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Improvement in Glassware Presses.

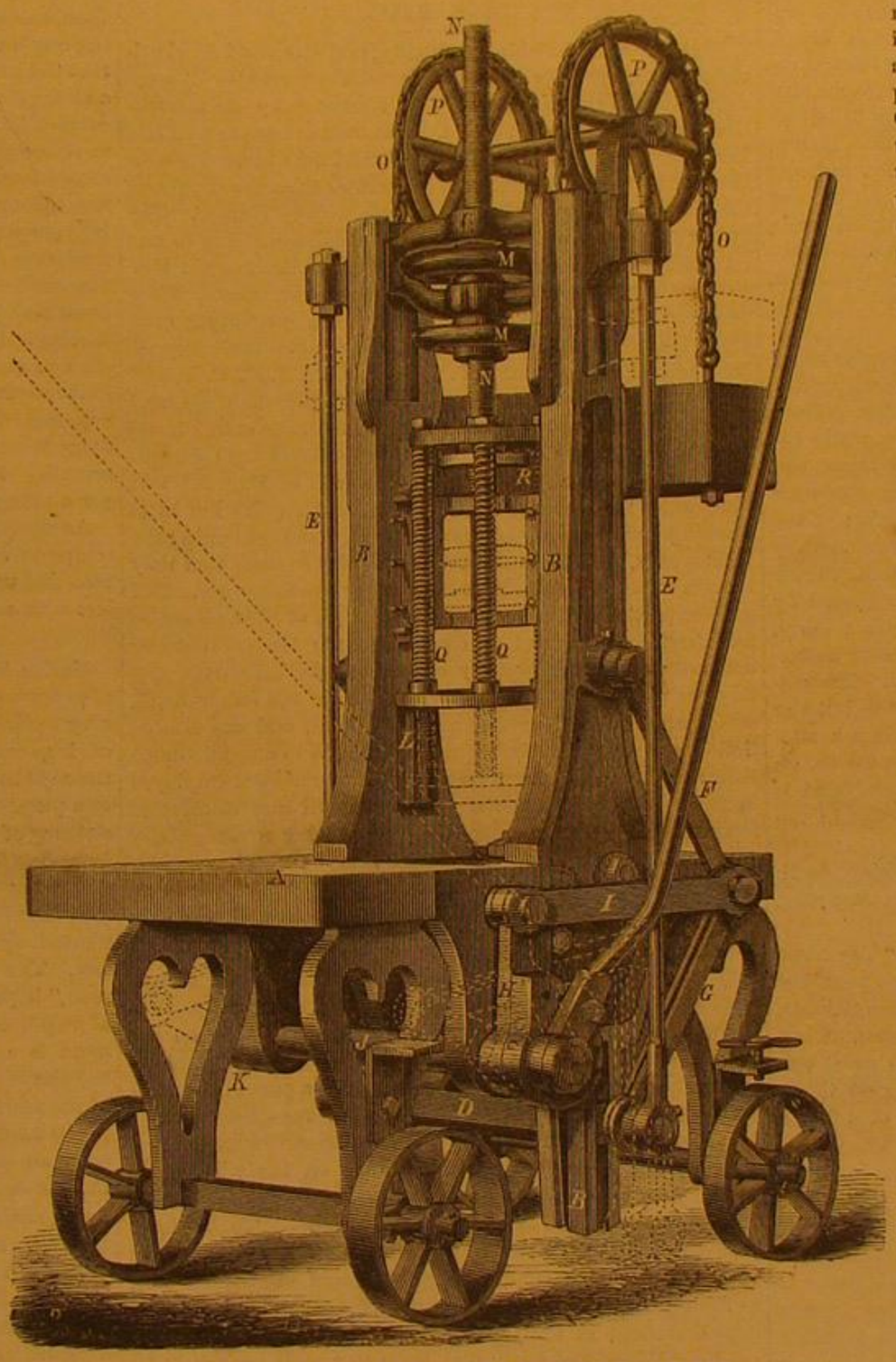
In the construction of glassware presses it is desirable that the movement of the platen or presser toward the bed shall begin with a rapid, and terminate with a slow but powerful movement; and it is also desirable that this movement shall be effected by means which will operate with so little friction and side thrust that the press will work sensitively, or so that the operator can determine, by feeling, the resistance offered just when the pressing should be discontinued; if the pressing is continued beyond the proper point the mold is injured and the ware spoiled.

The press shown in the accompanying engraving has a peculiar combination of devices by which the moving parts of the machine operate to give the platen or presser a motion which changes from a rapid one at first to a slow but powerful movement at last, at the same time leaving the press delicate and sensitive in its indication, through the lever, of the resistance offered to a continued pressing movement.

In the engraving the parts are shown in the position which they occupy previous to making a stroke. The dotted lines show the position they occupy when the presser is brought to its lowest position in making an impression.

To the bed, A, are attached two uprights, B, in the top and bottom ends of which are formed guide ways, in which the ends of the crosshead, C, and crossbar, D, can be made to reciprocate simultaneously, being connected by the links, E. Toggles, made by links, F and G, on each side of the machine, are operated by the movement of the rocker lever, H, connected to the toggles by the links, I. Each link, F, of each toggle is pivoted to a fixed pivot in each upright, B; and the lower link, G, of each toggle is connected to the crossbar, D. The rocker lever, H, is fixed upon the rocker shaft, J, which carries, at the other end, a rocker lever, K, one of the links, I, being coupled to the rocker lever, H, the other to a rocker lever, K', said links being connected one to each toggle.

On the inner surfaces of the uprights, B, are guide ways, L, which guide the presser in its reciprocating motion, the presser being connected to the crosshead, C, by the screw hand wheels M, and screw, N, by which the platen can be adjusted toward and from the bed to suit various hights of molds. To counterbalance the gravitation of the moving parts, and thereby increase the sensitiveness of the press, chains, O, with a weight at one end, pass over the wheels, P, and are attached to the crosshead, C. It will be obvious that the first part of the movement of the lever toward the operator, will rapidly move the platen by straightening the toggles; and that the movement of the platen, proportionately to the movement of the lever, will grow less and less, and more and more powerful in effect as the toggles approach a straight line. The toggles thrust directly down upon the crossbar, which pulls through the links, E, in a direct line with the crosshead, C, thus avoiding all side thrust and strains on the crossheads and platen, so that the most delicate ware can be made on this press, as well as the heaviest. The friction, as in weighing apparatus, is reduced to a minimum by the system of pivots and centers. The springs for holding the mold in position, shown at Q, are of good length, four in number, and adjustable by the screw hand wheel, R.



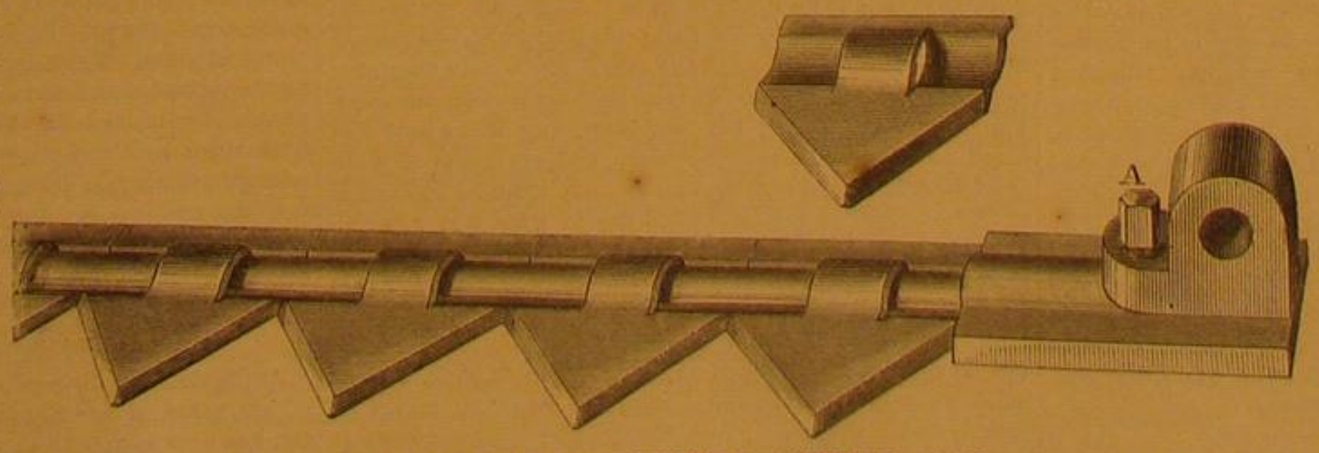
HAWES & HERSEY'S GLASSWARE PRESS.

This press was patented June 8, 1869. The presses are manufactured by the inventors and patentees, Messrs. Hawes & Hersey, well-known machinists and press builders, of South Boston, Mass., and are pronounced by those who have seen or used them, to be the best machine of the kind ever produced. For rights to build, or for presses, they can be addressed as above.

Harvester Cutter Bar.

Our inventors are latterly turning out a series of unusually practical and valuable improvements. The one we now present to our readers, is a device that will save much time, trouble, and expense to farmers, and the convenience of which must be obvious upon even a cursory inspection. The cutter bar is made of the patent cold rolled iron of Jones and Laughlins, noticed at length on page 50, Vol. XX, SCIENTIFIC AMERICAN, and is made so that its cross section is of the form made by the intersection of two equal circles. It has not a rivet hole in its entire length—a fact which will be significant enough to farmers, when they recall the points of fracture in the finger bars they have broken in their practice.

Upon this bar are slipped the cutters, made in the form shown in detail at the upper part of the engraving. The terminal knife being fastened by a screw, shoulder, or any other suitable means, and the cutter bar being thrust in and held by the set screw, A, all are held firmly, yet any one can be reached and removed with the utmost facility, when occasion requires. Should a cutter bar break, all the knives can be removed, another bar inserted, and the knives replaced in five minutes. But as the shape of the bar and the absence of rivets give great strength with lightness, it is evident that not only will there be less liability to breakage, but the reciprocation of the bar will absorb less power than the old form of bar. The easy removal of the knives is also a great advantage in grinding, obviating any necessity for special appliances for this object. They can be perfectly and easily ground on the ordinary grindstone



ADJUSTABLE HARVESTER CUTTER BAR.

The inventor informs us that although his patent bears date June 8, 1869, he has already received orders for twenty thousand of these bars. Communications should be addressed to G. L. Du Laney Mechanicsburg, Pa.

CHINA AND THE CHINESE.

It is now conceded by shrewd observers of current events, that the Chinese element is destined to become in the future an important part of our population, and to exercise a great influence on the destiny of this continent. It is not therefore to be wondered at that the periodicals of the time should find the discussion of anything which pertains to this remarkable people acceptable to their readers. So little have China and Chinese customs been understood, that now when the public mind is awakened to the importance of better information in regard to that ancient empire, it is surprised at the very erroneous ideas it has hitherto entertained. This surprise arises not only from the differences between our customs and those of the Chinese, but also from the fact that the Chinese have made very much greater advances in civilization than has been generally supposed by other civilized nations.

Some of these facts have been put in a very acceptable dress by a writer in the *Atlantic Monthly*, for September, from which we extract a portion:

China is the type of permanence in the world. To say that it is older than any other existing nation, is saying very little. Herodotus, who has been called the Father of history, traveled in Egypt about 450 B.C. He studied its monuments, bearing the names of kings who were as distant from his time as he is from ours—monuments which even then belonged to a gray antiquity. But the kings who erected those monuments were posterior to the founders of the Chinese Empire. Porcelain vessels, with Chinese mottoes on them, have been found in those ancient tombs, in shape, material, and appearance precisely like those which are made in China to-day; and Roselini believes them to have been imported from China by kings cotemporary with Moses, or before him. This nation and its institutions have outlasted everything. The ancient Bactrian and Assyrian kingdoms, the Persian monarchy, Greece and Rome, have all risen, flourished, and fallen—and China continues still the same. The dynasty has been occasionally changed; but the laws, customs, institutions, all that makes national life, have continued.

The authentic history of China commences some three thousand years before Christ, and a thousand years in this history is like a century in that of any other people. The oral language of China has continued the same that it is now for thirty centuries. The great wall bounding the Empire on the north, which is twelve hundred and forty miles long, and twenty feet high, with towers every few hundred yards—which crosses mountain ridges, descends into valleys, and is carried over rivers on arches—was built two hundred years before Christ, probably to repel those fierce tribes who, after ineffectual attempts to conquer China, traveled westward till they appeared on the borders of Europe five hundred years later, and, under the name of Huns, assisted in the downfall of the Roman Empire.

All China was intersected with canals at a period when none existed in Europe. The great canal, like the great wall, is unrivaled by any similar existing work. It is twice the length of the Erie Canal, is from two hundred to a thousand feet wide, and has enormous banks built of solid granite along a great part of its course. One of the important mechanical inventions of modern Europe is the Artesian well. That sunk at Grenoble was long supposed to be the deepest in the world, going down eighteen hundred feet. One at St. Louis in the United States, has since been drilled to a depth, as has recently been stated, of more than four thousand feet. But in China these wells are found in tens of thousands, sunk at very remote periods, to obtain salt water.

The method used used by the Chinese from immemorial time has recently been adopted instead of our own, as being

much more simple and economical. The Chinese have been long acquainted with the circulation of the blood; they inoculated for small pox in the tenth century; and about the same time they invented printing. Their bronze money was made as early as 1,100 B. C., and its form has not been changed since the beginning of the Christian era. The mariner's compass, gunpowder, and the art of printing were made known to Europe through stories told by missionaries returning from Asia. These missionaries, coasting the shores of the Celestial Empire in Chinese junks, saw a little box containing a magnetized needle, called Ting-nan-Tchen, or "needle which points to the south." They also noticed terrible machines used by the armies in China, called Ho-pao, or fire-guns, into which was put an inflammable powder, which produced a noise like thunder, and projected stones and pieces of iron with irresistible force.

The first aspect of China produces that impression on the mind which we call the grotesque. This is merely because the customs of this singular nation are so opposite to our own. They seem morally, no less than physically our antipodes. Their habits are as opposite to ours as the direction of their bodies. We stand feet to feet in everything. In boxing the compass they say "westnorth" instead of northwest," "eastsouth" instead of southeast, and their compass-needle points south instead of north. Their soldiers wear quilted petticoats, satin boots, and bead necklaces, carry umbrellas and ans, and go to a night attack with lanterns in their hands, being more afraid of the dark than of exposing themselves to the enemy. The people are very fond of fireworks, but prefer to have them in the daytime. Ladies ride in wheelbarrows, and cows are driven in carriages. While in Europe the feet are put in the stocks, in China the stocks are hung round the neck. In China the family name comes first, and the personal name afterward. Instead of saying Benjamin Franklin or Walter Scott, they would say Franklin Benjamin, Scott Walter. Thus the Chinese name of Confucius, Kung-fu-tsee, the Holy Master Kung; Kung is the family name.

In the recent wars with the English, the mandarins or soldiers would sometimes run away, and then commit suicide to avoid punishment. In getting on a horse, the Chinese mount on the right side. Their old men fly kites, while the little boys look on. The left hand is the seat of honor, and to keep on your hat is a sign of respect. Visiting cards are painted red, and are four feet long. In the opinion of the Chinese, the seat of the understanding is the stomach. They have villages which contain a million of inhabitants. Their boats are drawn by men, but their carriages are moved by sails. A married woman while young and pretty is a slave, but when she becomes old and withered is the most powerful, respected, and beloved person in the family. The emperor is regarded with the most profound reverence, but the empress mother is a greater person than he. When a man furnishes his house, instead of laying stress, as we do, on rosewood pianos and carved mahogany, his first ambition is for a handsome camphor-wood coffin, which he keeps in the best place in his room.

The interest of money is thirty-six per cent, which, to be sure, we also give in hard times to stave off a stoppage, while with them it is the legal rate.

We once heard a bad dinner described thus: "The meat was cold, the wine was hot, and everything was sour but the vinegar." This would not so much displease the Chinese, who carefully warm their wine, while we ice ours. They understand good living, however, very well, are great epicures, and somewhat gourmands, for, after dining on thirty dishes, they will sometimes eat a duck by way of a finish. They toss their meat into their mouths to a tune, every man keeping time with his chop-sticks, while we, on the contrary, make anything but harmony with the clatter of our knives and forks. A Chinaman will not drink a drop of milk, but he will devour bird's nest, snails, and the fins of sharks, with a great relish. Our mourning color is black, and theirs is white; they mourn for their parents three years, we a much shorter time. The principal room in their houses is called "the hall of ancestors," the pictures or tablets of whom, set up against the wall, are worshiped by them; we, on the other hand, are very apt to send our grandfather's portrait to the garret.

Such are a few of the external differences between their customs and ours. But the most essential peculiarity of the Chinese is the high value which they attribute to knowledge, and the distinctions and rewards which they bestow on scholarship. All the civil offices in the Empire are given as rewards of literary merit. The government, indeed, is called a complete despotism, and the emporer is said to have absolute authority. He is not bound by any written constitution indeed; but the public opinion of the land holds him, nevertheless, to a strict responsibility. He, no less than his people, is bound by a law higher than that of any private will—the authority of custom. In China, more than anywhere else, "what is gray with age becomes religion." The authority of the emperor is simply authority to govern according to the ancient usages of the country, and whenever these are persistently violated, a revolution takes places and the dynasty is changed. But a revolution in China changes nothing but the person of the monarch; the unwritten constitution of old usages remains in full force.

Setting Mineral Teeth.

Surgeon Duchesne, of Paris, has invented a method of fixing mineral teeth to the dental piece. Each tooth is furnished with a hollow of a size exceeding that of the orifice, by which orifice the rubber in its plastic state enters into the tooth, assuming inside the internal configuration, and, as it were, the shape of a nail-head of a pyramidal form, or of the form of a flattened cone, and the rubber being properly vulcanized, the tooth becomes firmly attached to the dental piece. The hole being obtained by placing on the rear side of the mold of the tooth, which is molded of materials well known to tooth manufacturers, the base of a piece of wood, or of any other suitable material, cut into the shape of a cone, and which can be consumed or melted at a lesser degree of heat than that required for the baking of the tooth; this piece of wood or other material being destroyed during the process of biscuiting, there remains in the center of the tooth a hollow, corresponding in size and shape with the material which has been burnt out. The principle of strength which is claimed for this tooth consists in the fact, that the rubber, a portion of the dental piece to which it is to be attached, entering into the tooth itself, the tooth actually forms part and parcel, so to speak, of the dental piece; and the principle of the invention consists in the hollow in the center of the tooth of a larger size than the orifice by which the rubber, or other plastic material is introduced, of whatever form this hollow may be, whether produced by the consuming, melting, or annihilating of any animal, vegetable, or mineral matter, that can be annihilated by a less heat than that required for the baking of the tooth.

THE MANUFACTURE OF PAPER---PAPER MADE FROM RAGS.

Rags are a marketable commodity, and command fixed prices according to their quality. As with all articles of commerce, these prices are governed in a measure by the mercantile law of supply and demand. As foreign rags are sold at a less price than the American article, and the consumption in the United States is considerably greater than the supply of the latter, large quantities are imported from Europe. The larger proportion of foreign rags that find their way to our Atlantic cities, are exported from Bremen, Hamburgh, Rostock, Ancona, Messina, Leghorn, Palermo, and Trieste. They arrive in our ports in closely packed bales, containing each about four hundred pounds, which, according to their respective qualities are branded S. P. F. F., S. P. F., F. F., F. X., and F. B. There are many varieties, even in these divisions, and their qualities afford very clear indications of the state of comfort and cleanliness of the particular localities from whence they were originally gathered. The rags of England and the United States are generally clean, and require but little washing and cleansing before they are ground into pulp; the Italian rags, on the contrary, are originally so dirty that they require to be washed in lime before they are fit for use. The greater portion of the rags from the north of Europe are so dark in their color and so coarse in their texture that one naturally wonders how they could have formed part of any tidy woman's garments; while those, on the other hand, which are collected in England, Scotland, and the United States, appear evidently to have belonged to a people much better clad. Having thus alluded to the material employed in paper making, the reader's attention will now be directed to the process of its manufacture. The visitor to a regularly organized paper mill is first conducted to

THE RAG ROOM.

The initial process of sorting the rags is conducted in a long room, in which from twenty to thirty women are employed in sorting, dusting, and cutting them. Each woman stands at a frame or table, the top of which is covered with a net-work of wire, through which to admit the dust; on her left is a quantity of rags conveniently placed, on her right is a box divided into three compartments. On a part of the table an upright knife is fixed for cutting the rags into suitable lengths. As it is the business of the woman to sort and cut the rags, she spreads a certain quantity on the wire frame, and as she shakes them a great deal of the dirt passes through the interstices of the wire into a box beneath. Those pieces that require to be cut she draws across the blade of the knife, by which it is instantly divided. All seams are thrown out, as the sewing thread, unless thoroughly ground, would produce filaments in the paper. These are afterwards picked out by children, and again find their way to the woman's table. The work of sorting and cutting rags is performed with great rapidity. When cut, sorted, and dusted, the rags are weighed into bags of a hundred pounds each and conveyed to

THE BOILING AND WASHING ROOM.

Here they are placed into large square chests or vats, in which steam is admitted from below and boiled with lime for a few hours. From the boiling room they are conducted in suitable vessels to an upper room in the mill, where they are emptied into troughs or cisterns, several of which are ranged in a row; these troughs and the machinery within them, are technically called engines, and are used for washing the rags. The troughs are usually ten feet long, four and a half feet broad, and two and a half feet deep, and are made of wood lined with lead. In each trough an iron cylinder 22½ inches in diameter and 26 inches wide is fitted; pure water is conveyed by means of a pipe or tube into the trough a few inches from the top, and another tube connects with the lower part for carrying off the soiled water. The cylinder being set in motion by means of steam or water power, about a hundred weight of rags are dumped in, as before mentioned, and as much water introduced as will raise the whole to within an inch or two of the brim. Into the cylinder is fixed a number of knives at given distances apart, projecting a little more than an inch from its axis; and beneath the roller is a plate in which is also attached a number of knives. When the cylinder commences its revolutions, of which it is made to make about 160 per minute, the rags are carried with great rapidity through the knives; and as the cylinder is depressed or elevated, the rags are bruised or cut as may be required. Above the cylinder is a cover made of a wire frame communicating with the pipe which admits the pure water. When, therefore, the whole mass is in agitation, the rags, after passing through the knives of the cylinder and plate are carried up an inclined plane in the trough and the foul water is carried off through the waste pipe below; in this way the rags are cut bruised, and washed.

After the above operation is continued for a sufficient time, the water is let off and the cleansed mass is removed to a press for the purpose of driving out the greater part of the water. They then undergo the process of

BLEACHING.

This process reduces all descriptions of rags to a uniform whiteness, and requires to be so conducted as not to injure the quality of the fabric. On being removed from the press the rags are placed in a receiver, or chamber made of wood, from which the external air is carefully excluded. Into this chamber are conveyed pipes communicating with a retort, in which a chemical chlorine is formed by the application of heat to a due proportion of manganese, common salt, and sulphuric acid. This part of the process is completed in a few hours. The rags are now white, but they have an intolerable smell. To remove this, and to preserve them from being injured through the effects of the bleaching, they undergo a second process of washing and bruising which entirely purifies them. From the washing engine the rags are conveyed to the beating engine, which is constructed similar to the other except that the knives on the cylinder and plate are closer together, and the former revolves with greater rapidity. Having been ground for several hours in this machine, the rags assume the beautiful appearance of pulp technically called "stuff." It should here be remarked that all paper manufacturers do not use the same materials for bleaching the rags. In several large paper mills a substitute for manganese is used. This is a mixture of phosphates of lime and soda ash which seems to answer the required purpose, and is much less expensive. The same may be said of the whole prescribed formulæ in paper making. So rapid are the strides of scientific progress, that ere a useful practical theory is put in full operation, new improvements are suggested, which, in many cases, are made to supersede it. Hence, no description of this extensive branch of art will fully represent every manufacturer's method. The essential features, however, of the processes employed in paper making, are similar in all paper mills.

As what is technically called "machine-made paper" is a comparatively late invention, it may properly be expected that this treatise should preface any remarks upon the subject with a brief description of

HAND MADE PAPER.

Until a little more than half a century since all descriptions of paper were made by hand. The process though simple is very beautiful, and evinces a remarkable degree of mechanical ingenuity. We have already described the various stages the rags have gone through up to the time they are reduced to a pulp. From this pulp or "stuff," which is about the consistency of pure milk, and resembling it in appearance, paper is made. The stuff is first poured into a vat, at the bottom of which is a copper vessel made to fit exactly within it, for the purpose of keeping the stuff warm. This warmth is communicated by means of heat supplied by a steam pipe from below. The workman forming the sheet, who is called a "vatman," is provided with two molds. These are slight frames of wood, covered with a fine wire cloth. Fitting to each mold is a dekle or movable raised edging which determines the size of the sheet. The vatman, putting the dekle on one of the molds, dips it vertically into the stuff, and bringing it to the surface horizontally, covered with pulp—which, to preserve an equal consistency is kept in a state of agitation in the vat—and shakes it gently so that all parts of the wire frame shall be equally covered with it. This operation requires a great deal of nicety, both in determining the required thickness of the sheet and in producing it of a uniform thickness throughout. The vatman then pushes the mold with the incipient sheet to his fellow workman, who is called a "coucher," and carefully taking off the dekle applies it to the second mold, and proceeds as before. The coucher, who receives the first mold, having a pile of porous pieces of flannel by his side (called "felt"), turns the mold carefully over upon one of these, and upon which the sheet remains, having been detached from the mold; he then places a felt on the sheet and is ready to turn over another from the second mold. Thus the vatman and the coucher proceed, only two persons being required at each vat, the one molding a sheet of paper and the other placing it upon the felt, until a certain quantity is made, when the pile of felts is subjected to the action of a powerful press. The sheets, after this pressure is completed, have acquired sufficient consistency to enable them to be again pressed by themselves. They are next parted, then dried; next sized in a mucilage, to give them greater body and strength, and again dried and pressed, and finally counted into quires and reams. Any number of vats, each requiring the services of two men, may be used at the same time. This is a matter, however, usually regulated by the capacity of the mill and the means of the manufacturer.

MACHINE MADE PAPER.

As previously intimated, the progress of mechanical science of late years, in paper making as in many other branches of art, has been so rapid in its onward march that manual labor is in a great measure superseded by machinery. In paper making, machinery is not only a saving of manual labor, but economizes time and money, and largely multiplies the facilities for its manufacture, as will be made plainly manifest to the most indifferent observer.

