SCIENTIFIC AMERICAN

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

Vol. XXIV.- No. 20. [NEW SERIES.] | NEW YORK, MAY 13, 1871. | $3 per Annum [IN ADVANCE.]

Hannahs' Patent Metropolitan Railway.

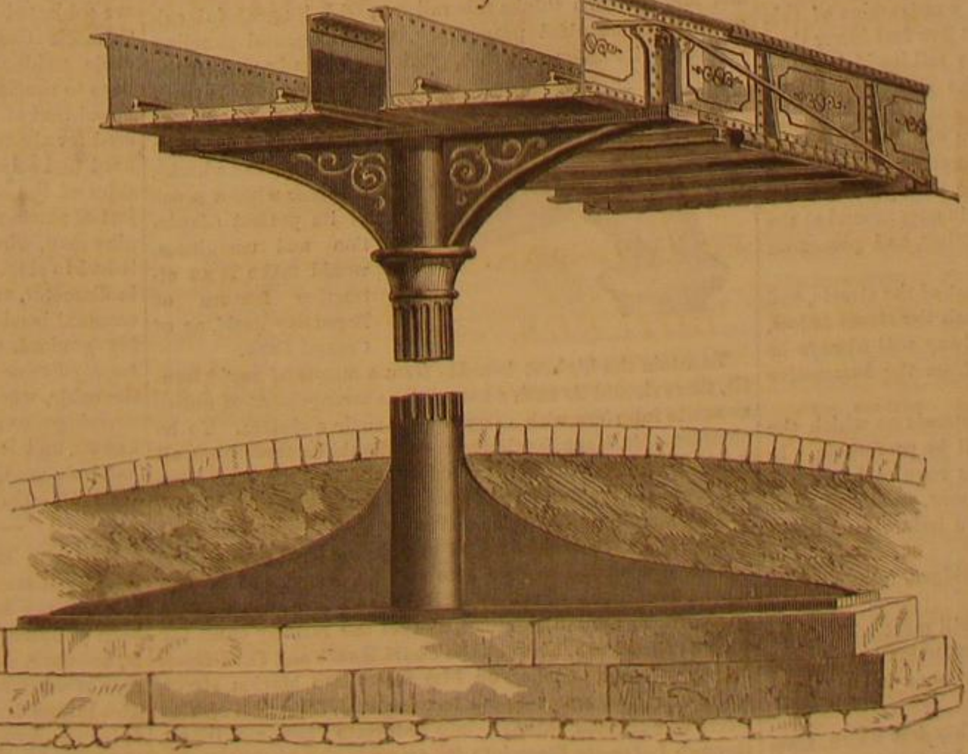
The accompanying engraving is that of a system of elevated railways for New York, invented by J. M. Hannahs, of Chicago, Ill, and patented August 2, 1870.

It is a double track railway, supported by single columns in the middle of the street, where the carriage ways are sufficiently wide; that is, in broad avenues, parks, squares, etc. Where streets are narrow, like Broadway, it is proposed to place the columns at the edge of the sidewalk, on each side of the carriage way, and to connect each series to the other by arch girders (Fig, 5). In either case the railway may extend over themiddle of the carriage way; or, if thought advisable, as it might be in some cases, single tracks may be supported by the columns on each side of the way.

The girders will be of iron or steel, of proper thickness, riveted up into the form shown, the rivets on the inner side being countersunk, so as to leave a smooth surface. The girders are connected across the bottom by cross-bars, on which is placed a strong, water tight oak floor.

On this floor, near the sides of the girders, are placed the T rails. The inside of the girders being smooth, there will be a complete, strong, and internally smooth inclosure, of sufficient hight of side wall to rise above the full diameter of the wheels, and above the lower framework and floors of locomotive and cars, only the lighter upper work of the cars rising above the sides. The ends of the axles are intended to run so near the sides of the girders, that the wheels cannot get off the track, and the bottoms of the cars will only run from three to four inches from the track (see Fig. 4), so that the drop to the rail, in case of the breakage of an axle, would be slight; and the car, striking the rail, would slide along without noticeable concussion, careening, or damage.

Fig. 2



HANNAHS' PATENT METROPOLITAN RAILWAY

The inventor regards this feature, which he styles the "safety feature" of his plan, as so unquestionable and self-evident that it will secure general public confidence.

On the ends of the girders, there are strong head blocks (as shown in Fig. 2), riveted or bolted on, for the fourfold purpose of making substantial and solid bearings, for the ends of the girders, on the cross beams, and as braces to prevent them from spreading at the top. Being made with lugs, they serve to draw the girders together endwise, near the top surface, which is done by heavy steel bolts, which strengthen the girders. They also serve as towers, over which to place the truss rods or cables.

At intervals of six feet, are riveted to the outer sides of the girders, fins or braces, the feet of which are fastened to the projecting cross-bars, serving to give rigidity to the girders, and prevent their spreading.

The truss is not only an ordinary, independent one, acting as a strengthener and supporter for the girder within itself, as usual, but taking hold, as it does, upon the girders beyond for anchorage, it is as really a complete suspension cable, for any single length of the railway, as is the cable of a suspension bridge.

The girders being bolted rigidly together by the cross-bars, and each being strong of itself, and additionally strengthened by being drawn endwise to the girders beyond, by the steel bolt before mentioned, and upheld by the truss or cable, anchored as it is, provided that all are of suitable and proper proportions, and provided that the columns will bear it up, will, it is claimed, make a structure strong and enduring as it is possible to make of iron.

The columns are designed to be of cast iron, with bases reaching far out beyond the line of the weight of the superstructure; and each column, with base and upper cross beam, may be cast in one piece. The base of the column will rest upon a cut stone foundation, say four or five feet below the surface of the street.

It has been denied by some engineers that columns can be set so as to sustain such a railway; the inventor of the railway under consideration maintains that this is a mistake.

Such columns, as those which have failed in the West side railway in Greenwich street, in this city, set on crumbling brick foundations, will not do. His line of argument, in reference to these columns, is illustrated by the diagram, Fig. 3, and is as follows: If a stone pier were carried up from the stone foundation to the proper hight, fifteen feet broad at the base, and contracted toward the top, as shown by the lines, A, and a cast iron plate of sufficient thickness were placed upon the top, no one would doubt its capacity to support its share of such a superstructure. Now suppose that, instead of stone, the pier is of solid cast iron, placed on the same foundation; it would bear up the railway with any possible weight or speed of trains thereon. Such a pier, placed in the street, would be too much of an obstruction. But if thus set up to remain, the vast pyramid of iron might be reduced in size, provided the full size of the base and the top bearing, with sufficient brackets and thickness of each, were left intact. The question is, how much can its immense proportions be reduced and still retain the necessary strength?

A trifling reduction of the pier, as shown by the dotted lines, B, while the base and cross beams are not reduced, leaves it still, to all intents and purposes, a perfect pier. Then let the reduction go on, as at C, till it stands as a column, D, two feet in diameter, with base, shaft and cross beam unimpaired. It would then, it is maintained, be capable of bearing up, in perfect safety, this narrow track railway, with all the travel that could be crowded upon one or both tracks, as much as though it retained the original form indicated by the lines, A.

While columns may easily be cast entire, so exact that only drilling will be required, yet Mr. Hannahs thinks they can be made much lighter and cheaper with a base and cross beam of cast iron, and the shaft of wrought iron riveted up. In this case the base would be a plate with flanges or ribs to strengthen it, with a heavy ring or flange to which to bolt and rivet the wrought iron shaft. The cross beam can be bolted in a similar manner.

The arch girders will be riveted up, as shown, of wrought iron, and bolted to the heads of the columns prepared to receive them.

It is proposed to drive the cars with small locomotives of about the weight of a small fire engine. They will be very low, with only four wheels, and the wheels, cylinders, cranks, and pitmans will be entirely within the girders, and out of sight, so that horses will not be frightened. Dummies might be used, but their appearance is uncomely, and therefore objectionable.

The cars will be narrow, and will have only four wheels, with rear door for entrance and front door for egress, so that there may be no crowding or delay.

Trains will consist ordinarily of three cars, holding forty passengers each when necessary, though starting, as they easily may, every minute, there will be no necessity for thus crowding the cars. More cars can be added, and the trains start every minute, if necessary.

The engineer always stops at every station, so that he knows just when to shut off steam and put on brakes, but he starts only on signal. Being without obstruction, and having regular places to stop, high speed can be attained. It will be observed, also, that the peculiar construction of this railway brings the floor of the cars about five feet lower than the Greenwich street railway, while the rail itself is not so low. Fare will be paid on entering the station, as at the ferries.

