap, and the two bases pressed together, and secured, as in ordinary rails. The rail, when together, is in appearance similar to those in present use. In this rail, the leading objects are to have a rail with a movable top, and fulfilling the following conditions: The top to be easily removed by simply pressing the lower part of one base-piece from the other, the spikes having first been withdrawn from one of the bases. Yet at the same time when in its place it securely holds all parts of the rail together. To have no bolts, keys, pins, or holes, in it, to work loose or weaken the rail. To allow of unequal expansion of all its parts, thereby preventing one of the greatest causes of broken rails. To allow of being made a continuous lap joint rail, as shown in the drawing. The impossibility of a broken rail throwing a train from the track; or the breaking of a rail by unequal expansion. The form of the rail is such that, even though it should be broken in a number of places, it would remain securely together. The greater the weight placed on it, the tighter will its joints fit together, as the angular corner, *x*, along the center of the cap, will have a tendency to press in between the corners, *b*, of the base, thus pressing the upper edges of said pieces outward making the joints, *c*, *d*, *e*, and *y*, *z*, perfectly firm and tight. To be easily rolled and placed together, and to require no hand or other extra work on it, but to be finished when it comes from the rollers. Also the repairing or replacing of a rail at much less expense and time than any in use, and the top can be turned around when worn on one side.

While possessing all the good qualities of the steel and iron rail, it is cheaper and stronger than either, and there being no wear of the bases, they will last indefinitely. For further information address Geo. W. King, Georgetown, D. C.

A Good Example.

The Boston and Albany Railroad Company have provided a library of a thousand volumes of reference and miscellaneous books, and have fitted up a hitherto vacant apartment in the second story of the Boston passenger station for their reception. The library is divided into two departments, styled the Consulting and Circulating. The first named comprises railway enactments, English and American, encyclopedias, reports, scientific works, etc., to the number of four hundred, which are never to be removed from the building, except by permission of the library committee. The circulating department embraces standard works of interest, instruction, fiction, bound volumes of the most valuable periodicals of past years, etc., five or six hundred in number. Any person in the service of the company on the line between this city and Albany is privileged to take books from this department, two at a time, and to hold them two weeks—the train baggage masters and station agents along the route transmitting them to and from the library on Tuesday and Thursday of each week. Wednesday being the library day for reception and delivery.

How to Stretch Drawing Paper.

The *Building News* gives the following directions, which the writer says have been used successfully by him for fifteen years:

Have your boards perfectly clean and dry, free from dirt, grease, or gum. Have your paper clean on both sides, as the wet sizing will fix pencil marks or dirt in the grain of the paper.

Use gum arabic, dissolved in water, for mucilage. The mucilage should always be kept in readiness for use, and of consistency which will permit a ready application with a bristle brush. If too thin, it will lack strength and be slow in drying, and if too thick, the properties will be the reverse.

The remaining preparations are a clean sponge, bowl of clean water, napkin or towel, and a paper folder or similar instrument.

The tools and materials in readiness and within reach, we will proceed to strain the sheet.

On a flat board, with all parts accessible, lay the paper with the back up. Wet the entire back of the paper, including the edges. This must be done by passing the sponge over the surface rapidly, and but once, leaving it well moistened, but without puddles or floating water. Wait a few moments until the first wash has been absorbed and distributed through the grain of the paper, and then apply a second wash in the same manner. As soon as the second wash has been applied, wipe the water and a part of the moisture from the outside edges and apply the mucilage. The paper should now be limpid, but not soppy. Turn the paper and place in position on the board.

This operation is easily performed by taking hold of the paper at the two opposite corners with the thumbs and forefingers, catching the paper inside of the gummed edges, the thumbs being on the surface side. In raising the paper from the board, let it bag moderately, which will prevent the corners from dropping, and the same precaution will keep the paper in shape during the operation of turning, and afterwards. The sheet turned, fix the same in position, first one corner, following up with one side and the whole sheet.

The paper should now lie flat on the board, with the surface and edges evenly extended. Press the gummed edges to the board rapidly with the paper-folder, taking care to work the surplus gum outside the sheet and not under. Wet evenly the face of the paper with the exception of marginal edges about one inch wide. This last operation enables the gum to dry first. When dry, the sheet will be found clean and evenly strained, with smooth edges, and the sizing less disturbed than by any other method.

A little practice will enable one to get the exact tension desired, and one person can more readily perform the entire operation than two, even for such sizes as—Double Elephant.

THE TOPLIFF AND ELY ADJUSTABLE VELOCIPEDE.

When the attention of inventors is directed to any one branch of mechanics, or to any one object, it is a matter of surprise how many improvements may be made on devices which seem at first sight near perfection. In no instance within our experience has this been more forcibly exemplified than in that of the velocipede excitement—almost a mania. No sooner does one of these improvements present itself than others follow, so that even the daily journals find it expedient to devote a department of the paper to "velocipede notes."

Fig.3 Fig.2

One great objection urged against the bicycle is the difficulty of its management by beginners, and the degree of expertness necessary to be attained to successfully manage it. But it has its undeniable advantages. The bycicle, or two-wheeled velocipede, can turn corners that a tricycle cannot; it has less friction; is more under the control of the rider, and in all respects conforms more in its gyrations to his person than any three-wheeled concern could do; thus rendering him more independent of mere mechanical appliances. The "poetry of motion"—if there is such a thing—can be more easily shown by the course of the bicycle rider than by him who strides the three-wheeler, and thus the vanity of the expert is aroused, and he feels, like the skater, that the "eyes of the world are upon him."

It is, however, hard on beginners and the obese, those whose bodily activity has been for years directed to the brain. Imagine the "hefty" editor of the Scientific American on a two-wheeler, with all his load of science and patents in his head; *he* would make a healthy show on a bicycle!

Here, however, in the accompanying engraving, is just the thing—a three-wheeled or two-wheeled contrivance at the will of the rider. It is splendid. See the carelessness of the rider in the perspective engraving, then see the means by which he obtains his carelessness, shown in the accompanying diagrams.

The axle carrying the rear wheels is of a depressed V-form (exaggerated in the diagrams to more forcibly present the idea). When the novitiate mounts the machine it is as represented in the Fig. 2, the wheels at the outer extremity of the crooked axle. Then it is an ordinary three-wheeled velocipede. In this state the rider may run for an indefinite distance; but when he has learned, he may, by a single movement of the lever seen in the perspective drawing, reverse the position of the axle by a half-revolution, and run the wheels together, as seen in Fig. 3. In this case the two wheels, where they impinge on the ground, are simply one. As these wheels are constructed to run on any portion of this crooked axle, no difficulty is experienced in holding them at any intermediate point desired, while they are prevented from coming together by a fixed collar, or flange, on the axle at the point where the two angles meet.

In all other respects this velocipede is similar to others now in use. It is manufactured by Topliff & Ely, Elyria, Ohio. Patented February 23, 1869, through the Scientific American Patent Agency. Correspondence should be addressed as above.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Economy of the Short Stroke of Engines in Non-rotary Propulsion.

MESSRS. EDITORS:—Referring to my former paper on propelling vessels, on page 44, current volume, I now propose to point out a source of waste or non-utilized steam, which, owing to the radical imperfections of the present rotary system, is seldom if ever considered as such, namely, the steam consumed by an unnecessary length of stroke of engine; for if a pressure of 1,000 pounds of steam passing through a distance of $\frac{1}{2}$ foot, in a given time, will produce the same amount of propulsion that 1,000 pounds passing through 12 feet in the same given time will; the former (a short stroke) must be far more economical than the latter (a long stroke).

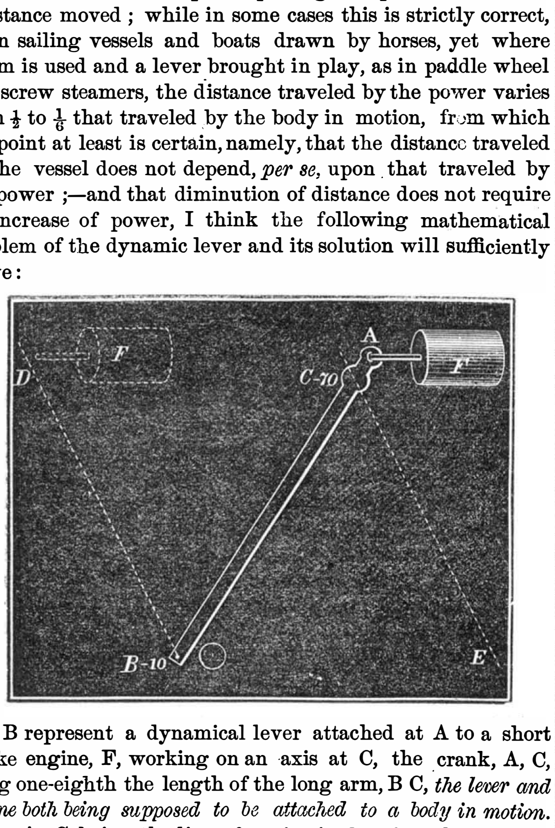
The writer's hypothesis is, that the speed of vessels, as relates to distance traveled, is determined by the amount of pounds' pressure and the duration of time of such pressure, and not by the distance through which this pressure passes.

For instance, supposing a vessel's resistance at any given velocity is equal to 1,000 units, the pressure of 1,000 units of power continuously applied during any duration of time, will produce motion at the same rate of velocity whether that power passes through the same or a less distance than that traveled by the vessel.

No one will deny that 1,000 pounds pressure is the equivalent of 1,000 pounds of resistance, but many may be of opinion that the pressure, or power, must pass through the equal distance of the resistance overcome, or that if the power passes through a less distance, the diminution in distance must be made up by an equivalent increase of power.

To sustain my hypothesis of the economy of a short stroke and long duration of time—it is necessary to show that neither of the above opinions can be correct.

Now as relates to the power passing an equal distance with resistance moved; while in some cases this is strictly correct, as in sailing vessels and boats drawn by horses, yet where steam is used and a lever brought in play, as in paddle wheel and screw steamers, the distance traveled by the power varies from $\frac{1}{2}$ to $\frac{1}{6}$ that traveled by the body in motion, from which one point at least is certain, namely, that the distance traveled by the vessel does not depend, *per se*, upon that traveled by the power;—and that diminution of distance does not require an increase of power, I think the following mathematical problem of the dynamic lever and its solution will sufficiently prove:



A B represent a dynamical lever attached at A to a short stroke engine, F, working on an axis at C, the crank, A, C, being one-eighth the length of the long arm, B C, *the lever and engine both being supposed to be attached to a body in motion.* The axis, C, being the line of motion is therefore the point of impact of the power and the resistance of body to be moved.

This resistance at axis, C, is represented as 70 pounds, while the resistance at the true fulcrum, a circle, B, is represented as 10 pounds, and it is required to move the resistance of 70 to D, without moving the resistance of 10 in the opposite direction of E.

Now it is obvious that 75 pounds pressure (over and above friction) applied at A, will overcome the resistance of 70, which will move in the direction of D, without overcoming the resistance of 10 at the circle, B; for the crank being one-eighth, it would require 8 times or 80 pounds, passed through one-eighth the distance to counterbalance the 10. Therefore 75 pounds passed through one-eighth the distance could not possibly displace the 10.

Suppose the stroke of engine to be 1 foot the distance traveled by point, B, of long arm of lever would be 8 feet if the resistance of 10 were moved to E, but as these 10 pounds are not displaced, it is obviously impossible for the engine to make its stroke without moving the resistance of 70 to point, D, from which it is easy to see that the resistance at C of 70 has been moved 8 feet to D, while the engine has made its stroke of 1 foot, *the power consumed* being 75 pounds passed through 1 foot, *the effect produced* being 70 pounds moved a distance of 8 feet.

This being correct (and I respectfully challenge any mathematician or engineer to disprove it), it follows that in propelling apparatus (non-rotary) the distance traversed by the body moved depends upon the pressure applied, and duration of such pressure, rather than upon the length of stroke of engine.

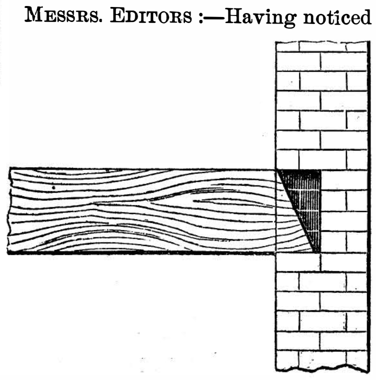
In further corroboration of the foregoing permit me to call attention to the fact that in the propelling apparatus of all living creatures the Divine Wisdom has ordained that the power to propel them shall always be applied at the axis or line of motion, hence the wonderful economy of power in nature.

In connection with this subject of steam propulsion, permit me to suggest to the leading engineers in the country, that, as it is daily becoming more apparent, with each new improvement in the more economical generation or utilization of steam, that the days of sailing vessels, and of towing canal boats by horses, are rapidly coming to an end, could some method be invented, saving fifty per cent over any at present in use, the economy of steam over sail or horses, would at once become so great as to insure its speedy adoption, in which case all the engineers and manufacturing establishments would be taxed to their utmost to supply the demand for engines, boilers, and machinery, for many years to come; hence, if they studied their best interests they would give an attentive ear and careful thought to any new invention, by which so desired an end might be possibly accomplished. If our leading engineers would once realize the fact, that the vital principles of all propulsion on land, on water, or of a bird through the air, is that of the dynamic lever; that though paddle wheel and screw are both dynamic levers, the axis in the paddle wheel is not the fulcrum, but the point of impact of the power and line of motion of the boat's resistance; and if the difference between the static and dynamic levers was fully understood, a new era of steam navigation would soon dawn upon the world, and many vast improvements in speed and economy of power be inaugurated for the benefit of mankind at large. F. R. P.

New York city.

Fastening Beams in Walls.

MESSRS. EDITORS:—Having noticed in your paper that the usual custom of building the ends of floor timbers into brick and stone walls, is apt, in case of fire, to throw over the walls, and that resting the timbers on corbels interferes with the cornice line below, allow me to suggest a cheap mode of obviating these defects. By cutting the ends of the timbers on a bevel, and laying in the wall as in the inclosed sketch, the cornice line will not be broken, and in case of fire the timbers will fall with little chance of injury to the wall. If in your opinion this plan is novel or useful, please publish for the benefit of all concerned. C. O.



Paterson, N. J.

How to Make Good Yeast.

MESSRS. EDITORS.—On page 59 of No. 4, for January 23d of this year, in the latter part of Prof. Horsford's lecture on bread, he gives a recipe for yeast which I consider a very poor one, for three reasons. 1st. It requires fresh baker's yeast to start its fermentation. 2d. It will only keep a week in winter, and from two to four days in summer. 3d. If bread made with it is not closely watched, and baked at the critical moment, it will be infallibly sour. The first objection is a serious one out West, on a farm, to wit: How are you to get fresh baker's yeast, when the nearest baker lives may be fifteen miles off? The second and third are equally serious to a woman who has her hands full of work at all times, for she must be making yeast every few days in warm weather; and when she bakes, be hovering over the stove to watch the loaves and turn them. I now offer you a recipe I brought from England, and which I have used with never-failing success for fifteen years. It is self-fermenting, improves by keeping, and, with its use, it is impossible to make sour bread, unless the flour is sour or the yeast is left uncorked. It will keep for weeks, winter or summer.

On Monday morning put two ounces of best bale hops into a gallon and a pint of cold water, boil half an hour, strain hot, and dissolve two ounces of finest table salt and half a pound of A sugar in the liquor; when cooled to new milk warmth, put one pound of sifted flour into a large basin, make a well in the center of it with the hand, and add the liquor by degrees, stirring round and round with a spoon, until the whole of the flour is evenly mixed with the liquor; set the pan with the liquor on a stool by the stove—in winter time day and night. In hot weather this is not requisite On Wednesday morning boil and mash finely three pounds of good potatoes, and mix them with the liquor in like manner as the flour. On Thursday morning there should be a heavy dark scum on the surface. The yeast must now be stirred thoroughly, and strained through a sieve or colander into a gallon jug, corked firmly, tied down, and placed in a cool cellar. Shake well before using.

N. B. The liquor should be stirred three or four times a day during the process. A gallon serves my family for sixteen bakings. I use no drugs, as soda, etc., etc., in my bread, nor milk, as that causes bread to dry rapidly. It is best to add a teaspoonful of salt when you bake, and that should be dissolved in a little warm water and mixed with the yeast in setting the sponge over night. When the bread is once kneaded and put in the pans to rise, it may be left for hours with safety from souring, it will only be too porous.

Galena, Ill. KIRBY KITTOE, M. D.

Suction of Sinking Bodies.

MESSRS. EDITORS:—As the SCIENTIFIC AMERICAN has long since become the institution to which a considerable portion of the Yankee nation look for reliable information relative to scientific questions, I am induced, therefore, to request of you, or some other of your learned correspondents, to inform such of your readers as go down to the sea in ships, whether or not the common assertion and belief is true, that, in case a vessel founders and sinks at sea, it will produce a downward current or suck, so-called, that will carry with it all floating objects, such as boats, rafts, and persons swimming in the immediate vicinity of the sinking ship.

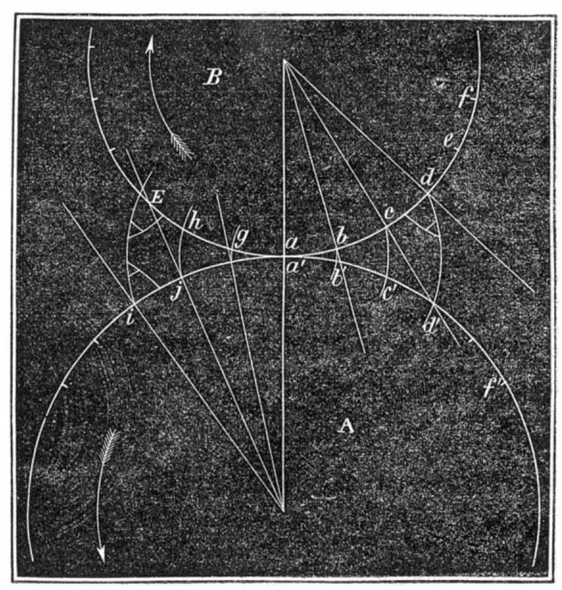
W. P. M.

[We presume there can be no doubt that sinking bodies of considerable bulk do produce a powerful downward current; yet many instances are recorded where a large boat, as a ship's long boat, or a raft, has withstood the tendency to go under, the boat, or raft, being on the vessel's upper deck at the time of sinking. Small bodies are usually drawn downward, but afterward float. The period of submergence would, however, in most cases destroy human life.—EDS.