The process of converting a thin pulp into paper by machinery is a rapid though complicated operation. In the

whole range of labor-saving machinery there is perhaps no series of contrivances which so forcibly address themselves to the senses ; and yet, with all its intricate and wonderful operations, there is nothing mysterious in it, as the spectator can see and comprehend its workings from the beginning to the end. At one extremity of the machine is a large chest which is kept full of pulp, and through which a wooden cylinder with fan-shaped projections attached, is kept revolving to keep the fibers of rags, which resemble pure snow flakes, perpetually moving, and consequently equally suspended in the the water which contains them. At the bottom of the chest is a cock through which a continuous stream of pulp flows into a vat placed below it, which is always kept filled to a certain hight. This pulp flows through a narrow wire sieve, situated in the upper part of the vat, and is also kept in motion to make the sifting process the more complete. Having passed through the sieve the pulp flows through a pipe in the vat still onward to a ledge, over which it falls in a regular stream, like a sheet of water over a smooth dam ; here it is caught upon a plane which presents an uninterrupted surface of five or six feet, upon which it is evenly spread. This plane is constanly moving onwards with a gradual pace, and has also a shaking motion from side to side. This plane is composed of an endless web of the finest wire very closely woven together. The pulp does not flow over the sides of the plane because of a strap on each side, which is kept moving and passing upon its edges, and which regulates the width of the paper. After passing the wheels where these straps terminate, the paper is sufficiently formed not to require any further boundary to define its size. The pulp at this stage has ceased to be a fluid though the paper is still tender and wet. When it quits the plane of wire the paper passes over a large cylinder covered with felt, upon another plane also covered with felt, which moves onward the same as the wire plane. This felt surface is also endless, being united at the extremities like a towel upon rollers. It now travels up an inclined plane of felt, which gradually absorbs its moisture, when it is seized between two rollers which powerfully squeeze it. From thence it travels up another plane of felt and through a second pair of pressing rollers. The paper up to this point is quite formed but it is fragile and still damp ; from these it is received upon a small roller, and is guided by this over the polished surface of a large heated cylinder. The soft tissue now begins to smoke and the paper commences to harden. From this cylinder or drum, it is received upon a second, considerably larger and much hotter than the first ; as it rolls over the polished surface of the drum all the roughness of its appearance when in the cloth region gradually vanishes. At length having passed over a third cylinder, still hotter than the second, and having been subjected to the pressure of a blanket which confines it on one side, while the cylinder smoothes it on the other, it is caught upon the last cylinder, which passes it over to the reel, upon which it is wound in a finished state but in an endless roll. It has now to be cut into required lengths so as to form the size of the sheet. This is done in a supplementary machine which receives it off of the reel, and by means of a circular knife it is cut into the requisite lengths. The paper is counted into quires and reams, folded double, and subjected to a certain pressure, so that it may pack close for marketable purposes.

From the commencement of the process, when the pulp first flows into the wire web until the paper into which it is formed is received upon the reel, a little less than two minutes is occupied. The web of wire travels at a rate which produces twenty-five superficial feet of paper per minute.

In a machine the thickness of the paper is regulated by the quantity of stuff which is allowed to flow out of the chest ; and all that is required to render the thickness invariable is an invariable speed in the motion of the machine. If the web of wire travels at a rate that will form twenty-five feet of paper per minute, and the chest discharges five gallons of pulp in the same period, there can be no change in the thickness of the sheet ; but let the machine move at greater speed, say at the rate of twenty-five per minute, while the discharges are but five gallons, and the paper will be thinner by one fifth. Again, let the pace of the wire plane be unaltered, and the chest discharge ten instead of five gallons per minute, and the sheet will be just double the thickness.

In conclusion it should be remarked that the process of converting rags into pulp is the same with machine-made as with hand-made paper, except that in the former it is conducted on a more extensive scale. A hundred years ago rags were made into pulp, first by washing them by hand and then by placing them in close vessels until they became half rotten, and after the fiber was nearly destroyed they were reduced to pulp either by hammering in a mortar or by a cylinder grinding against the sides of a circular wooden bowl. These operations were slow, expensive, and very destructive to material ; and yet, crude as the method was, it existed for centuries, and so continued up to the period when science stepped in to enlighten mankind with its manifold wonders.

Portable Boilers.

At the Steam Users' Association monthly meeting, held at Manchester—Mr. W. Fairbairn, President, in the chair—Mr. L. E. Fletcher, chief engineer, said that the increasing number of boilers used for steam crane and other similar purposes, renders it important that any dangerous defects to which these boilers are liable should be generally known. The explosion of these boilers has become by no means unfrequent, and as they are now constantly used in the erection of public buildings, and sometimes in close proximity to crowded thoroughfares, the subject becomes of increasing importance. The boiler in question was of the internally-fired vertical class, cylindrical in the external casing, as well as in the internal fire-box, and domed on the top, while the flames from the fire-box pass off to the chimney through a single central uptake tube, which formed a most important tie between the crown of the fire-box and that of the external casing. Boilers of this type are very simple in construction, and well calculated when new to resist a high pressure, so that they are very generally adopted. The dimensions of the one under consideration were : Height, 8 ft. 9 in. ; diameter, 3 ft. 6 in. in the external shell, and 2 ft. 9 in. in the fire-box ; while the thickness of the plates was $\frac{5}{16}$th in., and the load on the safety-valve, per square inch, 70 lb. The defect to which it is now wished to call attention, was a deep groove or furrow running entirely round the inner casing of the fire-box at the bottom of the water space, and eating into the metal to a depth varying from $\frac{1}{8}$ to $\frac{3}{16}$th in., so that more than half the strength of the plate was gone. This is not a peculiar case ; others very similar havd been met with, and especial danger arises from the fact that these grooves are very difficult to detect. They take place so low in the water space as to be very nearly, if not entirely, concealed by the blocking ring at the bottom, while the only opportunity of examining them is through one or two small sight holes cut through the outer casing. It is frequently supposed that because boilers are small therefore they are safe, whereas the fact of their being small makes them dangerous. Small boilers cannot be inspected as larger ones can, since they do not admit of access for a man, and, therefore, they are to a greater or less extent apt to be worked on at a risk. The internal examination, and thus the safety, of portable boilers is a question which hitherto has not received that consideration which it deserves, but the subject should no longer be neglected. It is well worthy of the attention of engineers to endeavor to construct such portable boilers as are too small to admit of a man's getting inside, so that they may be taken to pieces for examination ; and it becomes imperative either that arrangements should be made for doing this, or that these boilers should not be allowed to work on for more than three or five years without being cut open for examination, whatever the inconvenience might be. No doubt if the attention of engineers were directed to this subject, inventive talent would soon construct boilers that could without much difficulty be taken to pieces so as to be examined internally, and thus their safety ensured.

PULEX IRRITANS IN HARNESS.

What is a "Pulex Irritans?" This formidable name, dear reader, is the scientific cognomen of that formidable little monster, the flea. These minute pests have been made to do, what by nature they are ill calculated for, namely, to administer to the amusement of mankind, showing an amount of docility truly surprising when brought under the subjection of skilled trainers. Novices they are generally adroit enough to elude. The following humorous description of the performances of a troupe of these little comedians we copy from the "Naturalist's Note Book :"

"If any inquiring reader wishes to know whether that little tormentor, scientifically known as "Pulex irritans," and vulgarly as the flea, has ever been found of any use in the economy of nature's realm, we are happy to inform him that we can answer his question in the affirmative. It must not be imagined that we are going to discuss the question whether it is desirable that the human form divine should be subject to sundry little aggravating bites, which are liable to make one's angry passions rise, or whether the ordinary avocations of fleaish life are at all beneficial to humanity at large. Our object is to place him before our readers as we have seen him, in a new light, earning an honest livelihood (*mirabile dictu !*) by the sweat of his brow, and affording a subsistence to the individual whose philanthropic ingenuity helped him to such a desirable end.

"'From information received' (to use police parlance) we went to an exhibition opened by Mr. Kitchingman, in order to view the performances of his stud of trained fleas, or, as worded in his announcements, 'of trained apterous insects, the only specimens of the articulata in the world ever taught to perform.' These apterous laborers were harnessed by means of an extremely fine hair or fiber of silk, which was tied round their bodies, having the two ends rising perpendicularly above their backs and fastened to a split in a tiny straw, which formed the pole of the carriage they were engaged in drawing. We must confess that at first we entered the room with some feelings of alarm, suggested by the thought that some of the menagerie might escape, but this was soon dissipated at the sight of their burdens, which at once set our minds at rest.

"The performances were highly interesting and considerably varied. One flea was engaged in a swing, his motion being caused by his kicking violently against one side of a well in which he was placed, which exertion bumped him against the other side and made him indignantly jump away again, so that the unfortunate creature was in a perpetual state of kicking. Another hauled up a little ivory bucket from a well, while a third drew a ship along a tight rope, walking upside down. A fourth was occupied in turning a cardboard cylinder after the manner of a treadmill, but two others, still more unhappy, were occupied in a compulsory see-saw worked by each in turn giving a vigorous spring into the air, thus bringing the other at the opposite end of the balance to the ground. The largest, and consequently, we presume, the laziest, declined to jump at all, but remained sitting quietly down, leaving his comrade miserably suspended from the beam, and frantically clutching at the air in the vain attempt to reach the ground. A military pulex was engaged in firing off a miniature cannon, but on a former occasion the shock was too much for his nervous system, so that when we were present he was unable to perform. The exhibitor kindly gave us a good deal of information about his collection which was very interesting. The fleas are generally imported from Russia and Belgium as being larger and more docile than the English ones, and are set to work immediately, the training beginning with a starvation of two days. At first they are very refractory, persisting in progressing by a series of violent jumps instead of a proper jog trot ; but after a week or so they sober down and draw their burdens steadily unless stirred up to violent exertion, when they will gallop vigorously for a few inches, but sit down to rest and regain their breath directly afterwards. After they once learn to walk steadily, we are told, it is difficult to persuade them to leap again. At night all the performers are unharnessed and fed on the back of the employer's hand, after which repast they repose in a box enveloped in cotton wool. If at night any performer does not feed heartily, and with a good appetite, his progress is proportionately languid and slow the next day; but when any member of the establishment declines to eat for three or four days, his end is expected in a short time. About a hundred others are usually kept in stock and training, as they are comparatively short lived, three or four months being supposed to be the allotted period of their days. Perhaps confinement and hard labor affect their spirits. The workman engaged in drawing up the bucket had, however, reached the hoary age of nine months, and his demise therefore will not be unexpected. The immense muscular power possessed by these creatures is here fully demonstrated. No doubt many of our readers have experienced the difficulty of holding a wild pulex for a minute or two, before consigning it to perdition. The flea Hercules draws a model of a ship estimated to be five hundred times his own weight in a very easy manner. It seems that the English fleas are the most stubborn and difficult to train, but when once properly subdued they work better and last longer than the others ; but the Englishman we saw was anything but steady, tugging and straining at his collar in a frantic manner.

"One of the most interesting features of the exhibition is the beautiful form of the models employed for the work. They are carved in ivory and exquisitely finished, and, of course, of the minutest size possible, being adapted to the fleas in a most ingenious manner, and manufactured by the exhibitor himself. The delicacy of touch and sight attainable after practice is surprising, as each performer is harnessed without the aid of a glass, merely being taken between the operator's finger and thumb. Mr. Kitchingman told us also that he knows every individual performer by sight, so that he has no difficulty in selecting each member of his troupe for his own work."

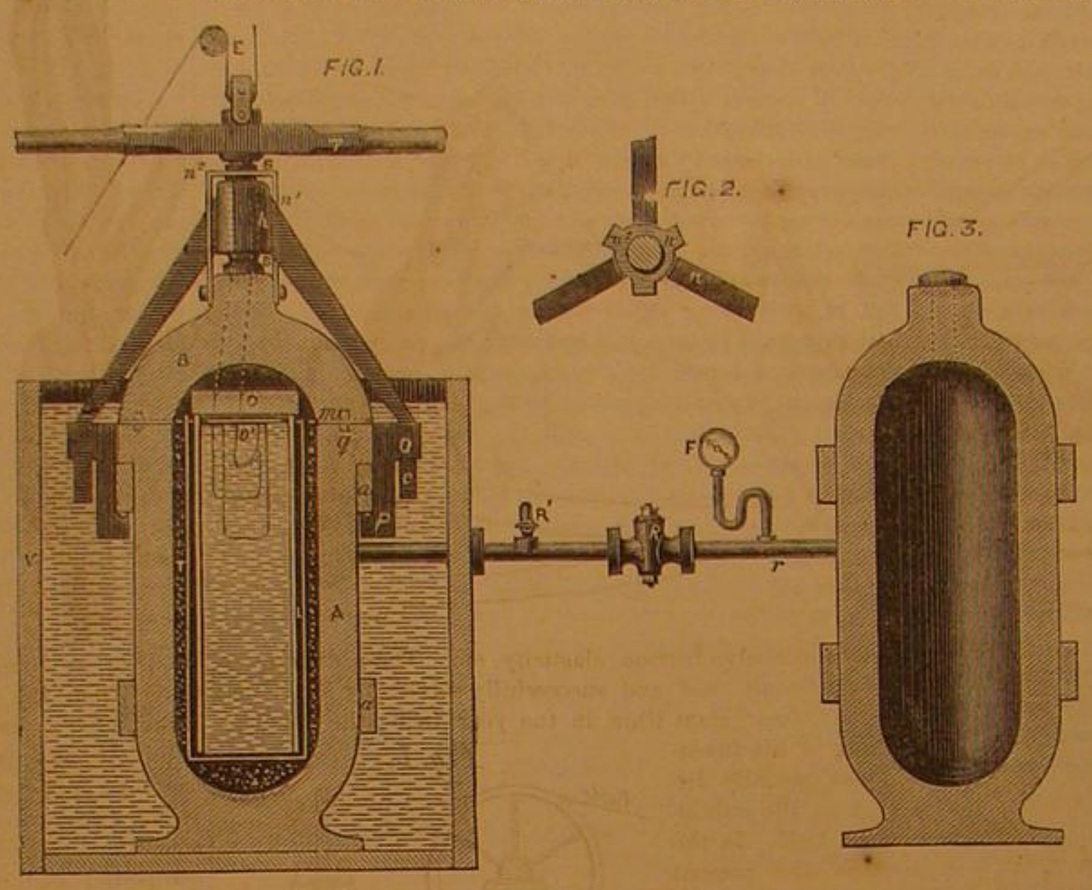
Revival of Interest in Sorghum.

The quantity of cane planted this year, says the *Sorgo Journal*, and the interest manifested in sorghum, is greater than in any year since 1866. The value of sorghum as a farm crop is beginning to be appreciated, and those now engaged in the business are devoting more attention to its cultivation, and are providing better facilities for its manufacture than ever before. This is wise, and all the enterprise which may be devoted to the crop will be well rewarded. Sweets of all kinds are and must be high for the present, and probably for many years. Last year's crop of sorghum is about exhausted. New Orleans and tropical molasses are scarce, and sugars are almost at famine prices. This state of things is, of course, aggravated by the disturbances in Cuba, and by the fact that Louisiana has not produced all the sugar and molasses that could be consumed, as many predicted she would. But there is an underlying cause of high prices greater in importance and greater in permanence than these accidents of the time, and which would be felt even if peace prevailed in Cuba, and a half million hogsheads of sugar were being made in Louisiana. We refer to the natural increase in the consumption of sugar, and to the growing disproportion between the demand and the supply. This will prevent sugar and molasses from declining to the old prices, until some new and much more productive source of sugar shall be developed. We make this remark to remove a notion which prevails, that, if Cuba were restored to peace, and Louisiana to her former productive capacity, sugar and molasses would be furnished at their old prices, and then sorghum would be no longer profitable. Reasoning thus, many have refrained from engaging in sorghum, and many who are in the business, regarding it as a temporary or short-lived enterprise, fail to make adequate and permanent preparation for the business. This is a mistaken policy, we think, and we advise those who are making preparation for work to consider well, and see if they are not warranted in regarding sorghum as a business likely to be permanently profitable, and worthy of a permanent and a substantial outfit in buildings and apparatus. But all the probabilities are that Cuba will not for many years, if ever again, produce her former supply of sugar, and that Louisiana will not for five, and, perhaps, ten years, produce as much sugar as she did before the war. So that the producer of sorghum may calculate upon a good substantial and a continuous profit from the business, and also upon the chances amounting almost to a certainty that the profits will be for some years, at least, extraordinary. Under these circumstances the "revival of interest in sorghum," must, we think, become a permanent and a growing revival.

In a recently published paper on the gases given off by fruit it is stated that various kinds of fruit after having been plucked from the trees—for instance, apples, cherries, gooseberries, and currants—begin to absorb oxygen and give off carbonic acid.

Casting Metals, Glass, etc.

Letters patent have been taken out in France for improvements in casting metals, glass, and other materials. We give an illustrated description of the apparatus employed. An air-tight vessel is formed of a hollow cylindrical vessel of cast iron, closed at its lower end, and strengthened on the exterior by rings of wrought iron shrunk upon it. The vessel is closed air-tight at its upper end by a hemispherical cover, between which and a flange around the upper edge of the vessel is placed a washer of soft metal; the lid when closed is pressed firmly down upon the washer by a screw working through a head or nut which is held down to the vessel by three descending arms, formed at their lower ends with lugs to hook on to other lugs which pass below the flange on the top of the vessel. When the head or nut is thus held the lid can be forced down by turning the screw which works through the nut. In case where it is desirable to apply the heat to the material during the time it is solidifying, as, for example, when casting ingots of steel, the mold into which the steel is to be cast is surrounded with a casting of thin metal, and placed within the air-tight vessel. Between the thin metal case and the sides of the vessel, pieces of charcoal are roughly broken up, and are so placed that air may penetrate readily through the charcoal; when the melted metal is poured into the mold the charcoal is thereby brought to a red heat and ignited, and by this means the metal is kept heated. As soon as the metal has been poured into the mold, a thin plate is placed upon the top of the metal in fusion, and a thick plate of fire-clay is placed over the top of the mold; the lid of the outer vessel is then put on, and the joint is made air tight by forcing it down by a screw, as above described. Compressed air is afterwards admitted into the vessel from a suitable reservoir; the communication between the reservoir and vessel can then be closed by a cock, so that the pressure in the vessel may be increased by the expansion of the air as it becomes heated.



APPARATUS FOR CASTING METALS, GLASS, Etc.

Fig. 1 of our illustration shows a vertical section of an apparatus constructed as described, the apparatus is more especially suitable for making castings of steel, but similar means may be employed when making castings of glass or other fluid substances.

A is a strong vessel of cast iron, strenghtened exteriorly with wrought-iron rings, *a*, shrunk upon it; B, a lid for closing the vessel air tight; S, the screw for pressing down the lid or cover on top of the vessel, A; the screw works through the nut, *n*, which, when the lid is to be closed, is held down to the vessel, A, by three arms formed at their lower ends with lugs, *c*, which are passed under other lugs, *o*, the stems, P, of which are fixed to the upper strengthening ring, *a*, of the vessel, A.

The screw and nut are connected to the top of the lid, B, by three other arms *n*1, descending from a ring, *n*2, through which the screw passes freely. The construction of these parts is clearly seen in the cross section shown at Fig. 2. At the top of the screw is carried a pulley, over which is passed a cord, E, by which the screw and with it the lid, B, can be raised or lowered when the lid is disconnected from the vessel. *q*, *q* are steady pins to keep the lid concentric with the top of the vessel, A, and *m*, is a soft-metal washer for making the joint between the vessel, A, and lid, B, air tight. In the interior of the vessel, A, is placed an iron ingot mold, L, into which the melted metal is to be pored; the lower end of the mold is closed by an iron bottom, as shown, and the top of the mold is covered over with a slab of fire tile, marked D, the ingot mold is surrounded by a casing, T, of thin sheet iron, and between this casing and the sides of the vessel, A, is placed charcoal broken into small pieces so that the air may pass freely amongst it. At Fig. 3 is represented a reservoir of compressed air communicating with the vessel, A, by a pipe, *r*, on to which is fitted a pressure gage, F, to indicate the pressure of air in the reservoir. The passage of air through the pipe, *r*, from the reservoir to the vessel, A, is controlled by a cock, R, the pipe, *r*, also carries a tap, R1, by opening which the pressure of air may be reduced when desired.

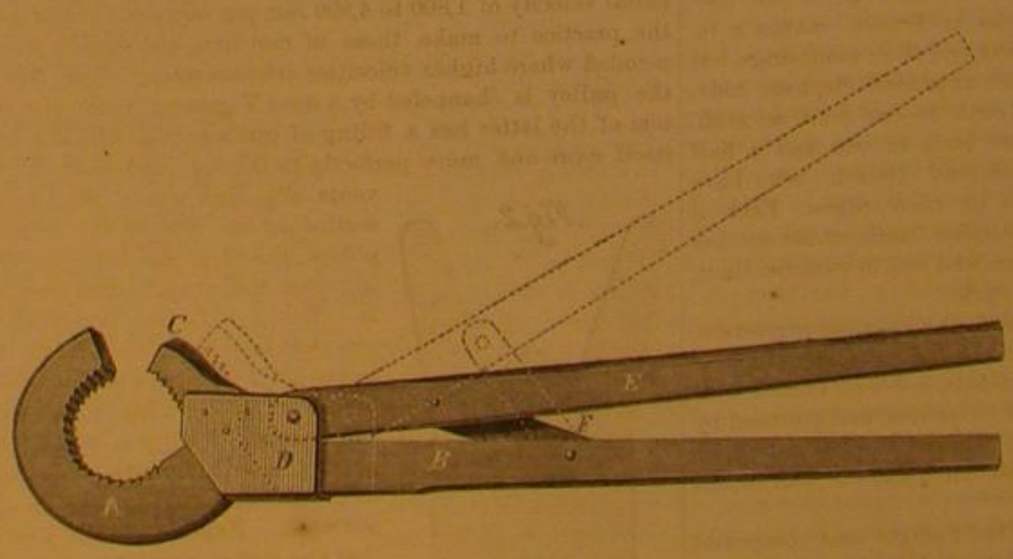
The apparatus is used in the following manner: Supposing the air reservoir to be filled with air at a pressure of about 10 atmospheres and that the melted steel is ready to be run into the ingot mold, the metal is poured into the ingot mold, L, the small disk of sheet metal, D1 is placed on the top of the fluid metal, and the whole is covered over with the disk of fire tile, D, as shown in the illustration, the fire tile having been previously heated to a white heat.

As the ingot mold becomes heated by the metal poured into it the heat is radiated from it across the small air space between the mold and the thin metal case by which it is surrounded, heats this casing to a red heat, and ignites the charcoal by which it is surrounded. The lid, B, is closed and fixed securely on the top of the apparatus, the lower end of the screw being forced down on the circular washer, *u*, on the top of the lid, B, by turning the screw of the lever arms, T1, upon it; the apparatus being closed, the tap, R, is opened, the compressed air passes into the apparatus, so making the pressure in the vessel, A, equal to the pressure in the air reservoir, the air becoming quickly heated, in the vessel, A, the pressure rises, and if the tap, R, is then closed, the pressure in the vessel, A, will rise above that in the air reservoir.

It will thus be seen that the pressure in the vessel, A, can readily be regulated by means of the taps in the pipe, *r*. We must here remark that the quantity of air which passes from the air reservoir into the vessel, A, is relatively very small, as the vessel, A, is almost entirely filled with the ingot mold, the casing, and the charcoal with which it is surrounded. This is very advantageous for economizing the compressed air employed, but more especially for concentrating the heat in a small space, so that the metal in the ingot mold may cool slowly and as regularly as posible, the exterior of the vessel, A, is surrounded by water contained in a bath or vessel, V, so as to keep it cool, as shown by our illustration. Steel thus cast into molds and subjected to pressure, is under the most favorable conditions for solidifying into a homogeneous mass, for as regards pressure it is compressed with a force which is considerable, as a pressure of ten atmospheres corresponds to a column of melted metal of about forty-five feet high; if this is compared with the hight of the head or get of metal usually employed by founders it will be seen how greatly superior is the process of casting above described to that usually employed. A pressure of ten atmospheres has been taken as an example, but there is nothing to prevent a pressure of twenty thirty or forty atmospheres being employed, as this may be done without danger. By the process above described a dense and homogeneous ingot is obtained, as the metal is not only subject to pressure while in a fluid state, but also as it passes through the pasty into the solid state. By the combined use of a concentrated heat and great pressure a highly malleable steel is obtained, and also a steel which when tempered becomes extremely hard, these being the two most valuable qualities in steel.

Improvement in Pipe Tongs.

This is an implement which is of great importance in gas fitting and plumbing, and presents decided advantages over the old style of pipe tongs. By its use the pipe may be more firmly grasped with less liability to injury, while it is equally convenient in use. In the engraving, A, is a curved jaw comprising about, or a little less than three fourths of a circle,



CRAIN'S PATENT PIPE TONGS.

and is forged with the handle, B, in one continuous piece. C is also a curved jaw about, or a little less than one fourth of a circle in extent, and is riveted to a bent plate, D, passing over the back of B. The other handle, E, is pivoted to D, and the two handles are connected by a link, F, so that when the handle E, is opened to the position shown by the dotted outline, the jaw, C, is withdrawn to the position shown by its dotted outline. This allows the pipe to enter between the jaws.

When the handles are pressed together, the jaw, C, approaches the other with great force through the action of the toggle formed by the handle, E, and the link, F; but as the pipe is grasped on all sides there is no danger of crushing it. The jaws are toothed internally in the usual manner, and for the same purpose. Patented, through the Scientific American Patent Agency, Aug. 3, 1869, by R. Crain of Shaffer Farm Dennison Post Office, Pa., who may be addressed.

SOMETHING NEW IN MECHANICS.

Under this head the *Independent Democrat*, of Concord, N. H., gives us a long description of what the editor supposes to be a new way of transmitting power, specially useful in cities as a substitute for steam, the invention of Horace Call, of that city.

By means of water wheels and pumps, air is to be compressed at the river bank and conducted in pipes to the city shops. Here the air discharges into the bottom of a tank, and bubbles up like a boiling caldron. Within the tank is a bucketed wheel, so arranged that the buckets will receive the ascending current of air, the force of which will turn the wheel and drive the machinery of the shop.

"The philosophy of the power," says the *Democrat*, "is simple. The air displaces the water in an upward current, equal to the weight of water down. It is so simple that it is a wonder that it has never been applied before.

"The possibilities of this invention afford a wide field for speculation, and one which we will not enter upon to-day. When we consider that it probably costs $50,000 a year to operate the stationary engines in this city, while a river with 10,000-horse power runs through it, unused, the magnitude of an invention which proposes to make it available at a comparatively small expense, is one which challenges the attention of mechanics and scientific persons."