At the ends of the railway, the curve will be around the engine and car house, so that the locomotives and cars can be switched off and on, as shall be desired, with greater facility than horses can be changed. The train goes around at the ends of the tracks, from one on to the other, and passes on without delay.

The cars will be entirely above the dust of the streets, and yet no dust or dirt from the cars can reach the street below, because the water-tight floor of the railway will always be damp, and so hold any ashes or dust from the locomotive from being blown about.

As before mentioned, there are many streets on which the single track, each side of the street, will be preferable. In this case, the track can, as circumstances require, be curved from the side to meet on the single columns, and also be carried from the single columns on to the before mentioned arches, at pleasure.

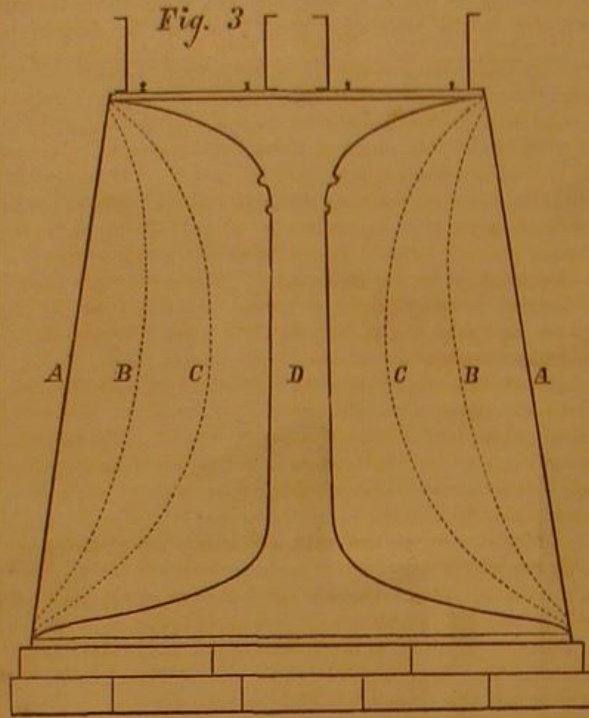
The cars will be reached by light bridges, from waiting rooms, at proper intervals.

Of course, a work of this magnitude will meet with objections; the principal of which will be obstruction to light and obstruction to carriage-way, from the columns being in the middle of the street.

Obstruction to light, in a street of eighty feet width, from a structure like this, being less than twelve feet in width, or of three feet in hight, at an altitude of fifteen feet, cannot, it is thought, be material; not nearly so much as an awning would produce.

The matter of obstruction from the columns in the street requires some consideration. Of course business streets, as Broadway, or any street no wider than Broadway, will be spanned by the arch girder. The carriage way in all such streets would be left intact. But on reaching the broad avenues, which comprise the principal extent of the railway, and where the columns will be in the middle of the street, there will still be more room on either side of the single columns, than is contained in the whole width of the carriage ways of streets in the lower part of the city. The single line of columns, seventy feet apart, in such a street, even though thronged with travel, would not, it is thought, be a noticeable obstruction. In fact, there are streets in the lower

Fig. 3



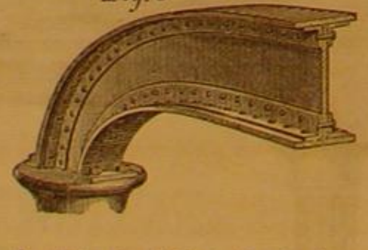
part of the city, as, for instance, Bowery, Center, Broad, and other streets, where, Mr. Hannahs maintains, a single row of columns would be no obstruction. As can now be seen, the middle of Broad street is occupied as a carriage stand, without material inconvenience to travel. If columns were planted at intervals of seventy feet in that line of carriages, they would not add to the inconvenience. But, of course, no column should be placed at any intersection of streets. If, however, they prove a slight obstruction, it is thought so much should be conceded and borne with, considering the vast tide of travel that will come rushing down by that channel—a flood which, like that of the Nile, brings prosperity, to the whole city, and especially to the immediate route of the travel. It would be a tide additional to that which now maintains its inexorable ebb and flow in the great thoroughfares of the city.

Fig. 4

The ease with which the Greenwich trains run up and down a grade of 129 feet to the mile, has demonstrated the fact of its adaptedness to any grade in New York.

If the objection be raised that the railway will be an obstruction to view or sight, it is one which lies equally against shade trees and other street adornments, which really add to, instead of detracting from, the beauty of streets; and Mr. Hannahs thinks this railway, with its graceful columns and beautiful proportions, its ornamental paneling and finish, its unique coaches, gliding noiselessly past (for so smooth could the track be kept that he is confident that it would be less noisy than a hack), together with a sense of its perfect adaptation and usefulness, would make it an attractive feature of Broadway itself, or of Central Park.

Fig. 5



To attain the highest benefits from a means of rapid transit, there should be such a harmonious arrangement of routes as not to interfere with carrying out such a system. To be complet , Mr. Hannahs thinks there should be three lines, all meeting together at their extremities, and that the most eligible route for the first line is from the Battery, up Broadway, to 34th street, then up 6th avenue to and through Central Park. But as that route might be objected to at present, the next best would be to pass into and up Broad and Nassau streets to Spruce street; then let Elm street be opened through one block to Chambers street, and let the railway cross the corner of the Park, between the Court House and Tax Offices, into Elm street; thence up Elm street into Marion street, and up Marion street to its termination. Then let Marion street be extended through into Lafayette Place, and thence through Lafayette Place into 4th avenue; thence over Union Square into Broadway and 6th avenue, and through Central Park. This route is very near Broadway, being only two short blocks therefrom at any place, and most of the way but one. This route would also, Mr. Hannahs believes, open and bring into use a new and valuable thoroughfare between Chambers street and Astor Place, which is now valueless for travel or traffic.

This route is almost a straight line from the corner of Broad and Beaver streets to 4th avenue. It would not defeat the harmony of the system, as then another line could be located on each side of the central one. But this line may be carried on up 4th avenue from Lafayette Place, and another up 8th avenue, both meeting at their extremities. Even then there would be afforded, for a long time to come, the necessary facilities for rapid transit for New York and Westchester county.

With the system fully carried out, and the three lines established, the central one might make more frequent stops for the accommodation of city travel, that is, for Broadway and Fifth avenue, and adjacent parts, and for visitors to Central Park.

With the view of New York bay from the elevated position of the railway at the Battery, and the trip up Broadway, through Central Park, and beyond, an excursion on this railway would be unequalled for magnificence and variety.

Mr. Hannahs estimates that the entire structure may be constructed in one year, at a cost of $300,000 per mile on the broad avenues, and at a somewhat increased cost when two sets of columns with arch girders are required. On narrow streets, where the anchors are short, the cost will not be much greater than where single columns are employed. The parts all being made from drawings, can be constructed at different shops and brought together, so that the work might progress rapidly.

For descriptions, drawings, specifications, estimates, and plan of operating the road, address J. M. Hannahs, 37 Broadway, New York.

Precautions in Using Wire Rope.

In winding with round wire rope upon conical drums, it is important to make sure that the angle of inclination of the surface of the drum is not too great, as otherwise the coils of the rope are apt to slip off and cause serious accidents. Several fatal accidents have occurred in England from this cause. Mr. Wales, a government mining inspector (Great Britain), in his examination upon the cause of one of the accidents referred to, said:

"In his opinion, what most affected the proper and safe working of the spiral drum was the angle which the rope formed between the pulley over the shaft and certain portions of the drum. In the present case the angle was fifteen degrees, and in his opinion the accident was principally due to that fact, and not to any defect in the rope, which was broken by the jerk caused by the rope falling from the drum. In conclusion, he remarked that in erecting spiral drums, care should be taken to have the rope at as easy an angle as possible, and in no case ought it to exceed from ten to eleven degrees."

Professor Warrington Smyth, of the British Royal School of Mines, in one of his lectures directs attention to the precautions necessary in the use of conical drums. He mentions the case of a very serious accident a few years ago, by which the lives of a number of men were sacrificed, simply, he believes, in consequence of the cage having been wound up at too great a velocity, and then allowed to slacken too suddenly, the result being that the laps got loose, some parts slipped off, the rope went over the edge of the drum, and was snapped. Mr Smyth then points out how this danger may be obviated by an ingenious contrivance of M. Lemielle, which consists of an endless rope passed down the shaft, and over a pulley at each extremity. The rope is thus kept constantly stretched out, and motion is communicated to it by a direct acting cylinder, which sets one of the pulleys in motion.