Gearing---Form of Teeth.

MESSRS. EDITORS:—Why are the teeth of wheels made on a curve, is a question which, if propounded to a majority of mechanics, who have almost daily experience on the subject, would not elicit a satisfactory explanation. A few remarks, therefore, on the subject many not be inappropriate.

Let the two circles, A and B, represent the peripheries or pitch circles of two wheel, A the driver and B the driven, and the divisions, $a\ b\ c$, etc., respectively equal to $a'\ b'\ c'$, etc. Now if power be applied to A, and the friction of the faces of the wheels is greater than the resistance, it is evident that B will revolve, and the points, $a\ a'\ b\ b'$, etc., will coincide. But when the resistance is greater than the friction, recourse must be had to projections or teeth to prevent slips. Let the right line at the point, a', represent the side of a tooth, as both peripheries are to move at the same velocity, advance the wheels in the direction of the arrows until the points b and b' fall on the line of centers. It will now be observed, while the point a has advanced to g, the side of the tooth has progressed beyond, indicating a tendency to move the wheel, B, at a greater velocity. To prevent this the side of the tooth is required to be curved back to the point, g. Again imagine the wheels to be revolved until the points, c and c', coincide at the line of centers. The point, a, will now have advanced to h, while the side of the tooth represented by E, has traversed a greater distance in order to maintain the relative velocities; it must be curved back to h. Upon advancing the wheels another division, the departure from the curve becomes more apparent. Proceeding to form the tooth, bisect the division, $i\ j$, draw the curve found in an opposite direction from the point of bisection; from the center of A, with the proper radius draw an arc cutting the curves, and the point of the tooth is completed. A cavity is now required in the wheel, B, to enable the wheels to revolve. The sides of the cavity are formed by the curve already found extending into the wheel, B, as at g. Bisect the division, g, h, draw the curve in an opposite direction, and the root of the tooth is produced. To construct the tooth of the wheel, B, it is only necessary to revolve the wheels in the opposite direction and repeat the preceding operation. The curve forming the point of tooth of one wheel will be a curve for the root of the other. The curves thus found are the epicycloidal, the proper mathematical curve for the teeth of gearing. In practice the epicycloidal curve is not invariably given to the teeth of wheels, because it is peculiar to the diameters of the wheels for which it is constructed, and admits of a limited range in case the teeth are wanted to be used for other



diameters than that for which they were made. To make patterns or cutters for every pair of wheels that are required would entail great expense on manufacturers, hence they generally have recourse to methods of their own,or use those laid down in text-books, for the purpose of constructing teeth; some of which, for fine pitches, are almost equal to the epicycloid and admit of more extended application with different diameters. Our method, which I have found to work well in practice, is to lay off the points of the teeth with the pitch, and for the roots, set one point of the compasses in the center of one tooth, and with the other point describe the root of the adjacent tooth; but where the disparity in the diameters is very great, this rule will have to be departed from, especially in large pitches, in which case the tooth of the pinion should be determined first, in order to obtain adequate strength at the root, and the teeth of the large wheel adapted to the peculiar form of the pinions. Epicycloid teeth, when properly constructed, require no clearance, or at most but a trifle, except at the bottom where good clearance should always be given, as much of the noise heard in gearing running is caused by the teeth "bottoming," often occasioned by the shafts springing or the journals and boxes wearing.

In departing from the epicycloid more clearance should be given between the teeth. The forward side of the driving tooth should come in contact with the rear side of the driven tooth first, and not, as I have observed in some instances, in ill-constructed teeth when the reverse was the case, the teeth in first meeting wedging and tending to press the wheels asunder, thereby consuming useful power in doing useless work. More clearance is required when the teeth are cast than when cut. In the former there is always some irregularity, even where there has been the utmost care exercised with the pattern, owing to the unequal contraction of the metal or the rapping of the pattern and mending up of the molds.

There are various methods of arranging the teeth of gear wheels, but in every departure from the plain spur there is a measurable amount of detriment. The step gear when a tooth is divided into a series, and each alternate one placed out of line with the other, is a favorite plan with some where heavy work is to be done. But I have failed to be convinced of its superiority over the continuous tooth. Unless set with the greatest accuracy some teeth will sustain more than their proper amount of strain while others will sustain less. These assertions can be verified by any one examining such gear and observing the inequality of the wear. The double oblique tooth is resorted to where strength of tooth is required and the face limited. In this style the teeth unite in an apex at the center of the face and diverge obliquely with the axis. While this method gives a strong tooth it is a consumer of power as well as a transmitter. Of all the abominations of gearing the single oblique tooth is probably the greatest. In this style of gearing the teeth present inclined planes to each other, and there is a constant tendency in the teeth off or forcing the wheels asunder in a line with the axis, which tendency is resisted by the wheels being secured to the shafts, and a great amount of power is absorbed by these antagonistic tendencies. I have seen a pair of such wheels, designed by an eminent engineer, absorb half the power of a pair of four-horse trunk engines.

Let me here condemn the practice prevailing to some extent of endeavoring to make many teeth bear at the same time. The number of teeth bearing depends altogether on the diameters and pitch, and any attempt to make more teeth bear than these will properly admit of, must necessarily cause a departure from the proper curve of the tooth or a disproportioned length. If strength is the object better give a little more face.

Cast teeth when true are much better than cut teeth, the outside scale wearing longer than the softer metal within. Especially are these remarks applicable to bevel gear, in which it is impossible to cut the teeth properly with the means usually employed in cutting engines, owing to the curve of the tooth being a varying one from end to end. After a perusal of the foregoing, the following facts must be impressed on the mind. 1st. The pitch is the arc between the centers of two contiguous teeth, hence the ordinary rule, (Dia. × 3·1416) ÷ pitch = No. of teeth, or (Dia. × 3·1416) ÷ No. of teeth = pitch, is the proper one. 2nd. The plain spur is the best form of a gear wheel. J. C.

Washington, D. C.

Window Glass.

Messrs. Editors:—I read in your last number a description of "How Window Glass is Made," which, though I have read many similar before, seems to me now so awkward in process—not in description—that I cannot help entering my protest against the idea, though it seems to be a fact, that there has been no essential improvements in glass making since the time the "Arabs camped, and burnt seaweed," etc. —you all know the story of its discovery. To take a lump of viscid tenacious material on the end of an iron tube, and blow it, and twirl it into such a shape that it is possible to make it flat, after a deal of further trouble, and this to be the only means of effecting this result now known, seems to me to be a disgrace to American inventive genius.

Why cannot a pot of melted viscid substance like glass be drawn out into sheets, as well as a continuous sheet of paper from the tank full of pulp, or a continuous lead pipe from a crucible full of melted lead. Guessing, *a priori*, I should say much easier, and better, and smoother, for the substance to be worked is of just the right nature to yield with ease and without danger to the manipulations of machinery, and be worked into all shapes, without breakage or chemical corrosion. "But," will say the glass workers, "it is the excessive temperature at which it must be worked that is the difficulty." My friends, if it took a machine as heavy as a Fondrinier paper machine, and all made of platinum, it seems to me it would pay if a sheet of glass could be run out like a sheet of paper, and I believe it can, and will be done some time. I have seen a glass thread spun at the rate of many thousand yards a minute, and it seems to me a sheet is only, theoretically, a multitude of threads.

When we open up the immense soda and potash fields of the Western desert, and when the pine forests and other timbers are exhausted, the question, of what shall we build houses, and construct a great many other things, now made of wood, will lie between glass, iron, and paper.

Cheap soda, potash, and fuel, and a glass (paper) machine to make it on, will decide the question in favor of this indestructible material, so far as it is applicable.

Who is there that has capital and spunk enough to try the experiment? A small apparatus to run out a sheet ten inches wide, made of platinum, and set in the furnace, running out a stream of window glass, through proper orifices and annealing ovens, I believe to be a possibility, and a not far distant accomplishment. C. Boynton.

A Good Puddling Furnace.

Messrs. Editors:—I notice in a late number of the Scientific American, an extract from an English paper showing the extraordinary economy of E. B. Wilson's patent puddling furnace now in use in England and elsewhere. It seems, however, that the consumption of sixteen hundred weight of coal to the tun of puddled bars, is about the best that can be averaged, with his furnace, running night and day. This shows a great saving over what has been used as a general thing in England, or wherever coal is cheap; but it is not so economical as a double puddling furnace built in the Cold Brook Iron Works, this place, by Mr. John Wilson, an English furnace builder, now here: This furnace made 42 tuns 10 hundred weight of six inch bars (Scotch pig iron) with 27 tuns of coal, I think half Cumberland and half Pictou, equal to 12 hundred weight and three-quarters to the tun of 2,240 pounds. I doubt if a more economical furnace has ever been built. E. G. S.

St. John, New Brunswick.

Poor Work on Agricultural Machines.

Messrs. Editors.—"Fulton" under the head of "Good Agricultural Machinery" in your issue of Jan. 23, page 54, current volume, says he noticed an article headed "Poor Mechanical Work on Agricultural Machinery" referring to issue of Dec. 16, volume XIX, page 393, which he claims "does a great injustice to a large class of manufacturers," etc. I noticed the same article and was greatly pleased that your ever-welcome paper should speak a word on that subject in the way of relief to the farmer.

As I was born and raised on a farm I have had considerable experience with agricultural machinery and can testify, as well as all other farmers, that nine-tenths of the machinery sold us are made only to sell and not to fit,"Fulton" to the contrary notwithstanding.

I never have seen a reaper that could be set up and run without the aid of a file or cold chisel, and sometimes new holes have to be made in order to get in some of the bolts; as was the case with some half an acre of reapers painted in high colors and shipped to this place last season, in pieces, to be set up "from the pile," not one of which could be set up without the assistance of a whole kit of blacksmith and carpenter tools.

While it is necessary that the greatest skill should be exercised in constructing this class of machinery, which is subjected to constant jerks and strains of different parts, by its movements over uneven ground, and being in all sorts of positions, the mechanical workmanship is fully developed only in other classes of machinery that set firmly on their feet or ride on easy springs. The prices that farmers have to pay for their machinery would warrant a better class of work.

Western Farmer.

Waukon, Allamakee Co., Iowa.

The Scientific American.—In these days, when new and worthless publications are being thrown on the market by the score, it is with a pleasing satisfaction that we come face to face with our old, tried, and trusty friends. We have not yet reached that millennial period in newspaperdom when a successful journal is born in a day. The process is like the processes of nature: "first, the blade, then the ear, and then the full corn in the ear." Among the newspaper successes in this country, none is more noteworthy than the Scientific American. For an American journal it is old in years, but young in strength and vigor, leaving all its imitators and would-be rivals, and there is a host of them, in the distance. It is safe to say that there is a degree of freshness, strength, and originality in the Scientific American that are found no where else among journals professing to occupy a similar sphere. A complete file of this paper from the original date of publication, would be a library in itself.—*American Builder.*

Artificial Ebony.—This substance, now used to a considerable extent in Europe, is said to be prepared by taking sixty parts of seaweed charcoal, obtained by treating the seaweed for two hours in dilute sulphuric acid, then drying and grinding it, and adding to it ten parts of liquid glue, five parts gutta-percha and two and a half parts of India-rubber, the last two dissolved in naphtha; then adding ten parts of coal tar, five parts pulverized sulphur, two parts pulverized alum, and five parts of powdered rosin, and heating the mixture to about 300 degrees Fahrenheit. We thus obtain, after the mass has become cold, a material which, in color, hardness and capability of taking a polish, is equal in every respect to ebony, and much cheaper.

For the Scientific American.

"WASTE" AND "ECONOMY" OF FUEL.

NO. 4.

How much remains to be done in connection with economizing the fuel consumed by our engines in the production of "work," will be comprehended, if we fully realize the fact, that not more than ten per cent of the real power of the coal burnt under our most perfect modern steam boilers, is turned to useful practical account.

In the year 1702, Savary constructed a steam engine by means of which, a weight of 1,000 tuns could be raised one foot high by the combustion of one bushel of coal.

In 1720, Otto Guericke Newcomen made an atmospheric engine which lifted 3,500 tuns by the consumption of the same amount of fuel.

Watt's original engine raised 6,000 tuns, the modernized Watt's engine raises 15,000 tuns by the same weight of coal.

The average duty of the ordinary improved Cornish engines of our day is equivalent to 56,000 tuns raised one foot high by the combustion of the same quantity of coal as above. Large as this last amount may seem to a superficial observer, it is yet infinitely below the probable realizations of the future, as the following computation conclusively demonstrates.

If we consider the calorific value of the combustion of one pound of average coal, as equal to 6,000 or 7,000 centigrade units of heat, and if each of these units, as has been proved by recent elaborate researches, is equivalent to 420 kilogrammetres or nearly 2,700 foot pounds, we find, that one pound of coal produces a force equal to 16,200,000 or 18,900,000 of foot-pounds.

The most economical engines in the world, do not on an average, reach a higher figure than 1,398,094 foot-pounds per pound of coal consumed, this being only 0·074 to 0·086 of the whole theoretical amount, or only from $7\frac{4}{10}$ to $8\frac{6}{10}$ per cent of the real power concentrated by nature in one pound of coal.

We must be careful not to confound the amount of foot pounds which are equivalent to the combustion of one pound of coal with the quantity of heat needed to vaporize a certain amount of water, this being a quite different thing.

If it takes 635·5 centigrade units of heat to evaporate one lb. of water and if one lb. of coal evolves on an average 6,500 centigrade units, then theoretically 10·22 lbs. of water should have to be evaporated from a lb. of such coal. We find in practice, that 8 lbs. of water from 1 lb. of coal may be taken as a fair average, so that in this case 2·20 lbs. of water or 22 per cent only have really been lost. By greater care and attention, this amount of waste may be further reduced, so as to assimilate still more closely the practical with the theoretical results.

What really becomes of the 90 per cent, more or less, of foot-pounds, lost, during the combustion of one lb. of coal, as mentioned above? This is a question which we expect to be asked and which we will here attempt to briefly elucidate.

The equivalent of the combustion of one lb. of coal being as above stated 18,900,000 foot lbs; we may suppose 10 per cent of this quantity to be converted into useful work by the engine and another 10 per cent to be entirely wasted (by remediable causes), during the production of steam. This gives a total consumption of 20 per cent or of 3,780,000 foot-pounds, leaving an apparent loss of 15,120,000 foot-pounds which have vanished during the vaporization of 10 lbs. of water. In such a case we might affirm that 15,120,000 foot-pounds have really been absorbed or rendered latent in the work of converting one lb. of water into steam, for which purpose every centigrade unit of heat evolved by the coal must have had to furnish no less than 2,520 foot-pounds of hidden work. A much larger quantity of fuel than 10 per cent, is however, in most cases, wasted by remediable causes.

We have shown in previous articles, in the Scientific American, how bad stoking causes a waste of fuel, which may reach 25 per cent; how, the necessary blowing off in cases of salt or impure water produces a loss of 33 per cent, and how priming and scale may add another 30 per cent to the above.

This however is but a fraction of what often takes place, as waste by radiation of heat and consequent condensation of steam in the boilers, steam-pipes, and cylinders are another source of very considerable loss. This radiation may, to a considerable extent, be obviated by the use of external coverings of felt or canvas, by superheating the steam, by steam jackets, or better yet, by the combined effect of these various remedies.

Leaks are another frequent cause of loss of fuel, the amount of which can only be determined by the calculation of the units of heat in every lost pound of steam or water, remembering that the waste by leakage of one lb. of steam exceeds by 5½ times at least, that which would originate from the leakage of one lb. of hot water from the boiler. As is known to every tyro, repacking of the slides, pistons, blow-off nozzles etc., are the preventives of loss by leakage.

An imperfect vacuum leads to a waste of fuel, as the required power will in such a case, have to be obtained from a lower step of expansion and with a corresponding increase in the consumption of fuel.

The neglect to "ease" and "stop" in time, the urging of the fires, the unnecessary friction of any of the rubbing surfaces of the engine, the excess or the deficiency of draft in the furnaces, the use of bad coals, and many other causes too numerous to be here enumerated, all concur to increase to an almost indefinite extent, the waste of fuel.

The sum total of remediable waste in our ordinary carelessly managed engines, frequently reaches formidable figures, and this before the very eyes of the proprietors of the same who seem totally blind to the fact, that wasting fuel is injurious to their pockets.

It is not of the highest importance, as is sometimes believed, that an engine should run beautifully smooth and easy; it is however, most essential, that every bushel of coals burned under its boilers should be made to furnish their maximum of usefulness, a result, which can be attained only by constant care and vigilance, two words which in themselves comprise the whole duty of the engineer, and ought to be his motto.

ALUMINUM.

BY PROF. C. A. JOY.

Forty years ago a few grains of this metal were prepared by Professor Woehler, at the University of Goettingen. He sealed the little pellets in a glass tube, and it was not thought that the metal could ever have any useful applications. The discovery rested dormant for thirty years, when attention was called to it by the eminent French chemist, Deville.

The circumstances were as follows: The Emperor Napoleon, anxious to display some interest in scientific matters, appropriated fifty thousand francs to defray the expenses of researches into the properties and uses of aluminum, and Henry St. Claire Deville was authorized to make the experiments. We happened to be in Paris when this took place, and were one day invited by Professor Deville to witness the preparation of the metal in the presence of the Minister of War, Professor Dumas, and of other celebrities. Deville, who is the most genial, popular, and successful of the French chemists, received his guests with great cordiality, and explained, in the clearest possible manner, every step of the operation. He extracted a pure, silver-white metal from a lump of clay. The way he did this was very simple. Chlorine gas was passed over heated clay mixed with charcoal, and the chloride of aluminum thus produced was driven over melted sodium. The chlorine first extracted the metal from the clay, and was in turn decomposed by the sodium. In chemistry, might makes right and every compound can be attacked and forced to capitulate, if the proper weapons are brought to bear upon it. The aluminum was first seduced from its strong citadel of clay by the chlorine, and was then attacked and captured by the sodium.

The experiments, in a small way, having proved successful, extensive works were established in the neighborhood of Paris, where aluminum was manufactured on a large scale. At the Paris exhibition of 1867, Mr. Paul Morin exhibited numerous objects manufactured from pure aluminum and from its alloys.