There appears to us nothing in the above invention which warrants the great expectations expressed by our New Hampshire cotemporary. The practice of driving machinery by compressed air is very old. Ordinarily it is wanting in economy as compared with the direct employment of water or steam. But in inaccessible locations, in mines, and tunnels, it is used to advantage, serving for ventilation as well as power. In the Hoosac and Mont Cenis tunnels the drilling machines are driven by air, which is compressed by water power and carried long distances in pipes to the drills.

The only novelty in Mr. Call's improvement lies in his tank and air wheel; but this form of air engine can hardly be as effective as the ordinary machines. The resistance of the wheel revolving in the water, and the friction of the rising air will about equal, we should think, the friction of a well-constructed piston engine.

The Ponsard Process of Smelting Iron Ore.

This is a French improvement, if indeed it shall prove to be in practice a real improvement. The chief feature of the Ponsard process, is that the ore is pulverized and mixed with pure coal or carbon, and then placed into tubular crucibles, heated from the outside. By thus protecting the ore from the direct action of the fuel employed for heating the crucibles, inferior combustible matter can be used and a certain economy thereby effected. By an arrangement of the furnace, gray or white iron, or even steel, can be produced at will. The furnaces can easily be converted into puddling furnaces into which the metal can enter at one side and run out at the other, prepared for being submitted to the rolling mill.

Suit for a Million.

Andrew Whiteley, who for a long time has been contending with the Commissioner of Patents for certain reissues, has finally entered suit against that official. In his declaration he sets forth that, in various patent cases in which he was assignee of Gage, Weeks, Haines, and others, for improvements in harvesters, etc., he obtained certain orders of Judge Fisher, of the Supreme Court of the District of Columbia, directing the Commissioner of Patents to take certain evidence as to novelty, to reissue certain patents, and to antedate others; that, in consequence of these proceedings, he has been compelled to lose time, opportunities of making money, and to employ counsel, by reason of which he is a large loser. He therefore brings suit, laying his damages at one million dollars.

If Mr. Whiteley should succeed in getting judgment for the amount of damages claimed, we imagine that it might go hard with Commissioner Fisher to raise the funds.

Carvalho's Painting of the Grand Canyon of the Colorado River.

Mr. S. N. Carvalho, patentee of a very excellent steam super-treating device and an artist of considerable merit, gave a private exhibition of a new painting of his, on Friday evening, September 3d, at his studio, 765 Broadway. The subject is a view of the Grand Canyon of the Colorado River, and is of interest from the fact that the sketches were taken by Mr. Carvalho on the spot and while attached to the Fremont expedition as photographic artist. The stern and impressive grandeur of its everlasting rocks made such an impression on Mr. Carvalho that he took sketches of them

from various points of view with great trouble and at much personal risk.

The picture represents the canyon at the head of Diamond Creek, where the vast rocky walls rise abruptly to the hight of from 3,000 to 6,000 feet. At the bottom of this gloomy and terrible abyss flows a stream of dark water, flecked here and there with foam. In the background is a line of lofty bluffs, many of them crowned with masses of rock of enormous size and fantastic shapes, in which domes, towers, spires, and minarets are faintly outlined.

REAR-HORSES.

General Engelmann, of Illinois, has found by experience, that the best way to get rid of the grasshoppers in a vineyard is to raise rear-horses there, which are also known as devil's horses, *alias* praying nuns, *alias* intelligence bugs, *alias* devil's riding-horses, but the correct English name of which is "camel cricket."

Fig. 1 gives a very good view of the sexes of this insect, *b* representing the male, which is of a brown color, and *a* the female, which is of a green color. The female has such short wings that she is incapable of flight; but the male flies as readily and as strongly as an ordinary grasshopper. The General's mode of colonizing this insect in his vineyard, is to collect the masses of eggs in the dead of the year and place them upon his grape vines. Fig. 2 will enable the reader to recognize these singular egg masses whenever he may happen to meet with them. Persons are very generally ignorant of their real nature, and on the principle that "everything that is unknown must be something hateful and destructive," are apt to cut them off and throw them into the fire. They should, under no circumstances, be destroyed. As a general rule camel crickets are only found in the central and southern parts of Missouri, in the southern part of Illinois, and in other southerly regions. But Mr. D. B. Wier is domesticating them at Lacon, on the Illinois river; and on one occasion one of their egg masses was found as far north as Lee county, Northern Illinois. We are inclined to believe that, with a little care and attention they may be acclimated at points further north than these.—*American Entomologist.*

Fig. 1.

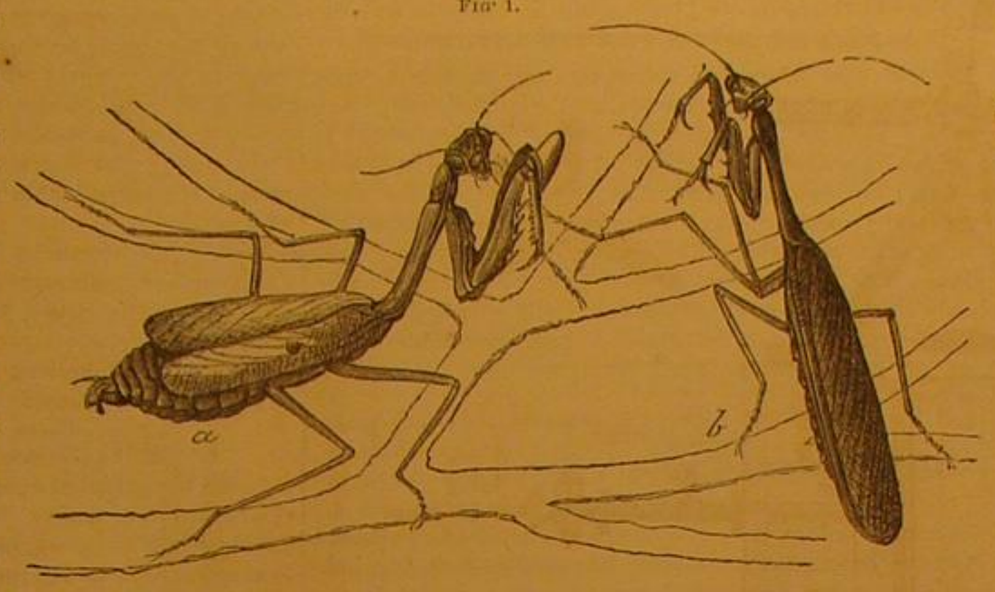


Fig. 2.

TRANSMISSION OF POWER.

BY WILLIAM S. AUCHINCLOSS, HONORARY COMMISSIONER TO THE PARIS EXPOSITION 1867.

LEATHER BELTING.

An examination of the different leather departments, and the varieties of belting in actual use, reveal a tendency on the part of manufacturers to improve the quality of wide belts by securing 2-inch strips along their edges. Specimens of this character are exhibited by Messrs. Webb & Son, Stowmarket, England; Mr. William Ruland, of Bonn, Prussia; H. Lemaistre & Co., Brussels, Belgium; Placide Peltereau, 32 Rue d'Hauteville, Paris; Poullain Brothers, 99 Rue de Flandre, Paris; and others of less note. The material forming these strips is (with a single exception) leather of the same quality as the belt. The methods of attachment are variable, as laces, threads, rivets, eyelets, and brass screws, The English use the threads, Prussians the laces, and the French all the varieties enumerated. Mr. P. Peltereau, proprietor of one of the largest houses in France, makes a remarkable display, not only of belts and their mountings, but of different kinds of leather; such as tanned elephant hide, varying in thickness from one fourth to one half an inch, and hippopotamus hide, from one inch to one and a half inches in thickness. His 8-inch and 10-inch belts have leather facings two inches wide on their edges. Each of these facings is attached by two leather laces, whose stitches have three fourths of an inch span, and run in parallel lines, separated by one and one fourth inch.

The "inextensible belt," for which, at a previous exposition, he received a gold medal, has steel instead of leather edging strips. These strips, for a 10-inch belt, are two inches wide by one sixty-fourth of an inch in thickness, and attached by two riveted rows of copper tacks. These tacks are one eighth of an inch in diameter, and placed three and one half inches between centers.

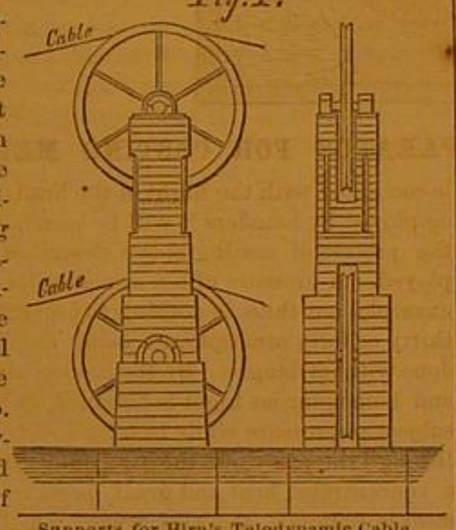
Messrs. Poullain Brothers join their single, and compound their double belts with headless one eighth of an inch brass screws. This is accomplished with a very ingenious machine, of which there are several types in the French department. It carries a coil of plain brass wire, which, while being fed to the work, passes through a die of twenty-eight threads to the inch. The screw thus formed enters the belt at a point closely clamped by a foot-lever, and, having passed through, is cut off. Finally, the belt being placed on a surface plate, the points of all the screws are slightly riveted. The most compact and expeditious of these machines is the invention of Mr. Cabourg, 74 Rue St. Honoré, Paris.

Mr. E. Scellos, of 74 Boulevard du Prince Eugène, exhibits what he terms a "homogeneous belt," for 150-horse power. This belt is nineteen and one half inches wide by three fourths of an inch in thickness. It is composed of 104 leather strips three fourths of an inch in width, laid longitudinally with reference to the belt, and laced transversely; the distance between laces is one and one fourth inch, and diameter of lace equals three sixteenths of an inch. The advantage of edge-bound wide belts, where frequent shipping is an essential, we think will be readily conceded; and to what extent they can supplant double belts, is a subject worthy of experimental inquiry. The use of very wide belts is seldom resorted to in the machinery department. One of the stationaries has two central ribbed pulley rims bolted to the arms of its fly wheel; on these run four belts six inches in width; another has two 12-inch edged belts, and so on—the inclination was always to increase the number rather than the width of the belts.

TRANSMISSION OF POWER TO GREAT DISTANCES.

For the transmission of power to great distances, leather and rubber belts are rendered useless by their extreme elasticity, and the expensive character of their intermediate supports; while shafting with bevel gears consumes the applied power in excessive friction, elasticity, etc. These difficulties were studiously met and successfully solved by Mr. C. F. Hirn, of Colmar, Haut Rhin, in the year 1860; the practical working of his invention was partially displayed at the exhibition of 1862. In the park of the present Exposition, his system is clearly shown by the operation of a centrifugal pump, deriving its power from a stationary engine, working on the opposite side of the artificial lake, and distant some 500 ft. from the pump. This so-called "telodynamic system is based on the substitution of a high velocity developed in a small mass, for its converse; namely, large mass moving with small velocity. The power conductor is simply a light wire rope, passing over pulleys of large diameter, and upheld at intervals of about four hundred feet by support-pulleys. The construction of these pulleys, and their supports, is shown by the accompanying figures, 1 and 2, giving a side view and end view, and a section of the rim of the pulley.

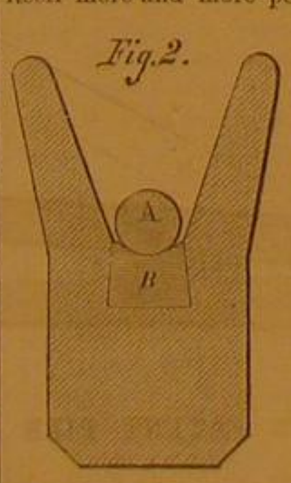
Fig. 1.



Supports for Hirn's Telodynamic Cable.

The two extreme pulleys, or those which receive and distribute the power, are rotated at speeds having a circumferential velocity of 1,800 to 4,800 feet per minute. It has been the practice to make these of cast iron, but steel is recommended where higher velocities are necessary. The face of the pulley is channeled by a deep V-groove, while the bottom of the latter has a filling of gutta-percha which adapts itself more and more perfectly to the rope and entirely prevents slip and wear. Fig. 2 is a section of the rim of the support pulley, showing the cable A, resting upon the gutta-percha cushion, B. Herein lies the secret of its practical success; a result only attained after most discouraging experiments upon pulleys constructed successively of copper, wood, cast iron, etc., with facings of leather, india-rubber, horn, lignumvitæ, and boxwood. Experience has proved that the loss of power by the telodynamic system is quite trifling, and arises mainly from the resistance of the air to the arms of the pulleys, the friction of their axles, as well as the rigidity of the rope in its passage over the pulleys.

Fig. 2.



It has been found that two pulleys, twelve feet in diameter, making 100 revolutions per minute, with a cable of seven sixteenths of an inch diameter, can, by means of a circumferential velocity of 4,000 feet per minute, transmit 120-horse power (to distances less than 400 feet) without sustaining a loss of more than two and one half per cent. If this limit is exceeded, it will become necessary to introduce support pulleys of seven feet diameter, and for these there should be estimated a mechanical loss of about one per cent per 3,300 feet of distance traveled. The pecuniary expense, independent of the ground rent, amounted to $1,000 (gold) per 3,300 feet, plus $600 for the receiving and distributing pulleys, with their respective shafts and supports. It is evident that this system cannot be limited in its application by rectilinear transmission, but is susceptible of all the changes in direction which inclined pulleys can command. There are already between 400 and 500 instances of its employment in connection with the manufacturing interests of the continent. Its advantages in respect to our own country can hardly be overestimated.

CADMIUM AND ITS USES.

BY PROF. C. A. JOY, OF COLUMBIA COLLEGE.

Seven cities dispute the right of having given birth to the immortal Homer, and seven men claim the honor of having discovered cadmium. A learned German has tried to show that Homer was a myth. Cadmium was named after the mythical *cadmia*, but is, nevertheless, a reality.

It was in 1818, just fifty years ago, that the attention of chemists was called to some samples of zinc that were sold for medicinal purposes; they gave, when in solution, a suspiciously yellow color with sulphureted hydrogen, and hence were condemned as containing arsenic. A number of chemists were furnished with specimens for examination, and several of them got on track of a new metal at the same time.

Frederick Stromeyer, who was born in Gœttingen, in 1778, and was for many years professor of chemistry at the University in his native city, until his death in 1835, was the first to publish a full account of investigations into the properties of the new substance in September, 1818, and he gave to the metal the name of cadmium.

Karsten simultaneously proposed to call it melinium, from the quince-yellow color of one of its compounds; Gilbert gave it the name of junonium, from the planet Juno, and John christened it klaprothium, after a famous chemist; but all of these strange appellations have been eliminated from our nomenclature, and cadmium is the only one recognized in modern times.

The discovery of cadmium forms an era in the line of scientific research. It was the first metal found in a compound and not in an ore, and it could not have been detected until chemical analysis had reached an advanced state of accuracy. Traces of it were soon found in zinc ores, but it was not until after the lapse of twenty years from the time of Stromeyer's publication, that an ore of cadmium was discovered. Lord Greenock, at that time, described a mineral which had been picked up on his estate, and which proved to be a cadmium blende, analogous to zinc blende, or to galena. The new ore was called greenockite, and since that time it has been found in various localities; it is, however, a very rare mineral.

For commercial purposes, we obtain the metal from zinc ores and furnace deposits. By subjecting zinc to downward distillation, the first portions that come over often contain cadmium. The pure metal is obtained by dissolving the regulus in sulphuric acid, and converting it into a sulphide, by means of sulphureted hydrogen, then re-dissolving and re-precipitating, by carbonate of ammonia, and reducing with a proper flux. As thus obtained, it is a white, soft, malleable, ductile metal, eight and one half times heavier than water. It leaves a mark upon paper the same as lead, and when bent gives out a creaking sound, similar to that known as the "tin cry." It can be distilled the same as zinc, but unlike zinc, when it is set on fire and burns, it gives a brown oxide. It sometimes happens that zinc-white is contaminated by this brown powder and rendered worthless as a paint. Cadmium melts at about 440° Fah., and when alloyed with other metals, causes them to fuse at a lower temperature; a very little of it renders copper very brittle. Seventy-eight parts of cadmium, and twenty-two parts of mercury, was, for a long time, used for plugging teeth, but, as the amalgam oxidizes easily and turns yellow, and the mercury proves injurious to health, this application is pretty much abandoned. Mr. Abel has proposed an alloy for jewelers' use, which is said to be very malleable and ductile, and to possess a fine color. It is composed of 750 parts of gold, 166 parts of silver, and 84 parts of cadmium. We had occasion, when giving an account of the properties of bismuth, to speak of the very fusible alloys composed of bismuth, tin, lead, and cadmium; they melt at a point much lower than cadmium itself.

It is as a yellow paint that cadmium compounds are the most highly prized. By mixing a solution of gum arabic, chloride of cadmium and hyposulphite of soda together, we obtain a fine yellow paint, which is one of the most durable known to artists. There are other ways of making it, and the purity of color depends very much upon the absence of metals that turn black when mixed with sulphur, and the care with which it is dried. The very property that led to the condemnation of zinc-white, and which ultimately brought about its discovery, is the yellow color, now most frequently turned to valuable account.

The keeping properties of the collodion, made sensitive by the iodide and bromide of cadmium, have made these salts great favorites with photographers, and a new use for cadmium has sprung up of late years in this direction.

Manufacturers are getting more into the habit of saving the furnace and flue dust of zinc works, and of separating the cadmium from them, and in this way the supply of the metal is increasing. Salts of cadmium find application in medicine. The sulphate is applied to the eyes to remove specks from the cornea, the nitrate produces violent vomiting and purging, and, in general, when taken internally, the

salts can only be employed in very small doses, as recent experiments of Monsieur Marme have shown them to be violent poisons. The best antitode is the carbonate of soda and the white of an egg.

The following mixture burns with a brilliant white flame, surrounded by a magnificent blue border: Salpeter, 20 parts; sulphur, 5 parts; sulphide of cadmium, 4 parts; lamp black, 1 part.

This can be moistened and made up into balls or candles, and ignited after the manner of a fuse.

We have thus given the history and prominent applications of the rare metal, cadmium.

Correspondence.

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

Improved Apparatus for Extinguishing Fire Wanted.

MESSRS. EDITORS:—I have read with interest your recent article regarding losses by fire from steam heating apparatus. Last winter we had a hot house, the property of Denn s Bowen, Esq., of this city, destroyed by fire. I gave it my opinion that the cause of it was from their heating pipes, which were directly under the wooden platform where the fire first appeared, but those who claim to be competent judges scouted the idea.

It seems to me that the sprinkler apparatus used in the woolen mills, alluded to in your paper, week before last, would be an excellent thing to use in our elevators in this city, which invariably burn up, when they catch fire, owing to the combustible material of which they are made, and the draft caused by the bins running from the top to the bottom of the elevator. I wish you would wake up some of the scientific men to making improvements in the manner and machinery of extinguishing fires, it seems to be the most neglected of all the branches of business. To be sure there has been considerable improvement made, such as the steam fire engines, fire alarm, telegraph, etc., etc. But don't you think that there is still further improvement to be made? It seems to me that a fire engine can be made which does not weigh over three thousand pounds, and still be as effective as the ones which are now used that weigh seven thousand pounds.

I have taken great pleasure in reading your valuable paper, and I hope it may long continue in its field of usefulness.

PETER C. DOYLE.

Buffalo, N. Y.

Purifying Drinking Water.

MESSRS. EDITORS:—Your correspondent in No. 9, present volume, suggests a very good remedy for keeping water pure; but it is at the cost of extra care, and manual labor, and expense of an air pump which requires close attention to operate successfully for any length of time.

My remedy is to use a pump that will give a slight agitation to the water every time the pump is used. I used in a large cistern a Joyce submerged pump, which consists of a semicircular cylinder, with arms extending out each side, and operating on a pivot to force the two plungers back and forth in the cylinder. These arms were connected by rods to a double handle at the top to give motion. This plunger with the two rods produced an agitation that kept the cistern water sweet for years. The pump was located a few inches from the bottom, and it never produced roiling.

As the pump was used from twenty to fifty times a day, I think it was more efficient than would be an air pump, with the great liability of neglect. There are similar pumps in use, but I can speak from experience of this one only.

Omaha, Nebraska. J. M. G.

Boiler Test Proposed.

MESSRS. EDITORS:—I would suggest through your valuable paper that at the coming exhibition of the American Institute this fall, a test of steam boilers should be made to ascertain what boiler will produce the most steam power with a given consumption of fuel.

The proper way to test them would be to have a tank full of water in which a propeller wheel of coarse pitch connected to a 40-horse power engine is arranged to work. The boiler that gets the greatest number of turns out of the wheel with least consumption of fuel should be pronounced the champion boiler.

If a test of this kind takes place, I, for one, will furnish a 40-horse power boiler of my patent.

HUGH LESLIE.

Jersey City, N. J.

[Our correspondent is perfectly safe in this challenge. The American Institute will not commit themselves, we understand, to any test of boilers this year; but if they would do so, they would scarcely permit so unscientific and unsatisfactory a method as our correspondent proposes. We have asserted and reasserted over and over again that the only reliable test of a boiler is its evaporative power compared with the fuel it consumes, and yet our readers will persist in complicating the problem by saddling some other condition upon it. As well might it be proposed to test a boiler by running an engine and a cotton mill with it as an engine and propeller wheel. Believe us, friends, an engine and boiler are two distinct animals. They don't belong even to the same genus, let alone species. To test the speed of a horse we do not tie an elephant to his tail and run the two together.—EDS.

AS FAR as man can go back in time, says Dumas, as far as man can reach by observation in space, the concrete elements of matter present the same character as Lavoisier's elements.

POOR TIME.---HOW TO DOCTOR DISABLED CLOCKS.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY F. P. WARREN.

As the worm is to fruit, making it deformed and one-sided, so are poor timepieces to our lives, making them unsteady and irregular. We can plainly see that there is much loss of time in being too early, or too late for meals, for trains, and for engagements, or that the broken rest, taxing the mind with the rising hour, and standing in the cold waiting for the train, will affect the health; but we little realize the unconscious influence that living by a poor timepiece has in forming unsteady and irregular habits in a family. It is a secret enemy, and as such, should be conquered, and trained a trusty servant, or destroyed like the vermin of the house, or the weeds of the garden. And on every mantle, be it palace or mansion, cottage or hovel, should stand a clock that can be depended upon.

WHAT IS THE MATTER WITH THE OLD CLOCKS?

Resinous dust mixes with the oil on clock pivots and forms a wax, which, when thick enough, will stop the clock. As a grinding tool can be made with diamond dust embedded in brass, which will continue to cut till no brass remains to hold the dust; so sand and gritty dust is caught by oiled clock pivots and ground into the brass, where it remains embedded, even after the most thorough cleaning. The particles of grit, together with bits of steel, ground from the pivots, can be plainly seen with a good microscope. Grit grinds the pivots of clocks rough, and often grains of sand are embedded in flaws and rough places. Such pivots will soon cut out new bushing.

THE REMEDY.

Scrape the bearings and polish the pivots.

PIVOT POLISHING.

This may be done by means of a very simple lathe made of a piece of board, cut something like a boot-jack, the hole about two inches square, with a wood center or plug in one ear, holding one pivot, the other ear cut off even with the plug and notched to receive the pivot to be polished; a small bow, with a violin string, running on the pinion or arbor, turns the wheel, while a few strokes of the pivot file on the pivot, will polish like glass. It requires a little practice to get used to working the bow, and the pivot file, in opposite directions, at the same time, but, when familiar with the operation, pivots are easily and speedily polished. There should be two holes in the end of the plug, and two corresponding notches in the end of the short ear, to receive both large and small pivots. The plug should be held with a thumb screw so that it can be easily varied to suit the different lengthed arbors. A common wood screw, with the head altered, will answer.

This "board lathe" can be held upright in a vise, or otherwise conveniently fastened. The common "verge lathe," with wood centers, will work well with small wheels, but there is not swing enough for the large ones, which often need polishing the most.

TO MAKE A PIVOT FILE.

Grind a common flat file perfectly smooth, roughen with emery paper, and always use with oil.

TO BUSH.

Bend sheet brass into a tube with the hole the size of the pivot; ream the unworn side of the hole in the clock plate till the hole is round, then ream equally to the size of the tube, beveling the edges; swedge the tube in, and dress to the proper size.

The common way of bushing is to close the hole with a punch, but this, closing only near the edge, leaves a poor bearing. A better way is to cut a hole through the plate about one-eighth of an inch from the pivot hole, with a narrow chisel. The pivot hole will close as the chisel hole is enlarged, and can be reamed out to make a good bearing. The chisel should be about one-twelfth of an inch wide, gradually enlarging back from the edge.

CLEANING CLOCKS—HOW NOT TO CLEAN A CLOCK.

Forget to let the springs down; bend the escape wheel points awkwardly, working at the pin underneath; raise the upper plate a little, and the clock will come to pieces itself. Go around the room and pick up the wheels, not noticing the bent cogs and pivots, and lay them together, where the boys can play with them while you are cleaning. Wipe the plates with an old, greasy, sticky chamois skin or rag, clean the holes with a dirty string, and, if the boys' fingers are quite dirty (and what boys' are not who are always handling things?) let them hold and hand you the wheels, when you find a place for them. If the clock does not go together good, loose your temper and make it; if the wires are in the way, bend them out, and when the clock is together, bend them again to make it strike right. After handling the verge and touching the escape wheel points with your sticky fingers, oil the whole clock profusely—get your pay—and then, if it don't run till "taken home," or till you get "around the corner," tell the owner it is worn out and advise him to buy a new one.

HOW TO CLEAN A CLOCK.

Touch watch oil to the pivots, and run the wheels to loosen the dirt; too deep and too shallow gear notice, and mark the holes that need bushing; tie the springs with strong cord, loosen the click spring, and let them down steadily by the key turning in the palm of the hand. If the two largest wheels of the trains are alike, mark the strike side, that there may be no mistake in putting together. Wipe thoroughly every part of the works with a clean rag. Clean the cogs with a pack of cards riveted together. If the clock is old, scrape them with a sharp knife; polish the pivots if at all rough or worn, and clean with a fresh rag pressed well against the shoulder with the thumb nail. The pivot holes, if the pivots are worn rough, should be lightly scraped with a sharp reamer, and cleaned with a pine stick till they no longer blacken it.

PUTTING UP CLOCKS.

Always work slow, and pin as you go, using shoemakers' zinc nails.

Time train wheels are always plain; the wheels of the striking train have something attached to them, either plates, pins, or wires.