It is found to be very dangerous to allow wire ropes to wind over any inequality or projection, by which the wires are subjected to repeated bending back and forth. At the Cannock Chase Colliery, England, in 1867, the flat wire cable suddenly snapped, and precipitated eight men and boys to the bottom of the shaft, killing five. The inspector found that at the point of fracture, the cable had been covered for about eighteen inches with hemp, which had become hard and solid, and formed a bolster or projection on both sides of the cable, three fourths of an inch thick. The object of placing this hemp upon the cable was to show the engine man, when the cage was opposite a certain drift, where it had to stop. In passing to and fro over a pulley five feet in diameter, and under a drum of the same diameter, the constant bending broke off the wires. This effect was probably gradual, since it appeared on examination that only twenty-five or twenty-six wires, one seventh of the number in the cable, were whole when the cable finally parted. The covering also prevented the condition of the cable from being known, and it was believed that the breaking of the wires had been going on for three weeks or a month before the accident.—*Extracted from Blake's "Mining Machinery."*

Railway Bridge over the Ganges.—Notwithstanding the numerous railway lines, and the erection of many extensive railway bridges in India, the river Ganges has not yet been polluted by the shadow of the locomotive. That event is, however, close at hand, as a railway bridge is now in process of construction, which is to span the river at Cawnpore. The bridge is to be put up without the use of scaffolding. It is to be hoped that none of the girders will topple into the river, for in that case the Hindoos will be certain to ascribe it to the anger of their deity, and as a just punishment for invading the sanctity of the holy stream.

SOLUTIONS FOR SILVER PLATING.

[From Watt's Electro-Metallurgy.]

In making any of these solutions, perfectly fine silver must be employed; or, if it be desired to use standard or other impure silver, it will be better to purify the silver by first dissolving it in nitric acid; then add about one quart of cold water to the acid solution obtained from dissolving four ounces of silver. Now throw in a few pieces of sheet copper to precipitate the silver. In a few moments the silver will begin to deposit itself upon the copper, and by continuing the process for some time, and adding a gentle heat, the whole of the silver will eventually become precipitated in the form of minute crystals. When the pure silver is thus obtained, it is to be again dissolved in two parts water and one part nitric acid.

Solution 1: fine silver, 1 ounce; nitric acid, about 1 ounce; water, ½ ounce.

Put the silver carefully into a Florence flask, and then pour in the acid and water; place the flask on a sand bath for a few minutes, taking care not to apply too much heat; and, as soon as chemical action becomes violent, remove the flask to a cooler place, and allow the action to go on until it nearly ceases; when, if there be silver still undissolved, the flask may be again placed on the sand bath until the silver disappears. If, however, the acid employed has been weak, it may be necessary to add a little more. The red fumes, formed when chemical action is going on, disappear when the silver is dissolved, or when the acid has done its work. If a little black powder be visible at the bottom of the flask, it may be taken care of separately, as it is gold. I have frequently found gold in the silver purchased of a refiner; in some instances more than sufficient to pay the expense of the acid employed.

The nitrate of silver formed during the above operation should be carefully poured into a porcelain or Wedgwood capsule, and heated until a pellicle appears on the surface, when it may be placed aside to crystallize. The uncrystallized liquor should then be poured from the crystals into another capsule, and heat applied until it has evaporated sufficiently to crystallize. When this is done, the crystals of nitrate of silver are to be placed in a large jar or other suitable vessel, and about three pints of cold distilled water added, the whole being well stirred with a glass rod until the crystals are dissolved.

A quantity of carbonate of potassa is now to be dissolved in distilled water, and some of the solution added to the nitrate of silver, until no further precipitation takes place. It is advisable occasionally to put a little of the clear solution in a glass, or test tube, and to add a few drops of the solution of potassa, in order to ascertain whether all the silver is thrown down, or otherwise; as soon as the application of the alkaline solution produces no effect upon the solution of nitrate of silver, this operation is complete.

The supernatant liquor (that is, the fluid which remains above the precipitate) should next be carefully poured off the precipitated silver, and fresh water added; this is again allowed to settle, and the water poured off as before, which operation should be repeated several times in order to wash the precipitate thoroughly.

A quantity of cyanide of potassium is then to be dissolved in hot or cold water, and rather more than is sufficient to dissolve the precipitate added. In a few minutes the carbonate of silver will be dissolved by the cyanide, but in all probability there will be a trifling sediment at the bottom of the vessel, which may be separated from the solution by filtration, and preserved, as in all probability it will contain a little silver.

Sufficient water is now to be added to make one gallon of solution. Should the solution be found to work rather slowly at first, a little of the solution of cyanide may be added from time to time, as it is required: but it is preferable, in working a new solution, to have as small a proportion of cyanide as possible, otherwise the articles may strip, especially if they are composed of German silver.

When a silver solution has been worked for some length of time, it acquires organic matter, and is then capable of bearing, without injury, a larger proportion of cyanide.

It is necessary that the nitric acid employed for dissolving silver should be of good commercial quality, if not chemically pure, for if it contain hydrochloric acid (which is not an unfrequent adulteration), a portion of the silver dissolved will become precipitated in the form of a white flocculent powder (chloride of silver), and the success of the operation is thereby impaired.

Solution 2: To one ounce of silver, dissolved and crystallized as above directed, is to be added three pints of distilled water. The silver is to be precipitated from this by adding gradually a strong solution of cyanide of potassium. This must be done with caution, as an excess of cyanide will redissolve the precipitate. Should the operator, however, accidentally apply too much cyanide, a little nitrate of silver in solution may be added, the silver of which will be precipitated by the surplus cyanide. A portion of the solution should be placed in a wineglass occasionally, and a drop of cyanide added, until no further effect is produced by this substance.

As soon as the precipitate (which is white) has subsided, the clear solution is to be poured off, and fresh water added, this being done several times, as before, to wash the precipitate.

Three pounds of ferrocyanide of potassium (yellow prussiate of potassa) may now be dissolved in water, and added to the precipitate.

When the precipitate is dissolved, add sufficient water to make one gallon of solution, which should then be filtered before using. This solution is not very profitable to the electroplater, as it requires fresh silver to be added frequently, owing to the fact that the anode, or silver plate, is not acted upon by the ferrocyanide, therefore the solution soon becomes deprived of its silver. It may be used, however, for experimental purposes.

Solution 3: One ounce of fine silver, dissolved and treated as before, to which add three pints of distilled water. Precipitate the silver by adding a strong solution of common salt—an excess does no harm. A single drop of hydrochloric acid will show whether all the silver is thrown down or not. The white precipitate thus formed (which is chloride of silver) is to be washed as before.

A quantity of hyposulphite of soda is next dissolved in hot distilled water, and a sufficient quantity added to dissolve the precipitate. Water is then to be added to make one gallon. This solution is decomposed by light, and should therefore be kept covered up, or in a dark place. It is not much used by electroplaters.

Solution 4: One ounce of fine silver treated as before, and dissolved in three pints of distilled water. Precipitate with common salt, and wash, as above directed. Dissolve the precipitate with a strong solution of cyanide of potassium, taking care not to add much more than will dissolve the chloride of silver. Filter carefully, at least once through the same filtering paper, and once through clean filtering paper, and then add enough distilled water to make one gallon of solution.

The above solution is very useful when it is desired to plate an article delicately white, but the silver is liable to strip when the burnisher is applied to it. This solution, however, may be employed with less fear of the work stripping, if it be used weaker, with a small surface of anode and feeble battery power.

Under all circumstances this solution is more applicable to surfaces which only require to be scratch-brushed, or which are to be left dead. Chased figures, clock dials, cast metal work, etc., may be admirably plated with this solution.

Solution 5: One ounce of fine silver, as before, and the crystals dissolved in three pints of distilled water. Add strong solution of cyanide of potassium until no further precipitation takes place. If too much cyanide be added, it will re-dissolve the precipitate. Pour off the supernatant liquor and wash the silver as before. Now add strong solution of cyanide to dissolve the precipitate. Make one gallon with distilled water. The solution should have a moderate excess of cyanide, and it must be filtered before using.

Solution 6: A silver solution may be made by dissolving one ounce of silver as before. Dissolve the crystals in one pint of distilled water. Next be prepared with a large vessel full of lime water, made by adding recently slaked lime to an ample quantity of water, which, it must be remembered, dissolves but a very small percentage of lime. To the clear lime water is to be added the solution of nitrate of silver, which will be converted into a dark brown precipitate (oxide of silver.) When all the silver is thrown down, the clear liquor is to be poured off, and the precipitate washed as before. Now add strong cyanide of potassium solution to dissolve the oxide of silver, and make one gallon with distilled water.