The specific gravity of the metal is 2·67. It is tin white, fusible at a red heat, brilliant, malleable, ductile, sonorous, an excellent conductor of electricity, insoluble in dilute sulphuric acid, and in concentrated nitric acid; easily soluble in hydrochloric acid and the alkalies. It does not decompose water, as was at first supposed, and does not oxidize materially in the air.

Professor Henry Wurtz, of New York, has recently discovered that if it be rubbed with mercury it oxidizes so rapidly as to produce great heat. It was at first found impossible to solder the metal, but this difficulty has been at length overcome. When fused with iron it forms a crystalline mass not malleable. Mixed with copper in the proportions of ten parts of aluminum, and ninety parts of copper, it forms a beautiful alloy, possessed of the color and many of the properties of gold. This alloy is called aluminum bronze, and is now frequently employed for the manufacture of watch cases, watch chains, and imitation jewelry. Nearly all the aluminum now manufactured is converted into the above alloy and the interest in it, which at one time began to flag, is once more revived, and several new establishments have arisen for its manufacture.

Four hundred pounds a month are now manufactured in France, and sold at twelve dollars a pound. It is also largely produced in England.

Aluminum is one of the most abundant metals on the earth. It is found in brick and porcelain clay, in feldspar, in cryolite, in granite, in slate rocks, in the ruby and sapphire. When iron rusts, it turns to a red powder, which can be washed away. When aluminum rusts, or is fused at a great heat among the crystalline rocks, it gives to us the precious stones called the ruby and sapphire.

As soon as the metal is required in large quantities, some method will be devised for producing it at a cheap rate; and when that time arrives we shall not have to fit out expeditions to go and search for the ore in remote regions, but we can dig for it under our feet, nearly everywhere, and make a mine of every stone quarry.

The beautiful tone of the metal has suggested its use in the manufacture of bells, and a successful application of it for this purpose has been made.

Aluminum has been employed by chemists as a reducing agent in the preparation of some of the rare metals, and we may have to record a more extensive use of it for this purpose.

There have recently been introduced into use in Paris two new alloys of aluminum. The first is called aluminum silver, or third silver (tiers argent), and is composed of one-third silver and two-thirds aluminum. It is chiefly employed for forks, spoons, and tea service, and is harder than silver and more easily engraved. The second is called minargent, and is made of one hundred parts copper, seventy parts nickel, five parts antimony, and two parts aluminum. It is a very beautiful, permanent, and brilliant alloy, capable of replacing silver for many purposes.

It must be acknowledged that the applications of aluminum in the arts are not so numerous as was at first predicted, and its manufacture, as compared with other metals, can, at the present time hardly be called a metallurgical one. The metal is so light that a little of it will go a great way. A cubic foot of it weighs one hundred and sixty-eight pounds, whereas a cubic foot of gold weighs twelve hundred pounds, and silver weighs six hundred and fifty-six pounds, iron four hundred and fifty pounds, and even granite weighs one hundred and eighty-six pounds to the cubic foot.

If the price of it were the same as that of silver, it would still be much cheaper, as only one-fifth as much would be required to cover the same space.

So abundant is this metal, that it is safe to predict that the day is not far distant when our houses may be built of it instead of bricks, and we shall use it for many purposes now unknown. —*New World.*

EXPLOSIVE COMPOUNDS FOR ENGINEERING PURPOSES.

Mr. Perry F. Nursey a few weeks ago read a paper on the above subject before the Society of Engineers, of London, from which we extract the following:

"Although many attempts have been made to supersede gunpowder, but few have practically succeeded, and this arises not so much from any inadequacy on the part of the substitutes, as regards power, but on account of the extreme liability of most of them to premature explosion from varying causes. Gunpowder itself is open to this objection, and hence the propositions to reduce the risk by mixing it with protecting ingredients. But this is not enough, we must go a step further. What is required is a material over which we can have perfect command, one which shall do more than burn when in contact with air, but which shall equal, if not exceed, gunpowder in its power when ignited in an air-tight chamber, as in a bore hole, or the barrel of a gun. The necessity for this is evidenced almost daily in one or other of our mining districts, where a large percentage of the explosions occur in the blasting operations. How frequently is gunpowder ignited by stray sparks, even when standing about, but much more frequently do accidents arise when tamping is going on. Here the contact of the metal rod with the rock leads to many a fearful accident. So much is this so, that the Royal Cornwall Polytechnic Society have taken the matter up, and have suggested safe methods of performing this dangerous operation. But however careful a miner may be, there never can be perfect immunity while he has to deal with a material which carries within itself all the elements of danger and destruction. To meet the case a perfectly inexplosive material is required, one which will not explode so long as the atmosphere has access to it, but in which all the active energy of gunpowder is developed immediately it is fired out of contact with the air.

"Gunpowder itself is at present more largely used than any other explosive material, and it is a remarkable fact that, notwithstanding the centuries which have elapsed since its first discovery, no radical or permanent change has been effected in its composition. Slight variations, it is true, have been made from time to time in the proportion of its constituents, but, in the main, gunpowder remains much as it was 600 years ago. But the danger ever present in handling this material has always been so patent, that many years since means were devised for rendering it harmless while in store, and to restore to it its power at the time of use. Colonel Ryley was the first to propound this theory, and he submitted his plans for enveloping the grains of gunpowder in bone dust, to the Government some twenty-five years since. In later times—in fact, very recently—Mr. Gale's proposition to render gunpowder non-explosive and explosive at will has been much before the public. His plan was to mix ground glass with the powder for storage and transport, and to sift it from it again when it was required for use. This addition to a large amount of a foreign substance with the powder no doubt answers the purpose most effectually; but unfortunately there are practical difficulties in the way of its adoption. The objections are, increased bulk and weight for transport, the necessity of numerous sets of mixing and shifting apparatus, and the utter impropriety of having to prepare an explosive material just when it is required for use. Beside, in blasting operations, the accidents usually occur in charging the mine; therefore a system of this kind would be of no value whatever.

"Before quitting the subject of gunpowder, it may be interesting to notice the force this material is capable of exerting when used for blasting purposes. The following particulars show the amount of earth or rock thrown down or removed by 1 pound of powder, under various circumstances, the results being taken from actual practice. At the Round Cliff, Dover, 85,232 pounds of chalk were thrown down by 1 pound of powder. In the Leith cutting, Tunbridge, 31,860 pounds of hard white sand were moved by the same weight of powder. At Plymouth 22,000 pounds of limestone were moved per pound; in small charges only 8,900 pounds were moved. In Antrim, 45,084 pounds of white limestone, and 32,430 pounds of whinstone or basalt were moved by 1 pound of powder. At East Dunmore, 14,280 pounds of hard conglomerate were moved; and on the Londonderry and Coleraine Railway, 22,400 pounds were thrown down by 1 pound of powder. Taking the mean of these results, we have 32,832 pounds of material to 1 pound of powder.

"Numerous compounds have been brought forward from time to time, for which it was claimed they perfectly superseded gunpowder. But, until very recently, no material has been found which would answer all the practical purposes, and fulfill perfectly all the conditions and requirements of that most important material. Saltpeter is the agent to which the characteristics of gunpowder, as an explosive material of permanent character, are mainly due. It is to the substitution of other nitrates for this constituent that most attention has been given, and the nitrates of sodium, lead, and barium have been successively tried. But although the products, which have been known by the names of soda gunpowder and barytic powder, etc., have obtained a certain amount of temporary success, they have ultimately been abandoned. In fact, all mixtures of this class, when compared with gunpowder proper, have been found to exhibit important and radical defects. Chlorate of potash has been a favorite substance with inventors, notwithstanding its violently explosive nature. The object has, of course, been to tone down its violence by proper admixture with other ingredients, and the resulting products have been to some extent successful. One of the earliest mixtures of this class was German or white gunpowder, which was tried, but proved unsuccessful. Many preparations of a similar character have also been brought before the public. Of this class is Ehrhardt's powder, the invention of which is also claimed by Mr. Horsley. M. Ehrhardt's compositions are as follows:

BLASTING POWDER.

Chlorate of potash	½ part
Nitrate of potash	½ "
Tannin of cachou	1 "
Charcoal	9 "

POWDER FOR ARTILLERY.

Chlorate of potash	1 part
Nitrate of potash	1 "
Tannin	1 "

POWDER FOR SHELLS.

Chlorate of potash	1 part
Tannin	1 "

"Mr. Horsley's powder is a compound of chlorate of potash and gall nuts in proportion by weight of three to one. The ingredients are ground separately to a state of fine powder, and then passed, also separately, through a very fine wire sieve. The two ingredients so prepared and thoroughly dried are blended when required to form the explosive compound. The blending of the ingredients is safely and easily accomplished by passing them in a mixed state through a series of horsehair sieves, arranged one below the other and set in motion. Upon the upper sieve the two ingredients are first mixed by being run together from two receptacles placed above the sieve, one containing a given weight of chlorate of potassa, and the other one-third of such weight of gall nuts. As the chlorate of potash is much heavier than the gall nuts, the volumes or measures of the two receptacles are about equal. Motion being imparted to the sieves, and as the two finely ground ingredients pass downwards through the sieves, they become blended, and form the explosive compound. Powders in which chlorate of potash is an ingredient are undoubtedly somewhat dangerous. The fact, however, of cannon-priming tubes, which are composed of chlorate of potash and ter-sulphide of antimony, having been prepared, stored, and used for more than thirty years past without accident, ought to relieve apprehension on that score. When treated, as it should be, with care, and not improperly blended with combustibles, chlorate of potash is practically safe. With regard to the explosive power of Horsley's powder, it may here be interesting to adduce a few facts in the shape of results of trials which came under the author's notice, and which were made to institute a comparison of its strength as against gunpowder. An eprouvette, weighing with its carriage 10 pounds, 2 ounces, was placed on a fir plank in a perfectly level position. The charge in each instance consisted of 50 grains of the various powders, and was kept in place by a small wad of thin paper. The recoil of the eprouvette, when charged with fine grain sporting powder, was $\frac{9}{16}$ inch; with very fine grain sporting powder, $\frac{11}{16}$ inch. Fine grain sporting powder in a state of meal, and compressed by a weight of 400 pounds on the square inch, gave a recoil of 4 $\frac{2}{16}$ inches. Horsley's powder in a similar state of meal, and with a similar pressure of 400 pounds per square inch, showed a recoil of no less than 11 $\frac{9}{16}$ inches. These results afford some idea of the relative power of Horsley's powder and the best gunpowder. The author has examined some blocks of elm which had been submitted to experiment to show the comparative disruptive force of Horsley's powder and of common gunpowder. In each case equal charges were used, and the eprouvette was discharged one inch from the wood and at right angles to its face. The disruptive force of Horsley's powder on the wood was as if a solid body had been driven into it, separating the fibers and tearing a hole completely into it. The force of the small grain best sporting powder merely left a mark upon the surface of the blocks.

A Wooden Railway.

A description of the Wooden Railway recently constructed for the Clifton Iron Company between Clifton and the Adirondac mines in New York is given as follows by Mr. C. G. Myers, late President of the Company. The rails are of hard maple scantling, 4x6 inches, set on round ties, on which are framed slots 6x4. The rails, set on edge and keyed in the slots by two wooden wedges driven against each other, project two inches above the ties. The rails admit of bending sufficiently to make the curves. The ties are laid on the earth and ballasted in the usual manner to two inches of the bottom of the rail. It takes 21,120 feet, board measure, of scantling for a mile, and 1,760 ties at three feet apart. Our road is a very rough one. We have a great deal of trestle work, some of it over thirty feet high, which is vastly more expensive than a level route. The engines used weigh from ten to fourteen tuns. The rails will probably last about five or six years. An engine will move about thirty tuns of freight at about six or eight miles an hour, with heavy grades and sharp curves. The Company expects to move over the road next year from 50,000 to 100,000 tuns of freight. Trains have passed over the road, light, at the rate of twenty miles an hour, but this would not do for freight.

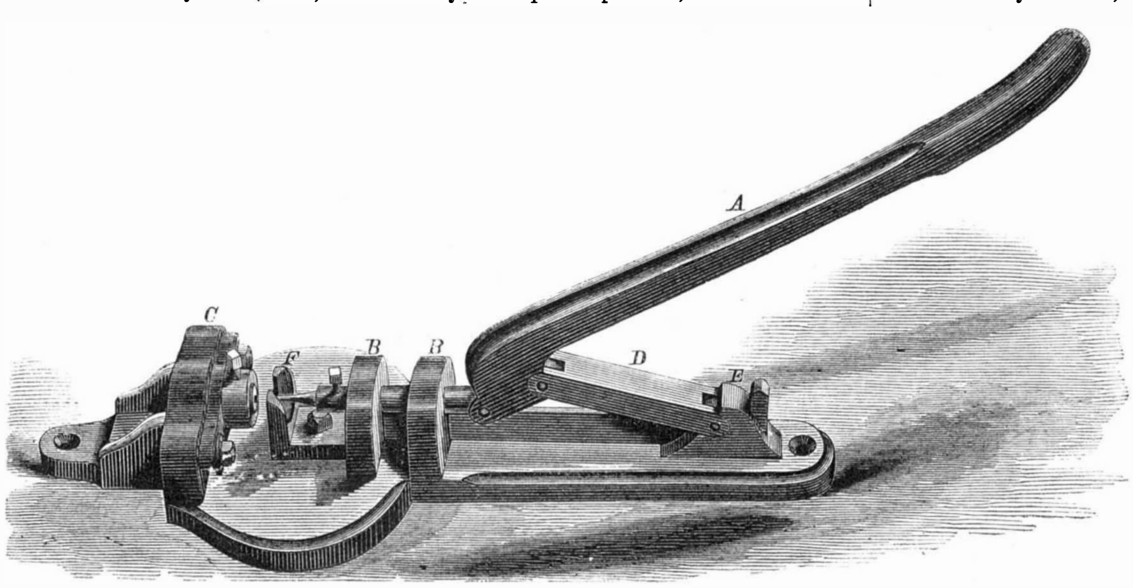
Bench Punch for Perforating Sheet Metals.

A handy punch for ordinary and shop purposes, for light work, and which may be used on the work bench, is a desideratum in any machine shop. In the machine shown in the accompanying engraving, the old device of the "toggle joint" is used, the most powerful form of the lever when moving short distances.

The machine is very simple in construction, and almost impossible to get out of order. A brief description will show its build and use perfectly. The frame, or bed plate, is a single casting, screwed to the bench. To the handle, A, is pivoted a sliding arbor moving through holes in the snugs, B, and carrying a punch at its end, held in the arbor by a set screw. The matrix, or die, is similarly held in an adjustable seat bolted to the snug, C. A lever, D, is pivoted to a snug, E, at the rear of the bed plate, and also to the handle, A, just behind the sliding arbor.

The operation is so easily understood that nothing more than a reference to it is required. The sheet or piece of metal to be punched, is placed between the punch and die, the handle depressed forcing the punch forward and through the metal, when the handle is raised, and the punch moves back, the holder, F, releasing it from the metal.

It is apparent that punches and dies of any form may be used on this machine, as one of either may be instantly removed and others substituted. The machines may be made of different sizes, but one weighing only 21 lbs. will punch wrought iron or brass one-eighth of an inch thick. It may be used for cutting saw teeth or severing wire by employing the proper dies and punches.



MASON'S LEVER BENCH PUNCH.

Patented July 31, 1866. Orders should be addressed to Goodnow & Wightman, manufacturers and sole agents, 23 Cornhill, Boston, Mass. See advertisement on another page.

Manufacture of Clay Tobacco Pipes.

The clay of which these are made is obtained in Devonshire, in large lumps, which are purified by dissolving in water in large pits, where the solution is well stirred up, by which the stones and coarse matter are deposited; the clayey solution is then poured off into another, where it subsides and deposits the clay. The water, when clear, is drawn off, and the clay at the bottom is left sufficiently dry for use. Thus prepared, the clay is spread on a board, and beaten with an iron bar to temper and mix it; then it is divided into pieces of the proper sizes to form a tobacco pipe; each of these pieces is rolled under the hand into a long roll, with a bulb at one end to form the bowl; and in this state they are laid up in parcels for a day or two, until they become sufficiently dry for pressing, which is the next process, and is conducted in the following manner: The roll of clay is put between two iron molds, each of which is impressed with the figure of one-half of the pipe; before these are brought together a piece of wire of the size of the bore is inserted midway between them; they are then forced together in a press by means of a screw upon a bench. A lever is next depressed, by which a tool enters the bulb at the end, and compresses it into the form of a bowl; and the wire in the pipe is afterward thrust backwards and forwards to carry the tube perfectly through into the bowl. The press is now opened by turning back the screw, and the mold taken out. A knife is next thrust into a cleft of the mold left for the purpose, to cut the end of the bowl smooth and flat; the wire is carefully withdrawn, and the pipe taken out of the mold. The pipes when so far completed, are laid by two or three days, properly arranged, to let the air have access to all their parts, till they become stiff, when they are dressed with scrapers to take off the impressions of the joints of the molds; they are afterwards smoothed and polished with a piece of hard wood.

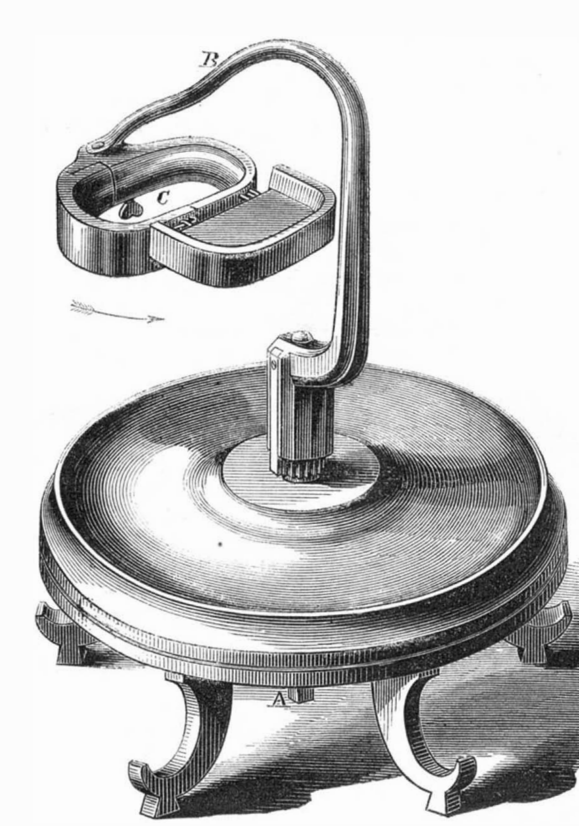
The next process is that of baking or burning; and this is performed in a furnace of peculiar construction. It is built within a cylinder of brickwork, having a dome at top, and a chimney rising from it to a considerable hight, to promote the draft. Within this is a lining of fire-brick, having a fireplace at the bottom of it. The pot which contains the pipes is formed of broken pieces of pipes cemented together by fresh clay, and hardened by burning; it has a number of vertical flues surrounding it, conducting the flame from the fire-grate up to the dome, and through a hole in the dome into the chimney. Within the pot several projecting rings are made; and upon these the bowls of the pipes are supported, the ends resting upon circular pieces of pottery, which stand on small loose pillars rising up in the center. By this arrangement a small pot or crucible can be made to contain fifty gross of pipes without the risk of damaging any of them. The pipes are put into the pot at one side, when the crucible is open; but when filled, this orifice is made up with broken pipes and fresh clay. At first the fire is but gentle, but it is increased by degrees to the proper temperature, and so continued for seven or eight hours, when it is damped and suffered to cool gradually; and when cold, the pipes are taken out ready for sale.