If you bear in mind that larger wheels gear into the pinions of smaller, you can hardly place them wrong; but the strike wheels must so gear, that the wire with a poker crook will drop into its notch at the same instant of the bell hammer stroke, and the crank of the fly wheel, when at rest, should be opposite to the wire which catches it before striking. The drop of the escape wheel on the verge being lost power, they should be as near together as possible, and allow the sure escape of the teeth; but, as the escape wheel is held from the verge by the power, it should be pressed toward it during a trial of one revolution, or the teeth will catch whenever the power is slack, as on cold nights.

Oil freely, with the best watch oil, the different bearing parts of the verge; other parts will run longer and wear less without.

Wooden clocks can be made as good as new by returning the pivots and bushing the bearings with brass. The balance pivots of marine levers, when worn, should be re-turned and re-tempered.

A clock cannot be well regulated with the pendulum loose at the point of suspension.

Chemical Discovery in the Past Year.

In the inaugural address of Professor Stokes, President of the British Association, made at the opening of the annual meeting, held this year, at Exeter, England, he made the following remarks on the progress of chemical discoveries: In chemistry I do not believe that any great step has been made within the last year; but perhaps there is no science in which an earnest worker is so sure of being rewarded by making some substantial acquisition to our knowledge, though it may not be of the nature of one of those grand discoveries which from time to time stamp their impress on different branches of science. I may be permitted to refer to one or two discoveries which are exceedingly curious, and some of which may prove of considerable practical importance.

The Turaco, or plantain-eater of the Cape of Good Hope, is celebrated for its beautiful plumage. A portion of the wings is of a fine red color. This red coloring matter has been investigated by Professor Church, who finds it to contain nearly six per cent of copper, which cannot be distinguished by the ordinary tests, nor removed from the coloring matter without destroying it. The coloring matter is, in fact, a natural organic compound, of which copper is one of the essential constituents. Traces of this metal had previously been found in animals, for example, in oysters, to the cost of those who partook of them. But in these cases the presence of the copper was merely accidental; thus oysters that lived near the mouths of streams which came down from copper mines, assimilated a portion of the copper salt, without apparently its doing them either good or harm. But in the Turaco, the existence of the red coloring matter which belongs to their normal plumage, is dependent upon copper, which, obtained in minute quantities with the food, is stored up in this strange manner in the system of the animal. Thus in the very same feather, partly red and partly black, copper was found in abundance in the red parts, but none or only the merest trace in the black.

This example warns us against taking too utilitarian a view of the plan of creation. Here we have a chemical substance elaborated which is perfectly unique in its nature, and contains a metal the salts of which are ordinarily regarded as poisonous to animals; and the sole purpose to which, so far as we know, it is subservient in the animal economy is one of pure decoration. Thus a pair of the birds which were kept in captivity lost their fine red color in the course of a few days, in consequence of washing in the water which was left them to drink, the red coloring matter, which is soluble in water, being thus washed out; but except as to the loss of their beauty it does not appear that the birds were the worse for it.

A large part of the calicoes which are produced in this country in such enormous quantities are sent out into the market in the printed form. Although other substances are employed, the place which madder occupies among dye stuffs with the calico printer, is compared by Mr. Schunck, to that which iron occupies among metals with the engineer. It appears from the public returns that upwards of 10,000 tuns of madder are imported annually into the United Kingdom. The colors which madder yields to mordanted cloth, are due to two substances, alizarine, and purpurine, derived from the root. of these alizarine is deemed the more important, as producing faster colors, and yielding finer violets. In studying the transformations of alizarine under the action of chemical reagents, MM. Graebe and Liebermann were led to connect it with anthracene, one of the coal tar series of bodies, and to devise a mode of forming it artificially. The discovery is still too recent to allow us to judge of the cost with which it can be obtained by artificial formation, which must decide the question of its commercial employment. But assuming it to be thus obtained at a sufficiently cheap rate, what a remarkable example does the discovery afford of the way in which the philosopher quietly working in his laboratory may obtain results which revolutionize the industry of nations! To the calico printer, indeed, it may make no very important difference whether he continues to use madder, or replaces it by the artificial substance; but what a sweeping change is made in the madder-growing interest! What hundreds of acres hitherto employed in the madder cultivation are set free for

the production of human food, or of some other substance useful to man! Such changes can hardly be made without temporary inconvenience to those who are interested in the branches of industry affected; but we must not on that account attempt to stay the progress of discovery, which is conducive to the general weal.

How to Determine the Strength of Rough Castings.

It is not uncommon for the engineer and machinist, when ordering castings for a specified purpose, to give the proportions in which the mixture of pig shall be made, with a view to obtaining a given strength in the proposed casting. This course cannot be supposed to be an accurate guide to the determination of the casting when completed, since there are several causes which may reduce their strength during the melting, pouring, and cooling of the casting, and the dishonesty or carelessness of the founder may also defeat the end proposed.

When it is important that a given strength should be obtained, it is recommended by one of the highest engineering authorities, Professor Rankine, that the best course for the engineer to pursue is not to specify to the founder any particular kind or mixture of pig iron, but to specify a certain minimum strength which the iron should show when tested by experiment.

As to the appearance of good iron for castings, it should have on the outer surface a smooth, clear, and continuous skin, with regular faces and sharp angles. When broken, the surface of fracture should be of a light blueish-gray color and close-grained texture, with considerable metallic luster; both color and texture should be uniform, except that near the skin the color may be somewhat lighter and the grain closer; if the fractured surface is mottled, either with patches of darker or lighter iron, or with crystalline spots, the casting will be unsafe; and it will be still more unsafe if it contains air bubbles. The iron should be soft enough to be slightly indented by a blow of a hammer on an edge of the casting. When cut by tools of different kinds, the iron should show a smooth, compact, and bright surface, free from bubbles and other irregularities, of a uniform color, and capable of taking a good polish.

Castings are tested for air bubbles by ringing them with a hammer all over the surface.

Cast iron, like many other substances, when at or near the temperature of fusion, is a little more bulky for the same weight in the solid than in the liquid state, as is shown by the solid iron floating on the melted iron. This causes the iron as it solidifies to fill all parts of the mold completely, and to take a sharp and accurate figure. The solid iron contracts in cooling from the melting point down to the temperature of the atmosphere, by about one per cent in each of its linear dimensions, or one eighth of an inch in a foot nearly; and therefore patterns for castings are made larger in that proportion than the intended pieces of cast iron which they represent.

The rate of linear expansion of cast iron between the freezing and boiling points of water is about ·00111.

A convenient instrument in making patterns for castings is a contraction rule; that is, a rule on which each division is longer in the proportion already mentioned than the true length to which it corresponds.

In designing patterns for castings, care must be taken to avoid all abrupt variations in the thickness of metal, lest parts of the casting near each other should be caused to cool and contract with unequal rapidity, and so to split asunder or overstrain the iron. It is advantageous also that castings, especially those for moving pieces in machinery, such as wheels, should be of symmetrical figures, or as nearly so as is consistent with their purposes, in order that they may have no tendency to become distorted while cooling.

Iron becomes more compact and sound by being cast under pressure; and hence cast-iron cylinders, pipes, columns, shafts, and the like, are stronger when cast in a vertical than in a horizontal position, and stronger still when provided with a head, or additional column of iron, whose weight serves to compress the mass of iron in the mold below it. The air bubbles ascend and collect in the head, which is broken off when the casting is cool.

Care should be taken not to cut or remove the skin of a piece of cast-iron more than is absolutely necessary, at those points where the stress is intense. In order that this rule may be carried out in pieces (such as toothed wheels) which are shaped to an accurate figure by cutting or abrading tools, care should be taken to make them as nearly as practicable of the true figure by casting alone, so that the depth of skin to be cut away may be as small as possible.

Discovery of America by the Chinese.

Was Columbus the first discoverer of America, or did he only re-discover that continent after it had, in remote ages, been found, peopled, and forgotten by the Old World? A writer in the *Gentleman's Magazine* thinks it is curious that this question has not been more generally raised, for it is very clear that one of two things must be true: either the people whom Columbus found in America must have been descended from emigrants from the Old World, and therefore America was known to the Old World before Columbus' time, or else the aborigines of the Western Hemisphere were the result of spontaneous human generation, the development of man from a lower species of animal, or descended from a second Adam and Eve, whose origin would be equally puzzling. Unless we are prepared to cast aside Holy Writ, and all our general notions of the origin of the human race, we must believe that there was at one time communication between the Old World and the New. Probably this communication took place on the opposite side of the world to ours, between the eastern coast of Asia and the side of America most remote from Europe; and I believe it is quite possible that the inhabitants of Eastern Asia may have been aware of the existence of America, and kept up intercourse with it while our part of the Old World never dreamt of its existence. The impenetrable barrier the Chinese were always anxious to preserve between themselves and the rest of the nations of the Old World renders it quite possible that they should have kept their knowledge of America to themselves, or, at any rate, from Europe. The objection that the art of navigation in such remote times was not sufficiently advanced to enable the Chinese to cross the Pacific and land on the western shore of America is not conclusive, as we have now found that arts and sciences which were once generally supposed to be of quite modern origin, existed in China ages and ages before their discovery in Europe. The arts of paper-making and printing, among others, had been practiced in China long before Europeans had any idea of them. Why, then, should not the Chinese have been equally, or more, in advance of us in a navigation? The stately ruins of Baalbec, with gigantic arches across the streets, whose erection would puzzle our modern engineers, the Pyramids, and other such remains of stupendous works point to a state of civilization, and the existence of arts and sciences, in times of which European historians give no account.

One fact corroborative of the idea that the Old World, or at least some of the inhabitants of Asia were once aware of the existence of America before its discovery by Columbus is that many of the Arabian *ulema* with whom I have conversed on this subject, are fully convinced that the ancient Arabian geographers knew of America, and in support of this opinion point to passages in old works in which a country to the west of the Atlantic is spoken of. An Arab gentleman, a friend of mine, General Hussein Pasha, in a work he has just written on America, called *En-Nessr-Et-Tayir*, quotes from Djeldeki and other old writers to show this.

There is, however, amongst Chinese records not merely vague references to a country to the west of the Atlantic, but a circumstantial account of its discovery by the Chinese long before Columbus was born.

A competent authority on such matters, J. Haulay, the Chinese interpreter in San Francisco, has lately written an essay on this subject, from which we gather the following startling statements drawn from Chinese historians and geographers.

Fourteen hundred years ago even America had been discovered by the Chinese, and described by them. They stated that land to be about 20,000 Chinese miles distant from China. About 500 years after the birth of Christ, Buddhist priests repaired there, and brought back the news that they had met with Buddhist idols and religious writings in the country already. Their descriptions, in many respects, resemble those of the Spaniards a thousand years after. They called the country "Fusany," after a tree which grew there, whose leaves resemble those of the bamboo, whose bark the natives made clothes and paper out of, and whose fruit they ate. These particulars correspond exactly and remarkably with those given by the American historian, Prescott, about the maquay tree in Mexico. He states that the Aztecs prepared a pulp for paper-making out of the bark of this tree. Then, even its leaves were used for thatching; its fibers for making ropes; its roots yielded a nourishing food; and its sap, by means of fermentation, was made into an intoxicating drink. The accounts given by the Chinese and Spaniards, although a thousand years apart, agree in stating that the natives did not possess any iron, but only copper; that they made all their tools, for working in stone and metals, out of a mixture of copper and tin; and they, in comparison with the nations of Europe and Asia, thought but little of the worth of silver and gold. The religious customs and forms of worship presented the same characteristics to the Chinese fourteen hundred years ago as to the Spaniards four hundred years ago.

There is, moreover, a remarkable resemblance between the religion of the Aztecs and the Buddhism of the Chinese, as well as between the manners and customs of the Aztecs and those of the people of China. There is also a great similarity between the features of the Indian tribes of Middle and South America, and those of the Chinese, and, as Haulay, the Chinese interpreter of whom we spoke above, states, between the accent and most of the monosyllabic words of the Chinese and Indian languages. Indeed, this writer gives a list of words which point to a close relationship; and infers therefrom that there must have been emigration from China to the American continent at a most early period indeed, as the official accounts of Buddhist priests fourteen hundred years ago notice these things as existing already. Perhaps, now, old records may be recovered in China which may furnish full particulars of this question. It is, at any rate, remarkable and confirmative of the idea of emigration from China to America at some remote period, that at the time of the discovery of America by the Spaniards, the Indian tribes on the coast of the Pacific, opposite to China, for the most part, enjoyed a state of culture of ancient growth, while the inhabitants of the Atlantic shore were found by Europeans in a state of original barbarism. If the idea of America having been discovered before the time of Columbus be correct, it only goes to prove that there is nothing new under the sun; and that Shelley was right in his bold but beautiful lines: "Thou canst not find one spot whereon no city stood." Admitting this, who can tell whether civilization did not exist in America when we were plunged in barbarism? and, stranger still, whether the endless march of ages, in rolling over our present cultivation, may not obliterate it, and sever the two hemispheres once again from each other's cognizance? Possibly, man is destined, in striving after civilization, to be like Sisyphus, always engaged in rolling up a stone which ever falls down.

Effects of Hashish.

This drug, the *Cannabis Indica* of the U. S. Pharmacopœia, the resinous product of hemp, grown in the East Indies, and other parts of Asia, is used in those countries to a large extent for its intoxicating properties, and is doubtless used in this country for the same purpose to a limited extent. Its effects, although perhaps similar in some respects upon all who take it, yet vary considerably according to the constitution of the individual, condition of mind and body, etc., at the time of its administration. A writer in *Appleton's Journal* gives his personal experience of its effects as follows:

"I have often taken the drug, rather for curiosity to discover what its attractions might be, than for aught of pleasurable excitement I ever experienced. The taste of the potion is exactly what a mixture of milk, sugar, pounded black pepper, and a few spices would produce. The first result is a contraction of the nerves of the throat, which is anything but agreeable. Presently the brain becomes affected; you feel an extraordinary lightness of head, as it were; your sight settles upon one object, obstinately refusing to abandon it; your other senses become unusually acute—uncomfortably sensible—and you feel a tingling which shoots like an electric shock down your limbs till it voids itself through the extremities. You may stand in the burning sunshine without being conscious of heat, and every sharp pain is instantly dulled. Your cautiousness and your reflective organs are painfully stimulated; you fear everything and everybody, even the man who shared the cup with you, and the servant who prepared it; you suspect treachery everywhere, and in the simplest action detect objects the most complexedly villainous. Your thoughts become wild and incoherent, your fancy runs frantic. If you happen to exceed a little, the confusion of your ideas and the disorder of your imagination will become intense. I recollect on one occasion being persuaded that my leg was revolving upon its knee as an axis, and could distinctly feel as well as hear it strike against and pass through the shoulder during each revolution. Any one may make you suffer agony by simply remarking that a particular limb must be in great pain, and you catch at every hint thrown out to you, nurse it and cherish it with a fixed and morbid eagerness that savors strongly of insanity. This state is a very dangerous one, especially to a novice; madness and catalepsy being by no means uncommon terminations to it. If an assembly are under the influence of the drug, and a single individual happen to cough or laugh, the rest, no matter how many, are sure to follow his example. The generally used restoratives are a wineglassful of pure lemon-juice, half a dozen cucumbers eaten raw, and a few puffs of the hookah; you may conceive the state of your unhappy stomach after the reception of these remedies. Even without them you generally suffer from severe indigestion, for, during the intoxication, the natural hunger which the hashish produces excites you to eat a supper sufficient for two days with ordinary circumstances.

How to Make Paper Transparent.

Artists, architects, land surveyors, and all who have occasion to make use of tracing paper in their professional duties will be glad to know that any paper capable of the transfer of a drawing in ordinary ink, pencil, or water colors, and that even a stout drawing paper, can be made as transparent as the thin yellowish paper at present used for tracing purposes. The liquid used is benzine. If the paper be damped with pure and fresh distilled benzine it at once assumes a transparency, and permits of the tracing being made, and of ink or water colors being used on its surface without any "running." The paper resumes its opacity as the benzine evaporates, and if the drawing is not then completed, the requsite portion of the paper must be again damped with the benzine. The transparent calico, on which indestructible tracings can be made, was a most valuable invention, and this new discovery of the properties of benzine will prove of further service to many branches of the art profession, in allowing the use of stiff paper where formerly only a slight tissue could be used.

Annual Exhibition of the Montgomery County and East Pennsylvania Aggricultural and Mechanical Society.

The annual exhibition of this association is announced. It will be held on the grounds of the society, near Norristown, Pa., on Thursday, Friday, and Saturday, September 23d, 24th, and 25th, 1869. The book of entries will be open at the office in Norristown, on and after Tuesday, the 11th day of September. Exhibitors must have their articles and animals entered on the Secretary's book, on or before Thursday evening, September 23d. Where partners or firms exhibit as such, each member of the firm who attends as an exhibitor, must have an exhibitor's ticket.

Communications may be addressed to A. S. Hallman, corresponding secretary, Norristown, Pa.

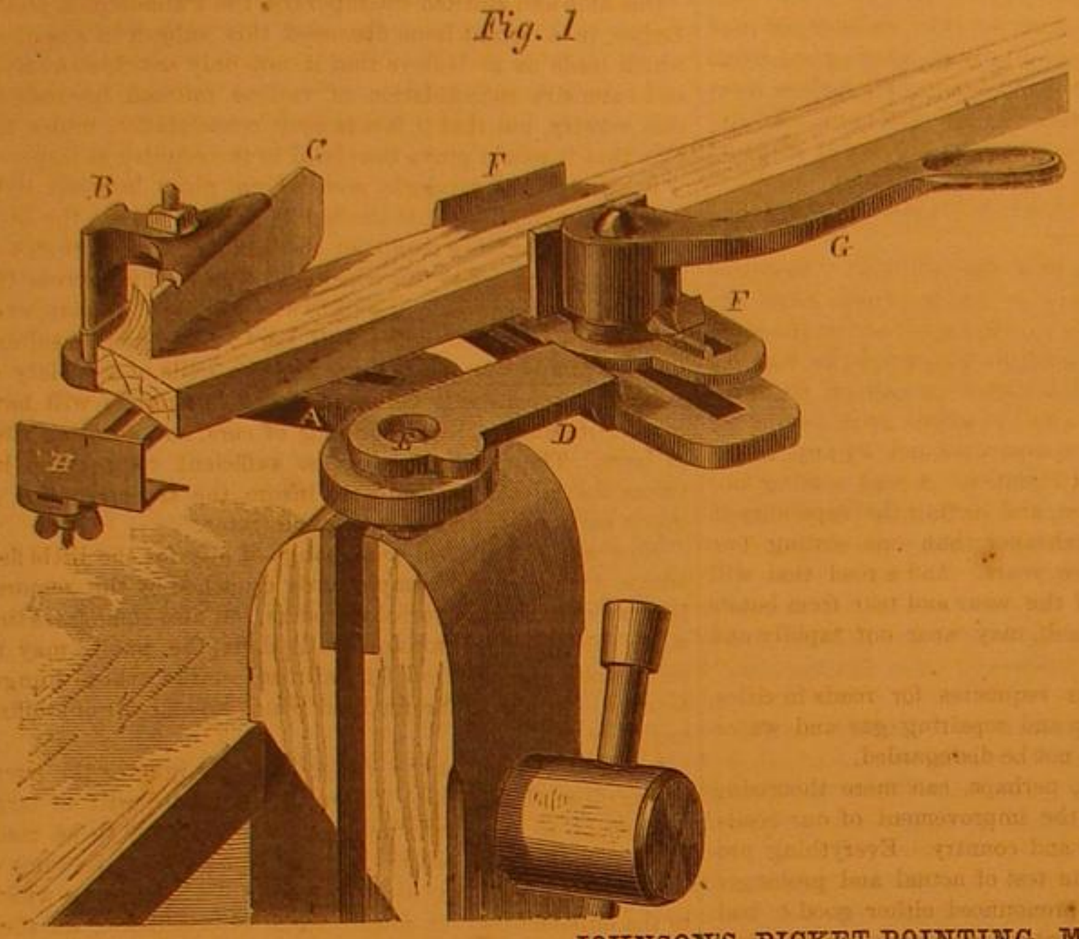
FIXING COLORS ON TEXTILE FABRICS.—Solutions of iron, copper, manganese, or chromium, either pure, singly, or mixed together, or in conjunction with coloring matters, are by this process employed for printing on textile fabrics, which consist of wool and cotton, wool and thread, goat's-hair and cotton, etc., and on all other tissues composed of a mixture of textile, vegetable, and animal matters, either by means of the cylinder printing machine or otherwise, the process being the same as that for printing thread tissues, thread and cotton, or cotton. The fabrics are allowed to oxidize after the application; the oxidation being completed by subjecting them to an alkaline or bichromate bath. The advantages of the application of this system to the tissues named, is that the colors or tints obtained are unchangeable either by the action of light or washing.

Improved Picket-Pointing Machine.

The object of this invention is to point the ends of pickets or fence-palings, and to cut circular sides or edges on other wood-work; and it is one of the most simple and perfect working devices lately brought to our notice. It not only does its work rapidly but in the most perfect manner, and in the adaptation of ends to means, displays much more ingenuity than is commonly met with in machines of a similar character.

It consists in attaching an ordinary carpenters' plane-bit to an iron frame, on which is pivoted an arm for holding the picket, or other article of wood, in such a manner, that by turning the said arm on its pivot with the picket, the plane-bit shall cut one side near the end in an arc of a circle at one movement. By this means pickets may be pointed or dressed to shape at the ends with great expedition and accuracy, and with a saving of much of the labor expended in the ordinary manner of performing this kind of work.

Fig. 1



JOHNSON'S PICKET-POINTING MACHINE.

The machine is held firmly by a lug either in a vice as shown in Fig. 1, or wedged in a notch on a bench. The lug is attached to, and supports the bed-plate, A, Fig. 1. On one side of the bed-plate, A, is secured an adjustable clamp, B, in which is held a plane-bit, C, having its edge in a vertical position; and on the opposite side of the bed plate a swinging arm, D, is pivoted at E, to turn horizontally, with a sliding and adjustable clamp, F, operated by an eccentric lever, G, for holding pickets of different sizes, placed in the clamp as shown. In front of the plane bit, C, is placed an adjustable slide or gage, H, against which the end of the picket is placed while it lies in the clamp, F, to regulate the pointing or cutting of the plane bit.

When the picket is thus placed in position as shown, it is held tight in the clamp, F, by the lever and eccentric, G, and then by drawing the outer end of the picket, which now acts as a lever, towards him, the operator swings it around with the arm, D, on the pivot, E, so that the side of the picket near the end, is brought against the edge of the plane bit, and cut in the arc of a circle. The operation being repeated with the other side of the picket, the work is accomplished.

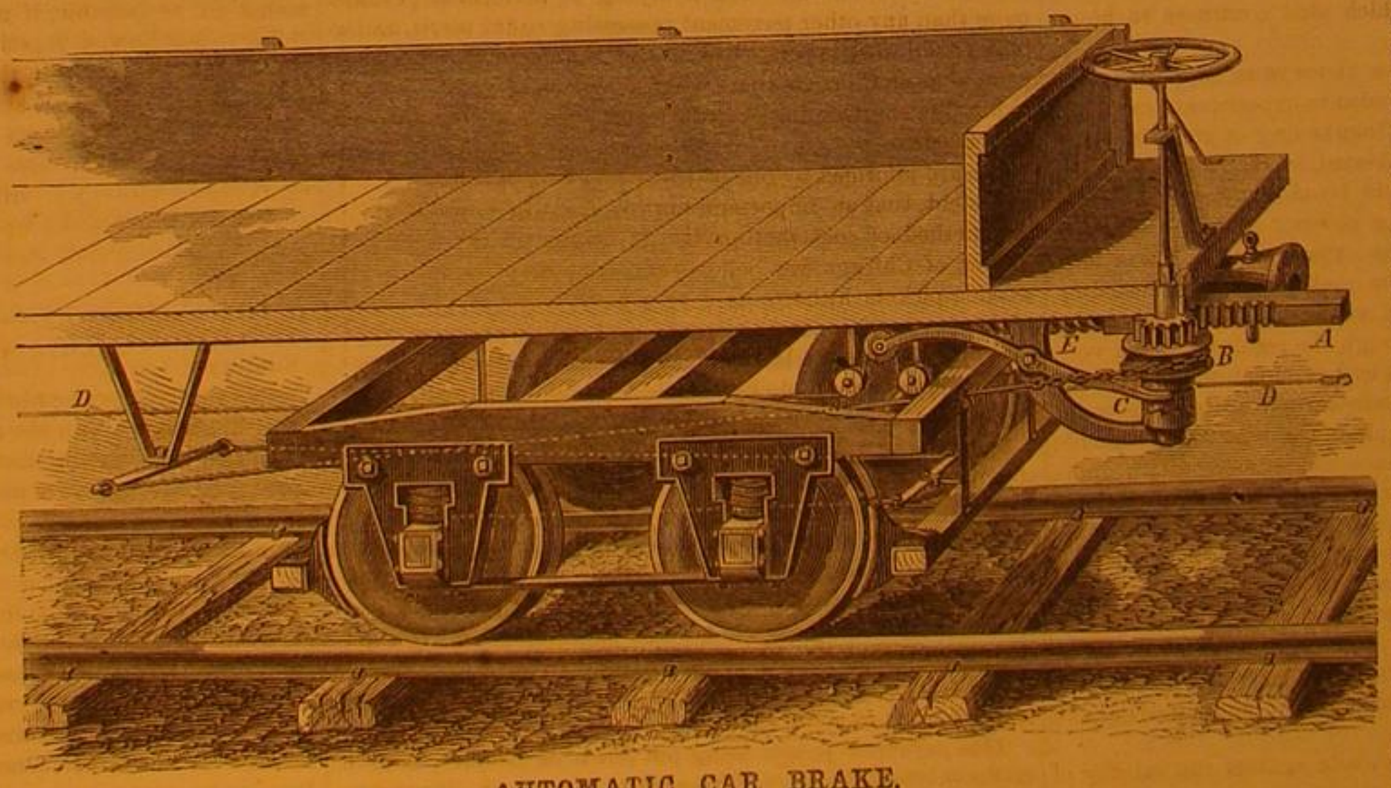
Figs. 1 and 2, respectively, exhibit applications of lumber cut in this form to fences and eaves. Patented Jan. 14, 1868, through the Scientific American Patent Agency. For particulars address W.W. Johnson, Nashville, Tenn., who will sell the right for all the States except Georgia and Tennessee.

Automatic Car Brake.

The object of this invention is to place the whole line of brakes throughout a railway train at the disposal of the engineer, and to employ the reverse motion of the engine in case of emergency, or its resistance to the onward motion of the train when slowing up, to operate the brakes at the will of the engineer. At the same time it is not proposed to dispense with brakemen on fast trains, or to do more than to add to the safety of such trains by securing prompt and efficient action of all the brakes in times of peril.

The apparatus is simple and cheap, does not demand any change in the present construction of cars or locomotives, and is controlled by the engineer through the medium of a small cord running from the locomotive back under the entire train.