This makes a very excellent solution, although it is somewhat troublesome to prepare.

Solution 7: Dissolve in one gallon of water one ounce and a quarter of cyanide of potassium, in a stoneware or glass vessel. Fill a porous cell with some of this solution, and place it in the larger vessel; the solution should be the same hight in both vessels. Then put a piece of sheet copper or iron, connected with the wire which proceeds from the zinc of the battery, into the porous cell. Place in the stone vessel a piece of stout sheet silver, which must be previously attached to the wire issuing from the copper of the battery. It is well to employ several cells alternated, for this purpose, when a large quantity of solution has to be prepared; that is to say, the zinc of one battery should be united by a wire with the copper of the next, and so on. In a few hours the solution in the larger vessel will have acquired sufficient silver, and the solution may be at once used. The porous cell is to be removed, and its contents may be thrown away.

In working this solution, at first it is necessary to expose a rather large surface of anode, and small quantities of cyanide must be added occasionally until the solution is in brisk working order.

This is one of the best solutions, when carefully prepared, and is less liable to strip than many others.

Solutions of silver may be prepared by precipitating the silver from the solution of nitrate with ammonia, soda, magnesia, etc., etc., but for all practical purposes the soluti ns 1, 4, 5, 6, and 7, may, if carefully prepared, be depended upon.

When it is desired that the articles should come out of the bath having a bright appearance, a little bisulphuret of carbon is added to the solution. This is best done in the following manner: Put an ounce of bisulphuret of carbon into a pint bottle containing a strong silver solution with cyanide in excess. The bottle should be repeatedly shaken, and the mixture is ready for use in a few days. A few drops of this solution may be poured into the plating bath occasionally, until the work appears sufficiently bright. The bisulphuret solution, however, must be added with care, for an excess is apt to spoil the solution. In plating surfaces which cannot easily be scratch-brushed, this brightening process is serviceable. The operator, however, must never add too much at a time.

In making up any of the foregoing solutions, the weights and measures employed are troy, or apothecaries' weight, and imperial measure.

Cultivation of the Fig, and its Preparation for Market.

The preparation of the fig for market is so simple that any family, having the trees, can succeed. It requires no sugar or syrup; as the fruit dries, it forms its own sugar. The greatest trouble is in gathering. If picked by hand, it will be found a tedious process. The best plan is to hold a sheet under the tree, then shake the tree hard enough to make the ripe fruit fall. Do not place the sheet upon the ground, as the ripe figs will burst open and be ruined for drying. Prepare a bath of strong ley that will swim an egg, have this near the boiling point. Put the figs in a basket, dip in the ley for two minutes, then dip in clear water. The reason for putting them in ley is to destroy the acrid gum in the skin, also, to change the color of the purple fig; let the fruit drip a short time, and it is ready for drying.

If dried in the open air, hurdles should be made with narrow slats, upon which to place the fruit. Keep in the sunshine. The second day you can flatten the figs by pressing them with the hand; the hurdles, with the fruit on them, must be placed under shelter at night, or when it rains. An objection to drying in the open air is, that a fly lays eggs in the fruit, and in a short time they become wormy. This can, however be obviated by heating them in an oven or stove, just hot enough to destroy the vitality of the egg, but not hot enough to candy the fruit. It requires a little practice to know when the fruit is dry; it should be soft enough to pack close in a box with moderate pressure; it keeps much better packed close, and is free from the attack of insects.

The boxes should contain from ten to fifteen pounds. Use oak, cypress, or gum, as pine will impart a turpentine taste to the fig.

The best and most expeditious plan is to erect a drying house, the size of which will depend upon the extent of the orchard. Where plank is scarce, a house can be built of logs, five feet by ten feet, and six feet high. Face both sides of the side logs, so as to leave a space of three inches between each; when the logs are put up, let these spaces begin two feet six inches from the bottom. Make an arched clay or brick flue through the house lengthwise, smoke-tight, with a chimney at the end outside; thick stove pipe can be used for a flue. Put slats across the ends and center of the house. Make frames half the width of the house, to fit the openings in the logs across the bottom of these frames or drawers and, make a lattice of palmetto stems; upon this place the figs and keep up a moderate fire; in twenty-four to thirty-six hours the fruit will be dry. Be careful not to have too great a heat, for it will darken the fig, give it a sirupy taste, and injure the market value. In building the house put a tight roof on, and daub all the cracks with clay.

Brain Weight.

An eminent German professor once assumed that, as a certain size and mass of brain is essential for the exercise of the mental faculties, therefore all the human race must be furnished with an equal amount of brains. This truly Teutonic theory has since however, been effectually dissipated. An elaborate paper was read not very long ago, before the Royal Society of England, in which the existing evidence as to the weight of brain among different nations was analyzed. The average brain weight for the English is stated to be 47·50 ounces; for the French 44·58; for the Germans, 42·83; but there are discrepancies in the results of different observers, some giving a greater average than this to the Germans. The Italians, Lapps, Swedes, Frisans and Dutch come into the category with the English. Among the Asiatic races, the Vedahs of Ceylon and the Hindoos give a mean of over 42·11 ounces. The skulls of Mussulmans afford a slightly increased average of brain weight over those of the Hindoos. Two skulls of male Khonds—one of the unquestioned aboriginal races of India—show a brain weight of only 37·87 ounces. The general average of the Asiatic table shows a diminution of more than two ounces when compared with Europeans. The general mean of African races is less than that of European races, although there are great differences; the Caffre rising high, and the Bushman sinking low in the scale. The average of the whole of the aboriginal American races reaches 44·73 ounces, which is 2·14 ounces less than that of the European races. The Australian races show a brain weight one ninth less than that of the general average of Europeans. The Malays and others of the Oceanic races, who migrated boldly, for commercial purposes, over the North and South Pacific Ocean, and occupy the islands show a tolerably high average of brain weight; and, on arriving at this section, we return in some measure to the large brain weight of Europeans.

Preservation of Honey.

As further information on the subject of the preservation of honey, and the prevention of its candying and turning white, we give the following directions, from Mrs. Sarah Kennedy, of White Hall, S. C.:

After the honey is passed from the comb, strain it through a sieve, so as to get out all the wax; gently boil it, and skim off the whitish foam which rises to the surface, and then the honey will become perfectly clear. The vessel for boiling should be earthen, brass, or tin. The honey should be put in jars when cool, and tightly covered.

To keep honey in the comb, select combs free from pollen, pack them edgewise in jars or cans, and pour in a sufficient quantity of the boiled and strained honey (as above) to cover the combs. The jars or cans should be tightly tied over with thick cloth or leather. The writer says that these processes have been in use for twenty years with unvarying success.

THE snail has 110 rows of teeth, with 111 on each row, or 12,210 teeth in all.

THE COCHINEAL INSECT AND ITS ALLIES.

Like the Aphides, the bark lice belong to the order of Hemipters or bugs—insects, we may remind the reader, which have a mouth adapted for piercing vegetable or animal tissues, and then sucking up their juices. In the characteristic hemipters, as this name, "half-winged," implies, the four wings are partly thickened, opaque, and coriaceous, and partly membraneous; but there is a subdivision of the order in which the wings have not the typical character, but are thin and translucent throughout their extent; and the members of this group are thence termed the homopterous (signifying "similarly winged") bugs. It is to this subdivision that the insects under consideration are assignable, and its characters may be familiarly observed—as we stated in our former paper on the Lantern fly (*Fulgora*)—in the common Harvest fly or Locust (*Cicada*). The families of the aphides, or plant lice, and coccidæ, or bark lice, are closely allied, but yet present us with some remarkable differences. The males of the coccids are minute insects, winged, it is true, but having only one pair of wings, the hinder pair being aborted and only represented by rudiments, reminding one of the similar condition of the wings in the Dipters or flies. In fact, so unlike are these males to the other members of this order, that they have been mistaken for dipterous parasites of the females and not for their lawful husbands. The mouth organs of the males, after they attain the mature stage, are but slightly developed, and they are consequently said to take little or no nourishment during the brief term of their perfect existence. The females are also remarkable for their "degraded" structural characters; they are wingless, and generally appear as little more than an animated scale, but they have a well developed beak, and use it for piercing the plant, whose juices they imbibe. The scale-like larvæ, when hatched from the eggs, crawl over the plants they frequent, living upon their sap and passing through the ordinary phases of insect growth. The adult female coccus is an ovoid-shaped creature, very convex above, as represented in the engraving accompanying our last paper. Soon after emerging from the pupa stage, she attaches herself by her beak, and frequently by an exudation from her body or else from the punctured plant, and proceeds to the reproduction of her kind. The convex and scale-like body is distended with eggs; these she finally lays underneath her, in such manner that they are almost entirely concealed from view; as they are discharged from the interior of the body, the latter collapses from beneath, the upper and lower walls thus coming together and forming a protected shell over the eggs. Most of the coccids also secrete, in greater or less quantities, a whitish feculent substance, amidst which the eggs are deposited, and which frequently, also, is developed as a covering to the larvæ and even of the adult insect. The collapsed female dies; and when the eggs hatch, the young readily escape from under the extraordinary protection, and make their way to their feeding grounds. According to Leuckart, these females, like those of the aphides, have carried the doctrine of "woman's rights" to the extent of dispensing considerably with husbands, whose services are only required at one period of the year. During the rest of the season, the multiplication of the family is carried on by virgin, or rather, as examination shows, by undeveloped females.