Dentistry in Japan.

This trade, for such it may be more fitly considered in Japan, is carried on by a very low class of people, usually peripatetic in their habits, and who carry with them a box covered with brass ornaments, by which their occupation is recognized. Now, the extraction of a tooth by one of these gentry is regarded by the Japanese as a capital operation, and not without reason, if the information given me is reliable, that death (from tetanus, I presume) is not unfrequently the result. The tooth is extracted by the operator's fingers, but not until it has been well loosened by means of a stick and a mallet vigorously wielded. The operation is seldom performed, but I saw some teeth in possession of one of these charlatans that had large portions of the alveolar process attached. In the face of these facts it can scarcely be credited that artificial teeth, sustained by atmospheric pressure, have been in use from time immemorial. These teeth are carved out of sea-horse ivory, the molars being plentifully studded with little brass bosses, and the whole strongly mounted upon a base cut from the hard shell of a species of gourd, and carved to conform to the irregularities of the gums and palate. I have several sets of these teeth in my possession; they are not expensive, the very best, a complete upper set, costing about five boos, or about one dollar and sixty cents. Colossal fortunes are not accumulated from dentistry in Japan, as may be inferred from the foregoing.—*Dr. A. M. Vedder.*

GEISLER'S PATENT BABY WALKER.

The implement represented in the engraving is intended to assist infants in learning to walk, and to amuse them in waking hours when the mother or nurse may be otherwise employed. It is a circular ornamental platform with a raised rim around its outer edge, and a standard, A, in the center, adjustable as to hight, on which revolves a curved arm, B, to the extremity of which is attached a yoke, C, for embracing the child's body. This yoke is in two parts, one sliding within the other, and locked by a pin or screw when closed, so that it may not be opened by accident. On the front of the yoke is a tray for holding playthings or food.



The joint or pivot of the yoke, where it is attached to the end of the curved arm, permits only a slight lateral swing, so that the child can neither turn off the edge of the platform nor cramp under the curved supporting arm.

At the base of the arm, just above the surface of the platform, the standard is cut into or ratched, into the teeth of which fits a spring pawl on the upright. This allows the child to travel forward, but prevents a reverse motion. The pawl is seated in the upright, and the ratchet is concealed so that the child's clothes cannot by any accident be caught. It is partly shown in the engraving. Annoyed and wearied mothers and cross fathers will appreciate the use and value of this device.

It was patented through the Scientific American Patent Agency, Sept. 22, 1868, by Frederick A. Geisler, who may be addressed at Bristol, R. I.

PANAMA HATS.---WHAT THEY ARE MADE FROM, AND HOW.

The screw pines are natives of tropical regions; are abundant in the islands of the Indian Archipelago, and in most of the tropical islands of the Old World, but rare in America; the section Cyclantheæ, on the contrary, being exclusively confined to that continent.

This order is divided into two sections, the first of which called Pandanæ, and the second Cyclantheæ. Each of the sections contain several genera, some of which contain several species. The *Carludovica* is a small genus of the second section of the order. Of this genus the species called by botanists *Carludovica Palmata*, in the most valuable and interesting; it is the plant from whose leaves the celebrated Panama hats are made. Dr. Seeman, a celebrated South American traveler, states that the leaves of this plant are from six to fourteen feet high, and their lamina about four feet across. In the Isthmus the plant is called *Portorico*, and also Jipijapa, but the last name is the most common, and is diffused all along the coast as far as Peru and Chili; while in Ecuador a whole district derives its name from it.

The *Jipijapa* is common in Panama and Darien, especially in half shady places; but its geographical range is by no means confined to them. It is found all along the western shores of New Grenada and Ecuador; and it has been found even at Salango, where, however, it seems to reach its most southern limit, thus extending over twelve degrees of latitude from the tenth N. to the second S. The Jipijapa, or Panama hats, are principally manufactured in Veraguas and Western Panama; not all, however, known in commerce by that name are plaited in the Isthmus; by far the greater proportion is made at Manta, Monte Christi, and other parts of Ecuador. The hats are worn almost in the whole American continent and the West Indies, and would probably be equally used in Europe, did not their high price, varying from two to one hundred and fifty dollars, prevent their importation. They are distinguished from all others by consisting only of a single piece, and by their lightness and flexibility. They may be rolled up and put into the pocket without injury. In the rainy season they are apt to get black, but by washing them with soap and water, besmearing them with lime juice or any other acid, and exposing them to the sun, their whiteness is easily restored.

The process of making these hats is as follows: The "straw," previous to plaiting, has to go through several processes. The leaves are gathered before they unfold, all their ribs and coarser veins removed, and the rest, without being separated from the base of the leaf, is reduced to shreds. After having been put in the sun for a day, and tied into a knot, the straw is immersed in boiling water until it becomes white. It is then hung up in a shady place, and subsequently bleached for two or three days. The straw is now ready for use, and in this state sent to different places, especially to Peru, where the Indians manufacture from it those beautiful cigar cases, which have been sometimes sold in Europe for thirty dollars apiece. The plaiting of the hats is very troublesome. It commences at the crown, and finishes at the brim. They are made on a block, which is placed upon the knees, and requires to be constantly pressed with the breast. According to their quality, more or less time is occupied in their completion; the coarser ones may be finished in two or three days, the finest take as many months. The best times for plaiting are the morning hours and the rainy season, when the air is moist; in the middle of the day and in dry, clear weather, the straw is apt to break, which, when the hat is finished, is betrayed by knots, and much diminishes the value.

Test for Illuminating Petroleum.

The Corry (Pa.), Kerosene Oil Works recommend the following as a simple manner of determining the fire test of kerosene oil: "Take a cup or tumbler, fill it nearly full of water (previously tested by the thermometer to be 110° or 111° Fah.), then take a tablespoon full of the oil, of which it is desirable to test the igniting point, immerse it in the water, and stir for a moment or two to permit the oil to reach the equal temperature of the water, pass a lighted match very closely over the surface of the oil once, which always floats on the water. If it does not ignite, it can be safely used, but if it does ignite, discard it, however low the price may be; this is a fair and sure test as far as safety is concerned. The other so desirable point—does the oil burn brilliantly and without charring the wick?—the experience of every family will soon detect. Something depends upon the wick, and something upon the lamp; but properly manufactured oil is the main thing needed."

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Contents:

(Illustrated articles are marked with an asterisk.)

THE PATENT OFFICE.

We have received several well-written communications respecting the propriety of discontinuing the present system of examination of applications for patents. The writers, as a general thing, are opposed to any change in this respect, and express themselves willing to pay for the service—if it can be properly and efficiently done. Ah! there's the rub. Now, it appears to us—though it is not a new idea—that the best possible thing to be done would be to establish the Patent Office upon an independent basis, which would enable the Commissioner to control the appointments, and manage its affairs without the interference of Senators and Representatives, who have succeeded in turning all our public departments into places for stowing away political favorites. The Patent Office is now suffering from this evil, and the Commissioner is necessarily much hampered in carrying out reforms in the service.

We notice with much gratification that a bill has been introduced into Congress to allow an increase in the examining force. This looks like business, and we trust that the bill may speedily become a law, and that under the new administration, the business of the Patent Office may be energized into new life. From present appearances, we think that inventors will soon have a more prompt and efficient examination of their cases.

IS A FLYING MACHINE A MECHANICAL POSSIBILITY?

Our readers are well aware that the above question has been answered, theoretically, in the affirmative many times; but it has never been practically answered except in the negative. We mean, of course, an artificial flying machine capable of performing flight independent of ordinary winds and currents, so that under most common circumstances it can be trusted to perform its work as ships do now, and have done for centuries. Man has made himself master of the treacherous sea, can he not also penetrate the aerial depths and control his motions in that element?

Much as has been said, written, and done in the elucidation of this subject, it is astonishing how little has been to the purpose. The inventions which have from time to time been made and tried only to demonstrate their utter absurdity, have been for the most part constructed in apparent ignorance of the true principles involved; and those who have criticised these inventions and ridiculed them have shown, in a majority of instances, almost as much ignorance as those whose work they have condemned.

Notwithstanding the failures which have uniformly attended the attempts to construct a useful flying machine, and the emphatic negative given by a large number of scientific writers to the question which heads our article, the belief in the ultimate accomplishment of flight by means of human devices has never lacked adherents among the learned and the unlearned. The organization of the Aeronautical Society, which gave its first exhibition at London last June, is an evidence that the belief is gaining rather than losing ground. Let us, then, examine the merits of this question.

The report of the above society contains some curious matter in the description of the engines exhibited. Steam engines have usually been considered as quite inapplicable to any possible flying machine, on account of the high relation their weight bears to their power. But what are we to say of an engine weighing only sixteen lbs., and being able to work to one-horse power? The council of the society voted their £100 prize to Mr. Stringfellow for an engine of this description; and whether or not it ever becomes the motive power for flight, it would seem, from its ingenuity, to be well worth the reward. "The cylinder," the report tells us, "is 2 inches in diameter, stroke 3 inches, and works with a boiler pressure of 100 lbs. to the square inch; the engine working 300 revolutions per minute. The time of getting up the steam was noted; in three minutes after lighting the fire the pressure was 30 lbs.; in five minutes, 50 lbs.; and in seven minutes there was the full working pressure of 100 lbs. When started, the engine had a fair amount of duty to perform in driving two four-bladed screw propellers, 3 feet in diameter, at 300 revolutions a minute."

The data for calculating the power are taken as follows: Area of piston, 3 inches; pressure in cylinder, 80 lbs. per square inch; length of stroke, 3 inches; velocity of piston, 150 feet per minute; $3 \times 80 \times 150 = 36{,}000$ foot-pounds. This makes rather more than one-horse power (which is reckoned at 33,000 foot-pounds). The weight of the engine and boiler was only 13 lbs., and it is probably the lightest steam engine that has ever been constructed. The engine, boiler, car, and propeller together were afterwards weighed, but without water and fuel, and were found to be 16 lbs."

This engine seems to demonstrate the possibility of making engines light and powerful enough for purposes of flight. The American wild goose frequently weighs more than this entire machine, boiler, propeller, and all; and the power exerted by this bird in flight, must be vastly less than that performed by the engine, according to the report referred to. Borelli assumed that a goose exerts in flight a force of 400-horse power, an estimate so wild and extravagant that it is simply ridiculous.

Dr. Fox, of Scarborough, has translated an instructive paper written by M. de Lucy, of Paris, "On the Flight of Birds, of Bats, and of Insects," in reference to the subject of aerial locomotion; in which it is stated, as the result of numerous investigations, that in flying animals the extent of winged surface is always in inverse ratio to the weight of the creature. He compares gnats, dragon-flies large and small, ladybirds, daddy-longlegs, bees, marsh-flies, drones, cockchafers, stag-beetles, and rhinoceros-beetles together, and arrives at the following highly interesting and unexpected results. The gnat, which weighs 460 times less than the stag-beetle, has 14 times more of (proportional) surface. The ladybird weighs 150 times less than the stag-beetle, and possesses 5 times more of surface, etc.; and it is the same with birds. The sparrow weighs about 10 times less than the pigeon, and has twice as much surface. The pigeon weighs about 8 times less than the stork, and has twice as much surface. The sparrow weighs 339 times less than the Australian crane, and possesses 7 times more surface. If we now compare the insects and the birds, the gradation will become even more striking. The gnat, for example, weighs 97,000 times less than the pigeon, and has 40 times more surface; it weighs three million times less than the Australian crane, and possesses 140 times more surface.

Coulomb calculated that in order to support a man it would be necessary to have a surface 12,789 feet and 2 inches in length, by 191 feet and 10 inches in breadth, but it has been since ascertained that a man can descend quite easily from a great elevation, with a supporting surface of 29 square yards, 8 square feet, and 14 square inches. This superfices reduced to a square gives the length of a side 5·3 linear yards, nearly. The length of supporting beams from the center needs therefore to be only about 2·75 yards, provided their own weight is not taken into account.

Precisely here comes in the first difficulty. These arms or beams necessary to sustain a web of silk or other texture, must have strength, rigidity, and lightness. When man can make a structure as strong, as rigid, as elastic, as light in proportion to bulk as a goose quill, the problem of flight will be nearly solved. Compensation for want of power in the muscles of the chest may be made by calling into play those of the thighs and legs as well as the arms, by means of suitable appliances.

What is now required, is a material combining greatest strength with least weight. We know of no such material now available for the purpose. We therefore conclude that until such materials are discovered man will not fly. To use the words of one of the sages of a shop in which many of our youthful days were spent, flying is, at present, "theoretically practicable, but practically impracticable."

APPLICATIONS OF THE GIFFARD INJECTOR.

This anomaly in mechanics is capable of a number of applications, and has been applied to uses not probably contemplated, originally, by the inventor. The main object was to enable a steam boiler to feed its own water by a jet of live steam. In some cases this proves to be an excellent method, but is not capable of general application. Where it can be applied it is economical and effective.

The Morton "Ejector Condenser," invented by Mr. Alexander Morton, of the firm of Neilson Brothers, Glasgow, Scotland, has worked finely in supplying boilers by their exhaust steam. It is a modification of, or rather an improvement on, the Giffard injector. A short time ago the application of the Giffard principle was extended to the raising of water by means of a water jet supplied from a head of considerable hight and was fully tested in France with excellent results. In Sheffield, England, the water is supplied from a head of 240 feet the jet being only one-eighth of an inch in diameter, the throat into which it discharges being three quarters of an inch in diameter. The suction and delivery pipes are two inches diameter, the water being drawn through the suction pipe from a depth of fourteen feet. The efficiency of this apparatus is claimed to be very great; that it delivers 72 per cent of the power expended, a duty considerably greater than that of pumps usually employed.

The ejector is in use, also, for discharging ashes and scoriæ from the boiler room of ships. A pipe of sufficient capacity, three or four inches diameter, extends from the outside of the ship, above the water line, down to the fire-room floor, ending there in a funnel-shaped mouthpiece, just above which is a pipe leading from the boiler to introduce a steam jet. The discharge pipe is furnished with proper valves not necessary to explain as every engineer understands the use of "flap," or check valves. Even at ten pounds pressure to the square inch the force is sufficient to lift the debris of the boiler furnaces. The quantity of the steam that passes up the pipe is very small compared with the volume induced by its velocity. Of course, this apparatus can be readily adapted to the discharge of ashes from stationary boilers, and also for excavating sand and gravel under water for the purpose of sinking cast-iron foundations. It is evident that, with modifications, the principle of the Giffard injector may be applied to many uses to which it is not now generally applied.

WHY IS MECHANICAL LABOR OBJECTIONABLE?

We copy the following from the Philadelphia *Ledger*:

A few days ago, a gentleman advertised for a clerk. By the close of the first day on which the advertisement appeared there were four hundred and eighteen applicants for the one clerkship. This afforded a very forcible illustration of the extent to which the occupation of clerking and bookkeeping is overstocked. But a few months since the head of a business establishment, who wished some help in the way of writing, but in which some literary ability was required, advertised for an assistant at a moderate salary, and having incidentally mentioned that the position might suit a lawyer or physician not in good practice, got more than a hundred applications, of which fifty-three were from young lawyers and doctors.

Here was another illustration of an over-supply of the professional or "genteel occupations." Another advertiser who wanted a person to take charge of the editorial work of a weekly paper, got fifty-seven applications, not more than half a dozen of the applicants being recognized newspaper writers, but nearly all of them being clerks, bookkeepers, and professional men. Still another advertised for two apprentices in a wheelwright and smith shop, in one of the semi-rural wards of the city, requesting applicants to give their address and age. He got three applications, but in every case the applicant was too old, two of them being over eighteen, and one nearly twenty. Still another advertised for an office boy, about fourteen years old, and had so many applicants that his place was crowded for more than five hours, and the applicants were of all ages, from mere children not more than twelve years old to full grown men of twenty-one.

These are not very cheerful or encouraging signs. The present generation of young men seem to have a strong aversion to every kind of trade, business, calling, or occupation that requires manual labor, and an equally strong tendency toward some so-called "genteel" employment or profession. The result is seen in such lamentable facts as those above stated—a surplus of bookkeepers and clerks of every kind who can get no employment, and are wasting their lives in the vain pursuit of what is not to be had, and a terrible over-stock of lawyers without practice and doctors without patients. The passion on the part of boys and young men to be clerks, office attendants, messengers, any thing, so that it is not work of the kind that will make them mechanics or tradesmen, is a deplorable sight to those who have full opportunities to see the distressing effects of it in the struggle for such employments by those unfortunates who have put it out of their power to do anything else, by neglecting to learn some permanent trade or business in which trained skill can always be turned to account.

The applications for clerkships and similar positions in large establishments, are numerous beyond anything that would be thought of by those who have no chance to witness it. Parents and relatives, as well as the boys and young men themselves, seem to be afflicted with the same infatuation. To all such we say, that the worst advice you can give to your boy is to encourage him to be a clerk or a bookkeeper. At the best it is not a well-paid occupation. Very frequently it is among the poorest. This is the case when a clerk is fortunate enough to be employed, but if he should happen to be out of a place, then comes a weary scarcity, the fearful struggle with thousands of others looking for places; the never-ending disappointments, the hope deferred that makes the heart sick, the humiliations that take all the manhood out of poor souls, the privations of those who depend upon his earnings, and who have no resource when he is earning nothing. No father, no mother, no relative should wish to see their boys or kindred wasting their young lives in striving after the genteel positions that bring such trials and privations upon them in after life.