Its construction and operation will be readily comprehended by referring to the accompanying engraving. A is a bar of iron lying parallel to the longitudinal axis of the car, with a rack upon one side, which engages with a stout pinion attached to the break wheel shaft. The chain pulley, B, has a clutch attached to its under side, which clutch is operated by a collar and the lever, C. The end of the lever C remote from the clutch bar has a small pulley attached to it over which the cord, D, runs. The cord also passes under two fixed pulleys as shown in the engraving, so that when drawn tight it depresses the end of the lever C, and raises the clutch out of gear. In this position the brakes do not operate and the train may be backed. In going ahead the clutch is dropped into gear and the breaks operate as follows: When the engine is checked in its onward motion, the first car to the rear presses checked in its onward motion, the first car to the rear presses the end of the bar, A, against the rear of the tender. The bar yields to the pressure, and imparts motion through the pinion to the brake wheel shaft, the chain is wound up, and the brakes are put on. This car being thus checked in its motion, the next in order approaches it, and the same operation is repeated with it, and so on successively throughout the entire train. As soon as the engine increases its speed, the pressure on A, is relieved, a coiled spring, E, thrusts out the bar, A, to its original position, when the speed of the car to which it is attached increases and throws off the brakes on the car behind it, and so on successively throughout the train. The apparatus acts entirely independent of the buffers, and is simple and strong. It would seem to supply a means for breaking up a train with certainty and rapidity. Patented by Inglis Walker, 7 Congress street, Lynn, Mass., to whom communications may be addressed.



AUTOMATIC CAR BRAKE.

The Fourth Louisiana State Grand Fair.

This Fair will be held in the city of New Orleans, in 1870, commencing on Saturday the 23d day of April, and will continue nine days. The aim of the directors, is to afford facilities for the display of all products of industry and ingenuity, and they express the determination to make this fair as popular as any ever held in this country.

Those who are desirous of giving special premiums, must notify the Secretary, Luther Homes, Esq., office of Mechanics Institute, New Orleans, as soon as possible, and not later than the 1st day of November, 1869, so that their names and premiums offered may be published in the premium catalogue which is to be printed and ready for distribution by the 1st day of December next. This exhibition will doubtless be one at which a large proportion of American industry will be represented.

Fig. 2

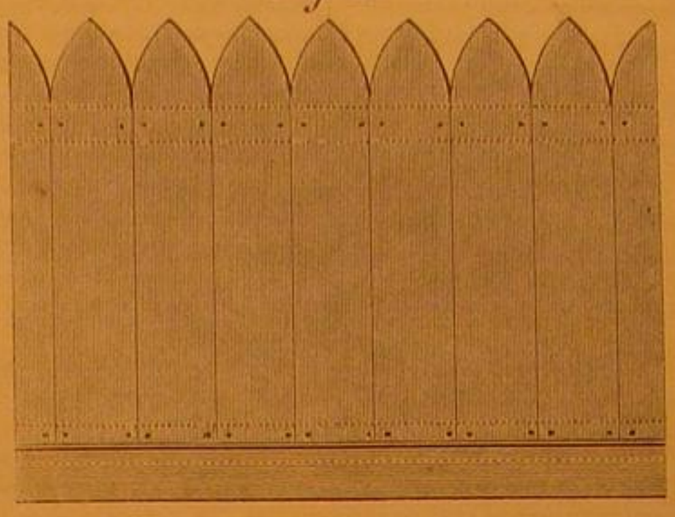
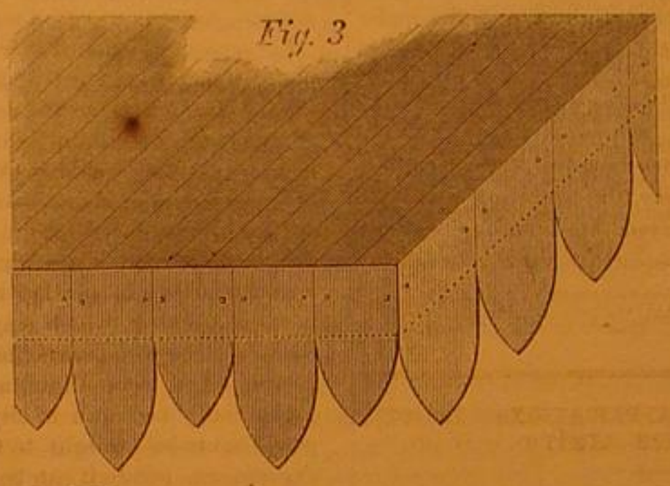


Fig. 3



Exeter-Change.--A Spice of English Humor.

Exeter Change is the name of a humorous take-off on the British Association which meets this year at Exeter. As the scientific journals and the *savans* take the joke in good part and are enjoying a general side-shaking over the many capital hits made, we may as well also enjoy our quiet laugh over the following extract from a paper "On the Alcoholic Compound termed Punch," by John T—n d—ll, LL.D., F, R. S.—It has a capital imitation of the style of a certain eminent lecturer and physicist. Let us content ourselves with the last two paragraphs—

"Experiment has proved that the juice of three or four lemons, and three quarters of a pound of loaf-sugar dissolved in about three pints of boiling water, give saporous waves which strike the palate at such intervals that the thrilling acidity of the lemon-juice and the cloying sweetness of the sugar are no longer distinguishable. We have, in fact, a harmony of saporific notes. The pitch, however, is too low, and to highten it, we infuse in the boiling water the fragrant yellow rind of one lemon. Here we might pause, if the soul of man craved no higher result than lemonade. But to obtain the culminating saporosity of punch, we must dash into the bowl, at least, a pint of rum and nearly the same volume of brandy. The molecules of alcohol, sugar, and citric acid collide, and an entirely new series of vibrations are produced—tremors to which the dullest palate is attuned.

"In Punch, then, we have rhythm within rhythm, and all that philosophy can do is to take kindly to its subtile harmonies. It will depend in some measure upon previous habits whether the punch when mixed will be taken in excess or in moderation. It may become a dangerous ally of gravity and bring a sentient being to the gutter. But, on the other hand, it may become the potent inner stimulus of a noble outward life."

Steel.

A piece of good steel is an almost priceless treasure, because tools are an indispensable requirement. Yet make steel as carefully as possible, you cannot always rely upon its uniform quality throughout the same piece. Outer indications are often unreliable, and even breakage revelations refer but to the point of fracture. In forging steel the secret is the temperature. Too high or too low will ruin all; and this temperature must vary with the kind of steel required. Therefore cheapness should never be sought as the chief good. Blistered and shear steel want more heat than cast steel; the greater the amount of carbon, the lower must be the heat at working, and yet the harder is the labor. Good forging is as important as good material. After cooling, the hammering should be very light, or internal fracture will be set up, not homogeneity. Let the blows fall in one direction; certainly not at right angles to each other, so as to destroy the grain. Burned steel may be brought round by heating hot and quenching in water repeatedly. In tempering, great care is needed. Forging tempers, and a less heat will then suffice. This hammering is better as a commencement, than hardening direct from the annealing oven.

At the International Pharmaceutical Congress, to be held in Vienna in September, one of the topics for discussion will be the formation of a universal *Pharmacopœia*; the object being to put an end to the inconveniences which sometimes arise from compounding prescriptions in a foreign country with medicines prepared according to a *Pharmacopœia* different from that in use in the country of the physician by whom the prescription was written.

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HAVE THE MECHANICAL APPLICATIONS OF STEEL REACHED THEIR LIMIT?

The great number of the useful applications of steel in the arts, which characterize the present age, have given to it the appropriate title of the "Age of Steel." It has been commonly predicted that the number of uses to which this metal can be put will be largely extended, and that iron will eventually give place to steel on railways, in bridge construction, and in many other important applications.

Sir William Armstrong in his recent address to the mechanical engineers at Newcastle, made some statements upon this subject that will attract the attention of the mechanical world, and will not probably pass unquestioned by those who are perhaps not less authorities on the subject than even Sir William Armstrong himself.

The conclusion at which he arrives is, to use his own language, "that although steel has a much greater tensile strength than wrought iron, it is less adapted to resist concussive strain." This conclusion is based upon the assertion that "the vibratory action attending excessive concussion, is more dangerous to steel than to iron," and also upon "the want of uniformity in steel, which still continues to be an objection to its use."

It must be admitted that these views were supported with much ability. The speaker alluded to experiments made by him some years since, on the toughening of steel in large masses by plunging it, when heated, in oil, from which he was led to expect that he would be able to produce armor plates of extraordinary resisting power. An armor plate of steel was made specially for the experiments, and was tempered in a large bath of oil. Its quality was then tested by cutting off pieces, bending and subjecting them to tension. The speaker asserted that although the result showed a very high tensile strength, combined with so much toughness that he was unable to match it by any sample of iron he could compare with it, yet when the plate was sent to Portsmouth for trial in the fullest confidence of its success, two shots from a 68 pounder sufficed to break it in various directions, and it was justly pronounced a failure.

Here then we are presented with an anomaly. The best and only tests which are available to the iron master, in order to prove the strength of iron and steel, having demonstrated the great strength and tensile power of the steel in the armor plate described, it utterly failed under a trial that an iron plate of similar dimensions would undoubtedly have withstood.

Now, whatever plea may be made against the validity of the preliminary test, will not avail to controvert the fact that steel is not understood, and in that fact we find, if not the proof that Sir William Armstrong is wrong in opinion in regard to the limit of the availability of steel, at least the ground for the hope that he may not be right.

There are yet unpenetrated mysteries in the nature of this wonderful material, which, notwithstanding the unremitting efforts of investigators, still elude their grasp. Even the nature of the common process of tempering is, as yet, a matter of theoretical discussion, about which absolutely nothing is known positively. To entertain the belief which Sir William Armstrong avows, and in which he is partially backed by *The Engineer*, is to entertain the unwelcome idea that the limit of knowledge in this field is reached.

The mind of most scientists would shrink from such a conclusion; the progress made in the manufacture of steel within the last decade forbids it; and the name and fame of the man who thus avows it, will fail to add weight enough to his views to lead to their extensive adoption.

WOOD AND CONCRETE PAVEMENTS.

That the days of the barbarous cobble-stone pavements, and of all other roadways approximating to them in character, are numbered, must, we think, be evident to every careful observer. This is an age of progress, but it is an age which favors smooth and rapid progress, and is intolerant of jolting and jarring. It has sickened of the intolerable nuisance of stone blocks and cobbles, and now demands something that will exact less of man and beast and vehicle, and it will get what it wants by and by.

The construction of good and durable roads is no easy problem, especially in a climate like ours, where giant frosts annually get under the surface and upheave it, unless some adequate means can be devised to prevent them. To dig down below the reach of frost, and carry up a solid structure to the surface as in a foundation for a building, would, of course, do away with this difficulty; but it introduces another, even worse—enormous expense.

The problem may, perhaps, be stated as follows: Required to make a roadway impermeable to water (which alone renders the action of frost destructive to roads), and at the same time sufficiently thick and strong to withstand the heaviest traffic for a reasonable period of time; smooth on its upper surface, but not so hard as to fail to afford good footing for horses; and *cheap*. But cheapness does not by any means mean small outlay in the first instance. A road costing four dollars per square yard at first, and having the capability to endure for twelve years, is cheaper than one costing two dollars, and lasting only three years. And a road that will transfer a great proportion of the wear and tear from beasts of burden and vehicles to itself, may wear out rapidly and still be a very cheap road.

There are also some minor requisites for roads in cities, such as facility in getting up and repairing gas and water-pipes and sewers, which may not be disregarded.

In no field of construction, perhaps, can mere theorizing be less relied upon than in the improvement of our roads, proverbially bad both in city and country. Everything proposed must be brought to the test of actual and prolonged experiment, before it can be pronounced either good or bad. Hence it is impossible at present to pronounce intelligently upon the merits of many new claimants upon public favor. And in the cases of many of those which have been for some time under trial, it is equally difficult to decide, as the circumstances under which they were tested have been in many cases the worst possible, and in no manner of accordance with the intentions of their originators.

Thus the *American Builder* informs us that "The manner in which the wooden pavements are being put down this season in Chicago is enough to make the dead inventor of the Nicolson pavement laugh in his coffin. Indeed it is a ghastly joke. To avoid paying an honest and just royalty, the city authorities are compelling the sorely taxed people to throw their money away."

The Nicolson pavement, if not the most durable, is certainly the most agreeable of roads, but we insist that in very few instances have its promoters been able to secure for it anything like a fair chance. Its durability depends upon the manner in which the work of laying is performed perhaps more than any other pavement possessing equal merit, and so long as the work is performed as the *Builder* states it is now being done in Chicago, there will not be lack of those who will saddle the shortcomings of contractors upon the character of the pavement.

We are informed by one of the promoters of the Nicolson pavement, that an important improvement has been made in the method of constructing it. It originated with Mr. De Golyer, of Chicago, we believe, and consists of replacing the wooden pickets hitherto used to separate rows of the blocks, with a layer of concrete rammed as hard as possible. This supports the blocks laterally in a much more efficient manner than was attainable by the old method, and greatly adds to the durability of the pavement.

We believe that experiment will ultimately lead to the construction of concrete roads which will answer all the requisite conditions.

In fact, some statements made in regard to the Scrimshaw pavement, if they are to be relied upon, would seem to give hope that this ultimatum has already been reached. We are informed that this pavement has been tried in Portland, Maine, on a piece of road exposed to very severe wear from heavy trucks used to carry large blocks of granite, and has stood the test of wear and weather for eight years.

This pavement is now being put down on Bedford avenue, in Brooklyn, and also in Fifth avenue, New York. It consists, first, of a foundation of stone laid like the cobble or block pavements. The earth and sand being carefully swept from the interstices of these stones, a layer of gravel and asphalt mixed with coal ashes is spread over the surface, and the whole rolled down with heavy rollers. Successive coats of fine gravel, asphalt, and coal ashes complete the work. Each coat is heavily rolled down as applied; and the road when finished has an elegant appearance, and is delightful to drive over.

The method of laying the concrete upon the old pavement without previously relaying it, is, we think, not likely to prove so efficient as when the stones are relaid, although on account of diminished expense it is done in some instances.

Per contra to the above favorable statements in regard to the Scrimshaw pavement, we hear rumors of unsatisfactory results in Montague street, Brooklyn, where it has been recently laid, and some assert that no such results as the above, given on the authority of the committee, appointed to investigate the merits of the Scrimshaw pavement previous to its adoption in Bedford avenue, can be realized.

Without crediting or discrediting the statements put forth in regard to this pavement, we shall patiently await the result of the experiments now in progress and, while we yet prefer the Nicolson pavement when properly and honestly laid, to any road we have yet seen, that does not prevent us from hoping and expecting something which will prove an advance on anything yet devised for American roads.

RAILWAY CONSOLIDATION.

Our able and spirited cotemporary, the Philadelphia *Public Ledger*, in a recent issue discussed this subject in a manner which leads us to believe that it not only anticipates rapid and extensive consolidation of various railroad interests in this country, but that it favors such consolidation under the plea that it would prove beneficial to the country at large.

It sees in the struggle, now taking place between rival lines, the indications that the big fish are to eat up the little ones, and, in an able review of the various railway routes of the country, comes to the conclusion that in this process the traveling and commercial public will be great gainers, even though the little fish suffer. It says: "By thus consolidating the companies, the expense and the evils of a variety of managing boards will be avoided, and the public will have greater regularity, less changing of cars, and uniform rates of fares. There will probably be sufficient competition between the great companies to insure the transportation of goods and passengers at reasonable rates."

Now we not only feel some pangs of pity for the little fish, whose bones are so complacently crunched by the remorseless jaws of more powerful monsters, but also some fears that when the supply of minnows falls short, the public may itself become the food of fat railroad sharks, whose hunger seems to be of that chronic kind which no amount of stuffing can allay.

It seems to us that the *Ledger* entirely ignores the great power of combination, or the plainly-indicated will of large capitalists to combine whenever there is money to be made by it. Though the railway kings of the present are, some of them, fighting among themselves with a bitterness which, to the outside observer, might seem irreconcilable, let them see how some millions might flow into their coffers by united movement, and you shall see them to-morrow as loving as brothers. So well is this understood on Wall street that in the last great Erie fight no one would have been surprised at a *denouement* which would have exhibited the principal contestants as partners in some deep game for the mutual interests of both.

It is difficult to see how the reduction of the number of rival interests could reduce competition, as the *Ledger* seems to think it would. This view seems to us as altogether opposed to both experience and the general law of supply and demand. How has it been with the great express companies? Has competition reduced their rates or has combination enabled them to maintain prices at a high standard? We do not at present see how such combinations can be prevented; but, at the same time, we are far from deeming them desirable. With the facilities afforded for manipulation by our present railway system, almost anything surprising seems to be possible, if not probable. It is a very difficult thing to see how a repetition of the extraordinary transactions which have within the last two years so astounded the world can be prevented at any time the "kings" again will it, unless some means can be devised to prevent consolidation. Let these men once secure full control of the great trunk lines and their tributaries, and with it the power to enforce their demands upon the commerce of the country, and who doubts that those demands would be despotically exorbitant?

GRANTS versus PATENTS.

We believe it was proposed recently, by Lord Stanley, to substitute grants from the national purse, instead of allowing patents for new and meritorious inventions. His lordship appears to have forgotten the fact that this system of grants was tried a century ago in England and abandoned. It encouraged imposture and gave no advantage to the public, as can be shown by reference to some examples. One Johanna Stevens obtained $25,000 for disclosing the secret of her cure for the stone. A Mr. Blake got $12,500 to assist him in perfecting his scheme for transporting fish to London by land; while a Mr. Foden was greatly overpaid with $2,500, to enable him to prosecute a discovery made by him of a paste as a substitute for wheat flour. If we mistake not, the British Parliament granted a considerable sum of money to pay Lady Webster for divulging the secret of her celebrated dinner pills, which were made up of aloes, mastic, red roses, and sirup of wormwood. The pills, perhaps, afforded a very comfortable relief to aristocratic gourmands, who, no doubt, were astonished to find of what simple elements they were composed.

Give a man a sum of money for his invention and you run the risk of paying him either too much or too little. Give him a patent and you secure the invention for the public, while his remuneration in money is determined according to its value. If the invention enrich him, it must also have benefited the nation. If the invention be a delusion, the public suffers no loss and the patentee reaps no gain. As a means for providing that the reward shall be fairly apportioned to

the service rendered, and shall be paid by those who profit by it, the grant of Letters Patent takes precedence of any arrangement hitherto made, and of every proposition yet advanced.

WHAT IS MATTER?

The author of "More Light: A Dream in Science," has published a treatise purporting to answer that, in our opinion, never-to-be-humanly-answered question, "What is Matter?" We have always denounced speculation upon topics which we believe to lie beyond the boundary of physical inquiry; believing that scientific methods cannot be applied to such investigation, if that may be called investigation, which is nothing more than either conjecturing what may be the causes of existing facts, or deducing a system from a basis of conjecture. Such speculations are generally a patchwork of guesses, with new names for old facts, which only transfer the mystery surrounding the ultimate causes of things.

The best illustrations of this statement we could possibly give are some short quotations from the work in question.

The universe is filled with centers of force; each center the center sphere; each sphere a compound of two spheres, having the same center, one a sphere of attraction, the other a sphere of repulsion.

* * * * *

It is by the separation of these two spheres of attraction and repulsion, and therefore by the calling forth and exercise of their powers by each, that we have the different modifications of matter.

The Divine Mind caused a certain immense, but yet finite, portion of space to be marked off from His immediate presence as a center—a great sphere—of space. This, by some manifestation of His power and presence, was filled with centers of force, the seeds, as it were, of that which was to be known as matter, round each of which two forces, attraction and repulsion, were in abeyance.

If the reader is not disgusted with the absurd and visionary character of these propositions, he will perhaps be interested in their analysis. The propositions may be thus restated. *Matter is force. Force has a Divine origin.* The latter proposition may be considered as foreign to the purpose of the work, which is to tell us what matter is, not from whence it originated.

But somehow the idea that matter is force does not seem satisfactory. We do not get a very good notion of it by calling it force, a term which is as mysterious as was matter before our author had poured upon it the brilliant light of his powerful intellect.

He would doubtless tell us were we to ask "What is force?" that force is—is—in fact—is matter, which would be perfectly intelligible and satisfactory. We should then have got to the ultimatum, and further inquiry would be superfluous.

We are not surprised at the severe lashing this book has received from the reviewers. Dreamers in science are out of place in the present age. The world does not need or want them. Dreaming and speculation are not just now in favor. There is too much work to do, to waste time and thought in such futile occupations.

DIVERSITY OF SPRINGS AT SARATOGA---NEW DISCOVERIES.

The visitor for the first time at Saratoga invariably expresses surprise at the great number of springs he finds there, and the variety of mineral ingredients analysis shows the waters of the different springs to contain. For many years waters from the Congress and Empire springs have been very widely known for their medicinal qualities, and an extensive business in bottling and shipping to all parts of the world has been profitably carried on. But how few, except visitors at Saratoga, have ever heard of the score and more of other springs within a radius of two miles, each possessing chemical ingredients in every case, varied in quantity, and generally very unlike in quality. Within a few yards of each other one spring produces a cathartic water, and the other gives a water having astringent properties. In the first no iron can be detected by chemical analysis, in the other particles of the oxide are seen by the naked eye. Every year new discoveries are made and new springs developed. Last year quite a sensation was produced by the discovery of a sulphur spring, and a commodious bathing house, erected after last season closed, has been extensively patronized this year. In removing some rubbish on the site of a barn, which was burnt last summer near Congress Hall, a new spring was discovered, which has been named "Hathorn Spring," after the proprietor of the hotel, by whom it is owned. It has been a favorite water this summer, and is believed by many to be the best cathartic spring yet discovered.

Mr. C. R. Brown, the enterprising jeweler on Broadway, opposite the Congress Spring grounds, has recently discovered a spring which he has named "Crystal Spring," on a valuable plot of ground he recently purchased, between his store and the Columbian Hotel, which he is about to have tested, and by next season the public will be invited to try its medicinal merits.

An analysis has just been made by Prof. Chandler, of the School of Mines in this city, and his report indicates the water to contain some valuable properties not to be found in like proportions in any of the many other springs at Saratoga.

The spring is located in a most central position, within a few feet of Broadway, and is more accessible to most of the hotel visitors than even the Congress. We hope the owner's sanguine expectations as to the value of his newly-acquired possession may be fully realized, and from its location and the analysis of the water, we have no doubt of the great value of the property. A stock company will probably be formed before many months for carrying on the business of bottling on an extensive scale. Any one desiring an analysis of either of the new springs can procure printed copies by inclosing ten cents and addressing Mr. Huling, office *Saratogian*, Saratoga Springs, N. Y.

HINTS ON THE BURNING OF ANTHRACITE COAL.

The burning of anthracite coal requires appliances quite different from those used for the burning of wood, or bituminous coal, but the reasons for these differences, are not well understood by the mass of people who use anthracite, and as we are constantly receiving inquiries suggested by imperfections in the construction of stoves, furnaces, and heaters, we deem it timely to give some hints on this subject.

In doing this we shall necessarily be obliged to repeat in substance much that we have said in former seasons upon the same and kindred subjects, but the importance and practical nature of the topic must be our excuse.

The temperatures at which different kinds of fuel ignite, vary greatly, and as anthracite is the most difficult to kindle of all the fuels in use in this country, novices in its use often find trouble in lighting it. This can only be done by the use of some more easily kindled fuel, wood or charcoal being generally employed for the purpose. Anthracite coal being a much more dense material than the other fuels named, requires a concentrated and powerful heat to raise it to the temperature at which it will commence to combine with the oxygen of the air. A common fault with those unaccustomed to it, is to use too coarse wood for kindling, and too much of it. This, while it generally succeeds in lighting the coal, leaves a bed of ashes below the coal which interferes with the draft unless raked out; an operation which always retards the combustion of partially ignited coal.

The wood should be of some rapidly burning variety which gives a quick and high heat, and should be split fine. It should be so placed that the coal will remain on the top of it and not fall through to the grate, leaving the kindling on the top of any part of the coal. The amount of kindling wood required depends much upon the size of the coal. A common mistake is to use too large sized coal. A good rule, where stoves or furnaces have a good draft, is to use coal as small as can be used without inconvenience from its sifting too freely through the grate.

Grates should have their bars closely set for stoves that are cleaned out daily, and have fires lighted in them each morning, while those which are intended to have fire kept in them continuously for days or weeks will not admit of fine grates, on account of the accumulation of ashes and small "clinkers."

There is much difference in coal in regard to the formation of clinkers. These are nothing but vitrified, or partially vitrified earthy matters, and only can form when a high heat is maintained; they are apt to be troublesome when there is too great draft. A coal stove or furnace should therefore be so constructed that its draft can be perfectly controlled. The bottom draft should admit of being closed air tight, as nearly as is possible to make it, and there ought always to be provision made for a top draft. If, however, the draft of a chimney should be so strong, that air in too great quantities is drawn in at the bottom when the dampers are closed, a damper in the pipe which will close it partially must be employed, though in sluggish chimneys such a damper is apt to force the gases of combustion into the room, and therefore it ought always to be avoided when possible.

The practice of putting ashes on the top of a fire to keep it, is very productive of clinkers, although it answers the purpose very well in other respects. Damp coal screenings are better, and may be economically burned in this manner.

If a coal fire gets very low, the quickest way to extinguish it, is to rake it at the bottom. To preserve a fire under such circumstances, a little coal should be placed on the fire, and when it has caught more may be added, and the raking deferred until it has got well ignited.

When the fire bricks have become burdened with clinkers which have fused and adhered, they may be cleaned by throwing oyster or clam shells into the fire box when the fire is very hot, and allowing the fire to go out. The clinkers will generally cleave off without the use of much force the next morning. From two quarts to one-half a peck, will be sufficient for most stoves, and the operation can be repeated if some of the clinkers still adhere.

In a subsequent article we shall say something on the proper regulation and adjustment of apparatus for warming buildings by hot air

GAS FROM THE LIGHT HYDROCARBONS.

We notice a description of a new(?) gas machine in the *Mechanics' Magazine*, of Aug. 6. This machine is described as being of any size desired, within certain limits, and the journal alluded to, considers it as an improvement upon anything hitherto known or employed in this direction.