Insignificant and degraded in life type as these lowly bugs are, they are powerful for evil, and many a lover of plants has seen a favorite one become a wreck, pining and flowerless, and finally die altogether away, and yet has scarcely dared to attribute the ruin to the almost inanimate scales that swarmed upon it. Fitch regards the "oyster-shell bark louse" as the worst foe to the apple tree in this country, and no tree is able long to withstand the exhaustion produced by this insidious pest.

But while the aphides are unmitigated pests, the coccids, as some atonement for these injuries, contribute largely to the artificial requirements of our civilized condition, and the value of the substances they secrete appears almost fabulous when the insignificance of the authors is known.

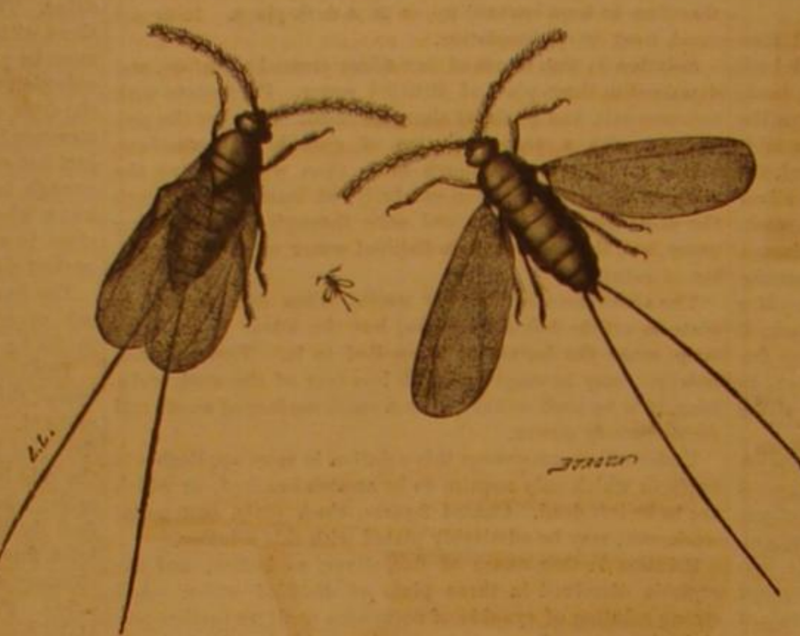
How important the culture of the cochineal insect is, in the countries in which it is carried on, may be judged from the fact that upwards of 2,500,000 lbs. of cochineal were imported into Great Britain in 1850, while 1,414,158 lbs., of the value of $927,946, were brought into this country in 1869. To meet this demand, we read of gardens of nopals (*opuntia*), the cactus upon which the *coccus cacti* feeds, in Mexico, containing from 50,000 to 60,000 plants; and this although, it is said, the largest part of the supply is obtained from the small gardens of poor proprietors. The *coccus cacti* was originally discovered in Mexico, but has since been introduced into other countries, notably into Java, Spain, and Algeria.

The Mexican cochineal has greatly superseded the use of the products of the European cocci, which formerly were used for obtaining similar dyes. These kermes dyes were known to the ancients even as far back as the days of Moses, and the *coccus polonicus* was collected in the middle ages as tribute from the rural serfs. But the uses of the coccids are not confined to the production of cochineal. The *coccus lacca*, a species of this family, feeding upon various trees in the vast countries of southern Asia, gives rise to the various products known as lacs and lac dyes. Stick-lack, from which seedlac and shellac are made and lac dye obtained, consists of the bodies and eggs of the bark lice, aggregated together upon twigs by a resinous substance, concerning which there appears to be doubt as to whether it is a secretion from the insect or an exudation from the wound made by the puncture of the bug.

The "vegetable wax" of China is another production of this family; and, according to Blanchard, a similar product may be profitably obtained from an European species of kermes, *C. ficus*.

Valuable as these important products are, it is a matter of speculation whether the net profit derived from them is equal, in a pecuniary point of view, to the damages others of the bark lice inflict upon us. In any case, it is a consolation to know that we can utilize, in some way, these devastators of Nature.

We have had occasion, in these papers, frequently to speak of the relative perfection of different insects, thereby implying their absolute imperfection; and this, and to speak of "degraded" forms of life, may seem to some minds to be an



THE MALE COCHINEAL INSECT GREATLY MAGNIFIED.

imputation on the "goodness" of the works of the Creator. The fact is, that these creatures, as we have hinted heretofore, are admirable in their perfection, if we look beyond the individual. The very lowness of the type of reproduction in the individual aphis may probably be its salvation as a race; and if the female coccids were not degraded as they are, they would possibly have long ago been exterminated, and we should have been without cochineal. As it is, they fill a place in Nature that would otherwise be vacant, and their very abundance proves how well they are adapted to the peculiar conditions under which they are placed; and this, though they may be utterly helpless by themselves, as are those aphides, of which Fitch tells us, which do not increase and multiply unless discovered and tended by a community of friendly ants!

THE SEA-HORSE.

This remarkable fish is found near our south Atlantic coasts. It belongs to the singular order known as *Lophobranch*, or tuft-gilled, which differ from other fishes in the peculiar structure of the gill arches, by which the gills are arranged in little tufts on each side of the head, under the "cheek" bones or gill covers.

The male is really and literally father and mother to the progeny, as he is provided with a pouch or sack in which the eggs are deposited by the female; in which sack the eggs are fertilized, hatched, and the young reared, by the male.

We are indebted for our engraving to the *American Naturalist*, in which the Rev. Samuel Lockwood, who has carefully studied the habits of the sea-horse, gives us much interesting information.

The structure of the sea-horse's tail is unlike that of any other fish, being covered with an envelope, consisting of long scales—four-sided, and suggesting a small four-sided file—in faculty, prehensile, like that of a monkey, and of considerable length. In the act of excluding its young, it catches its tail around some object, such as a shell, and drawing its pouch downward against the object, pushes up the contents, forcing the young out of the opening at the top of the pouch. A dried specimen of a sea-horse sent to us recently by Mr. E. L. Caum, of Pennsylvania, measured five inches in length. Says Mr. Lockwood:

"The sea-horse, when taken fresh from his native home, though almost laughably grotesque, is a very pretty creature Its general color is ashen gray; at first glance, an exceedingly sober suit. But if examined more closely, it will be found thickly studded with tiny spangles of metallic silver. Add to this its rich armature of daintily carved plates, like a coat of mail, its body always pertly erect, and, bent forward, it looks like the steed of a knight-errant in quest of adventure; and those pretty golden, yet queer little eyes, chameleon-like, independent of each other, intently gaze two ways at once. Then, as to that dorsal fin, in oddity and beauty it has no compeer among its ichthyic rivals, so tastily fringed with a neat border of delicate yellow, precisely like the yellow tipping of the tail of the cedar-bird. In truth this dorsal fin is cruelly libeled in every engraving we have ever seen. In nature it is an exquisite fan, in form, size, and ornament, worthy the hand of Queen Mab. Thus our sea-horse, though anomalous in form and habit, has beauty united with its strange features, and grace with its eccentricity. In fine, as we look at his equine appearance, and think of his monkey faculty, and his opossum traits, and that queer blending of innocent oddity with patriarchal dignity, we have to accept the old fisherman's proverb: 'There is nothing on the land that is not in the sea.'"

Food from Algæ or Sea Mosses.

William S. Rand, Jr., of Brooklyn, N. Y., states in the specification of his recent patent, as above, that there are known to be over two thousand distinct species of algæ, and among them many contain the most valuable elements of vegetable nutrition. Some writers affirm that they contain nutritive elements sufficient to sustain all the demands of the human system. Hon. William H. Harvey, Professor of botany in the Royal College in Dublin, says "that algæ have been neglected as an article of food from want of proper commercial form, ignorance, and its invariable companion, prejudice."