It would almost seem that comment on the above facts and accompanying remarks is superfluous, but in daily received correspondence we frequently find inquiries for advice from those who think their talents are not properly appreciated and their efforts not adequately compensated. The state of affairs shown by the instances quoted by our cotemporary, we think, are not only easily explained, but are susceptible of improvement. One cause of it is innate laziness and the other foolish pride. There may be others, but these are the principal ones; the laziness that prevents a man from *learning* his chosen business, and the pride that prevents him from *choosing* one suited to his capacity and education. Yet the lazy often desire the most laborious places, and the proud those where they are the servants of servants.

He who would turn up his nose in scorn at serving an apprenticeship at a trade where his hours of labor would be but ten at most, possibly only eight, out of the twenty-four, and who, at the expiration of three, four, or five years would be a competent workman worth a handsome compensation, possibly capable of acting as foreman, superintendent, or employer, chooses to agonize and struggle for a place in some mercantile business where he is the drudge of his fellow employés, and almost a thrall to his employers for years, only to find himself a clerk for the best part if not the remainder of his life. As a journeyman in almost any mechanical business his pay would be absolutely greater than as a clerk, his hours of labor would, in most cases, be less, his responsibilities less, and the wear and tear on his body and mind less. But—the mechanic labors with his hands, and soils them, and wears overalls, and colored shirts, and rolls up his sleeves, and carries the honorable insignia of toil about with him, while the clerk may sometimes keep clean hands, and dress neatly, and show a white shirt front, and carry only a pencil behind his ear; consequently the choice of the show with its accompanying drudgery, rather than the substance with its independence.

Within two weeks we have had calls from young men who have studied for the "professions;" two had studied law, one medicine. Each wanted advice, and, if possible, aid; but although neither could succeed in his chosen profession, neither was willing to attempt manual or mechanical labor. What each wanted was either an insurance agency, a clerkship, traveling agency, or place as copyist—anything rather than soil the hands. We can point to men who write "M. D." after their names who cannot compose a parseable English sentence. We know of members of the "bar" who do not understand the constitution of their country or the principles underlying it. These might have made good blacksmiths, or machinists, or carpenters, or ship-builders (though we much doubt it), but they might have been usefully employed in shoveling gravel.

But after having chosen a mechanical profession, it is not seldom the case that the apprentice looks upon his term of apprenticeship as so many years of lost or wasted time. He does not care to learn. He seems to suppose that the practical knowledge of his business is, somehow, to grow into his apprehension without effort on his part. To worry through the years of apprenticeship, with the least labor or effort to themselves and the least benefit to their employers, is really the principal study of some apprentices. *They* are not the only ones who look upon the years of apprenticeship in the same light. A letter received from a young man says he wants to become a machinist, but his father objects to his *giving* (?) three years to a trade.

Possibly the time will come when mechanical labor and mechanical skill will be valued at their true worth, as compared with other employment and other aptness; but so long as our young men prefer to preserve soft and clean hands as something more valuable than personal independence and a means of usefulness, we look for no abatement in the number of applications for "genteel" places.

ART OF COLORING MARBLE.

Did the ancients practice the art of coloring marble, or is it a recent American discovery? The New York *Times*, of February 15, 1869, in an editorial headed "Marble Coloring," says: "The art of coloring marble, through the entire mass, is supposed to have been known to the ancients, inasmuch as among the ruins traces of colored marbles and stones are found."

The *Metropolitan Record*, of February 20, 1869, in an article headed, "A New and Important Discovery in the Fine Arts, and its Special Application to Church Architecture," thinks there are plausible reasons why some writers have ranked the art of coloring marble among the lost arts, because "among the ruins of ancient temples and monuments, colored marbles and stones have been found, of whose original sources no trace can be obtained. If they came from quarries, the quarries are unknown in our day."

In Venice and other cities of Lombardy are columns and altars of a translucent white marble, *marmo statuario*, which resembles the Parian, but is not quite so opaque. The quarries of this kind of marble are as yet unknown. Might it not be said with equally plausible reasons that the Italians knew the art of making this marble, but they lost it?

That analogues and quarries of ancient colored marbles have not been found, is hardly a sufficient reason for classing the art of coloring marble among "the lost arts," for it may safely be asserted, that in all the countries which constituted the ancient world, Egypt, Asia Minor, Greece, Turkey, Italy, Northern Africa, and the Mediterranean Isles, have been in a state of stagnation since the fall of Rome and Constantinople; and that whenever accurate geologic and mineralogic surveys are made, the quarries may be re-discovered.

A synopsis of what the ancients knew and did as to marble, will conclusively show that the art of coloring marble through the entire mass was neither known to, nor practiced by them.

The word *marmaros* was applied by the earliest Greek writers to any rock, stone, block, or fragment, with the idea of shining, sparkling, bright. B. C. 800 Homer ("Iliad," xii., 380) and Euripides (B. C. 450, in his "Phœnissæ," 673) used the term in that sense. It was evidently derived from *marmarein*, to shine, sparkle, gleam, glitter. B. C. 270, Theocritus first applied *marmaros* to works of art in marble.

The word *marmaron*, marble, also rock crystal, or feldspar, on account of their shining appearance, was of later date. The Latin word *marmor* is formed from it, and is neuter like its original, in spite of its termination *or*. The German, *marmor;* Italian, *marmo;* French, *marbre;* English, *marble*, are but so many Graeco-Latin derivatives. Mineralogists have limited the word to rocks and stones, whose sole or chief ingredient is carbonate of lime, susceptible of polish.

There were at Rome, as early as 493 B. C., two ediles, architectural engineers, whose duty was to superintend the erection, adorning, and repairing of public buildings, streets, markets, etc. B. C. 366, two more were added, styled *curile ediles.* Julius Cæsar joined to them two *ediles cereales*, B. C. 44. The ediles had precedence in the Senate; their office was one of the most honored in the State. Would not one of these distinguished Roman savants and engineers have somewhere alluded to the art of coloring marble if such an art had been known and practiced?

Polygnotus, who was surnamed "The Prometheus of painting," and whose works were so highly esteemed, no doubt knew all the colors and coloring of his epoch, B. C. 469. Yet, in connection with him or his paintings, we find nothing of the art of coloring marble. Neither do we find any mention of such an art in connection with Polycletus, the famous sculptor and architect who built the theater at Epidaurus, which Pausanias pronounces, in symmetry and elegance, superior to every other theater, and not excepting those at Rome.

Vitruvius, the ablest Latin writer on ancient architecture, does not allude to the art of coloring marble through the entire mass in his ten books. Yet he lived under Augustus, who zealously patronized the arts, and was wont to say, "That he found the city built of brick, and left it constructed of marble."

Pausanias (A. D. 120) visited Greece, Macedonia, Asia, Egypt, and even Africa, as far as the temple Jupiter Ammon, then retired to Rome, where he wrote his ten books on the edifices, monuments, and works of art he had examined, and contrasted them with those of Rome. In the work of this author, who is the highest authority on ancient archeology, there is no allusion to any art of coloring marble through the entire mass; yet this erudite writer not only describes the edifices and works of art, but furnishes historical records, anecdotes, and legends connected with them.

Not even Belzoni (A. D. 1818), describing the vivid colors of his "Room of Beauties," "Researches and Operations in Egypt," p. 227, pretended to assert that the ancients knew the art of coloring marble and granite through the entire mass, though he may have thought they could beautifully color and stain it on the surface.

Hence, as neither the ediles from B. C. 493 to A. D. 476, a period of one thousand years, neither the ancient painters, sculptors, and architects, nor the ancient writers on archeology mentions the art of coloring marble through the entire mass, we may fairly conclude that the ancients knew nothing of this art, and that it is simply and purely an American discovery.

No doubt, Winkelman, author of the "History of Art among the Ancients," and Quatremère de Quincy could not help indorsing such a conclusion.

As a synopsis of the finest marbles known to the ancients might throw more light on this subject, and be a guide to American explorers and pioneers, we shall give it in a future issue.

VELOCIPEDE NOTES.

There are some who think, or pretend to think velocipedes are a frivolous invention, only calculated to subserve purposes of amusement, and soon to be superseded by some other ephemeral claimant for popularity. To such it perhaps seems a waste of time and space to record the progress of this most prominent mechanical invention of the time. We, on the contrary, have avowed and still avow our belief that the velocipede, as now improved, is destined to mark an era in the history of vehicles, an era that will last long after present cavillers and devotees have passed off the stage. We therefore continue our notes on the progress of this invention, and are confident from the many letters of approval we receive, they prove very acceptable to a large number of our readers.

A young mechanic in Dubuque, Iowa, has invented and constructed a vehicle which he terms the "velocycle," and which he claims will supersede the velocipede. A local paper describes it:

"The reader must disabuse his mind of all the forms common to the velocipede, and imagine a wheel 5 feet 10 inches in diameter. Nay, the imagination must go further and comprehend this wheel to be, as it were, two wheels of this diameter, and of a proportion not unlike a driving sulky's—that the two are made a unit by a light rim twelve inches wide, running around and within two inches of the outer circumference of the two supposed wheels. This comprehension will enable the reader to understand that this wheel is in reality a rim 5 feet 10 inches in diameter and about 14 inches wide, with two flanges, of two inches depth, projecting over the edges. Having entertained this form, we proceed further. Inside of this rim or wheel, a light but strong frame is hung, by a novel device, which keeps it independent, so far as not to obstruct its (the wheel's) motion. From the bottom of the frame, which is square, and running to the top of it, at an angle of nearly ninety degrees, is a band that may be properly called an endless ladder. The band, it will be understood, passes over a pulley below and a pulley above. On the edges of this endless ladder, in close proximity and parallel to each other, like strings of great beads, are a series of friction pulleys. These pulleys are so arranged as to unhinge on similar peculiarly contrived pulleys on the inner circumference of the main wheel or rim, near to the intersections of the flanges. The revolution of this band or endless ladder, through the medium of these pulleys, causes the main wheel or rim to revolve."

While the velocipede is still having its run in Paris, the other cities and towns of France are putting spokes in its wheels in the way of municipal restrictions. At Lyons no one can appear in the public streets or highways on a velocipede, and at Bordeaux, if a velocipedist goes out after sunset, he must carry a lantern, lighted.

A velocipede race took place at Worcester, Mass., a day or two ago. There were eighteen competitors, eight of whom were thrown. The remaining ten finished a course, of a little less than half a mile, in various periods of time; the fastest rider making the course in seventy-two seconds.

It is said that the first velocipede made its appearance in Minneapolis, Minnesota, on Tuesday, Feb. 16, and created a great excitement.

There are at the present time some twelve or fifteen schools in Boston where the use of the velocipede is taught, and they are increasing in number every day. At these halls from four to twelve machines are kept, and the arrangements whereby one pays for learning differ at the several places.

Some charge so much for a series of ten lessons, while others charge a small admittance fee and a certain price per hour for using the machine, as is the case in playing billiards. In either case they all made money, and a machine pays for itself in a very short time.

The hall velocipedes are for the most part slim built affairs, not suitable for roads, where a strong machine will be required to withstand the jar of uneven roads. It is estimated that upwards of one thousand young Bostonians are taking lessons in riding, with a view of going on the road when the spring opens.

Mr. Nat Perkins, of Riverside Park, will offer prizes for a series of velocipede races to come off on his race track early in the spring.

Walter Brown has opened the velocipede rink, number 10, in Boston, on Court street, near the Revere House.

A few evenings since, Mr. Hiram Henlin, of 720 Broadway, New York, and Mr. Samuel Keeler, the well-known and popular treasurer of the New York Theater, while at the velocipede school of Mr. C. Witty, engaged on a tilt at riding, which ended in rather a novel wager, Mr. Henlin agreeing to ride a velocipede against Mr. Keeler, from New York to Chicago, in less time than Mr. Keeler could, for the sum of $1,500 a side. Articles of agreement were drawn up, and a forfeit of $250 each placed in the hands of Mr. Charles H. Bladen, the final deposit was made at the house of Mr. Henlin, 720 Broadway, on the evening of Thursday, February 16, 1869—umpires and starting day then named. We suppose this will be the forerunner of several matches of the same kind, as the velocipede mania is on the increase. The affair is creating considerable excitement in sporting circles, and a large amount of money is already staked upon the result.

A new style of bicycle—the first specimen of which was completed about a fortnight since, and several of which have since been manufactured, and subjected to a variety of tests as to strength and susceptibility of easy propulsion and control—is, we are informed, the recipient of many encomiums from those who have learned to ride it. It is called the Improved American Velocipede, invented by A. T. Demarest, of this city. It differs from the styles best known to the public, in important respects. The iron arms, between which the front wheel is held, are inclined back at an angle of forty-five degrees from the perpendicular, which inclination brings the seat in such a relative position to the fore wheel that a man of medium hight can with his feet reach the treadles of one of these velocipedes, the front wheel of which is forty-five inches in diameter, with as much ease as he can those of the ordinary velocipede, the fore wheel of which is of a diameter seven or eight inches smaller. This peculiarity gives likewise great facility in describing sharp curves and circles of small diameter, the body being inclined in the direction in which the rider wishes to propel himself, and in the direction in which the driving wheel is inclined. Those who have become expert in the use of this new machine, claim that the movement of the body in propelling and guiding it is more nearly analogous to that in skating than is that employed in controlling the ordinary bicycle. Indeed, they claim that it can be guided by the mere inclination of the body without perceptibly varying the pressure upon the handles to the one side or the other. It is also claimed that by the peculiar rakish arrangement referred to, three obvious advantages are secured—that the driving wheel never touches the pantaloons to soil them; that however formidable an obstruction may be encountered, whether it be a curb-stone or anything else of equal hight, the arms holding the driving wheel will never be bent back in such a way that the wheels will lap each other (as those of the other styles of velocipede sometimes will), for the reason that those arms point directly toward such obstruction, the sole effect of striking it being to lift the front wheel and the rider; and that the hind wheel—whether a straight line be followed or a circle described—remains in an upright or nearly upright position.

The *Milwaukee Sentinel*, of the 18th February, says that "Mr. Cubberley, the inventor of the new velocipede, gave an exhibition of its speed and mode of operation at the Chamber of Commerce yesterday. The 'new-comer' made a favorable impression, and will doubtless supersede the treacherous 'bicycles.'" This machine is described as a tricycle, the rider sitting over and between the main wheels, as upon a sulky. These are about the size of the hind wheels of an ordinary carriage. The third, or guide wheel, is of small size, and serves merely to support the forward part of the machine.

Its most striking peculiarity is the ingenious contrivance whereby the weight of the rider is made to contribute to the propelling power, thus materially relieving the strain upon the muscles of the arms and legs. The apparatus for guiding, in addition to its main purpose, is so connected that the arms may assist in imparting motion to the wheels when not engaged in giving direction. The movements of the body in riding are very similar to the gentle rise and fall of a person riding on horseback, the rapidity of the motions increasing with the velocity.

The following remarks upon learning the velocipede are based upon practical experience and will be found of use to those who have not yet "broken their colt:"

"To learn the velocipede, where possible, it is advisable to use a velocipede not too elevated, so that the soles of the feet touch the earth. To start with the velocipede it suffices to run with the machine, so as to master well in the mind the action of the fore wheel, for all depends on this wheel. Half an hour of this is all that is requisite. Then one *only* of the feet is placed on the pedal, keeping the other leg on the ground, and one guides oneself in pushing this pedal a few moments. When one has by this acquired the notion of governing the velocipede, one lifts the leg that was on the ground and places it on the other pedal. Then cause the legs to regularly and alternately turn the pedals; speed of course is increased by quickening the action. After an hour or two one will certainly thus have acquired the means of attaining a medium speed. To get off, the feet are at once and simultaneously lifted off the two pedals, which diminishes the speed, upon which both feet are put at once to the ground.

"There is no danger, with a little caution, in using this machine in this way, even for a novice. The pedal is so constructed that the foot of the rider can at once leave it, and he has only to put the foot to the ground at the side upon which the machine inclines to gain a resisting point: one must not let the handles go; these serve to maintain and restore the balance of the machine when the rider has got off it.

Should the velocipede be too high to practice it in the mode above indicated, the learner should get some one to hold the machine, the hands on the extremity of the bar upon which the rider sits, so as in no way to impede the action of the fore wheel. It is well to choose a sloping ground to learn on.

So far, accidents have been neither numerous or serious, and the predictions that these machines would prove dangerous have not been verified. A Cincinnati paper gives the following account of a velocipede accident, resulting, however, from no defect in the machine:

A lad by the name of George Grier, having a desire to learn to ride the velocipede, engaged one of the machines at the velocipede school on Seventh street, and commenced his lesson in the fourth story of the building. He proved to be a very apt pupil, and having made the circuit of the large room several times with the assistance of his teacher, was anxious to try it alone. Mr. Miller acquiesced, and gave the novice a good start. The lad run the machine eight or ten yards very skillfully, but after that distance had been gone over, the velocipede became unmanageable, and made for a large hatchway in the middle of the room. The machine going at full speed, ran against the wooden guard around the opening, crashed through the boarding, and precipitated the rider to the cellar of the building, four stories and a half beneath. His fall was somewhat broken by the velocipede, which it seems struck the ground first, with him clinging to it; but notwithstanding this favorable circumstance, he received injuries which it is feared may prove fatal.

The junior editor of the Mauch Chunk *Gazette* has been experimenting on the velocipede, and gives an amusing account of his experience. The difference between these new-fangled horses and the orthodox quadrupeds seems to be about this: In the case of the former, the animal has to be broken before it can be ridden, while with the latter it is the rider who must undergo the breaking process.

ABOUT EARTHQUAKES.