Some of our American inventors will have a hearty laugh over this, when they read the description of the apparatus, the principle of which has been unsuccessfully tried over and over again in this country, in various forms, including the one described. The machine is stated to be "cylindrical in form, having a space between an inner cylinder which receives the charge of rock oil and the outer case. From the charge cylinder the oil exudes slowly into the space referred to, at the bottom of which it is absorbed by a layer of wool. The vapor rising from this oil in the saturated wool furnishes the essential element in the gas to be produced; the only other element is atmospheric air, with which the vapor is diluted. The air, which is only introduced into the machine when the consumption of gas is going on, is regulated in its admission by a piece of machinery actuated by a spring barrel movement, similar to that of a spring timepiece. The pump, which admits the atmospheric air, and the machinery with which it is connected, are put in motion as soon as gas begins to be drawn off, and the process of manufacturing the gas, the mixture simply of the atmospheric air with the vapor of the oil, at once commences and continues self-acting, as long as the charge of oil lasts, and gas continues to be drawn off. The process is beautifully simple, the gas being made instantaneously, without the application of heat, or any labor or attention whatever."

That the action of this machine is a repetition of the experience of many American inventors is evident from the following quotation from the journal referred to.

"The gas, as we saw it produced, was not very brilliant, but experience as to the qualities of the oils used, and practice in the use of the machine, will probably lead to the production of as high a quality as can be desired. According to the inventor's statement, a gallon of oil at 2s. 6d. will produce 1,000 cubic feet of fifteen-candle gas, and a charge of 3½ gallons will burn for 750 hours through an argand burner. The apparatus is adapted for use in houses, shops, theaters, churches, or other public buildings."

It might have been added, that its adaptation to the above purposes yet remains to be demonstrated, and we can promise, that when the oil becomes impoverished by the evaporation of its more volatile portions, or when its volatile character is decreased by a low temperature, the light will be still less brilliant than when exhibited to the editor of the *Mechanics' Magazine*.

Such experiments have had their day in this country, and it is well understood, that the principle upon which they are based is wholly inadequate. Eight years ago we experimented with and tested a large number of similar devices. The results of our investigations were the following conclusions. First, only the lightest of the hydrocarbons will volatilize at, say, 50 degrees, with sufficient rapidity to supply even a few burners with air saturated with hydrocarbon vapor in the proper proportions for illuminating purposes. Second, the oils, even if sufficiently light at first, rapidly become heavier by the consumption of their more volatile constituents, so that only a small proportion can be consumed ere the light begins to deteriorate. Third, if heat be applied to any machine of this construction, even admitting the safety of such an application, the amount of condensation in the service pipes will soon generate a train of evils well known to those who have been "through the mill," and which it is, therefore, unnecessary to specify here.

These difficulties have compelled the abandonment of the principle, and with its renouncement, to the adoption of better plans for utilizing the valuable illuminating properties of the light hydrocarbons.

One of these improvements was recently illustrated and described at length in these columns, and something which shall admit of adjusting the flow of the air to the volume of vapor generated, so that recondensation in pipes can be obviated, will be found an absolute essential to the success of any device for manufacturing gas from the distillates of petroleum.

STARCH AND ITS ADULTERATIONS.

This substance, which is of great importance in the arts, more especially in printing and finishing cotton and linen goods, is often adulterated, and in other respects may be of such a quality as to disappoint the manufacturer. Some inquiries which we have recently received upon this subject will be concisely and fully answered in the following extract from O'Neill's "Dictionary of Dyeing and Calico Printing:

"Starch is a widely-diffused vegetable product; it exists in a vast number of plants, fruits, and trees, and seems to be one of the fundamental bodies of organic life. Its composition is very similar to that of sugar, being a compound of carbon with hydrogen and oxygen, in the proportions requisite to form water. It is extensively used in printing and finishing, but does not in either case exercise any actions of a purely chemical nature; as a thickening it is only a vehicle for conveying the color or the mordant to the fiber; as a finish it is only to give stiffness or fulness to the cloth. But its actions in many cases involve the play of chemical affinities, and should be minutely known. Pure wheaten starch, when closely examined under the microscope, is found to be composed of very small globules. In commerce it is found in a peculiar state of aggregation, incorrectly said to be crystallized; the quality of the starch is often judged and determined by the appearance of these columnar masses called crystals. No other starch but that from wheat takes the same form in drying. It is not prudent, however, to depend too much upon this as a test, for I believe the crystalline character can be communicated to other starches, and that it is not an essential character of wheaten starch, but rather an accidental one, due to a partial decomposition and breaking up of some of the globules, which communicate a gummy nature and adhesive character to the remainder, or to a residue of unremoved glutinous matters. Starch does not dissolve at all in pure water when cold, it mixes up, but then settles down, leaving the liquid clear; it dissolves in hot water, swelling out to a great extent; it begins to dissolve, or the particles to burst, at about 150° F., but color cannot be well thickened at this heat, it must be boiled to get a good result. Starch boiled with acids, or acid liquor, thickens at first but afterwards becomes thin, owing to the destruction of the starch and its conversion into sugar; colors should not, therefore, as a general rule, be boiled until they begin to grow thin again—although in special cases this is prescribed, and is an advantage, but it is usually unnecessary, and likely to injure the color.

"A good wheaten starch is white and clear, has a sweet taste

on the tongue, or at least an absence of bad taste, and, before dissolving in the mouth, shows an adhesiveness to the tongue; when mixed with water it should give a white milky fluid, without any particles of dirt floating on the top, and should settle down quickly, forming a solid hard mass at the bottom of the fluid. As a trial for its thickening powers a quantity may be boiled with water in the usual manner; two proportions should be taken, one thicker than is generally required, and another thinner—for instance, one trial at one pound to the gallon, and both boiled with the usual precautions. The manner in which it behaves on boiling, as well as its appearance when boiled should be observed. A good starch will thicken gradually and evenly throughout, not in lumps; it will keep smooth all the time with only a moderate amount of stirring, and when boiled will be of a clear, transparent, gelatinous appearance—not milky and opaque, nor breaking off short when lifted with a stick. At two pounds per gallon it ought to be pretty stiff while hot, to pour out slowly, and for the most part adhere to the sides of a gallon mug, when this is inverted for a short time; at one pound per gallon it should flow smooth and oily, without appearance of water or breaks in it. When cold, the thick trial should be very stiff, and feel tough and solid in the hand; the skin should be of a tough leathery nature, and no water should be floating about—it will not be so clear as when hot, but still should be partially transparent; the thinner trial should be also of increased consistence, and not show any water; it should be smooth and not containing lumps. There are besides these characters a great number of others, too minute to record, which are combined in forming the opinion as to the quality of a sample of starch. It is a practical question, and nothing but a number of trials, upon all kinds of starches, will enable any one to form a correct opinion upon this matter.

"Starch is sometimes adulterated with mineral substances, as gypsum, sulphate of baryta, or mineral white, China clay, etc. The existence of these substances make a starch boil rough and opaque; they can be discovered by burning some of the starch in a proper manner—if much earthy matter be left as a residue, it will be a sign of adulteration. It is sometimes understood that starch for finishing contains mineral matters, and a proportionable reduction in price is made, but oftener there is only one party cognizant of it; at any rate a starch containing added mineral matter ought not to be used in mixing colors, however good it may be as a finishing starch. Inferior qualities of starch, under the names of seconds, slimes, and hair powder starch, are extensively used in the trade, and may be economically and easily employed in numerous cases; for it is not necessary, in making colors, that a starch as pure as is required for domestic purposes should be used; what is required is a good sound article, free from adulteration, not injured by acids or fermentation, and, if otherwise good, it does not matter whether it be in powder or in crystal, perfect white or a little grayish. Starch is sometimes injured by some of the gluten of the flour being left in it. Such a starch does not keep well, soon goes watery, or putrefies, emitting bad smells. By scattering a little of this kind of starch upon a red hot iron plate the gluten makes itself apparent, by giving off a disagreeable animal smell, like burning woolen, or leather, or the hoofs of horses. This kind of starch has never a good color, and, if in crystals, has a flinty hardness. Good starch does not contain more than ten or fifteen per cent of water; the latter is the largest quantity it should lose in drying, at moderate temperatures."

THE EXHIBITION OF THE AMERICAN INSTITUTE.

The annual exhibition of this association is to be held in the Empire City Skating Rink Building, corner of Sixty-third street and Third Avenue, New York city. The building was opened for the reception of articles and machinery to be exhibited on the 1st September, and is now well stocked with a large variety of things, comprised under the following departments, which will be more fully noticed in subsequent issues of our paper.

1. The Department of Fine Arts and Education, consisting of paintings on canvas, glass, etc., engraving, lithographs, photographs, sculpture, musical instruments, specimens of printing and bookbinding, philosophical instruments, etc.

2. The Department of the Dwelling, comprising apparatus for warming, lighting, cooling and ventilating, cooking stoves, kitchen utensils, carpets, oil cloths, tapestry, cabinet furniture, table furniture, ornaments for parlors, building accessories, mantels, grates, etc.

3. The Department of Dress and Handicraft, including wearing apparel for both sexes, sewing machines, artificial limbs, wigs and hair-work, jewelry, trunks, umbrellas, etc.

4. The Department of Chemistry and Mineralogy—soaps, toilet preparations, acids, leather, furs, india-rubber and gutta-percha preparations, paints, dye stuffs, sugars, confectionery, minerals, ores, apparatus for making gas, natural stones used in building, etc.

5. The Department of Engines and Machinery—machines for making wood, metal, and all tools used by artisans or in factories, not otherwise provided for.

6. The Department of Intercommunication, containing locomotive engines, cars, carriages, wagons, sleighs, models of ocean or river vessels, electric telegraphs, etc.

7. The Department of Agriculture and Horticulture—specimens of plants and flowers, fruits, vegetables, butter, cheese, plows, cultivators, mowers, reapers, churns, cheese presses, hemp, flax, cotton, etc.

Each of the above departments is to be divided into seven groups, articles of like nature being kept together. In addition to this there is the display of the National Association of Wool Manufacturers.

The main building is 350 feet in length by 170 feet in width, giving an area of 59,500 square feet. A new building has been erected at the easterly end of the Rink, 200 feet long by 50 feet wide, for the exhibition of machinery driven by steam. Two engines, of 90-horse power each, furnish the motive power for the machinery on exhibition, among which there are pumps, engines, a file cutter, lathes, planing machines, Merrill's tilt and atmospheric hammer and drop press, spinning machines, steam hammers, a Bullock printing press, Lyall's positive motion loom, and many other of the newest inventions for divers uses. The steam boilers for driving this mass of machinery are located in the rear of the new building. A large blacksmith's forge of new invention is also placed here, and is in constant operation. There are also many minor mechanical improvements on record, which will be noticed more in detail hereafter.

The exhibition is likely to prove a very successful and interesting one, and will doubtless be largely attended.

Editorial Summary.

WARMING CHURCHES BY GAS.—The following method has been patented in England. A brick chamber is made beneath the floor of the building, and a grating is placed over it to allow of the passage of hot air. Beneath this chamber an air flue in connection with the flooring, and covered with an iron grating, is introduced. By these means a current of air is made to pass into the building, and this air is brought into contact with a ring gas burner, which is supplied by an ordinary main by means of a spanner, by which the amount of heat can be regulated. Underneath this ring-burner is placed a small cistern made of fire-clay, filled with water; the heat from the gas burner acts upon the water, steam arises, and this is passed through pumicestone contained in a cylinder above the cistern; the use of this vapor is to moisten the atmosphere contained in the reservoir. Around this is a circular cylinder made of fire-clay, to contain heat. The whole is covered with a dome of fire-clay. This dome is worked by a lever for the purpose of lighting the ring-burner. By these arrangements, it is said that a pure heat, free from smell or smoke, is obtained, and that with a very small consumption of gas.

A NOVEL NUT CRACKER.—Two inventors in England have taken out a patent for cracking palm nuts, in order to remove the shell previously to submitting the kernels to the action of the press for extracting the oil; but it may also be used for the purpose of cracking any other kind of nuts that are required to be cracked in large quantities. A revolving fan is used for producing a blast of air which throws the nut with sufficient force against an iron or metal target to crack them without injuring the kernels. The fan is inclosed in a sheet of iron, or other suitable case, having an entrance passage, provided with a hopper for the introduction of the nuts, and a discharge pipe through which they are driven by a current of air, and discharged against the iron target, by striking which they are broken.

STEAM ENGINEERING AT THE FRENCH EXPOSITION.—We are indebted to the courtesy of William S. Anchincloss, C. E., Honorary Commissioner to the French Exposition of 1867, and author of an able work on "Link and Valve Motions," recently noticed at length in this journal, for a copy of his report on Steam Engineering, as illustrated by the Paris Universal Exposition of 1867. An extract entitled Transmission of Power, published in another column, is one of the many good things we find in this interesting work. It is to be regretted that so limited a number of copies of this report have been published, as the information it contains is of high value to American Engineers. We shall make some other extracts from this valuable report.

TARPAULIN.—A new method for making a durable and useful tarpaulin, consists in boiling gas tar, one hundred, weight, until it becomes hard, and at the same time boiling in a steam-jacketed pot fourteen gallons of Stockholm tar spirit, ten pounds of American resin, and one gallon of resin oil. When these ingredients are completely dissolved, they are mixed together, and in about ten minutes after, two ounces of oil of vitriol are added. This compound is found to preserve tarpaulins, sail cloth, and other fabrics. By the addition of proper pigments it can be made to receive different tints of dark colors, such as reds and browns.

TOOTH BRUSHES.—There has lately been introduced into the market a porous form of vulcanized india-rubber, called india-rubber sponge. It is proposed to substitute this material for bristles in the manufacture of tooth-brushes. A piece of india-rubber sponge is fixed to a handle of bone or ivory, and ridges are formed on the surface of the spongy material. Other brushes are made in a similar manner by fixing spongy-vulcanized india-rubber to a rigid back or handle; or, in some cases, as for horse brushes, a rigid back only is required. In some cases, the spongy india-rubber is checkered or cross-grooved.

POISONING BY CORALLINE.—M. Landrin has reported experiments to the French Academy, tending to show that pure coralline does not exert any poisonous action on the human skin. M. Tardieu rejoins, that the coralline-dyed stockings which he examined, and which did produce such effects, did not contain arsenic, lead, mercury, or other mineral poisons, but he cannot say whether or not the stockings were colored with coralline only. So the question stands in a position of uncertainty as to the real cause of the mischief imputed to this pretty dye.

NEW GAS BURNER.—A new French invention is a gas-burner, the object of which is in part to do away with the flickering of the flame, so as to render the light steady, also to cause a more perfect combustion of the carbon. It consists of a metal piece having several openings, through some of which gas issues, and through the others atmospheric air, which mixes with the gas. It appears to be a modification of the ordinary Bunsen burner.

STEEL FISHING RODS.—It is proposed by an English inventor to make fishing rods of iron, steel, or German silver, instead of pliable wood or cane. He constructs the rods as follows—either in one or several pieces, connecting them together by joints in the usual way or by any other means better adapted for the purpose. He uses either solid or tubular metal with the view to obtaining lightness and flexibility.

NEW PUBLICATIONS.

THE AMERICAN ENTOMOLOGIST, for August, completes the first year and the first volume. It has been admirably conducted, and is worthy of the most extensive support. The present number contains a fine colored plate of the Royal Horned Caterpillar and Moth, life size, together with about twenty other engravings. Commencing with the new volume the work is to be enlarged from 24 to 32 pages, the price remaining the same; namely, $1 a year. Monthly. R. P. Studley & Co., Publishers, St. Louis, Mo.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The quarry property at Cromwell, Conn., is now valued at $100,000. Three years ago it could be bought for $30,000.

Ground has been broken at Portland, Maine, for the construction of the Portland and Ogdensburgh Railroad.

The Supreme Court of Nevada has decided that the telegraph is a branch of commerce, and, as such, is under the control of Congress.

The navigation regulations of the Suez Canal state that the canal will be open for vessels of all nationalities with a draft of less than 24·6 feet.

The quantity of amber lately found at the Kurische Haff in Eastern Prussia, is said to be so great that the market price of the article has fallen.

The new iron bridge over the Cape Fear river, to connect all the railroad lines centering in Wilmington, North Carolina, was opened on the 28th of August.

The Imperial Insurance Company of London has paid $100,000 losses for the whiskey destroyed at the late Philadelphia First street fire, and will soon pay $200,000 additional.

Illinois is to have a new Capitol at Springfield. The plans, specifications, and estimates of the Commissioners have been officially approved. The cost, exclusive of foundation, is limited to $3,000,000.

The colossal bust of Humboldt, which was modeled by Professor Bläser, has been successfully cast in bronze by Howald, in Brunswick, Germany It is intended for New York and will cost about 17,000 thalers.

The English papers complain of the continued emigration of Cornish miners, which is not caused by want of work, but by the low rate of wages paid them. The men who have left are of the best class of miners.

The exhibition of the Pennsylvania State Agricultural Society is to be held in Harrisburgh, opening on Tuesday, the 28th of September, and continuing until the 1st of October. The premium list amounts to $10,000.

The oil excitement at Parker's Landing and about the mouth of the Clarion river still continues to increase. Twenty-three derricks are up on the Clarion county side, and many more on the Armstrong side of the Allegheny.

It is said that the town of Warren, Jo Daviess county, Illinois, offers a bonus of from $2,000 to $3,000 to any responsible person who will go to that town and erect and run a custom steam grist-mill, which is needed in that place.

The dome of the Invalides at Paris, is at last completed, and presents a magnificent appearance, sparkling with gold. It was gilded for the first time by Louis XIV., for the second time by the first Napoleon in 1806, and now for the third time by Louis Napoleon.

A California paper says that 50,000 tuns of wheat were lying in sacks along the banks of the Sacramento river, in Tehama, Butte, Sutter, Colusa, and Yolo counties, on the 1st of August, and that 60,000 more were to follow, making 110,000 tuns as the yield of five counties.

A crib 300 feet long, being one section of the whole length of 900 feet, to be used in the construction of a wharf at North New York, for the Harlem River and Port Chester Railroad, has been towed to its position. The balance of the crib is progressing rapidly, and a steam dredger is constantly at work deepening.

The present production of the White Pine mines is about $86,000 a week, and for the whole district about $100,000 a week. In a month or two the production will be increased to the rate of six millions a year, and the yield for 1870, it is confidently believed, will reach ten million dollars.

A Chicago paper says that there are over 20,000,000 gallons of water consumed daily in that city. It discusses the estimated future consumption and the limited facilities for supplying the demand, and contends that the lake tunnel will be inadequate to supply the city five years hence.

A heavy snow storm prevailed at the summit of Mount Washington, on Aug. 31. The telegraph wires were broken in several places by the ice, which accumulated to the thickness of two inches, or more. The thermometer stood at 28 deg. The *Times* says it snowed in this city on the 1st of September.

The Ames Works, in Chicopee, Massachusetts, are engaged on the bronze fountain for the Central Park, New York. An immense bronze basin is to be cast, which will rest on sixteen columns. The whole is to be octagonal in shape, and a number of curious jets and streams will be worked into the design at various points.

From the annual report of the Street Superintendent of San Francisco it appears that city has 102 miles of paved streets and 253,823 feet of sewerage. The cost of street work from July 1, 1868, to July 1, 1869, has been in round numbers $1,520,000; and the average cost has been nearly a million a year for ten years past.

The State Line Lode, Nye county, Nevada, according to the report of the United States deputy surveyor, is a gold-bearing vein, composed mainly of ferruginous and friable quartz. In many places the entire vein is so friable and crumbly as to be easily removed with the pick alone. A working test of 600 pounds gave a yield of $175 per tun. The improvements on the mine have cost about $2,000 coin.

The following is said to be an excellent imitation of the jet black China varnish for boots and shoes. Dissolve 10 grms. of shellac and 5 grms. of turpentine in 40 grms. of strong methylated spirits, having previously dissolved 1 grm. of extract of logwood, with some neutral chromate of potassa and sulphate of indigo, in the spirits. The varnish should be kept in well stoppered bottles.

New Haven, Conn., is becoming anxious about its water supply. The water is now pumped into the reservoir by water power, wasting ten millions of gallons each day in pumping two and a half millions. The company propose to put in steam pumps, which will enable them to supply a city of two or three hundred thousand inhabitants.

A Belgian has lately had a steamer of diminutive proportions constructed in England. This craft is twenty-four feet long and six feet wide. Her boiler is about the size of a teakettle, and the engine might be put in the

pocket of a great coat. She is said to be a fine sea boat, and has made two or three trips, running from Cowes to Ostend, with great speed. The owner intends to use this little steamer for coasting on the Belgian coast.

The largest span of any truss bridge in the United States is that of the great bridge across the Ohio river at Louisville, which is destined to connect the Kentucky and Indiana shores. The bridge itself will be, when finished (and the engineer in charge expects to turn over his contract for the building some time in November), one of the most splendid structures of the kind in this or any other country. This last span covers three hundred and seventy feet, and is a marvel of engineering skill.

The Philadelphia *Press* says that the miners' strike is spreading throughout the entire coal regions. At Hazleton, Luzerne county, it has assumed a serious aspect. The strikers are laborers employed by the miners to assist them in loading and removing the coal after it has been blasted. On the 23d Aug. they stopped the pumps in all the mines except those of Pardee and Co., and it is understood that work in this mine is also suspended. The sheriff was called upon, and he proceeded to the mines with a *posse comitatus* with the determination of protecting the engineers.

It is a well-known fact that, when it is desirable to cover metals, especially brass or copper, with a strongly-adhering coating of tin, this is usually effected by boiling the articles to be thus coated with an aqueous fluid, to which is added cream of tartar, crystallized protochloride of tin, and some lumps of pure metallic tin. Dr. Hillier states that, instead of this mixture he uses, with very good success, a solution of 1 part of protochloride of tin in 10 parts of water, to which he next adds a solution of 2 parts of caustic soda in 20 parts of water; the mixture becomes turbid, but this does not affect the tinning operation, which is effected by heating the objects to be tinned in this fluid, care being taken, at the same time, to place in the liquid a piece of perforated block-tin plate, and to stir up the fluid during the tinning, with a rod of zinc.

Business and Personal.

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

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; 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 advertisemets at $1·00 a line, under the head of "Business and Personal."

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

S. T. D., of Me.—It will take less power to work a force pump having a feed pipe larger than a discharge pipe, where the capacity of the pump is sufficient to supply the full capacity of the discharge. The reasons are, that atmospheric pressure can only force water through a pipe of given size at a given velocity, no matter how fast your pump is worked. If the pump has not capacity to force out water through the discharge pipe beyond the limit of supply through a feed pipe of given size, the feed pipe need not be enlarged; but force pumps, as a rule, work under more than atmospheric pressure, and consequently will discharge water through a pipe faster than the same sized pipe would supply it under atmospheric pressure. The friction is also less in a large feed pipe. Under the circumstances you describe, where the feed water has to be raised 20 feet and forced through an orifice of 1¼ inches, we think the feed pipe ought to be at least 2 inches. The making the feed pipe of a pump too small is a common mistake. The feed water is raised only by atmospheric pressure, 15 pounds, while a much larger pressure is applied to the plunger of the pump. Under such circumstances the water will not be supplied to the pump with sufficient rapidity to meet the demand. If the water in your pump is forced out with great velocity, you may need to employ a still larger feed pipe to obtain satisfactory results.

J. P. D., of La.—The breaking of inferior qualities of glass in in the manner described is not confined to lamp chimneys, although from the many changes in temperature to which they are subjected, it is more frequent with them. The difficulty is in the quality of the glass, both its composition and the annealing, are frequently at fault. The breaking of these chimney glasses is a great annoyance, and it is to be hoped that some inventor will give us yet a lamp that will not require a chimney. The only way to prevent in any measure this breakage, is to anneal the chimneys yourself before using them by heating them very hot and allowing them to cool slowly, but few have appliances to do this efficiently and without risk to the chimneys.

W. C. T., of Ga.—The crystals you send have no value. They are composed of quartz or silica, which is one of the most abundant and hardest of minerals, and is a constituent of many kinds of rocks. Silica does not melt under the blow pipe or dissolve in water. The dark colored mineral appears to be a form of limestone containing iron and other minerals, and is apparently of no value. It is, of course, impossible to state the exact constituents of a mineral specimen without making a careful chemical analysis.

A. R., of N. J.—The question whether a given amount of heat will develop more steam in a given time from boiling water than from water before it boils, is yet undecided. Dr. Ure thinks that boiling favors the escape of steam. We have never seen, however, any experiments, or recorded results of experiments, which are conclusive on this point. Our own opinion is that should any such experiments be tried no difference would be found.

A. R., of Pa.—The notion that a boiler sustains more pressure at the top than the bottom is an absurd mistake. The reverse is true, as in addition to the pressure of the steam above the water, there is the hydraulic pressure of the water on the bottom. As, however, the hight of the water in a boiler is not generally great, there is not much difference. It is not a fact that all boilers burst at the top.

W. F. D., of N. H.—There would be no very material difference in the amount of friction in water flowing through two pipes of the same size and form, one made of cast-iron and the other of cement. A good cement pipe is as cheap as anything we know of equally efficient. Your other inquiry requires a mathematical calculation, for which you should apply to an hydraulic engineer inclosing five dollars.

J. O. L., of Ill.—We do not know enough of the device you describe to say whether it contains any points of novelty. The idea of propelling a wind wheel by upward currents through a chimney stack is not by any means new, but the method of doing it in this case may be. There is no doubt that a considerable power might be obtained in this way in a tall chimney, but it would be at the expense of the draft.

T. P., of La.—The species of silk worm you ask about, the natural food of which is the foliage of the oak, imported to the southern part of Austria and France from Japan, have not, to our knowledge, ever been brought to this country. Should any of our correspondents happen to know of a trial of this species in the United States, we should be happy to hear from him.

F. K. H., of Ohio.—To make the finest piano finish on walnut chestnut, or other open and coarse-grained woods, it is usual to use a coarse kind of varnish called scraping varnish. A heavy coat of this is laid on the raw wood, and then the surface is scraped with steel scrapers. It is then varnished with a better quality of varnish, rubbed down perfectly smooth with pumice stone, and finally flowed with the best kind of varnish.

E. P. A., of S. C.—The advantages of the hydrostatic press over all others known for certain kinds of work, are enormous power in small compass, with less friction and perfect control, both as to the extent of motion in the platen and the amount of power applied. Your device is not new in principle. A patent would not be granted for it.

C. W. C., of Pa.—The circumstances which compel the removal of your chimney stack so far away from the furnaces are unfortunate, as they will compel you to run your chimney up higher to get the proper draft. We should think thirty feet additional hight would not more than fully compensate for the difference in position.

W. H. C., of N. Y.—Simply exhausting a receiver by means of an air pump, can never give any pressure upon its exterior greater than it sustains at all times, both before and after exhaustion. It simply removes atmospheric pressure from the interior.

S. T. B., of Ga.—One of the minerals you send appears to be a soft conglomerate of quartz and feldspar, of no value. We find gold in the other specimen, and it appears to be gold-bearing quartz which may be valuable. You should have it analyzed.

J. W. C., of Mich.—You can not profitably extract the sugar from cream sirups which have soured.—The cost of binding the SCIENTIFIC AMERICAN in this city is $1·50 per volume.