The only serious objection to algæ as articles of food is their peculiar flavor. Growing, as they do, mostly in salt water, they contain lime, sulphur, salt, iodine, etc., which impart what may be properly called a sea flavor.

The object of this invention, then, is to expel, by a suitable process, the objectionable ingredients without decomposing or changing the nutritious and health-giving qualities, and put in such form as will be the cheapest and most convenient for commerce and the consumer.

The mode of preparing algæ (with the exception of the *chondrus crispus*) is to thoroughly clean the moss by suitable machinery or by hand; and, by washing it in a light alkali, to remove the salt and disagreeable sea taste, and, after desiccation, to disintegrate or grind it to a fine powder or farine.

Climatology of Bright's Disease.

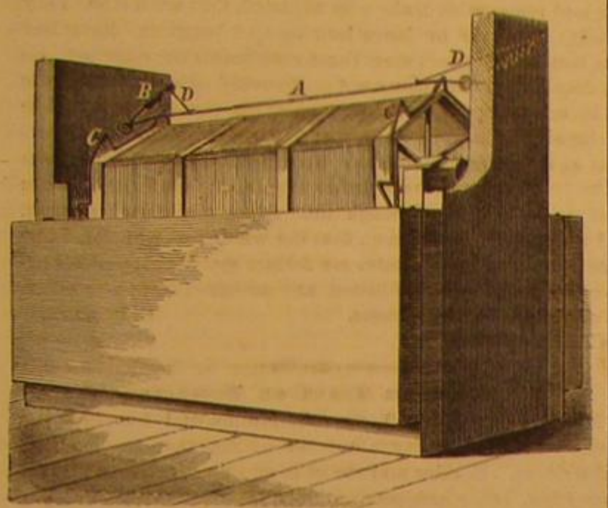
Gouverneur M. Smith, M. D., New York, does not doubt that climate is an element in the causation of Bright's disease. The inhabitants of the poles and the tropics are comparatively exempt from the disease, owing to the fact that the climates to which they are exposed are either uniformly cold or equably warm. The annual mean temperature of the city of New York and vicinity is 51° F., and therefore it is a location especially favoring the development of Bright's disease. It is consequently not surprising to hear that the malady is so frequently encountered. During the year 1867 the deaths in New York city numbered 23,441, of which number 425 were from Bright's disease. Rochester and Providence, with climates cooler than that of New York, have a considerably less mortality from Bright's disease. Dr. Smith believes that the liability to this disease is diminished where the vicissitudes of the weather are less abrupt than in this locality; in other words, that the climatic element of causation decreases both in more northern and more southern latitudes. The southern part of our union seems to present a place of refuge to one threatened with Bright's disease, or to one who has recovered from its more serious symptoms, and appears to offer a residence in which he is less exposed to excited irritation in parts of the kidneys which may be unaffected, or which may be but partially diseased. In following the isothermal line of 60° F., we find it commencing near the northern part of North Carolina, running through Chapel Hill and Raleigh, thence along the northern part of Georgia, Alabama, Mississippi, Arkansas, and Texas; thence crossing the continent and running northward on the Pacific coast, north of Sacramento, to about 40° of latitude. In conclusion, he says: "It behoves all, therefore, who reside in this metropolis during the winter months, to maintain a constantly uniform and normal temperature; an object which can only be attained by suitable diet, warm clothing, and a due attention to the warming of apartments."

The Iron-clads of the United States.

The iron-clad war vessels of the United States Navy now number fifty-one vessels of all classes. Most of these, we believe, are armed with smooth bore cast iron guns. The recent Prussian war has demonstrated, beyond all question, the superiority of cast steel breech-loading ordnance. A vessel armed with these might stand out of range of the heaviest guns of our iron-clads, and yet drive shot through them. The American Government is behind the age in respect to effective ordnance. It has not yet commenced the manufacture of steel breech-loaders.

MITCHELL & KESSINGER'S IMPROVED FLOUR BOLT.

In this improved flour bolt, a soft cotton cord, A, or a cord of other suitable flexible material, is extended lengthwise over the reel and fastened to coiled springs, B. On each end of the reel, or around the middle of the reel, are placed ratchet bands, C, over which the cord passes and straps down upon each section of the reel, one or more times, as it revolves. Auxiliary cords, D, are attached to the eyes of the springs, B, and are also attached to the principal cord, A, inside of the end ratchet bars, as shown.



This simple device can be attached to any reel at trifling cost, and, it is claimed, it secures important advantages, viz.: it keeps each section of the reel clear as it is presented to the rolling flour, and adds much to the capacity in bolting when the wheat is damp. It prevents beards and oat husks from sticking into the cloth to its injury, and preserves it from the ravages of moths. It is well known that the cleaner the cloth is kept, the less liable it is to be injured. The invention enables the miller to make the turn-out without difficulty, which, it is claimed, makes a large annual saving, and thus to satisfy his customers better.

The invention has been in use since December, 1868, and we have been shown letters from those using it, expressing in highest terms their satisfaction with the operation of the device. When grinding in damp weather, and when damp and musty wheat are ground, or when grinding new wheat before it has thoroughly dried, the work will, it is claimed, be done with greater ease and profit to the miller.

The principle of the operation of the device is that of whipping the cloth as with a bunch of broom straw. It does not jar the reel, but simply the cloth of each section, as it revolves. The ratchet bands serve to strengthen the reel, besides performing the office above described.

The invention was patented May 11, 1869, by Rufus S. Mitchell and Geo. Z. Kessinger. For further information regarding territorial or mill rights, address Mitchell & Kessinger, Monmouth, Warren Co., Ill.

Archimedean Screw and Centrifugal Pump.

At the meeting of the Institution of Civil Engineers (London) February 14, Mr. Vignoles, president, in the chair, the first paper read was "On the Archimedean Screw for Lifting Water," by Mr. Wilfred Airy. This communication was intended to supply information regarding the best form of the Archimedean screw, and its effect when laid at different angles of inclination to the horizon. After suggesting that the previous neglect of this subject was probably owing to the mathematical and practical difficulties attending the construction of screws in the ordinary way,—namely, with the threads at right angles to the surface of the core,—the author stated that he had adopted another principle of forming the spiral threads, which would simplify the work of construction and produce a more efficient machine. This was to make the spiral threads on the natural and developable system. If an annular piece of card or tin be wrapped upon a cylindrical core, having its edge retained in a shallow spiral groove on the surface of the core, it would naturally take up a fixed and determinate position, not at right angles to the surface of the core, but inclined to it, and inclined to it at an angle depending only upon the inclination of the spiral groove on the core. The core could only be constructed approximately by using a great number of small pieces. The developable threads also produced a more efficient machine than the threads of the usual form, as was shown by reference to tabular diagrams.

Experiments formed the basis of the investigation, and it was deduced from them:—

1. That the quicker the spiral, the flatter must the machine be laid to produce its best effect.

2. That screws of quick spiral angle, when laid at their best angle of inclination, delivered a far greater volume of water per revolution than those of slower spiral angle, when laid at their best angle of inclination.

In the most favorable case, the useful effect of the screw appeared at 88 per cent; and it was concluded that, after making allowance for certain small losses referred to, the useful effect of a well constructed screw should not be less than 85 per cent.

Reference was then made, by way of comparison, to other machihes commonly used for low lifts,—namely, suction pumps, centrifugal pumps, open Archimedean screws, scoop-wheels, chain pumps and Persian wheels; and the paper concluded by pointing out the various advantages of the Archimedean screw, more particularly as regards its durability, simplicity, and useful effect.

The second paper read was on "Centrifugal Pumps," by Mr. D. Thomson. The practical rules of construction were thus stated:

1. The arms of the fan were curved backwards, according to principles of construction which were explained by diagrams. The depth of the fan was one fourth of the diameter, and the central opening for the admission of the water was about nine sixteenths of the diameter. The space allowed in the case round the fan should be of ample dimensions.

2. The best duty was given when the speed of the periphery of the fan exceeded the velocity of a falling body, due to the height of the lift, by from 6 ft. to 8 ft. per second.

3. A fan 12 in. in diameter, and proportioned as described, would discharge 1,200 gallons of water per minute.

4. If the diameter of the fan were varied (the speed of the periphery and the lift remaining the same), the delivery of water was increased or diminished directly as the square of the diameter.