On the 13th of August last, and the three successive days, fearful earthquakes occurred on the coast of Peru and in the interior of Ecuador, extending from Ibarra, a town of Ecuador, fifty miles to the north of Quito, to Arica, Arequipo, and Iquique, along the coast for a distance of 1,200 miles, and over a wide, but as yet unascertained region of the interior. The particulars of the catastrophe are familiar to our readers. An English exchange, in discussing this disaster in connection with earthquakes in general, gives some interesting details, from which we condense the following:

"Of all the great and overwhelming evils to which men are exposed, there is no one so sudden, so terrible, and so destructive as that produced by earthquakes in those regions in which the great internal fires of the earth, or the vapors produced by chemical or other action, are still in full force. It is the opinion of the great Humboldt that if we could obtain daily intelligence of the condition of the whole surface of the earth, we should probably arrive at the conviction that the surface is almost always shaking at some point, and that it is incessantly affected by causes working at one point or other in the interior of the earth. Earthquakes probably owe their origin to the high temperature of deep-seated molten strata in the interior, and are quite independent of the nature of the rocks or of the earth near the surface. Earthquake shocks have been felt even in the loose alluvial soil of Holland; and the great earthquake which destroyed the city of Lisbon on the 1st of November, 1755, was felt as far north as the shores of the Baltic and the mountains of Scotland. But it is one great happiness which the natives of the British Islands and Northern Europe possess that they have long been free from earthquakes of destructive violence. The great internal fires or forces, of whatever nature they may be, by which destructive earthquakes are produced, seem to have exhausted their strength, at least for some hundred years now past, in Northern Europe. Yet our distance from these great centers of commotion is not so great as we generally suppose. The earthquake of Lisbon in 1755 was probably one of the greatest convulsions in modern times, and attended with the most terrible loss of life. That at Messina, in Sicily, in the year 1783, was scarcely less terrible or fatal, and nearly the whole of the south of Spain, of Italy, and of Greece have at various times been shaken and convulsed with earthquakes. Happily, however, they do not appear in modern times to have exercised any destructive influence north of the chain of the Alps, although tremblings of the earth were felt almost every hour, for months together, in the month of April, 1808, on the eastern declivity of Mont Cenis, a portion of the chain of the Alps at Fenestrelles, and Pignesol. Beyond that point these great internal forces, though often felt, have never produced any dangerous convulsion in modern times, and the natives of France, Germany, and the British Islands may regard it as one of the many great advantages for which they have reason to be thankful that they are now, and have been for many generations, free from destructive ravages of forces by which so many other portions of the earth are periodically laid waste. The people of the United States have, to a great extent, the same reason for gratitude; for, although there were very destructive earthquakes in the valley of the Mississippi in the years 1810-11, there never yet has been an earthquake by which any considerable city of the United States has been destroyed.

"From the West Indies southward, over the greater part of South America, the causes by which the earthquakes are produced appear still to be in action. In the earthquake of Rio Banba, in the same district of country which has just been laid waste, the whole city of Rio Banba, with 30,000 or 40,000 inhabitants, was destroyed in a few minutes by a sudden explosion like the blowing up of a mine. Humboldt states that this terrible event was unaccompanied by any noise, but that a great subterranean detonation was heard twenty minutes after the catastrophe at Quito and Ibarra, one of the towns or cities destroyed in the recent earthquake in Peru. It was not, however, even heard at Tacunga, another of the places destroyed, although that place is (or rather was) nearer to the great convulsion of 1797. In the celebrated earthquake of Lima and Callao (Oct. 28, 1746), a noise resembling a subterranean thunderclap was heard a quarter of an hour later at Truxillo, but unaccompanied by movement. In like manner after the great earthquake of New Granada (Nov. 16, 1827), subterranean detonations were heard with great regularity at intervals of thirty seconds throughout the whole Cauca Valley, while at a distance of 632 miles to the north-east the crater of the volcano of St. Vincent, one of the small islands of the West Indies, was pouring forth a prodigious stream of lava. During the violent earthquake in New Granada, in February, 1835, subterranean thunder was heard as far north as the islands of Jamaica and Hayti, as well as the lake of Nicaragua. Wonderful as these distances are, they are not greater than the vibration produced by the great earthquake of Lisbon, which was felt over a space four times as large as the whole of Europe. In that great convulsion the sea rose at Cadiz, in consequence of the commotion of the earth, above sixty feet; and in the West India Islands, where it usually does not rise more than three feet, to an elevation of at least twenty feet. 'There is no manifestation of force yet known to us (including the murderous inventions of our own race) by which a greater number of human beings have been killed in the short space of a few seconds or minutes than in the case of earthquakes. Sixty thousand were destroyed in Sicily in 1693; 30,000 to 40,000 at Rio Banba, in South America, in 1797; and perhaps five times as many in Asia Minor and Syria, under Tiberius and the elder Justinian, in the years 19 and 526.' We fear that this new calamity in Ecuador and Peru will prove, when all the results are known, nearly equal to some of the above."

New American Pigment.

The London *Mining Journal* in noticing some extraordinary puffs of a pigment, known here as "Bartlett's Lead," says: "The process described, and the resulting product, are alike improbable, if not impossible. The mine from which the raw material is derived was described as being first in New Jersey and then in North Carolina; yet the removal of the mine would be much more simple than the production of the pigment stated by the process described. An ore, which contains various metals—lead, silver, zinc, copper, gold, iron, and manganese—is treated so as to remove the silver, lead, and gold, and when the residuum has been subjected to a white-red heat, the powder becomes impalpable and delicately soft, and of a pinkish chocolate color—this seems to be a common impure iron paint. This powder is made into white lead by burning it with small hard coal in a closed furnace, from which the mineral is drawn off by large rotary fans in minute and delicate flakes, which prove upon analysis to be composed of lead and zinc, with a small percentage of cadmium. In this process, the transmutation of metals is an accomplished fact; and, assuming that it can be carried out in practice, it must be admitted that all existing chemical knowledge is absolutely worthless."

Editorial Summary.

A CURIOSITY.—At the dining rooms of Messrs. Crook, Fox, & Nash, Park Row, this city, we saw last week a curiosity in the form of a smelt inside the shell of an oyster. The oyster shell (lower valve) measured four and a half by three inches and the smelt was five inches long, lying curved to conform to the mouth of the shell and in a good state of preservation. As the food of the oyster consists of nothing larger than the animaculæ of the salt water, it must therefore be inferred that the smelt was on an exploring expedition while the oyster had his shell open for an airing, and when that representative of the family *clupeidæ* intruded, the oyster imprisoned him for ransom.

THE PATENT SANDSTONE.—The recent fall of the church built of this material at Morrisania has set people to thinking what is likely to happen to the Freedman's Bureau buildings at Washington, built of the same worthless stuff at a cost of $200,000. The material is the very last we should adopt for any structure required to be permanent, but perhaps permanency was not contemplated for the Freedman's Bureau.

IT is said that contracts have been made with a French Company for opening a canal across the Isthmus in Nicaragua and with an American Company for an Isthmus railroad. Work on the latter is to begin in the spring, and the first thirty miles of the canal are to be finished in eighteen months. The contract price is ten millions of dollars.

INTERESTING EXPERIMENTS BY PROF. TYNDALL.—Dr. Tyndall has made some very surprising experiments by passing vapors of different chemical substances into an exhausted glass tube, and then sending through them a beam of electric light. The vapor is at first invisible, but after the light has shone through it for a few seconds, it forms clouds of a blue, green, red, or mauve color, which break up into the most fantastic and beautiful forms, endowed with a rotary motion, which adds greatly to their effect on the eye. In some instances, the cloud takes the shape of funnels overlapping each other, and, curiously enough, the inner ones can be seen through the outer ones. The most surprising of all is the vapor of hydriodic acid. The cloud is seen cone-shaped, supporting vases of exquisite form, and over the edges of these vases fall faint clouds, resembling spectral sheets of liquid. Afterwards, a change takes place—roses, tulips, and sunflowers appear; then come a series of beautifully shaped bottles, one within the other, and on one occasion there was seen the shape of a fish with eyes, gills, and feelers. What, it may be asked, is the use of all this fantastic beauty? The answer is, that Dr. Tyndall finds therein illustration of chemical decomposition, examples of molecular physics, and explanations of the formation of cloud and the blue color of the sky, whereof we shall hear more by-and-by, and by which science will be enriched.

TEST FOR THE STRENGTH OF ALCOHOL.—Alcohol dissolves chloroform, so that when a mixture of alcohol and water is shaken up with chloroform, the alcohol and chloroform unite, leaving the water separate. On this fact Basile Rakowitsch, of the Imperial Russian Navy, has founded his invention. The instrument he uses is a graduated glass tube into which a measured quantity of chloroform is poured, and to this is added a given quantity of the liquid to be tested; these are well mixed together and then left to subside; the chloroform takes up the alcohol and leaves the water, which being lighter than the chloroform will float on the top; and the quantity of water that has been mixed with the spirit will be at once seen.

N F. BURNHAM, of York, Pa., in a recent letter, says: "I shall shortly send you an advertisement for my wheel; I have already received over one hundred letters from your description of it in your paper of the 9th Feb." This is a valuable endorsement of the SCIENTIFIC AMERICAN as an advertising medium.

THIS WINTER although a very mild one has been a very hard one on proprietors of Skating Rinks in New York and Brooklyn, who have only saved themselves from ruinous losses by adopting the velocipede.

MR. FRANK BUCKLAND states that the skin of the salmon will make leather as tough as wash-leather and about the thickness of dog-skin leather. The scale marks give a very neat pattern to the leather.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

QUICKSILVER.—It is asserted that the increased production of the California quicksilver mines has stimulated the workings of the old Almaden mines in Spain, and the Austrian mines of Idria, and that the price of this metal has fallen in consequence in London, where it is fifteen per cent lower than it was four or five years ago. California now sends quicksilver to various places in the following order of their importance—the first mentioned taking the smallest quantity; British Columbia, Australia, South America, Great Britain, New York, Mexico, and, during the past year, China, which was the best customer.

The Central Pacific Railroad Company finds it exceedingly difficult to keep their employés from deserting, on account of the White Pine gold excitement. They ship car loads of workmen who get their ride for nothing, and strike for the gold region when they get as near as the road can carry them.

An item stating that the first cotton mill erected in New England was at Putnam, Conn., recently found its way into our manufacturing items by mistake. The first cotton mill erected in the United States was at Pawtucket, R. I., built by Samuel Slater in 1793.

The amount of petroleum remaining unsold in the United States on the first of January last is stated at 520,588 barrels; afloat and in Europe, 439,668 barrels; total 960,256, showing a decrease of 312,925 barrels as compared with the first of January, 1863.

St. Thomas' Church, in New York city, is to have a full chime of bells, the largest of which will weigh 5,500 pounds and be the heaviest harmonic bell ever cast in the country.

A valuable sulphur deposit has been found in Louisiana, near Lake Charles, 500 feet beneath the surface.

One thousand stationary engines are employed in the manufacturing establishments of Philadelphia.

The revolution in Cuba has raised the price of sugar and greatly depressed the hoop-pole business in Maine.

The first piano shipped to Japan was sent recently by a New Haven manufacturer.

One of the Oriental Powder Company's mills, in Gorham, Maine, blew up on Saturday. A Prussian named Shaiel had his leg broken. No one else was hurt.

A transparent agate inclosing a drop of water has been found in Willamette river, Oregon.

The product of the Nevada mines for 1868 is stated as being sixteen millions of dollars.

Seeds of the cork tree have been brought from Portugal to Florida with a view to test its cultivation there.

A seventy-five pound nugget one-third gold, is said to have been recently found in an Oregon mine.

Earth is stated to have been found frozen in a Colorado mine at a depth of 125 feet.

An Illinois beet sugar company uses fifty tuns of beets a day, and will soon increase its consumption to sixty tuns.

A world's fair, to be held in San Francisco in 1870, is talked of.

Gold diggings have been discovered in Scotland.

A canal across the State of Georgia is talked of.

Answers to Correspondents.

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

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

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

T. P., of Mo.—If you wish to prevent the splitting of your hollow cutters or reamers in hardening, drill a small hole from the side to meet the large hole at its apex; otherwise there is no chance for the steam to escape and cracking is sure to result.

W. H. B., of Pa.—You can clean a clogged file or rotary cutter effectually by smearing it with oil lightly, exposing it to a forge flame a moment, and then carding it with the card that every machinist or filer uses. You may heat it so hot you cannot bear your hand upon it, but the temper will not be drawn.

S. R., of Me.—Ordinary rosin powdered and melted on the plate by a slight heat will give a temporary resistance to acids. In fact any resinous substance will form a base for a resistant to acids.

T. L., of Pa., wants to use an incombustible spongy coherent substance like platinum sponge but cheap. He says however that it need not possess all the properties of platinum sponge; all that is required is incombustibility, sponginess, and coherency.

H. N. C., of Pa.—A stream of cold air directed forcibly against a heated bar of iron keeps it hot, by the combustion of the iron itself. The oxygen of the air is brought so closely in contact with the heated metal, and is supplied in such quantity that it unites with the iron producing all the phenomena of combustion, among which is the evolution of heat.

A. W. P. of Pa.—There is no difficulty in making a speaking tube convey audible sounds one hundred yards. Biot, a celebrated French philosopher was able to hear low whispers through a tube of iron 3,120 feet in length. The straighter it is the better. We don't think putting it beneath the ground essential. Put it where it will be most convenient.

J. W. H., of Pa.—Self-sealing cans might be made that would perhaps allow the air to escape when the cans are heated, and close themselves hermetically upon the contraction of the air in cooling, but we are not aware that any such are used. The expulsion of the air is the only object to be attained in heating the fruit, where the modern process of canning is used, and if that is not thoroughly done the heating is detrimental rather than beneficial.

J. M., of Ill.—A good varnish for maps or water color paintings, is made of genuine Canada balsam and rectified oil of turpentine, equal parts. Mix; set the bottle containing the mixture in warm water, and agitate until the solution is perfect; then set in a warm place a week to settle, when pour off the clear varnish for use.

J. M. H., of Seminole Nation.—There is special legislation for the Indian reservations which can be found on consulting Brightley's Digest. Should the infringement of a patent be committed therein by a resident of some other State or Territory, a suit would be good, could the party be served, or the infringing machine be found within the jurisdiction of the court in which the suit is commenced. The Territories have District Courts which are severally invested with same jurisdiction as the U. S. Circuit and District Courts of the U. S.

Business and Personal.

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

Recent American and Foreign Patents.

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

LIME KILNS.—George Atkins, Sharon, Pa.—This invention has for its object to furnish an improved lime kiln, simple in construction, easily and conveniently operated, and which will burn the lime thoroughly with a comparatively small amount of fuel.

ANIMAL TRAP.—W. Bronson Jarvis, Washington, N. C.—This invention has for its object to furnish a simple, convenient, reliable, and self-setting animal trap, which shall be so constructed and arranged as to be not at all liable to get out of order.

ROCK DRILLING MACHINES.—S. Gable, Millerstown, Pa.—The object of this invention is to provide a simple and effective machine for drilling rocks.

MEASURING INSTRUMENT.—Thomas Bisbing, Buckstown, Pa.—This invention relates to a new and improved device for measuring cloth and giving lineal measurements generally; and the invention consists in operating a revolving dial plate by a sliding pawl and ratchet wheel.

MACHINE FOR MAKING PAPER PULP.—Frederick Burghardt, Curtisville, Mass.—This invention relates to a new and important improvement in producing paper pulp from wood, and consists in pulverizing the wood by bringing it in contact with a revolving cylinder provided with a grating filing or scraping surface, and in vibrating the scraper longitudinally for changing the cutting or scraping surface of the cylinder on the wood, and also in a revolving cleaning cylinder.

FEATHER RENOVATOR.—Enoch Colvin, Paulet, Vt.—This invention relates to an improved apparatus for renovating feathers, and consists in subjecting them to the action of steam and heated air.

CARRIAGE TIRES.—William Williams, New York city.—This invention relates to a new and useful improvement in carriage tires, whereby they are made much more useful than they have heretofore been, and it consists in providing the tire with a flange for keeping the tire in place on the wheel, and also for protecting and strengthening the wheel.

SAFETY HAT.—James J. Giltenan, Cincinnati, Ohio.—The object of this invention is to so construct a hat that the wearer may be protected from danger from the sun's rays, and from excessive heating of the head; and it consists in making the hat with a double crown, and in inserting a sponge or other absorbant between the crowns for retaining moisture.

LOCK.—A. F. Pfeifer, Newark, N. J.—This invention has for its object to furnish a cheap, simple, and effective lock, designed especially for piano locks, sewing machine cases, and similar uses; and it consists in the combination of one or more hook or catch bolts, with the straight or sliding bolt of the lock.

BINDING ATTACHMENT TO HARVESTERS.—Wm. W. Snell, Brushford, Minn.—This invention relates to a new binding attachment, which is more particularly intended to be applied to the Marsh Harvester, but which may as well be used on any of the other harvesters now in use. It is arranged to operate entirely automatic, and will adjust itself to suitable size of bundles as they may be desired.

AUTOMATIC BOBBIN BUILDER FOR SPINNING JACK.—Oliver Brothers, Naugatuck, Conn.—This invention relates to a new machine for automatically winding the yarn around the bobbins of wool-spinning machines; its object being to do away with the necessity of imparting oscillating motion by hand to the follower or thread guide.

PROCESS OF MAKING SHEET-METAL PANS.—C. Hodgetts, Brooklyn, N. Y.—The object of this invention is to avoid the weakening of the bottoms of sheet-metal pans; and the invention consists in forming a circular depression in the sheet metal plate from which the pan is to be struck, and in then bending up the sides of the pan, the depression remaining in the bottom at the junction of the same with the sides.

ROD COUPLING.—G. Thompson, Shamburg, Pa.—The object of this invention is to produce a device for connecting two rods, which are used as pump rods in oil wells, salt works, or for any other suitable purpose. It consists in the use of two clamps in which the ends of the rods are respectively held, the clamps being provided with male and female screw threads, or equivalent means, to enable their being connected; each clamp is constructed by cutting a wedge-shaped long recess into the lower end of a somewhat conical metallic block, and in forming lugs on the sides of such recess.

PROCESS OF MANUFACTURING PYROLIGNEOUS OR ACETIC ACID.—C. C. Parsons, New York city.—This invention relates to a new process of making acetic acid, and more particularly to a new manner of agitating and purifying the same, also to the application of electricity to the process.

VELOCIPEDE.—John A. Topliff and George H. Ely, Elyria, Ohio.—The object of this invention is to so construct a velocipede that it may be instantaneously transformed into a two or three-wheeled vehicle, as the rider may desire, and while in motion. It consists in providing a rear axle, which is bent, so as to be somewhat V-shaped, and in loosely hanging a wheel on each one of its inclined ends. When the axle is turned by suitable leverage provided for that purpose, so that its middle part is higher than its ends, the wheels will be both in the middle, and the tires will come together, so that the two rear wheels will constitute but one single wheel, making the velocipede a two-wheeled one, or, at least, one that possesses all the advantages of a two-wheeled velocipede.

CAR COUPLING.—W. J. Blackman, Columbus, Miss.—This invention relates to improvements in car couplings, by which it is designed to provide an arrangement by which the several cars of a train may be uncoupled by the engineer, while at his post on the engine, by means of hand levers and suitable connections, or by the brakemen on the several cars by a foot-pressing apparatus; and also certain improvements in the coupling apparatus.