"Pioneer Maggie."—A correspondent wishes to know the name of the builder of the above-named yacht. We do not know, but Henry Steers, of this city, builds first-class yachts.

W. S. P., of Mass.—The origin of yeast is obscure, like the origin of every other existence. Assuming the existence of a first cause, we maintain that it is not a subject for physical inquiry. Somewhere the mind must stop at a cause uncaused, a subject for faith not demonstration.

E. G. F., of Me.—The crank is to be regarded as a lever only, the fulcrum being the center of the axle, and the resistance being applied at the circumference of the axle, the point of application of the power being the center of the crank-wrist.

Inventions Patented in England by Americans.

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

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,350.—NUMBERING REGISTER.—G. Sickels and J. H. Thorndike, Boston, Mass. August 6, 1869.

HOLDERS FOR THE CHIMNEYS OF GAS BURNERS.—Elliott P. Gleason, New York city. August 6, 1869.

2,378.—MEANS FOR CARRYING OR STORING EGGS.—P. P. Josef, Buffalo, N. Y. August 9, 1869.

2,392.—ADDING APPARATUS.—C. Henry Webb, New York city. August 9, 1869.

2,402.—TREATMENT OF CONGLOMERATES OF CAST IRON, ETC.—T. S. Blair, Pittsburgh, Pa. August 10, 1869.

2,416.—MACHINERY FOR CHARGING GAS RETORTS.—N. O. J. Tinsdale, New Orleans, La. August 12, 1869.

2,425.—EXTRACTING COPPER FROM ITS ORES.—T. S. Hunt, Montreal, and J. Douglas, Jr., Quebec, Canada. August 13, 1869.

Recent American and Foreign Patents.

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

VALVE GEAR FOR STEAM ENGINES.—Charles L. Inslee, New York city, and Wm. H. Inslee, Newark, N. J.—This invention relates to new and useful improvements in valves, ports, and operating devices, whereby it is designed to provide a simple and cheap plan of construction, and a more efficient arrangement of the same for operation, than any now in use. The invention consists in an improved arrangement of steam chest passages and pipes, steam and exhaust balance valves, and operating devices.

TRANSPORTATION CASE FOR PACKING CANS.—Edwin Norton, Toledo, Ohio.—The object of this invention is to provide an improved packing case for the protection of tin shipping cans, such as are used for shipping oil and other substances, and are sent back and forth, both filled and empty, and are thus subjected to damage from careless handling and other causes. The invention consists in a packing case made of wood, or other suitable substance, permanently inclosing the can, and provided with a sectional lid, cover, or door, arranged to open a sufficient space only at the nozzle, to permit of readily filling or emptying the can, the said cover or door, being arranged at any position in the case, to coincide with the nozzle of the can.

IRON MANUFACTURING APPARATUS.—John Coyne, Allegheny City, Pa.—This apparatus consists of a circular carriage arranged to revolve on a circular table, in a horizontal plane, and provided with receiving and discharging molds, which move slowly past the tap of the furnace, and receive the molten metal flowing therefrom, and convey it to the place of discharging as it cools, and from which it is discharged by the dumping of the molds by the attendant.

SHAFT AND POLE HOLDER.—James S. Totten, Lebanon, Ohio.—This invention comprises the application of holding straps of any form or arrangement, when adapted for ready attachment, to the spring bars and shaft cross bars, by buttons connecting the one, and by buckling or looping around the other.

HOSE-PIPE NOZZLE.—Archibald Williscroft, Wilmington, Del.—This invention has for its object to furnish an improved nozzle for hose pipes, which shall be so constructed and arranged that it may be easily and quickly adjusted to throw a larger or smaller stream of water as may be desired.

MILL BURR.—George W. Wilson, Tolono, Ill.—This invention has for its object to enable the burrs of mills to be conveniently and easily balanced to a perfect standing, or running balance, by means of a device simple in construction and easily applied and adjusted.

PEAT MOLD.—Kingston Goddard, Richmond, N.Y.—This invention has for its object to furnish an improved mold for pressing wet peat into bricks or blocks for fuel, which shall be so constructed as to allow the water to escape while retaining the fine particles of the peat.

PLOW.—Edward Wiard, Louisville, Ky.—This invention has for its object to improve the construction of wrought iron, steel, and cast-iron plows, so as to make them simpler in construction and more efficient in use.

PLOW.—Edward Wiard, Louisville, Ky.—This invention has for its object to furnish an improved plow, which shall be so constructed and arranged that various kinds of plow plates may be used with it, according to the particular kind of plowing required to be done.

MANUFACTURE OF ILLUMINATING GAS.—Cleaveland F. Dunderdale, New York city.—This invention relates to a new and important improvement in manufacturing gas for illuminating purposes.

PUDDLING FURNACE.—J. B. Robinson, Duncansville, Pa.—This invention relates to new and important improvements in puddling or boiling furnaces, whereby they are rendered much more durable and more easily managed than such furnaces has hitherto been.

WHEEL HUB.—A. S. Woodward, Pepperell, Mass.—This invention relates to a new and useful improvement in metallic hubs for carriage, wagon, and other wheels, and consists in forming a hollow or shell hub cast in a single piece.

BAG HOLDER.—J. N. Collins, Menasha, Wis.—This invention relates to a new and useful improvement in the method of holding bags for filling with grain or other articles.

DIRECT IRON-PRODUCING FURNACE.—William Griffith, Jr., Pottsville, Pa.—This invention relates to a new furnace for reducing and producing iron directly from the ore by a continuous operation, and has for its object to reduce the expense of, and to economize time during the operation. The invention consists chiefly in arranging a deoxidizing chamber above the welding or puddling furnace, said chamber being heated by the gases that escape from the fire in the said furnace.

PIN CATCH FOR BREASTPINS AND SIMILAR ARTICLES.—Samuel Ayres, Danville, Ky.—This invention has for its object to so construct breastpins and other similar articles, such as badges, etc., that they can be secured to garments by means of an ordinary pin, in a secure manner, and with great convenience.

REVOLVING SPRING GUN.—Charles Bunge, Geneva, N.Y.—This invention relates to a new spring air-gun, which is so constructed that it can be readily set to automatically place a charge into the barrel, or at least in line with the same; it being provided with a reservoir which contains a suitable large number of charges. The invention consists chiefly in the combination of a perforated revolving feed plate with a stationary supply or reservoir chamber, from which, as the feed plate is turned, the balls constituting the charges, are transferred into the apertures of the feed plate.

SPINNING FRAME.—Wm. H. Brothers, Winooski, Vt.—This invention relates to a new spinning jack, which is so arranged that the mule or carriage will receive its motion by automatic machinery, without requiring any personal attention of the operator or attendant. The object of the invention is to do away with the necessity of working the shipper bar for reversing the motion of the mule, and to provide automatic means for changing the motion. The invention consists in the construction of devices for changing and reversing the motion of the mule for imparting to the thread the necessary drawing and twisting motion, and the requisite tension while twisting, and for operating the whole mechanism.

PRINTING TELEGRAPH MACHINE.—Charles T. Moore, White Sulphur Springs, West Va.—This invention consists of a set of sending apparatus, a set of receiving operating apparatus, and a set of apparatus for "calling" the office or station to which the message is to be sent, all conveniently arranged upon a stand, and adapted to work in conjunction with similar machines at all the stations, and capable of communicating with all the stations simultaneously, or with only one, as required.

PLANTING AND CULTIVATING MACHINE.—Nicholas Whitehall, Newtown, Ind.—The object of this invention is to provide a machine capable of planting and cultivating corn or other grain planted in a similar way, which may be readily adjusted to the condition of a planter or cultivator.

NAIL MACHINE.—F. Davison, Richmond, Va.—The object of the present invention is to provide an improved feeding apparatus, whereby the plates will be self-actingly fed in succession from a feed box containing a number of plates; also, an improved arrangement of vibrating feeding apparatus whereby the plates are so presented as to ensure the disposing of a sufficient amount of metal at the wide ends of the blanks and delivery of them to the griping dies to form the heads which are alternately on opposite sides of the griping dies; also an improved arrangement of carrier guides for conveying the blanks from the cutters to the griping dies.

PRESSES FOR COTTON AND OTHER SUBSTANCES.—John Simpson, Chester, S. C.—This invention consists in an arrangement of two followers to be moved toward each other by pinions working into toothed racks upon each end of the followers.

TACHYPODOSCAPH.—Jules Marie de la Rue, Nogent sur Marne, France.—This invention is composed, according to the use for which it is intended, of two, three, or more boats or floats, which are connected together by cross bars, and so held apart as to allow the driving paddle wheels to be fitted between them.

IMPLEMENT FOR HOLDING EARS OF CORN.—Wm. A. Morgan, Brooklyn, N. Y., and T. B. Mosher, New York city.—The object of this invention is to provide a device, by which boiled ears of corn can be conveniently held to the mouth so as not to soil the hands. The invention consists in the construction of a spring clamp, having two pointed jaws and a shank, the jaws having sufficient spring to cause them to fit and hold cobs of different lengths. The spring is also sufficient to prevent the cob from turning loose on the jaws.

EVAPORATOR.—Thomas and James M. Scantlin, Evansville, Ind.—This invention relates to certain improvements in sugar cane, and other evaporators, and has for its object to produce simple action and perfect satisfactory operation.

PLOW COUPLING.—Wm. Reck, Mendota, Ill.—This invention relates to a new device for connecting shovel plows and for allowing their adjustment apart. The invention consists in the use of connecting bars and a connecting clamp and stop.

CAR WHEEL.—C. Delafield, Castleton, and Frank G. Johnson, Northfield, N. Y.—This invention relates to improvements in car wheels, whereby it is designed to provide more elastic, durable, and cheaper wheels than those now in use. The invention consists in an improved construction of car wheels made of metal and wood.

REGULATING APPARATUS FOR WATER TANKS.—J. M. Crose, Lebanon, Ind.—This invention consists in a peculiar arrangement of valves, water recesses, a tilting bar, and balancing weights, in connection with the water tank and supply pump, to be set into motion by a float in the tank when the water falls too low, for closing an air passage to a constantly-moving pump by which the tank is supplied, to cause the said pump to work for filling the tank, and to be operated by the surplus water to cause the pump to cease working, as required by the supply of the water.

APPARATUS FOR BURNING HEAVY CLAY PIPES.—W. Wassall, Wellsville, Ohio.—This invention consists in a semi circular holder for the tube, arranged on rockers, pivoted or otherwise, and adapted for standing on end beside the tube which stands on a board or floor, so that the tube may be tilted into, or with the holder, as the latter is rotated on the rockers to turn the upper end down.

WASHING MACHINE.—Herman Carmer, Sonora, Cal.—This invention consists in an arrangement of a grooved rotating cylinder in a suitable tub and operating mechanism; also the same of a heating furnace for boiling or heating the water in the tub.

CHURN.—J. A. Ham and W. Carpenter, Jr., Barry, Mo.—The object of this invention is to provide an improved arrangement of means for operating a double churn dasher, or agitator, in opposite directions simultaneously: also for removing the operating machinery where access to the interior of the churn is desired.

COMBINED TURN AND SUBSOIL PLOW.—J. C. Gross, Goshen Hill, S. C.—This invention has for its object to improve the construction of the plow for which letters patent No. 27,636 were issued, March 27, 1860 (which letters patent were assigned to Mr. Gross, May 1, 1868), so as to make it simpler in construction, stronger, and more readily and conveniently adjusted for the various purposes to which it may be applied.

MACHINE FOR CUTTING TUBULAR PAPER BOXES.—Joseph Spooner and Ebenezer Spooner, New York city.—This invention has for its object to furnish an improved machine, by means of which tubular paper boxes may be cut from tubular paper rolls conveniently, rapidly, and accurately, and which shall be simple in construction, and easily and conveniently operated.

DITCH GAGE AND SCOOP.—David Gore, Carlinville, Ill.—This invention has for its object to furnish a simple and convenient gage and scoop for forming a groove in the bottom of open ditches for laying tiles, by means of which the groove may be formed accurately, and of the desired form and size, and at the same time at the desired grade.

AX.—Alden H. Jumper, Sunman, Ind.—This invention has for its object to improve the construction of the various kinds of axes, so as to make them more convenient and satisfactory in use.

SELF-WATERING SCRUBBING BRUSH.—A. D. Granger, Talbotton, Ga.—This invention has for its object to furnish a simple, convenient, and effective scrubbing brush, which shall be so constructed as to discharge water upon the floor while being used.

BRICK-PRESSING MACHINE.—J. F. M. Pollock, Manchester, England.—This invention has for its object to furnish an improved machine for pressing brick, which shall be simple in construction, effective in operation, and convenient in use.

ADJUSTABLE THILL COUPLING.—T. H. Andress, Sparta, N. J.—This invention has for its object to furnish an improved thill coupling, which shall be simple in construction, and easily and quickly adjusted to the distance apart of the thill or tongue irons to be attached, and which will hold them securely and safely in whatever position they may be adjusted.

COMBINED PLANER AND CULTIVATOR.—James A. Currie, Xenia, Ohio.—This invention has for its object to furnish a simple, convenient, strong, and effective machine, which shall be so constructed and arranged that it may be readily adjusted for use as a planter or cultivator, doing its work equally well in either capacity.

POTATO DIGGER AND PICKER.—H. M. Smith, Long Branch, N. J.—This invention has for its object to furnish an improved potato digger, which shall be strong, simple in construction, and effective in operation, and which shall, at the same time, screen the potatoes and deposit them in a basket, or other receptacle, suspended at the rear of the machine.

COTTON SEED AND CORN PLANTER.—John G. B. Gill, Chestnut Grove, S. C.—This invention has for its object to furnish a simple and convenient machine, which shall be so constructed and arranged that it will be readily adjusted for planting corn or cotton seeds, or for distributing fertilizers, may be desired.

SYRINGE.—James F. McMillan, Mansfield, Ohio.—This invention relates to a new and useful improvement in syringes, to be used in the practice of medicine and surgery.

WEIGHING SCALES.—John Decker, Sparta, N. J.—This invention relates to a new and useful improvement in scales for weighing, more especially designed for domestic use, and the invention consists in a balance beam, or bar, so marked or graduated that it serves as a measure, and so that each inch indicates one pound weight.

DOUBLE WINDOW.—Stephen, Earl of Mount Cashell, Moore Park, Ireland.—This invention relates to improvements in the windows of dwelling houses and public buildings, whereby the same are made much more effective in excluding cold air in the winter season, as well as insects and reptiles in the summer season, than the ordinary window.

STRAINER AND CUT-OFF FOR CISTERNS.—Samuel Ayres, Danville, Ky.—This invention relates to a new apparatus for straining the water running from a roof into a cistern, and for cutting it off, when it is to be conducted into a garden, or some other place, or to prevent overflowing of the cistern.

GARDEN PLOW.—W. F. Pagett and S. H. Gard, Springfield, Ohio.—The object of this invention is to provide for public use a simple and easily-adjustable instrument to be propelled by hand, which shall answer the purpose of a garden plow or scraper.

VEHICLE.—B. N. Carpenter, Mt. Jackson, Va.—This invention consists in providing, upon the under side of the bar which couples the forward and rear axles of a wagon, and longitudinally of the same, two or more friction rollers, against which the triangular frame, that forms the rear part of the tongue, may play, as the forward axle turns to one side or the other, the arrangement taking the place of a fifth wheel.

WASHING MACHINE.—J. W. Myers, Lyons, Iowa.—The object of this invention is to provide a simple, cheap, and efficient washing machine for washing clothes, and it consists in an arrangement of horizontal grooved rubbing disks, a tub, and operating mechanism.

RIGGING VESSELS.—E. W. Brown, Cambridge, Ill.—This invention consists in an arrangement of vertical rollers around the mast and rigging for spreading the sails, which are connected to the said rollers by drawing them outwardly along the spars as they are unwound from the said rollers, and taking them in by an opposite movement.

ICE CREAM FREEZER.—Wm. Hawkins, Oregon, Mo.—This invention consists in so arranging the cream holders, and the beaters therein, that both shall be rotated, but in opposite directions, and providing the holder with exterior ribs, to keep the ice in motion, and thereby withdraw the heat more rapidly from the cream; also, in other details of construction.

NAIL MACHINE.—John Coyne, Allegheny city, Pa.—This invention relates to improvements in cut-nail machines, designed to provide an arrangement whereby the nippers will be prevented from opening before the gripers do, when the griping cam becomes worn, and, consequently, lengthened in the part which holds the gripers together, thereby holding them in contact longer than when in the original and correct form.

SCREEN PUNCHING MACHINE.—J. Wellington Nesmith, Black Hawk, Colorado.—This invention consists in improved arrangements of a punching roller and grooved roller between which the sheet is passed to be punched, whereby they may be varied, to punch finer or coarser holes; also, whereby the sheet may be readily inserted and removed, so as not to punch the border. The said invention also consists in an improved construction of the punching roller.

TREATING FARINACEOUS SUBSTANCES.—John J. Ridge, St. Johns, England.—This invention consists in subjecting the said farinaceous substances to a roasting or drying process while contained within closed vessels or chambers, surrounded by and maintained under heat, uniformly, for about six hours, to the temperature of boiling water, steam, or otherwise, suitable outlet pipes or passages in the apparatus being provided for the escape of the vapor or gases evolved during the process, the ingredients thus prepared are then to be mixed or incorporated with other substances of an alkaline or saccharine nature in such proportions as may be found necessary for allaying acidity, or otherwise rendering the same soothing or agreeable to the palate. The invention also comprises an improved apparatus for treating the said substances.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUG. 31, 1869.

Reported Officially for the Scientific American.

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94,170.—INGOT MOLD.—George Abel and John Peddler, Temperanceville, Pa.

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94,172.—COMBINED LATCH AND LOCK.—J. H. Allen and John Schwab, Louisville, Ky.

94,173.—ANIMAL TRAP.—James W. Bagby, Northcutt's Store, Ky.

94,174.—HORSE HAY FORK.—William D. Ballard, Davidsburg, Mich.

94,175.—GUIDE FOR SEWING MACHINE.—Menzo M. Benster, Detroit, Mich.

94,176.—CHURN.—George Berkstresser, Bedford, Pa.

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94,178.—PRINTING TELEGRAPH.—John Blackie, New York city.

94,179.—SPRING SEAT FOR CHAIRS, CARS, CARRIAGES, ETC.—J. D. Bonney, Pembroke, Mass.

94,180.—REEL AND SWIFT.—M. V. Brigham, Mannsville, N.Y.

94,181.—VEGETABLE WASHER.—Jacob Bump, Hartford, N.Y.

94,182.—CLOTHES DRYER.—F. R. Butler (assignor to himself and L. R. Welles), Rocky Hill, Conn.

94,183.—BUTTON OR STUD.—John B. Carter, Hartsville, Ind.

94,184.—SKATE.—S. P. Castle (assignor to O. H. Castle), Urbana, Ohio. Antedated Aug. 14, 1869.

94,185.—MARKER FOR CORN GROUND.—Oliver H. Catey, Williamsburg, Ind.

94,186.—BEEHIVE.—David Collom, Tallmadge, Ohio.

94,187.—SEWING MACHINE.—Job A. Davis, Watertown, N. Y.

94,188.—KILNS FOR DRYING BRICKS.—E. C. Dean, Henry Hamilton, G. P. Tenney, and A. T. Putnam, Detroit, Mich.

94,189.—MACHINERY FOR CUTTING MATCH STICKS.—François de Bowens, Philadelphia, Pa.

94,190.—PUMP.—Alexander Dixon, Aurora, Ill., assignor to himself and J. J. Hall.

94,191.—SEA DRAG.—Jacob Edson, Boston, Mass.

94,192.—GAS STOVE.—I. N. Elwell, Flint, Mich.

94,193.—COOKING STOVE.—M. G. Fagan, Troy, N. Y.

94,194.—MACHINE FOR MAKING CUT NAILS.—D. J. Farmer, Wheeling, W. Va.

94,195.—FENCE POST.—Daniel Fisher, Fair Haven, Ohio.

94,196.—MACHINE FOR BOARDING AND GRAINING LEATHER.—L. A. Gignac, Troy, N. Y.

94,197.—CURRIER'S KNIFE.—L. A. Gignac (assignor to himself and P. Pollock), Troy, N. Y.

94,198.—ELECTRO-MAGNETIC ALARM FOR RAILROAD CARS.—Webster Gillett, Ypsilanti, Mich.

94,199.—FENCE.—James Godfrey, Allegheny City, Pa.

94,200.—LATHE FOR TURNING HUBS.—Andrew Goodyear, Albion, Mich.

94,201.—MACHINE FOR SHAPING HUBS.—Andrew Goodyear, Albion, Mich.

94,202.—SHRUB AND FLOWER BOX.—Gustaf Gustafson, Oakland, Cal.

94,203.—VENTILATOR.—Geo. Hayes, New York city.

94,204.—METHOD OF SEASONING AND PRESERVING WOOD.—Theodore William Heinemann, New York city. Antedated August 17, 1869.

94,205.—MACHINE FOR ROUNDING THE CORNERS OF SLATE FRAMES.—Robert Heneage and Albert Storer, Buffalo, N. Y.

94,206.—MANGLE.—Peter Henry Hink and Herrmann Kaack, Moline, Ill.

94,207.—SPRING BED BOTTOM.—C. Hogeboom, M. Hogeboom, and L. Van Vleck, Winslow, Ill.

94,208.—APPARATUS FOR RE-JEWELING WATCHES.—C. Hopkins, Philadelphia, Pa. Antedated Aug. 19, 1869.

94,209.—LOW-WATER INDICATOR.—G. M. Hopkins and J. A. Straight, Albion, N. Y. Antedated Aug. 17, 1869.

94,210.—METALLIC CARTRIDGE.—B. B. Hotchkiss, New York city.

94,211.—APPARATUS FOR FLUTING AND QUILLING.—Geo. R. Houghton, Flint, Mich.

94,212.—SEWING MACHINE FOR WORKING BUTTONHOLES.—Edmund Howard, Flushing, and W. H. Jackson, Brooklyn, N. Y.

94,213.—CRIMPING BRAKE.—Jarvis Howe, Milford, Mass. Antedated Aug. 21, 1869.

94,214.—MANUFACTURE OF CARBONATE OF LEAD, ACETATE OF COPPER, AND ACETATE OF IRON.—Otto Jacobi, Philadelphia, Pa.

94,215.—VELOCIPEDE.—S. H. Jennings, Deep River, Conn.

94,216.—COAL-BREAKING MACHINE.—John Jones, Chestnut House, Stratford, and S. P. Bidder, Jr., Hillfield, Mitcham, England. Patented in England, Nov. 17, 1863.

94,217.—STUMP EXTRACTOR.—J. A. Kausler and H. B. Cook, White Pigeon, Mich.

94,218.—STOPPING MECHANISM FOR KNITTING MACHINE.—John Kennedy, Claverack, N. Y.

94,219.—APPARATUS AND PROCESS FOR OBTAINING LIGHT FROM GAS AND OIL.—Joshua Kidd, New York city.

94,220.—PRINTERS' INK.—Camille Krejci, Scranton, Pa.

94,221.—LOTION FOR THE DESTRUCTION OF INSECTS.—Daniel Leibert, Washington, D. C.

94,222.—ALARM ATTACHMENT FOR STILLS.—J. C. Leistner, Cincinnati, Ohio.

94,223.—BASE-BURNING STOVE.—M. W. Lester, Chicago, Ill.

94,224.—HOT-AIR FURNACE.—M. W. Lester, Chicago, Ill.

94,225.—MACHINE FOR MAKING HORSESHOES.—W. W. Lewis, Cincinnati, Ohio.

94,226.—STEAM GENERATOR.—Herman W. Luders, Philadelphia, Pa.

94,227.—PASTRY ROLLER.—H. S. Maltby, Cincinnati, Ohio.

94,228.—PROCESS OF PREPARING WOOD FIBER FOR PAPER STOCK.—G. E. Marshall, Laurel, Ind.

94,229.—TRACE BUCKLE.—J. H. Martin, Columbus, Ohio.

94,230.—HAMES FASTENER.—J. T. McDivit, Fayetteville, Ohio.

94,231.—STEAM ENGINE VALVE.—J. D. Moon and J. T. Foster, Jersey City, N. J.

94,232.—MACHINERY FOR MAKING AXES.—H. D. Morris, Baldwinsville, N. Y.

94,233.—RACK FOR SUGAR, CREAM, SALT, ETC.—M. A. S. Mullin, Osgood, Ind.

94,234.—FLYING-HORSE MACHINE.—G. L. Newhall and J. F. Cummings, Chelmsford, Mass.

94,235.—LIQUID METER.—Chas. Nida, Greenville, N. J.

94,236.—PRESERVE JAR.—T. G. Otterson, Camden, N. J.

94,237.—MINCING MACHINE.—W. H. Pierce, Bangor, Me.

94,238.—FENCE.—S. M. Prentice, Aurora, Ill.

94,239.—LATHE CHUCK.—John Rich, Painesville, Ohio.

94,240.—UMBRELLA.—H. T. Robbins, Boston, Mass., assignor to Ellis, Knapp & Co., New York city.

94,241.—PIPE WRENCH AND PIPE CUTTER.—A. Robes, Somerville, and J. C. Chapman, Cambridgeport, Mass.

94,242.—SHIPS' FENDERS.—W. D. Robinson, Buffalo, N. Y.

94,243.—EXTENSION TABLE SLIDE.—Otis E. Sanford, La Porte, Ind.

94,244.—CROUT CUTTER.—J. G. Schwarz, Indianopolis, Ind., assignor to himself and J. G. Brand.

94,245.—VENTILATOR.—W. T. Sears and Wm. Edson, Boston, Mass., assignor to W. T. Sears.

94,246.—PROCESS FOR EXTRACTING OILS, ETC.—C. A. Seeley, New York city.

94,247.—SHEAR.—R. H. Seymour (assignor to Henry Seymour and Co.), New York city.

94,248.—FRUIT JAR.—H. E. Shaffer, Rochester, N. Y.

94,249.—EVAPORATOR.—A. W. Shidler, South Bend, Ind.

94,250.—WASHING MACHINE.—D. Smallwood, Middletown, Ohio.

94,251.—HARVESTER CUTTER.—J. S. Smith and John Coder, Swanton, Ohio.

94,252.—HUSK MAT.—J. P. Smucker, Ashland, assignor to himself and R. S. Owen, Bryan, Ohio.

94,253.—PRESS FOR CASTING METAL.—J. B. Tarr, Fairhaven, Mass. Antedated Aug. 25, 1869.

94,254.—LUBRICATOR FOR VENTILATOR.—Hugh Thomas New York city. Antedated Aug. 18, 1869.