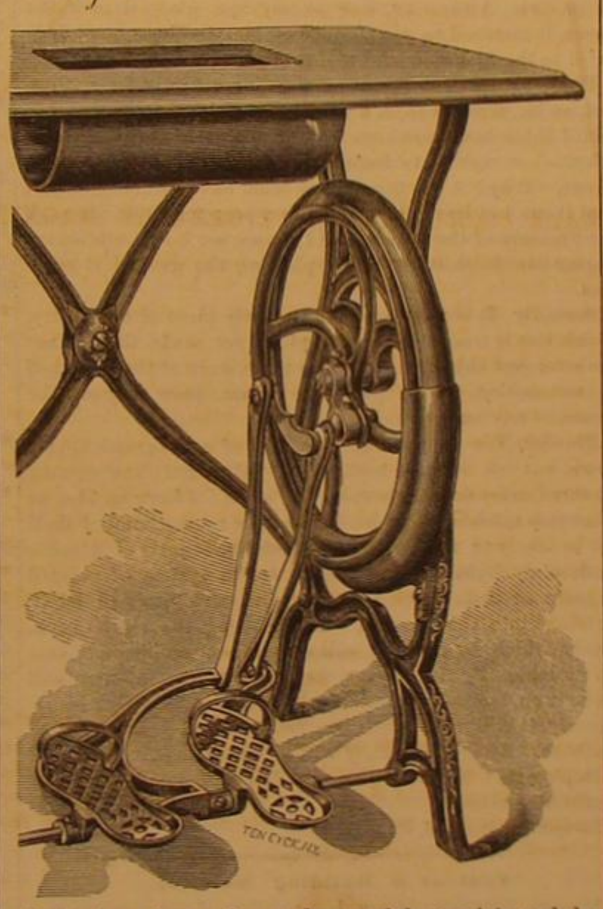
5. When a centrifugal pump, properly proportioned, was worked by a steam-engine, the duty that might be realised ranged from 55 per cent in the smaller sized pumps to 70 per cent in the larger machines, of the power shown by the indicator diagrams.

G. K. PROCTOR'S IMPROVED TREADLE MOTION.

This improvement is designed to render a double treadle motion, having no dead point, applicable not only to new sewing machines of all kinds, but to such as are already in use.

As will be seen, it is a double crank, of which our engraving shows only one form, but which is modified without change of principle, to adapt it to other methods of attachment.

Fig. 1



In the form shown, the attachment of the crank is made by set screws, to the hub of the wheel, and by a slot to the old crank wrist on the fly wheel. The two crank arms, A and B, Fig. 2, are set at right angles with each other, which obviates the possibility of both crank wrists being on the center at once, and allows the wheel to be started when in any position. The treadles act independently of each other, as will be understood without further explanation.

Fig. 2

On machines where the crank is formed on a shaft passing from end to end of the machine, instead of being attached directly to and forming part of the fly wheel, the double crank is attached by set screws.

In this way the inventor provides for the application to all machines of a double treadle motion, placing the machines entirely under control of the foot, leaving the hands free to work, making it easy to run the machine at high or low speeds, and giving more natural motion to the muscles, so that less fatigue is sustained by the operator. A stop motion, not shown, has also been provided, so that the machine cannot be started the wrong way. This can be used with or without the form of treadle movement illustrated.

Patented, March 7, 1871, through the Scientific American Patent Agency, by G. K. Proctor, whom address for rights or other information, 206 Essex street, Salem, Mass.

The Crystals found in Plants.

It has been proven by the microscopic examinations of distinguished naturalists, says the *American Journal of Microscopy*, that saline substances are spontaneously crystallized within the cells of plants, the crystals having been found ex-

Fig. 1.

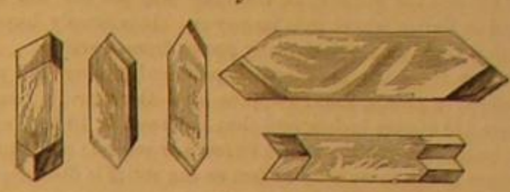
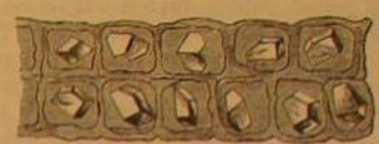


Fig. 2.



isting in infinite numbers throughout the bark, wood, and leaves of a great variety of trees and shrubs.

Prof. Bailey, of West Point, first called attention to this subject. He observed the crystals in the ashes of the hickory; afterwards he examined the bark previous to its being subjected to the action of fire.

When the bark of the hickory is illuminated by the rays of the sun, numerous glittering particles are seen. An examination proves them to be crystals, for when thin layers of bark or sections of wood are viewed by a microscope, the crystals are detected imbedded in their natural position.

They are, however, better seen by scraping the bark upon a plate of glass, upon moistening which with the breath, the crystals are made to adhere to the surface, while the woody particles are readily blown off. When placed under a microscope, the glittering atoms then appear as beautiful transparent crystals, having the forms shown in figure 1.

These crystals are identical in every particular with the polygonal bodies found in the ashes of hickory. Prof. Bailey examined the wood and bark of nearly every indigenous and foreign tree, and with the same result. Even in the densest woods, such as mahogany and lignum vitæ, the crystals may be found by scraping the wood into a watching glass filled with water, picking out the woody particles and then examining the residue. The crystals are likewise detached, in the minute particles that fall from worm-eaten wood, sawdust and in the finer particles of ground dye woods. This shows that even the finely ground medicinal barks, woods, etc., used by the pharmaceutist, may be examined successfully for the crystals peculiar to them.

It only remains for scientific men who desire to advance the interests of the profession of medicine, to examine all the medicinal vegetable substances, and ascertain the peculiar crystals belonging to each. Then, if these crystals are delineated and appended to our works on Medical Botany, Pharmacology, and even to Dispensatories, a great and practical advance in our knowledge of the purity of drugs would result.

When thin layers of the bark of the poplar are moistened, and examined by the microscope, the arrangement of crystals appears like an elegant piece of mosaic work, the crystals in the cells of the bark being either simple or compound, as shown in Fig. 2:

If we wish, for example, to satisfy ourselves whether a given specimen of pulverized Peruvian bark is adulterated or not, we first examine a thin layer of the perfect bark by the microscope, and ascertain the exact appearance of the crystals therein. Then we place some of the finely ground bark under the instrument, and see if the crystals, or all of them, have the same appearance. If the crystals in the pulverized bark be identical with those in the perfect specimen, we may decide the former to be genuine. If other crystals be found, the testimony is strongly in favor of adulteration.

This test, together with another which consists in the identification of the ultimate structure of the wood or bark, will enable us at all times to avoid imposition and the use of worthless drugs.

Licensing Druggists' Clerks.

A recent law, relative to the sale of drugs in New York city, is as follows:

The Mayor is directed to appoint, before the 1st of June, a board, consisting of one skilled pharmaceutist, one practical druggist, and two regular physicians, to hold office during the pleasure of the Mayor. These shall choose a practical druggist as secretary. The board shall examine and license all druggists, and clerks now employed, or hereafter to be employed, as clerks in drug stores. At the expiration of six months from the organization of the above board, any unlicensed person who shall make up a physician's prescription shall be deemed guilty of a misdemeanor, and shall be liable to a fine of not more than $500, or imprisonment not more than six months, or both. The salary of the members of the board shall be fixed by the Board of Supervisors, but shall not exceed $2,500 per annum.

Correspondence.

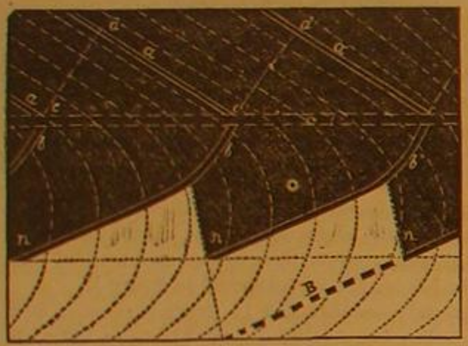
The Editors are not responsible for the opinions expressed by their Correspondents.

Filling the Issues of Turbines.

Messrs. Editors:—It is a well established fact that all good turbines possess the quality of working with filled issues; that is, the veins of water which they discharge are no less than the issues themselves; and it is plain that, if they are not filled, there can be no reaction, as there can be no pressure within a wheel which has the outlet so large that the entering water can escape without even touching all the surface of the issue or exit.

It is difficult to understand how port gate wheels can derive their power from anything but direct action of the water against the buckets, in the same way as the old undershot or flutter wheel gets its power. It is simply impossible that they should derive any power from reaction.