CHURN.—W. D. McFadden, Senatobia, Miss.—This invention relates to an improved method of operating a vertically reciprocating churn dasher from a rotary driving mechanism.

FURNACES AND TOOLS TO BE USED FOR METALLURGIC PURPOSES.—Wm. Yates, Westminster, England.—This invention relates to improvements in the furnaces and rods to be used in metallurgic operations, and more particularly to puddling, converting, and reheating furnaces, in which iron and steel are operated upon, and consists in constructing such furnaces, or protecting their inner surfaces by a lining, so that they will be better able to resist the great heat to which such furnaces are exposed in metallurgic operations.

CAR BRAKE.—J. W. W. Smith, Canton, Mo.—This invention relates to improvements in car brakes, whereby it is designed, by the employment of a cylinder having a tapered hole through it longitudinally and fitted to an axle having a corresponding taper, to provide a simple and effective brake, the said cylinder being provided with means for sliding on the said tapered shaft so as to cause it to adhere by the frictional contact therewith, and rotate with it, thereby winding up cords or chains attached to the brakes, or to free it from the said frictional contact.

CAR COUPLING.—T. Caldwell and L. C. Wilcox, Buffalo, N. Y.—This invention relates to a new and improved car coupling of that class which are commonly termed "self-coupling," and it consist in a peculiar construction and arrangement of parts.

GATE.—E. B. Scattergood, St. John's, Mich.—This invention relates to a new improved method of constructing and hanging farm gates, whereby they are rendered much more useful and convenient than gates of ordinary construction.

SELF RAKE FOR REAPING MACHINES.—Edwin H. Smith, Westminster, Md.—The object of this invention is so to provide a simple and effective self rake attachment for reaping machines, which, deriving its motion from the main drive wheel of the reaper, will obviate the necessity of employing an extra hand to rake off the grain as it falls on to the reaper platform.

VELOCIPEDE.—Isaac Samuels, Marysville, Kansas.—This invention relates to a new velocipede, which is set in motion by turning cranks by hand, and which is steered by the lower extremities of the occupant. The invention consists in the general construction and arrangement of parts, whereby the desired result—namely, causing the instrument to move rapidly with the application of but very little exertion, is obtained in a simple and efficient manner.

CULTIVATOR.—William Day, Morristown, N. J.—This invention relates to a new instrument for tilling the ground between rows of corn, potatoes, strawberries, onions, or any other similar plants, and consists in so arranging the draft above the wheels that a great leverage is obtained whereby the teeth or shovels of the instrument can be forced into the ground to any desired depth. The cultivators heretofore in use could not be made to do more than barely scratch the ground, a thorough overturning of the soil not being possible by their use, while this instrument will turn the soil to any desired depth in the most thorough manner.

SOFA BED.—B. L. Southack, New York city.—The object of this invention is to construct a sofa bed, in which the back of the sofa is used to form part of the bed bottom, in order to convert the sofa into a bedstead; the whole article has not to be moved off the wall near which it stands. This is a great inconvenience in the sofa beds now in use, and to overcome it is the chief object of this invention.

NEW PUBLICATIONS.

ELEMENTS OF GEOMETRICAL OPTICS. By N. F. Dupuis, M.A., Astronomical Observer to Queen's College, Kingston, Canada.

This is an abstract work, suited to the wants of students, engineers, surveyors, and astronomers, who wish to understand fully the principles upon which optical instruments are constructed. It contains concise formulae and useful problems for solution.

The NATIONAL NORMAL is the name of a new educational monthly, published at 176 Elm street, Cincinnati, Ohio, by R. H. Holbrook, who is also its editor. Mr. Holbrook has a wide reputation as an able writer upon educational matters, and the first three numbers we have received seem well adapted to the wants of the professional teacher. We commend this publication also to parents and others interested in educational improvement, as containing information and instruction that may be usefully applied to home education and family discipline, and as being calculated to elevate the standard of popular instruction.

The ATLANTIC MONTHLY for March has excellent articles by T. W. Higginson, Mrs. Stowe, Dr. Bowditch, James Freeman Clarke, James Parton, C. P. Cranch, and other well-known writers.

BROOKLYN MONTHLY.

A new candidate for popular support, and in all respects an excellent number. H. W. Love & Co., publishers.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING FEBRUARY 23, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

On each caveat	$10
On filing each application for a Patent (seventeen years)	$15
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On an application for Design (seven years)	$15
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

Patents and Patent Claims.—*The number of patents issued weekly having become so great, with a probability of a continual increase, has decided us to publish, in future, other and more interesting matter in place of the Claims. The Claims have occupied from three to four pages a week, and are believed to be of interest to only a comparative few of our readers. The publication of the names of patentees, and title of their inventions, will be continued; and, also, as heretofore, a brief description of the most important inventions. We have made such arrangements that we are not only prepared to furnish copies of Claims, but full Specifications at the annexed prices:*

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Patent Solicitors, No. 37 Park Row, New York.

87,088.—COMPOUND FOR REMOVING INK, STAINS, etc.—Victor G. Bloede, Brooklyn, N. Y.

87,089.—MACHINE FOR PLANTING COTTON SEED.—A.D. Brown, Sr., Columbus, Ga.

87,090.—SUGAR PRESS.—W. C. Bruson, Chicago, Ill.

87,091.—MOLD FOR CASTING METALS.—Edwin N. Cleaves, Boston, Mass.
87,092.—SAW TEETH.—Peter Cook, Tonawanda, N. Y.
87,093.—CELLULAR BUCKWHEAT HULLER.—Andrew Crawford, Wilkesbarre, Pa.
87,094.—BLACK INK.—D. A. Dougherty, Kittanning, Pa., assignor to himself, E. A. Brodhead, and J. M. Taylor.
87,095.—DOOR SPRING.—Wm. Duncan, Lebanon, N. H.
87,096.—REVERSIBLE KNOB LATCH.—Barthel Erbe, East Birmingham, Pa.
87,097.—CLAMP FOR ELEVATING WELL TUBES.—Daniel Fisher, Oil City, Pa.
87,098.—RAILWAY FREIGHT CAR.—William A. Goodwin, Newton, Mass.
87,099.—FIREPLACE.—Elwood Hampton, New York city.
87,100.—WOOD-SAWING MACHINE.—G. M. D. Harreld and B. E. Harreld, Washington, Iowa.
87,101.—CULTIVATOR.—James Harris, Janesville, Wis.
87,102.—LOW-WATER INDICATOR.—George M. Hopkins, Albion, N. Y.
87,103.—MACHINE FOR BRUSHING HATS.—Joseph W. Hopkins, (assignor to himself and C. B. Hardick), Brooklyn, E.D., N. Y.
87,104.—FLUID METER.—H. B. Leach, Boston, Mass.
87,105.—MAST HOOP.—W. T. Maddocks, Northport, Me.
87,106.—HAY RAKER AND LOADER.—J. C. Moore and C. B. Garlinghouse, Madison, and G. B. Garlinghouse, North Madison, Ind.
87,107.—BATHING DRESS.—Ozias Morse, Concord, Mass.
87,108.—ROTARY PUMP.—Jas. Naughton, Buffalo, N. Y.
87,109.—ANCHOR.—Guilford Norton, Boston, Mass., assignor to Philomela T. Vining, New York city.
87,110.—SHIELD FOR HARNESS.—M. W. Pond, Elyria, Ohio.
87,111.—RECLINING CHAIR.—E. C. Ranks, Boston, Mass.
87,112.—GRATE.—E. S. Renwick, New York city.
87,113.—REEL AND SWIFT.—W. G. Ricker and O. B. Webber, Rochester, N. Y.
87,114.—TEA AND COFFEEPOT STAND.—J. W. Routh (assignor to himself, J. A. Aikman, and W. H. Tisdale), Decatur, Ill.
87,115.—ADJUSTABLE SEEDER.—Charles Rundquist, Mankato, Minn.
87,116.—COLLAR.—C. W. Saladee, Circleville, Ohio.
87,117.—MACHINE FOR WINDING BRAID.—Wm. Shedlock and Alfred Shedlock, New York city.
87,118.—FLUID METER.—John Sheffield, Buffalo, N. Y.
87,119.—TANNERS' LEACH.—Simon Snyder, Cincinnati, Ohio.
87,120.—STREET CAR.—John Stephenson, New York city.
87,121.—STREET RAILROAD CAR.—John Stephenson, New York city.
87,122.—BRAKE FOR HORSE-RAILROAD CARS.—John Stephenson, New York city.
87,123.—MANUFACTURE OF ILLUMINATING GAS.—Levi Stevens, Washington, D. C.
87,124.—RAILWAY FROG.—A. B. Thompson, Owego, N. Y.
87,125.—METALLIC CARTRIDGE CASE.—William Tibbals, Hartford, Conn.
87,126.—SAFETY GUARD FOR RAILWAY CARS.—Thos. Walter, Philadelphia, Pa.
87,127.—COOKING STOVE.—W. H. Whitehead, Chicago, Ill.
87,128.—GLOBE SHADE FOR LAMPS.—Henry Whitney, East Cambridge, Mass.
87,129.—STRAIGHTENER FOR BOOTS AND SHOES.—G. W. Wilford, Dayton, Ohio.
87,130.—APPARATUS FOR PRODUCING HEAT AND LIGHT FROM GASES.—Robert d'Hurcourt (Edouard Armand), Paris, France.
87,131.—LIME KILN.—Geo. Atkins, Sharon, Pa.
87,132.—AMALGAMATED PLATE FOR COLLECTING GOLD AND SILVER.—Melville Attwood and John Roach, San Francisco, Cal.
87,133.—WRENCH.—B. F. Bee, Harwich, Mass.
87,134.—APPARATUS FOR MEASURING CLOTH, etc.—Thos. Bisbing (assignor to himself and M. V. Sorber), Buckstown, Pa.
87,135.—CAR COUPLING.—W. J. Blackman, Columbus, Miss.
87,136.—CAR STARTER.—Joseph Boswell and J. W. Brindle (assignors to themselves and Jacob P. Brindle), Wilmington, Ohio.
87,137.—OVERSHOE.—A. O. Bourn, Cranston, R. I.
87,138.—SPINNING JACK.—Oliver Brothers (assignor to himself and Joseph White), Naugatuck, Conn.
87,139.—MACHINE FOR PREPARING WOOD FOR THE MANUFACTURE OF PAPER PULP.—Frederick Burghardt, Curtisville, Mass.
87,140.—MATERIAL FOR FILLING FIRE-PROOF SAFES.—J. M. Burt, Philadelphia, Pa.
87,141.—WEDGE FOR AX HELVES.—Beauman Butler, St. Johnsbury Center, Vt.
87,142.—CAR COUPLING.—Thomas Caldwell and Lewis C. Wilcox, Buffalo, N. Y.
87,143.—HOISTING APPARATUS.—D. H. Chamberlain, West Roxbury, Mass.
87,144.—RECTIFIER AND CONDENSER FOR ALCOHOLIC AND OTHER SPIRITS.—J. F. Collins, New York city.
87,145.—FEATHER RENOVATOR.—Enoch Colvin, Paulet, Vt.
87,146.—SCREW COLLAR FOR CONNECTING COVERS TO GLASS VESSELS.—John Cook, New York city.
87,147.—CHURN.—De Witt C. Cooley, Wilkesbarre, Pa.
87,148.—PUMP PISTON.—Solomon Crowell, Syracuse, N. Y.
87,149.—PLOW.—Seymour Curtis, Fitchburg, Wis.
87,150.—MACHINE FOR GRINDING THE KNIVES OF MOWING MACHINES.—B. F. Davis, Auburn, N. Y.
87,151.—CULTIVATOR.—William Day, Morristown, N. J.
87,152.—CASING FOR REVERBERATORY AND OTHER FURNACES.—W. F. Durfee, Bridgeport, Conn.
87,153.—MANUFACTURE OF STEEL.—A. K. Eaton, Piermont, assignor to himself, Albon Man, Brooklyn, N. Y., and Jas. Macdonough, New York city.
87,154.—MOSKETO CANOPY FOR BEDS.—Warren B. Ellis, Boston, Mass.
87,155.—CHAMOZONATOR.—Wm. Elmer, New York city. Antedated Feb. 11, 1869.
87,156.—MANUFACTURE OF GAS FOR FUEL ILLUMINATION, ETC.—Wm. Elmer, New York city. Antedated Feb. 13, 1869.
87,157.—REFINED HEAVY OIL FROM PETROLEUM.—Hiram B. Everest (assignor to Vacuum Oil Company in Vacuo), Rochester, N. Y.
87,158.—CAR COUPLING.—R. F. Fairlie, London, England.
87,159.—ANIMAL TRAP.—Lafayette Faris, Princeton, Ohio.
87,160.—CORSET.—Susan B. Fisler, Newark, N. J.
87,161.—PAPER FILE.—John O. Foster, Pecatonica, Ill.
87,162.—ROCK DRILLING MACHINE.—Samuel Gable, Millerstown, Pa.
87,163.—MODE OF RENDERING WOODEN BUNGS IMPERVIOUS TO LIQUIDS AND GASES.—Philip Geier, Cincinnati, Ohio.
87,164.—SAFETY HAT.—Jas. J. Giltenan, Cincinnati, Ohio.
87,165.—COOKING STOVE.—Chauncey O. Greene, Troy, N. Y. Antedated Feb. 2, 1869.
87,166.—WATER METER.—Oliver B. Griggs, Mansfield, and Edwin A. Barrows, Windham, Conn., assignors to O. B. Griggs.
87,167.—MACHINE FOR CUTTING LEATHER STRAPS, ETC.—Justin Haberbush, Joseph Bentz, and F. S. Vogel, Lancaster, Pa.
87,168.—EXCAVATING MACHINE.—Peter W. Hamel, San Francisco, Cal.
87,169.—BITTERS.—W. P. Haubert and John Haubert, Canton, Ohio.
87,170.—SHEET METAL PAN.—Chas. Hodgetts, Brooklyn, E.D., N. Y.
87,171.—SECTIONAL PIER.—Ozial A. Howe, Jersey City, N. J.
87,172.—WELL CURBING.—W. T. Huntington, Washington, D. C.
87,173.—ANIMAL TRAP.—W. B. Jarvis, Washington, N. C.
87,174.—CAST-IRON CHORD CONNECTION FOR BRIDGES.—Chas. Kellogg, Philadelphia, Pa.
87,175.—HEARSE.—J. F. Kinback, Carbondale, Pa.
87,176.—TOLL COLLECTOR FOR GRIST MILLS.—Fredrich Klinkerman, Aurora, Ind.
87,177.—MODE OF CARBONATING AND DISPENSING ARTIFICIAL MINERAL WATERS.—Daniel Kolb and Thomas Kolb, Washington, D. C.
87,178.—VENTILATOR.—Oswald Krakoviez, Chicago, Ill.
87,179.—COFFEEPOT.—J. L. Labiaux, Newark, N. J.
87,180.—RAILWAY CAR WHEEL.—William H. Mason, Boston, Mass.
87,181.—LOW WATER DETECTOR FOR STEAM-GENERATORS.—G. B. Massey, New York city.
87,182.—FLUTING MACHINE.—Eli J. Manville, Waterbury, Conn.
87,183.—LIQUID METER.—Gideon B. Massey, New York city.
87,184.—SPRING BED BOTTOM.—Francis B. Matson, Rockford, Ill.
87,185.—CHURN.—W. D. McFadden, Senatobia, Miss.
87,186.—ASH-SHOVEL AND SIFTER.—William C. McGill, Cincinnati, Ohio.
87,187.—COMPOSITION INSULATOR FOR TELEGRAPH AND OTHER ELECTRIC CONDUCTORS.—J. M. Merrick, Jr., Boston, Mass.
87,188.—PIVOT FISHING LINE.—Francis X. Monnier, Detroit, Mich.
87,189.—LANTERN.—Robert Mood and H. M. Britton, Cincinnati, Ohio.
87,190.—BREECH-LOADING FIREARM.—Wm. Morganstern, New York city.
87,191.—SAW GUMMER.—Wm. Newcomb, Johnsonville, N. Y.
87,192.—APPARATUS FOR CHARGING AIR WITH HYDROCARBON VAPORS.—H. M. Paine, Newark, N. J.
87,193.—PURIFYING PYROLIGNEOUS OR ACETIC ACID.—C. C. Parsons, New York city. Antedated Feb. 12, 1869.
87,194.—FIRE ALARM.—Isaac T. Pease, Thompsonville, Conn.
87,195.—VEGETABLE SLICER.—George B. Peers, Farmington, Mo.
87,196.—PIANO LOCK.—A. F. Pfeifer, Newark, N. J.
87,197.—POTATO DIGGER.—Ephraim Phillips, North Beaver township, Pa.
87,198.—TOOL FOR CUTTING SCREW-THREADS.—Elijah S. Pierce (assignor to the National Screw Company), Hartford, Conn.
87,199.—APPARATUS FOR TREATING PETROLEUM SO AS TO PRODUCE OIL AND GAS THEREFROM.—A. C. Rand and Wm. M. Sloane, New York city.
87,200.—MACHINE FOR PRESSING SEAMS AND CUTTING WELTS OF BOOTS AND SHOES.—Edwin Reed, Kingston, Mass.
87,201.—MOLASSES PITCHER.—Chas. Reistle, Brooklyn, N. Y.
87,202.—COMPOUND FOR BATING HIDES AND SKINS.—L. F. Robertson, Morrisania, N. Y.
87,203.—APPARATUS FOR TREATING HIDES, SKINS, AND LEATHER.—L. F. Robertson, Morrisania, N. Y.
87,204.—VELOCIPEDE.—Chas. H. Robinson, Bath, Me.
87,205.—VELOCIPEDE.—Isaac Samuels, Marysville, Kansas.
87,206.—GATE.—E. B. Scattergood, St. John's, Mich.
87,207.—APPARATUS FOR DISTILLING AND SEPARATING OILS, FATS, AND THE LIKE.—Charles A. Seely, New York city.
87,208.—METHOD OF CONVEYING AND USING HEAT IN CHEMICAL AND OTHER SIMILAR PROCESSES.—C. A. Seely, New York city.
87,209.—ADJUSTABLE CURTAIN WEIGHT.—W. F. Shaw, Boston, Mass.
87,210.—APPARATUS FOR GENERATING GAS FROM PETROLEUM.—Wm. M. Sloane, Buffalo, N. Y., assignor to himself and Alonzo C. Rand, New York city.
87,211.—HARVESTER RAKE.—E. H. Smith, Westminster, Md.
87,212.—MACHINE FOR GRINDING EDGE TOOLS.—J. D. Smith, Greig, N. Y. Antedated Feb. 15, 1869.
87,213.—WAGON BRAKE.—John Smith, McKay, Ohio. Antedated February, 20, 1869.
87,214.—CAR BRAKE.—J. W. W. Smith, Canton, Mo.
87,215.—GRAIN BINDER.—Wm. W. Snell, Brushford, Minn.
87,216.—SOFA BED.—B. L. Southack, New York city.
87,217.—APPARATUS FOR CONVERTING A RECIPROCATING INTO A ROTARY MOTION.—C. L. Spencer, Providence, R. I.
87,218.—APPARATUS FOR CONVERTING MOTION.—Charles L. Spencer, Providence, R. I.
87,219.—OBTAINING TURPENTINE FROM TREES.—R. J. Steele, Jr., Rockingham, N. C.
87,220.—REVOLVING COULTER.—C. E. Steller, Chicago, Ill. Antedated Feb. 11, 1869.
87,221.—DAMPER.—L. C. Taber, Eaton, N. Y.
87,222.—STEAM ENGINE LUBRICATOR.—George W. Teasdale, Lexington, Cal.
87,223.—ROD COUPLING.—G. Thompson (assignor to himself and M. C. Geider), Shamburg, Pa.
87,224.—METAL-PLATE BENDING MACHINE.—Robert Tippett, Harrisburgh, Pa.
87,225.—VELOCIPEDE.—J. A. Topliff and Geo. H. Ely, Elyria, Ohio.
87,226.—APPARATUS FOR SEASONING AND IMPREGNATING WOOD WITH PRESERVATIVE SUBSTANCES.—M. Voorhees, Princeton, and G. W. N. Custis, Camden, N. J.
87,227.—MANUFACTURE OF FLOOR CLOTHS AND SIMILAR FABRICS, AND SLABS FOR PAVEMENTS.—F. Walton, Linoleum Works, Staines, England. Patented in England, Dec. 19, 1863.
87,228.—ADVERTISING DEVICE.—W. S. Webb, Providence, R. I.
87,229.—CARRIAGE TIRE.—Wm. Williams, New York city.
87,230.—LINING PLATE FOR STOVES.—A. Wisner, Philadelphia, Pa.
87,231.—FURNACE AND TOOL FOR TREATING IRON AND STEEL.—W. Yates, Westminster, England.
87,232.—STRAW CUTTER.—J. J. Andrew, Saltilloville, Ind.
87,233.—SAWING MACHINE.—J. K. Babcock, Shortsville, assignor to John Doyle, Bristol, N. Y.
87,234.—CURTAIN FIXTURE.—J. B. Bailey, New York city.
87,235.—LEACHING VAT.—T. H. Baker, Springfield, Ohio.
87,236.—MATCH BOX.—E. B. Beecher and L. W. Beecher, New Haven, Conn.
87,237.—CORN PLANTER.—W. T. Beekman, Petersburgh, Ill.
87,238.—TOY BIRD.—J. H. Bellamy, Charlestown, Mass.
87,239.—GRAIN SCREEN.—S. Blair, New Wilmington, Pa.
87,240.—COMPOSITION MARTINGALE RING.—C. B. Bristol, New Haven, Conn.
87,241.—REED ORGAN.—R. Burdett, Chicago, Ill. Antedated August 24, 1868.
87,242.—TELEGRAPH PUNCHING APPARATUS.—E. A. Calahan, Brooklyn, N. Y., assignor to himself and Marshall Lefferts, New York city.
87,243.—BLIND HINGE.—J. L. Cathcart, Georgetown, D. C.
87,244.—HARVESTER.—Walton Chapman (assignor to himself and John Barnett, Jr.), Salisbury, Conn.
87,245.—VELOCIPEDE.—A. Christian and John Reinhart, New York city, assignors to A. Christian.
87,246.—LOOP FOR HALTERS.—S. F. Cross, Canton, Ohio.
87,247.—DEPURATOR.—Wm. Curran, St. Louis, Mo.
87,248.—AMALGAMATOR FOR COLLECTING GOLD AND SILVER.—G. S. Curtis and H. Curtis, Chicago, Ill.
87,249.—COMBINED MANURE FORK AND HOOK.—R. Dean, Cohoctah, Mich.
87,250.—FILTER.—J. Ford, Newburgh, N. Y.
87,251.—SCYTHE SNATH.—P. Frost, Springfield, Vt.
87,252.—THILL COUPLING.—A. Furman, Lloydsville, Pa.
87,253.—ENVELOPE.—J. C. Gaston, Cincinnati, Ohio.
87,254.—MACHINE FOR THRESHING AND CLEANING GRAIN.—H. Gill and T. Hummel (assignors to H. Gill), Mansfield, Ohio.
87,255.—GLASS FURNACE KILN, ETC.—J. Green, Norristown, Pa.
87,256.—BURGLAR ALARM.—G. R. Harding, Manchester, Va.
87,257.—SWEAT SHIELD FOR HORSE COLLARS.—C. B. Hogg (assignor to American Horse Collar Company), Boston, Mass.
87,258.—MACHINE FOR SEWING BOOKS.—Amos Holbrook, Jr., Lynn, Mass.
87,259.—MECHANISM FOR DRIVING VELOCIPEDES.—M. Howe and D. F. Hartford, Boston, Mass.
87,260.—TIRE UPSETTER.—Wm. M. Hughes, San Francisco, Cal.
87,261.—MACHINE FOR MAKING TAGS.—C. S. Hutchinson, Burlington, N. J.
87,262.—BUTTON.—L. A. Jefferson, Bridgeport, Conn.
87,263.—HARVESTER.—J. H. Jones, Rockford, Ill.
87,264.—HARVESTER.—J. Herva Jones, Rockford, Ill.
87,265.—MILK COOLER.—Wm. M. King, Morrison, Ill.
87,266.—KITCHEN SAFE.—John M. Klingenmeier (assignor to himself and Henry Latz), Buffalo, N. Y.
87,267.—HORSE RAKE.—Samuel D. Knight, J. W. Smith, and George W. Bercaw, Bryan, Ohio.
87,268.—COVERING FOR WHIPS.—M. D. Knowles, Westfield, Mass.
87,269.—HORSE CRUPPER.—P. A. La France, Elmira, N. Y., assignor to himself and Oscar B. Gray, New York city.
87,270.—MANUFACTURE OF COLORS.—Anton Leykauf, Nurnberg, Bavaria.
87,271.—PORTABLE GAS GENERATOR.—Charles B. Loveless, Syracuse, N. Y.
87,272.—APPARATUS FOR GENERATING AND BURNING GAS FROM NAPHTHA, ETC.—David H. Lowe, Boston, Mass.
87,273.—BEDSTEAD.—Robert Martin, Chicago, Ill.
87,274.—FRUIT JAR.—John L. Mason, New York city.
87,275.—TOY.—Robert McCully, Philadelphia, Pa.
87,276.—APPARATUS FOR AMALGAMATING GOLD AND SILVER.—Robert McCully, Philadelphia, Pa.
87,277.—WATER-PROOF FABRIC FOR THE MANUFACTURE OF COLLARS, CUFFS, AND OTHER ARTICLES.—Charles Monestier and Ivar Bang, Paris, France.
87,278.—STEEL BEAM.—Richard Montgomery, New York city.
87,279.—STEAM BOILER FURNACE.—Isaac Morgan, Quincy, Ill.
87,280.—KING BOLT.—F. B. Morse, New Haven, Conn.
87,281.—BRIDLE BIT.—Daniel M. Nixon, Danville, Ill.
87,282.—MOLDING TOOL.—Andrew P. Odholm, Bridgeport, Conn.
87,283.—CONSTRUCTION OF DOUBLE-WALLED COOLERS.—John Oldfield, Thompsonville, Conn.
87,284.—PLOW.—O. Osborn, Trumansburg, N. Y.
87,285.—VELOCIPEDE.—Joseph J. Ott, Washington, D. C.
87,286.—LAWN MOWER.—E. G. Passmore, Philadelphia, Pa.
87,287.—VELOCIPEDE.—Stuart Perry, Newport, N. Y.
87,288.—SORGHUM JUICE EVAPORATOR.—Henry Ramey, Louisville, Ky.
87,289.—MACHINE FOR FILING SAWS.—George W. Rathbun, North Providence, R. I.
87,290.—VELOCIPEDE.—John Reinhart, New York city, assignor to A. Christian.
87,291.—DRY DOCK.—Jonathan Richardson, Germantown, Va.
87,292.—LIFTING JACK.—John Riddlesberger, Waynesborough, Pa.
87,293.—CROSSING PLATE FOR STREET RAILWAYS.—Jacob E. Ridgway, Philadelphia, Pa.
87,294.—STEAM GENERATOR.—G. Adolph Riedel, Philadelphia, Pa. Antedated February 12, 1869.
87,295.—PREPARING FIBER FROM BAMBOO, ETC.—Louis S. Robbins, New York city, and John A. Southmayd, Elizabeth, N. J.
87,296.—CORN CULTIVATOR.—R. B. Robbins, Adrian, Mich.
87,297.—METALLIC CARTRIDGE.—Benjamin S. Roberts, of the United States Army.
87,298.—MACHINE FOR TANNING, FULLING, AND CLEANSING.—Christian Schmitz, Philadelphia, Pa.
87,299.—MACHINE FOR MAKING GAS FROM VOLATILE OILS, ETC.—Joseph Emanuel Schwippel, St. Joseph, Mo.
87,300.—WASH STAND.—George Seelig, New York city, assignor to himself and Conrad Brencher.
87,301.—STEAM HEATER.—Joseph Shackleton, Rahway, N. J.
87,302.—COOKING STOVE.—Jacob H. Shear and Joseph Packard, Albany, N. Y.
87,303.—MODE OF POLISHING ARTIFICIAL TEETH.—Sidney B. Sill, Three Rivers, Mich.
87,304.—COPYING PRESS.—W. M. Smith, Washington, D. C.
87,305.—DRAFT EQUALIZER.—Seth H. Smith, North Adams, Mich.
87,306.—BOILING KETTLE.—Stephen Spoor, Phelps, N. Y.
87,307.—PNEUMATIC SPRING.—Louis Sterne, London, England.
87,308.—CHAIR FOR STREET RAILWAY RAILS.—James F. Stileman, Philadelphia, Pa.
87,309.—BIT STOCK.—Francis M. Thompson and John W. Thompson, Greenfield, Mass.
87,310.—WATER-PROOF BOOT AND SHOE.—Lewis C. Tower, Rochester, N. Y.
87,311.—THILL COUPLING.—Edward J. Watson (assignor to himself and George A. Ruby), Bridgeport, Conn.
87,312.—CLOTHES DRYER.—Seth Way, Laporte, Ind.
87,313.—PLANT PROTECTOR.—Wm. B. Wickes, Sharon, Mass.
87,314.—CASE FOR HOLDING CIGARS.—S. R. Wilmot, Bridgeport, Conn.
87,315.—HORSE RAKE.—Hosea Wood, East Henrietta, N. Y.
87,316.—GUN LOCK.—Alfred Young, Philadelphia, Pa.