94,255.—HANGING CIRCULAR SAWS.—Charles R. Tompkins, Rochester, N. Y.

94,256.—STONE-CHANELING MACHINE.—Frederick Townsend Albany, N. Y.

94,257.—PRESS.—I. H. Trabue, Livingston county, Ky.

94,258.—SEEDING MACHINE.—W. A. Van Brunt, Horicon Wis.

94,259.—WATER WHEEL.—Henry Van De Water, Attica, N. Y.

94,260.—DEVICE FOR FILLING STEAM GENERATORS.—Charles Ward, Detroit, Mich.

94,261.—WRENCH.—Walter Ward, Mount Holly, N. J.

94,262.—FENCE.—Thomas Westermann, Clinton township, Pa.

94,263.—MEANS FOR PUTTING UP AND USING POWDERS.—A. P. Willard, Battle Creek, Mich.

94,264.—MODE OF REMOVING STUMPS.—Henderson Willard (assignor to himself and Joseph Walker), Grand Rapids, Mich.

94,265.—GRAIN BIN.—C. D. Woodruff (assignor to himself and Wm. Krauss), Toledo, Ohio.

94,266.—CLAMP SCREW FOR CALLIPERS, ETC.—Daniel Wright, Jr., Waltham, Mass.

94,267.—THILL COUPLING.—T. H. Andress (assignor to himself and John Decker), Sparta, N. J.

94,268.—CLOD FENDER.—Daniel Applegate, Noblesville, Ind.

94,269.—VAPOR BURNER.—Wm. Aurich, Chicago, Ill.

94,270.—FASTENING FOR BREASTPINS.—Samuel Ayres, Danville, Ky.

94,271.—RAIN-WATER STRAINER AND CUT-OFF.—S. Ayres, Danville, Ky.

94,272.—BRIDGE.—Calvin Baker, St. Joseph, Mo.

94,273.—APPARATUS FOR PRESSING AND VULCANIZING INDIA-RUBBER.—Joseph Banigan, Woonsocket, R. I., assignor to the Woonsocket Rubbber Company.

94,274.—PERMUTATION PADLOCK.—Tracy Beadle and W. P. Yates, Elmira, N. Y.

94,275.—SPRING-WAGON SEAT.—J. I. Bear, Decatur, Ill.

94,276.—METHOD OF MAKING SQUARE-NECKED BOLTS.—Geo. C. Bell, Buffalo, N. Y.

94,277.—FURLING AND REEFING SAILS.—E. W. Brown, Cambridge, Ill.

94,278.—JACK FOR SPINNING.—W. H. Brothers (assignor to himself and Elisha Allen), Winooski, Vt.

94,279.—REVOLVING SPRING TOY GUN.—Charles Bunge, Geneva, N. Y.

94,280.—FERRULE.—S. N. Chapin, New Britain, Conn.

94,281.—TURBINE WATER WHEEL.—J. E. Chapman, West Reading, Conn. Antedated Aug. 19, 1869.

94,282.—FIRE AND BURGLAR ALARM.—J. L. Cheston, South Easton, Pa.

94,283.—BAG HOLDER.—J. N. Collins, Menasha, Wis.

94,284.—WOODEN PAVEMENT.—Chas. C. Converse, Biooklyn, N. Y., assignor to S. S. Greeley.

94,285.—MACHINE FOR CUTTING NAILS.—John Coyne, Allegheny City, Pa.

94,286.—APPARATUS FOR THE MANUFACTURE OF PIG-BLOOM.—John Coyne, Allegheny City, Pa.

94,287.—WASHING MACHINE.—Hermann Carmer, Sonora, Cal.

94,288.—TANK REGULATOR.—J. M. Crose, Lebanon, Ind.

94,289.—COMBINED PLANTER AND CULTIVATOR.—J. A. Currie, Xenia, Ohio.

94,290.—NAIL MACHINE.—F. Davison, Richmond, Va.

94,291.—ROCK CRUSHING MILL.—J. H. Day, Walla Walla, Washington Territory.

94,292.—COMBINED WEIGHING AND MEASURING SCALE.—J. Decker, Sparta, assignor to himself and E. De Camp, Boonton, N. J.

94,293.—RAILWAY CAR WHEEL.—Clarence Delafield, Castleton, and F. G. Johnson, Northfield, N. Y.

94,294.—FLOATING VELOCIPEDE.—Jules Marie de la Rue, Nogent Sur Marne, near Paris, France. Patented in France, December 14, 1868.

94,295.—LAMP.—J. A. Dew (assignor to himself and O. A. Bogue), Chicago, Ill.

94,296.—PLOW CLEVIS.—Thos. Dow, Yorktown, Ill.

94,297.—MANUFACTURE OF ILLUMINATING GAS.—C. F. Dunderdale, New York city.

94,298.—APPARATUS FOR PURIFYING SACCHARINE LIQUIDS, AND FOR CURING, DRYING, AND TREATING SUGAR AND OTHER MATERIALS.—W. B. Espent, Spanish Town, Jamaica.

94,299.—RUFFLING ATTACHMENT FOR SEWING MACHINES.—J. O. Fairbairn, Milwaukee, Wis.

94,300.—POCKET LAMP.—A. P. Foster and D. B. H. Bartlett (assignors to themselves and C. F. Howe), Lowell, Mass.

94,301.—COTTON SEED AND CORN PLANTER.—J. G. B. Gill, Chestnut Grove, S. C.

94,302.—PEAT MOLD.—Kingston Goddard, Richmond, N. Y.
94,303.—DITCH GAGE SCOOP.—David Gore, Carlinville, Ill.
94,304.—MACHINE FOR LINTING AND RELINTING COTTON SEEDS AND MOTES.—G. W. Grader (assignor to himself and W.B.Wiggs), Memphis, Tenn.
94,305.—SELF-WATERING SCRUBBER.—A. D. Granger, Talbotton, Ga.
94,306.—FURNACE FOR PRODUCING IRON DIRECT FROM THE ORE.—Wm. Griffith, Jr. (assignor to himself, J. S. Patterson, and T. C. Zulick), Pottsville, Pa.
94,307.—COMBINED TURN AND SUBSOIL PLOW.—J. C. Gross, Goshen Hill, S. C.
94,308.—GRAIN DRYER.—Remig Grotz, Chicago, Ill.
94,309.—SLATE-POLISHING MACHINE.—Stinson Hagaman, Weissport, Pa.
94,310.—SLATE-POLISHING MACHINE.—S. Hagaman, Weissport, Pa.
94,311.—CHURN.—J. A. Ham and W. Carpenter, Jr., Barry, Mo.
94,312.—CHURN.—J. A. Hanger, Staunton, Va.
94,313.—ICE-CREAM FREEZER.—William Hawkins, Oregon, Mo.
94,314.—WATER WHEEL.—Jacob Hepperly, Peoria, Ill.
94,315.—DUMPING WAGON.—Britain Holmes, Buffalo, N. Y.
94,316.—STEAM-ENGINE VALVE GEAR.—Chas. S. Inslee, New York city, and W. H. Inslee, Newark, N. J.
94,317.—CUE-LEATHER TRIMMER.—L. A. Johnson, H. W. Collender, and J. E. Boyle (assignors to Michael Phelan, H. W. Collender, and J. E. Boyle), New York city.
94,318.—AXE.—A. H. Jumper, Sunman, Ind.
94,319.—HORSE HAY FORK.—Nathan W. Kingsley, Swansea, Mass.
94,320.—BASE-BURNING FIREPLACE HEATER.—Philip Klotz (assignor to B. C. Bibb), Baltimore, Md.
94,321.—BRIDGE.—John Laird, Canton, Ohio.
94,322.—BRIDGE.—John Laird and G. F. Laird, Canton, Ohio.
94,323.—FLASK FOR CASTING DENTAL PLATE.—Samuel Lawrence (assignor to himself and Ambrose Lawrence), Lowell, Mass.
94,324.—COMPOSITION FOR MOLDS AND MODELS IN CASTING DENTAL PLATES AND OTHER ARTICLES.—Samuel Lawrence (assignor to himself and Ambrose Lawrence), Lowell, Mass. Antedated August. 24, 1869.
94,325.—CARRIAGE WHEEL.—Obed Look, Bridgeport, Conn.
94,326.—HARROW.—Isaac Low, East Fairfield, Ohio.
94,327.—COOKING STOVE.—Charles McClain, Carlyle, Ill.
94,328.—SYRINGE.—J. F. McMillen, Mansfield, Ohio.
94,329.—PRINTING TELEGRAPH.—Charles T. Moore, White Sulphur Springs, West Va.
94,330.—HOT-CORN HOLDER.—W. A. Morgan, Brooklyn, N. Y. and T. B. Mosher, New York city.
94,331.—DOUBLE WINDOW.—Steven, Earl of Mount Cashell, Moore Park, Ireland.
94,332.—WASHING MACHINE.—J. W. Myers, Lyons, Iowa.
94,333.—MACHINE FOR PUNCHING METAL SCREENS.—J. W. Nesmith, Black Hawk, Colorado Territory.
94,334.—COTTON CHECK.—S. W. Odell, Ouachita parish (assignor to himself and John Nixon), New Orleans, La.
94,335.—SEAT FOR SCHOOLS, HALLS, CHURCHES, ETC.—Harrison Ogborn, Richmond, Ind. assignor to Aaron Chandler, Davenport, Iowa.
94,336.—SKATE RUNNER.—P. A. Peer, Kalamazoo, Mich.
94,337.—BRICK MACHINE.—Julius F. M. Pollock, Manchester, England.
94,338.—PUMP.—A. N.Putnam, Antrim, N. H.
94,339.—PLOW COUPLING.—William Reck, Mendota, Ill.
94,340.—WAGON STANDARD.—George Richards, Richland Centre, Wis.
94,341.—PROCESS AND APPARATUS FOR TREATING FLOUR, MEAL, AND OTHER FARINACEOUS SUBSTANCES.—J. J. Ridge, St. Johns, Southwark, England.
94,342.—PUDDLING FURNACE.—J. B. Robinson, Duncansville, Pa.
94,343.—EVAPORATOR FOR SUGAR, AND OTHER LIQUIDS.—Thomas Scantlin and James M. Scantlin, Evansville, Ind.
94,344.—WINDOW.—George Shatswell, Waukegan. assignor to himself, Parne l Manson, and Charles L. Sampson, Chicago, Ill.
94,345.—HOLLOW GRATE BAR.—Noah Shaw, West Eau Claire, Wis., assignor to himself, J. F. Moore, W. M. Lee, and A. B. Alden.
94,346.—MACHINE FOR UPSETTING TIRES.—Elias Shopbell, Ashland, Ohio.
94,347.—HAY AND COTTON PRESS.—John Simpson, Chester, S. C.
94,348.—CLEVIS.—Zachariah B. Sims, Bonham, Texas.
94,349.—COTTON PLOW AND PLANTER.—Z. B. Sims, Bonham, Texas.
94,350.—COTTON PLOW.—Z. B. Sims, Bonham, Texas.
94,351.—COTTON PLOW.—Z. B. Sims, Bonham, Texas.
94,352.—COTTON PICKER AND CLEANER.—Z. B. Sims, Bonham, Texas.
94,353.—COTTON HOE.—Z. B. Sims, Bonham, Texas.
94,354.—STALK AND CANE PULLER.—Z. B. Sims, Bonham, Texas.
94,355.—THREE HORSE EQUALIZER.—Z. B. Sims, Bonham, Texas.
94,356.—POTATO DIGGER.—H. M. Smith, Long Branch, N. J.
94,357.—MOTH-PROOF LINING.—J. R. Smith, Chicago, Ill.
94,358.—TUBULAR PAPER BOX CUTTER.—Joseph Spooner and Ebenezer Spooner, New York city.
94,359.—MODE OF BLEACHING GRANULATED SUGAR.—T. C. Taylor, Philadelphia, Pa. Antedated August 20, 1869.
94,360.—APPARATUS FOR CARBURETING AIR AND GAS.—Oakes Tirrill, Boston, Mass.
94,361.—SHAFT AND POLE HOLDER.—J. S. Totten, Lebanon, Ohio.
94,362.—FLOATING VELOCIPEDE.—V. B. Townsend, Worcester, Mass.
94,363.—SHUTTER FASTENING.—B. D. Washburn, Boston, Mass.
94,364.—APPARATUS FOR TURNING HEAVY CLAY PIPES.—William Wassal, Wellsville, Ohio.
94,365.—PLANTER AND CULTIVATOR.—Nicholas Whitehall, Newtown, Ind.
94,366.—PLOW.—Edward Wiard (assignor to B. F. Avery), Louisville, Kentucky.
94,367.—PLOW.—Edward Wiard (assignor to B. F. Avery), Louisville, Kentucky.
94,368.—EMBOSSING PRESS.—J. M. Wilbur, Cleveland, Ohio.
94,369.—HOSE PIPE NOZZLE.—Archibald Williscroft, Wilmington, Del.
94,370.—MILL STONE BALANCE.—G. W. Wilson (assignor to himself and Horace Franc sco), Tojono, Ill.
94,371.—STEAM ENGINE PISTON.—Richard Witty, Chicago, Ill.
94,372.—CARRIAGE HUB—A. S. Woodward (assignor to himself and H. A. Parker), Pepperell, Mass.
94,373.—APPARATUS FOR COOLING AND REFRIGERATING.—John Agate, Pittsford, N. Y.
94,374.—ROASTING AND TREATING IRON ORES.—Henry Aitkin, Falkirk, Scotland.
94,375.—ARTICLE OF FOOD FROM PUMPKIN AND SQUASH.—E. W. Ayer and M. C. Ayer, South Waterford, Me.
94,376.—CHUCK.—W. F. Bacon, Skowhegan, Me.
94,377.—STEAM HEATER.—A. C. Baker, Westfield, Mass.
94,378.—WASH BOILER.—Oren Baldwin, Keokuk, Iowa.
94,379.—LINIMENT.—J. M. Barrett, Plymouth, N. C.
94,380.—GLOVE.—Orson Bartlit and J. D. Edson, Rockford, Ill.
94,381.—CHURN.—N. S. Barton, Mannsville, N. Y.
94,382.—TOE PLATE FOR BOOTS AND SHOES.—George Beatty, Cleveland, Ohio.
94,383.—PLOW.—J. C. Bell, Lebanon, Ind.
94,384.—NEEDLE FOR SEWING MACHINE.—J. B. Blanchard, Boston, Mass
94,385.—BATH TUB.—C. A. Blessing, Philadelphia, Pa. Antedated August 27, 1869.
94,386.—RAILWAY CAR COUPLING.—Ernst A. Bohne, Brookhaven, Miss.
94,387.—PIANO-FORTE STOOL.—Joshua Briggs, Peterborough, N. H.
94,388.—OTTOMAN PIANO STOOL.—Joshua Briggs, Peterborough, N. H.
94,389.—SEWING MACHINE FOR SEWING BOOTS AND SHOES.—J. H. Brown, Watertown, Mass. assignor to M. K. Moody, New York city.
94,390.—FAN.—Otto Bruck, New York city.
94,391.—MACHINE FOR MAKING HORSESHOE NAILS.—E. L. Brandage, Middletown, N. Y.
94,392.—SHAFT COUPLING.—G. A. Buchanan, Telford station, Pa.
94,393.—WINDOW CURTAIN HOLDER.—J. S. Burch and J. O. Burch, Buffalo, N. Y.
94,394.—GLOBE VALVE.—Henry Burt (assignor to himself and L. D. Towsley), Newark, N. J.
94,395.—BOILER FEEDER.—Henry Burt (assignor to himself and L. D. Towsley), Newark, N. J.
94,396.—LOCOMOTIVE ENGINE.—C. W. Cahoon, Portland, Me.
94,397.—VEHICLE.—B. N. Carpenter, Mount Jackson, Va.
94,398.—STOVE PIPE DRUM.—J. T. Clymer, Galion, Ohio. Antedated August 25, 1869.
94,399.—PRESSURE ADHESIVE GUM FOR ENVELOPES, ETC.—Philip S. P. Conner, Philadelphia, Pa.
94,400.—SAIL FOR VESSELS.—C. H. Crandall, Stonington, Conn.
94,401.—LOOM.—George Crompton, Worcester, Mass.
94,402.—SEA DRAG.—Samuel Curtis, Lynn, Mass.
94,403.—STEAM ENGINE CONDENSING APPARATUS.—C. H. De Lamater, New York city,
94,404.—CORN PLANTER AND GRAIN DRILL.—G. W. Dickinson, Charleston, Ill.
94,405.—COMPOUND TO BE APPLIED TO FRUIT JARS FOR RECEIVING WRITTEN LABELS.—George W. Doty, Wooster, Ohio.
94,406.—SEEDER AND FERTILIZER COMBINED.—Samuel M. Firey, Clear Spring, Md.
94,407.—SORGHUM PAN SKIMMER.—George B. Fitz, Louisville, Ky.
94,408.—FASTENING METAL TUBES TO GLASS CUPS OR VESSELS.—Gregory Gerdom, Albany, N. Y.
94,409.—STILL.—Henry Grogan, Flatbush, N. Y.
94,410.—RAILWAY FROG.—Friedrig Gubser, Newport, Ky.
94,411.—MODE OF OBTAINING FIBER AND OTHER PRODUCTS FROM THE MAIZE PLANT.—John T. Harris, Tyngsborough, Mass.
94,412.—POSTHOLE AUGER.—Ira Hart, Clarksburg, West Va.
94,413.—VEGETABLE CUTTER AND FEED-GRINDING MACHINE.—James T. Harvey, Murrysville, Pa.
94,414.—CAR WHEEL AND AXLE.—Frank Hudner, New York city.
94,415.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—D. W. Jameson, Warren, Ohio.
94,416.—PLUG CUTTER.—Melvin Jincks, Wallace, N. Y.
94,417.—CORN PLANTER.—James A. Johnson, Pendleton, Ind.
94,418.—REEL FOR REAPING MACHINE.—John Henry Keller, Boalsburg, Pa.
94,419.—SELF-CLOSING FAUCET.—Henry F. King, New York city.
34,420.—SASH HOLDER.—Benjamin S. Lawson, New York city, assignor to Augustus M. Miller, Brooklyn, N. Y., and Alfred Gill, Orange, N. J.
94,421.—LAMP BURNER.—John C. Love, Philadelphia, Pa., assignor to Holmes, Booth, and Haydens, Waterbury, Conn.
94,422.—BASKET REST FOR LADDERS.—William E. Ludlow (assignor to Henry C. Metcalfe), Cincinnati, Ohio.
94,423.—STEP AND EXTENSION LADDER.—Wm. E. Ludlow (assignor to Henry C. Metcalfe), Cincinnati, Ohio.
94,424.—TUMBLER WASHER.—John Matthews, Jr., New York city.
94,425.—HORSE HAY RAKE.—Wm. Matthews, Vinton, Ohio.
94,426.—STEAM PUMP.—George McFeely, Steubenville, Ohio.
94,427.—SADIRON HEATER OVEN.—Wm. McLucas, Wood Grove, Ohio.
94,428.—COMPOUND FOR CURING CHOLERA IN HOGS AND CHICKENS.—Anson C. McMahan, Lincoln, Ill.
94,429.—HOISTING APPARATUS.—J. Vaughan Merrick and W. H. Merrick, Philadelphia, Pa.
94,430.—OILER.—James A. Metcalf, Lawrence, Mass.
94,431.—PARLOR BEDSTEAD.—J. A. Morgan, Bloomfield, Iowa.
94,432.—TRANSFER ENGRAVING.—Robert Neale, Brooklyn, E. D., N. Y.
94,433.—SKATE.—John H. Noakes, New York city.
94,434.—GARDEN PLOW.—Washington F. Paget and Silas H. Gard, Springfield, Ohio.
94,435.—CHURN.—George N. Palmer, Greene, N. Y.
94,436.—GRAIN BINDER.—L. F. Parker, Davenport, Iowa.
94,437.—MACHINE FOR BURRING AND CLEANING WOOL.—Ziba Parkhurst, Milford, Mass.
94,438.—OX YOKE.—Cyrus Phelon, East Granville, Mass.
94,439.—JOURNAL.—David R. Quick, New York city.
94,440.—RAKE FOR HARVESTERS.—George H. Reister, Washington, Iowa.
94,441.—APPARATUS FOR WELDING CHAIN LINKS.—Henry Reynolds, Aurora, N. Y.
94,442.—MOLDING SCREW PROPELLERS.—Alexander K. Rider, Elizabeth, N. J., assignor to C. H. De Lamater, New York city.
94,443.—PAVERS' RAMMER.—Thomas Robjohn, New York city.
94,444.—CORN SHELLER.—Samuel P. Ross, Pittsburgh, and Niklaus Haller, Allegheny City, Pa.
94,445.—DUMPING CAR.—Clinton H. Sage, Fulton, N. Y.
94,446.—CORN HARVESTER.—J. W. Sharrard, Samuel Bryan, and Howard Hunt, Janesville, Wis.
94,447.—EXTENSION TABLE.—Joseph Sherman, Burlington, N. J.
94,448.—POCKET FOR RAILWAY CAR SEATS.—Sigmund Simonson, Bridgeport, Conn.
94,449.—LETTER BOX.—Samuel Strong, Washington, D. C.
94,450.—MODE OF COOLING AND FREEZING LIQUIDS AND OTHER SUBSTANCES.—A. H. Tait, New York city. Antedated August 24, 1869.
94,451.—LAMP BURNER.—Alvin Taplin, and H. D. Bradley, Forestville, assignors to "The Bristol Brass and Clock Company," Bristol, Conn.
94,452.—FRUIT JAR.—Wm. S. Thompson, Rochester, N. Y.
94,453.—MANUFACTURE OF COW BELL.—Wm. T. Tibbals and Lyman B. Tibbals, Cobalt, Conn.
94,454.—MARINE SAFE.—E. B. Tyler, Baltimore, Md.
94,455.—TIN-COATED EYELET.—Ambrose I. Upson, New York city, assignor to Waterbury Brass Company, Waterbury, Conn.
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94,459.—ROTARY WASHING MACHINE.—William H. Welch, Bloomington, Ill.
94,460.—MODE OF CLEANING MUSTY BEER AND OTHER CASKS.—Dennison Willard, Jr., Pittsford, N. Y.
94,461.—RAILWAY FREIGHT CAR.—Joseph Page Woodbury, Boston, Mass.
94,462.—VENTILATOR FOR WINDOWS.—William H. Cowl, Brooklyn, N. Y.

REISSUES.

45,834.—RAILROAD CAR FOR TRANSPORTING PETROLEUM.—Dated January 10, 1865; reissue 2,031, dated July 18, 1865; reissue 3,622.—Joel F. Keeler, Pittsburgh, Pa.
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56,345.—CORSET SPRING.—Dated July 17, 1866; reissue 2,929, dated May 12, 1868; reissue 3,529, dated June 29, 1869; reissue 3,624.—Frances Lee Barnes, New York city, executrix of the estate of Samuel H. Barnes, deceased.
75,390.—LAMP SHADE.—Dated March 10, 1868; reissue 3,625.—George Doolittle and George H. Diamond, Bridgeport, and Thomas Wallace, Jr., Ansonia, Conn., assignees, by mesne assignments of T. B. Doolittle.
59,595.—WHEAT DRILL.—Dated November 13, 1866; reissue 3,626.—James F. Harcourt, Moscow, Ind.
61,953.—HARVESTER.—Dated February 12, 1867; reissue 3,627.—Ætna Manufacturing Company, Salem, Ohio, assignees of Amos Rank.
52,341.—WAGON WHEEL.—Dated January 30, 1866; reissue 3,628.—John Thrasher, Albion, Mich.
10,722.—FIBER FROM CANE FOR PAPER AND FOR OTHER PURPOSES.—Dated April 4, 1854; extended seven years; reissue 2,973, dated June 9, 1868; reissue 3,629.—Kate Lowe and William McTeer, Baltimore, Md., assignees, by mesne assignments, of Benjamin A. Lavender and Henry Lowe.

DESIGNS.

3,639 to 3,642.—FLOOR OILCLOTH.—Hugh Christie, Morrisania assignor to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburg, N. Y. Four patents.
3,643.—FUR COLLAR.—Isaac Lewine, New York city.
3,644.—PRINTING TYPE.—Andrew Little, New York city.
3,645.—CLOCK CASE.—Carl Muller (assignor to Nicholas Muller), New York city.
3,646.—PAIR OF FIGURES.—Carl Muller (assignor to Nicholas Muller), New York city.
3,647.—PRESERVE DISH.—Wm. Parkin (assignor to Reed and Barton), Taunton, Mass.
3,648.—CAKE TAZZA.—Wm. Parkin (assignor to Reed and Barton), Taunton, Mass.
3,649.—ELEVATED OVEN RANGE.—Philip Rollhaus, Port Chester, N. Y.
3,650 to 3,652.—ORNAMENT FOR A CHILD'S HAT.—John Sealy, Jr., Newark, N. J. Three patents.
3,653.—STOVE.—Alexander White, Genesco, Ill.

APPLICATIONS FOR EXTENSION OF PATENTS.

MODE OF HANGING THE SCREENS IN WINNOWING MACHINES.—John A. Krake, of Alden, N.Y., has petitioned for the extension of the above pateat. Day of hearing, November 8, 1869.

MACHINE FOR CHANNELING STONE.—John Taggart, of Melrose, Mass., has applied for an extension of the above patent. Day of hearing November 15, 1869.

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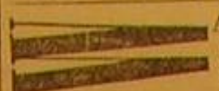

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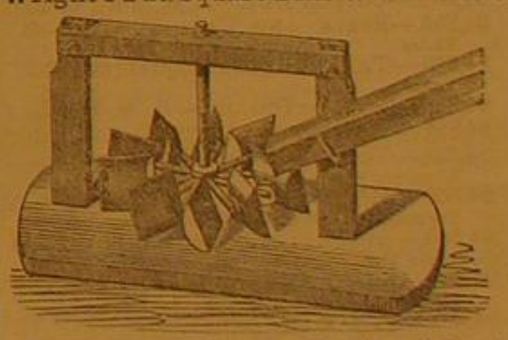

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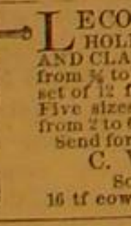

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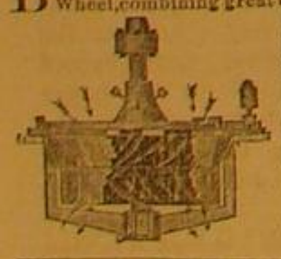

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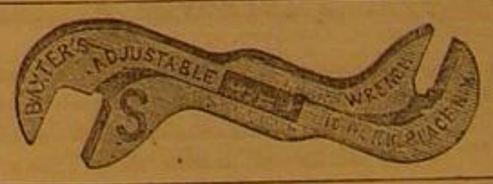

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