REISSUES.

62,313.—OFFICE CALENDAR.—Dated February 26, 1867; antedated December 11, 1866; reissue 3,306.—Clark W. Bryan, Samuel Bowles B. F. Bowles, and J. F. Tapley, Springfield, Mass., assignees of Clark W. Bryan.
62,001.—BUTTON FASTENING.—Dated February 12, 1867; reissue 3,307.—George J. Capewell, West Cheshire, Conn.
71,986.—TACK HAMMER.—Dated December 10, 1867; reissue 3308.—Thomas A. Conklin, New Britain, Conn.
42,675.—HOLLOW WOODEN WARE.—Dated May 10, 1864; reissue 3,309.—David Lyman, Middlefield, Conn., and Sidney Fairbank and Washington Whitney, Winchendon, Mass., assignees of Henry Mellish, Walpole, N. H.
18,579.—SEEDING MACHINE.—Dated November 10, 1857; reissue 3,310.—Frederick H. Manny, Rockford, Ill. assignee of Albert Franklin.
63,066.—BED BOTTOM.—Dated March 19, 1867; reissue 3,311. John S. Paine, Boston, Mass., assignee, by mesne assignments, of David Manuel.
37,006.—SLIDE FOR BREAST STRAPS FOR HARNESS.—Dated November 25, 1862; reissue 3,312.—Dexter Pettengill and Andrew Buckham, Delhi, N. Y., assignees, by mesne assignments, of Dexter Pettengill.
33,799.—HOT-AIR ENGINE.—Dated November 26, 1861; reissue 3,313.—Shaw's Union Air Engine Company, Brookline, Mass., assignees of Philander Shaw.
81,838.—COMPOSITION FOR ROOFING AND FOR OTHER PURPOSES.—Dated September 1, 1868; antedated April 3, 1868; reissue 3,314.—Benjamin Stephens, Wheeling, W. Va.

DESIGNS.

3,383.—BRACELET.—A. Codding, Jr., North Attleborough, Mass.
3,384.—SPOON OR FORK HANDLE.—John Cook, Brooklyn, N. Y.
3,385.—TRADE MARK.—John Farrell, Baltimore, Md.
3,386.—HAT BOX.—Gustav L. Jaeger, New York city.
3,387.—FACE-PLATE OF A LOCK.—Emery Parker (assignor to Russell and Erwin Manufacturing Company), New Britain, Conn.
3,388.—PICTURE FRAME.—Christian Pfeffer, Buffalo, N. Y.
3,389.—PRINTERS' TYPE.—Edwin Charles Ruthven (assignor to Mackellar, Smiths & Jordan), Philadelphia, Pa.
3,390.—GRINDING MILL.—Joseph Sedgebeer, Painesville, Ohio.
3,391.—SPOON.—Frederick Whitehouse, Brooklyn, N. Y., assignor to the Whiting Manufacturing Company, New York city.

Inventions Patented in England by Americans.

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

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,691.—TREATING DISEASES.—M. H. Utley, Montreal, Canada. December 4, 1868.
163.—BURNING BRICK AND OTHER LIKE ARTICLES.—H. W. Adams, Philadelphia, Pa. January 18, 1869.
187.—METALLIC ACTION FRAMES FOR PIANOFORTES.—Theodore Steinway, New York city. January 20, 1869.
214.—MACHINE FOR QUARRING AND SAWING STONE, ETC.—C. O. Luce and C. W. Green, Brandon, and C. M. Willard, Castleton, Vt. January 23, 1869.
215.—GRADUATING THE ADMISSION OF STEAM TO CYLINDERS OF STEAM ENGINES BY MEANS OF THE REVERSING AND REGULATOR GEARING.—W. A. Robinson, Hamilton, Canada. January 23, 1869.
223.—COMPOSITIONS RESEMBLING IVORY.—W. M. Welling, New York city January 25, 1869.
228.—MACHINERY FOR MAKING ARTICLES OF SHEET METAL.—W. D. Grimshaw, Newark, N. J., F. P. Erskine, Chicago, Ill., and J. P. Peabody, New York city. January 25, 1869.
230.—FERMENTING SUBSTANCES AND GERMINATING GRAIN AND SEEDS.—R. d'Heureuse, San Francisco, Cal. January 25, 1869.
243.—VENTILATING APPARATUS.—Henry Howard, St. John's, Canada January 29, 1869.
244.—MACHINERY FOR CUTTING VENEERS.—John N. Lyman, J. A. Squires and M. A. Lyman, New York city. Jan. 26, 1869.
255.—FIRE EXTINGUISHER.—Wm. Lincoln, Boston, Mass. January 27, 1869.

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U. S. PATENT OFFICE,
Washington, D. C., Feb. 17, 1869.

William Boyd and William F. Boyd, of Mansfield, Mass., having petitioned for the extension of a patent granted them on the 26th day of June, 1855, for an improvement in Bridle Winkers, it is ordered that said petition be heard at this office on the 31st day of May, next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 19, 1869.

Arcalons Wyckoff and E. R. Morrison, of Elmira, N. Y., having petitioned for the extension of a patent granted to them September 25, 1855, and reissued on the 14th day of October, 1856, for an improvement in Boring Machines, it is ordered that said petition be heard at this office on the 2d day of August next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 19, 1869.

Robert Cushman, of Pawtucket, R.I., having petitioned for the extension of a patent granted him on the 22d day of May, 1855, for an improvement in Stop Motion for Knitting Machines, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Feb. 19, 1869.

John Tyler, of West Lebanon, N. H., having petitioned for the extension of a patent granted him on the 22d day of May, 1855, for an improvement in Curbs for Water Wheels, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 20, 1869.

John S. Barden, of Providence, R. I., having petitioned for the extension of a patent granted to O. Snow and G. B. Farnum, assignees of the said John S. Barden, on the 22d day of May, 1855, for an improvement in Water Meter, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

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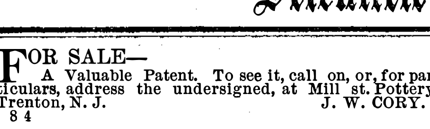

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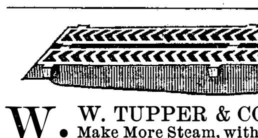

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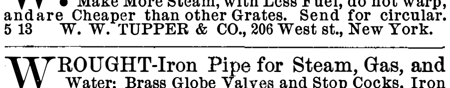

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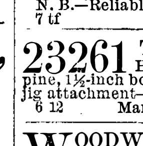

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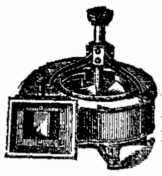

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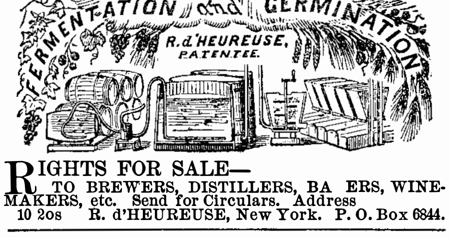

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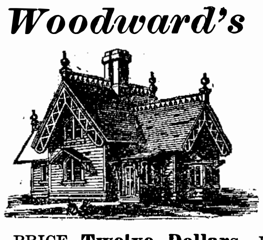

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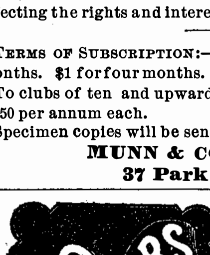

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