Reaction alone can be shown capable of giving 100 per cent effective power, thus: Suppose that the wheel's issues measure 144 square inches, and that the head is 10 feet, and the velocity through the issues 20 feet per second; now, since the issues are to move only as fast as the water is discharged (which simply means that the issues are to move, and not the water) 20 cubic feet per second will be discharged, and $20 \times 62\frac{1}{2} = 1,250$ pounds, falling 10 feet=22·7-horse power. This is the entire power of the water discharged. The constant pressure on the line of issue is $144 \times 4{\cdot}33$ (the pressure per square inch)=623·5 pounds moving 20 feet per second=22·7-horse power as before; consequently the effect is equal to the power applied. This is very evident, and simple enough, but in carrying out this theory there are certain conditions to be complied with, to aid in explaining which, I give the following diagram of a turbine: *a a a* are the guides, and *b b b* the buckets; the lines, *c d* and *m n*, the guide and wheel issues respectively. The numerous broken curved lines show the direction of the water, as it



passes through the wheel, when it (the wheel) is in motion. Now, it will be observed that the four following conditions are essential: 1. A pressure on the plane of issue equal to that due the head. This is approximated by having the inlet larger than the outlet, and is also aided by complying with the third condition. 2. Making the plane or line of issue at right angles to the plane of the wheel's rotation. Thus the first furnishes the propelling force, and the second gives it the right direction. 3. There must be no retarding force, consequently the buckets must be so shaped as to enter and pass, through the column of water, from the guides, "endwise," or without obstructing the water or being obstructed or retarded thereby; thus allowing the water to pass in a solid column downwards, with the mere thickness of the buckets separating one vein from another. This is easily accomplished when the relative velocities of water and buckets are considered. Also, all that part of the outside of the buckets from *m* to *n* must not be touched by the water, or, at least, no pressure must be exerted against it. This is accomplished by making a rather short turn or angle at *m*, and drawing that part of the buckets above it, so as to require a slightly faster downward motion of the water to this point than after passing it. This bend also locates the plane of issue nearer the desired position, as it is thus made nearer at right angles to that of the wheel's rotation.

Thus far we have secured the propelling force, and avoided retarding forces; and it only remains to see that the water is discharged no faster than the issues move. This is the fourth condition, and one that has been the cause of a vast deal of trouble and disappointment. Yet it is accomplished by the very simple expedient of locating the relative position, or distance asunder, of the guide and wheel issues, as is required by the natural motion of the water in passing from one to the other.

The simple fact is: That as the water issues from the guides, it has a certain intensity of force in a direct forward line, but is also, from the instant of leaving the guide issue, opposed and deflected from that course towards the wheel issues, by virtue of the law, that fluids under pressure tend towards the issue or outlet. The resultant is a certain curve, of uniform and quite short radius, so much so that it has been found necessary to limit the distance apart of guide and wheel issues to about four inches, as it has been determined that, in this distance, the direction of the water will have been changed so much as to then be passing directly across the plane of the wheel's rotation, or parallel with that of the issues, which, it is obvious, must be the case in order to fulfil this condition.

I have thus briefly stated the requirements of a successful turbine, but I do not mean to be understood as saying that any of these conditions, except the last, can be exactly complied with; but they can be very closely approximated. For instance, it is scarcely possible that the pressure within the wheel, and consequently on the plane of issue, can equal that due the head, but it is very far from being equal to that due one half the head, as has been attempted to be proved by discharging water through two equal orifices, first from one vessel into another, and then into the open air. Such illustrations are not applicable to the turbine, inasmuch as the veins from the guides, being arrested and deflected as they are, would offer apparently an increased resistance rather than otherwise.

As to the direction of the propelling force, very little loss can arise therefrom; and as to retarding forces, the mere thickness of the buckets is about all the resistance. By far the most important point, is "filling the issues and yet discharging water no faster than they move," for without this, all the other conditions must certainly be violated.

I have shown in the diagram a deep and improper bucket, B, in which the issue is so far removed from the guide issues that the water has, as shown, commenced to move in a backward direction; consequently the issues would not be filled without discharging water faster than they moved, and consequently not at all, unless the area of guides were very much the largest.

It will be observed that the whole foundation of the principle which I have attempted to explain, rests upon the question: What time and distance traversed will be occupied in changing the direction of matter when acted upon in different directions (constantly or continuously) by forces), the direction and relative intensity of which is known? A particle of water moving in any direction cannot change that direction in "no time" and "no distance."

I have stated the distance which I find it to be, in the case of a turbine, and now leave the mathematical solution of this solution of this question to abler minds.

Boyd, Mo. J. B. Reyman.

The Coming Steam Plow.

Messrs. Editors:—After plowing all day, I took up the Scientific American, and as my eye glanced over the pages, it fastened on your notice of Mr. Greeley's book dedicated to the first man who will make a steam plow, etc.

First. The coming steam plow will not really be a plow, but, as Mr. Greeley says, a machine to pulverize the ground; and I think inventors have been mistaken in confining their attention so rigidly to improving simply an engine to draw plows. Why? A traction engine must have so much weight that it can but leave the ground in a poor condition through the pressure of the wheels, and I cannot see how a stationary engine can finish its work by plowing the ground it occupies.

Secondly. It is a very unwieldy, costly piece of machinery, which last is true of all steam plows yet made, though not the strongest objection. Yet the price, even if they worked to satisfaction, would place the steam plow beyond the means of any but a prince.

Thirdly. We do not want two feet of soil turned upside down, but we want it broken up, pulverized; the coming machine must do this to meet the want. I have an idea of what this machine must be, but as I am no mechanic, I shall not be likely to realize it. The principal parts of it are, a moderately light traction engine, and a system of pointed daggers or arms behind said engine, and operated by it, striking into the ground, and throwing the earth backwards, which, by reaction, will move the machine on to another stroke. By this means, the action of the machine will move it on, instead of drawing it back, as formerly; consequently, it will need much less traction, and less weight of machine. Being portable, it will be convenient.

Hoping that the coming steam plow will soon be on hand, I subscribe myself, A. W. Johnson.

Lower Providence, Pa.

Coal as a Building Material.

Messrs. Editors:—In a late number of your paper you have a very instructive article on artificial stone, known as *béton*, showing not only the way of making it, but the uses to which it has been and can be applied as a building material, with a well grounded opinion that it will be used as the best substitute for the ordinary stone for building purposes. You have not mentioned the modern or recent rival of both stone and *béton*, found in the admixture of coal dust, or small particles of coal, and silicate of soda (water glass), treated in the same way, or nearly so, as you have described the treatment of *béton*, to make it fit for building purposes. In it we have not only a building material equal to *béton*, but an excellent article of fuel, which burns without smoke or smell, and leaves neither clinker nor ash. In the neighborhood of the coal mines, where lumber is scarce, and bricks too costly, blocks or bricks of this coal dust, now worthless, could be made, and houses equally as strong and lasting as those built of stone or *béton* could be erected for a mere trifle. By another article in the same number, it appears that one half of the coal mined is waste or worthless, but this material could be made use of, far more cheaply than the *béton* you so favorably describe. W. J. Dermody.

Washington, D. C.

[If this building material will burn as stated, it would scarcely do for city building.—Eds.

Popular Errors Regarding the Watch.

Messrs. Editors:—I am very glad Mr. Alvin Lawrence and myself are not likely to have any controversy on the subject of "popular errors regarding the compensation balance." His own statement of facts in answer to my communication on that subject, leaves the matter just as I stated it to be. Unadjusted compensation balances, solid (uncut) or cut open, are good for nothing in compensating for variation by changes of temperature, or, as his friend quaintly expresses, "ar'n't worth shucks"; and Mr. L. naively confesses, that when he buys them unadjusted, he is obliged to cut them and adjust them in his testing apparatus. With the adjusted ones I find no fault, and Mr. Lawrence's certificate of adjustment, accompanying a watch, should be as much respected as any manufacturer's, for he can adjust a balance, undoubtedly.

What I complain of is t e flooding the market with unadjusted balances and imitations, that dishonest—no, I mean ignorant—dealers palm off on the credulous public, to the serious detriment of those who desire honorable and honest treatment.

Mr. L. says he has found watches, guaranteed by responsible and respectable makers as adjusted, that are not so. Very likely; but does he know how many "bunglers" have had the handling of them since these certificates were given? So he may have found many not professedly adjusted that were so by accident; for expansion balances that are designed to be capable of adjustment are at first constructed as near perfect as it is possible to make them; and many such happen to be just right without further attention; but those that are just wrong must go through the "freeze and thaw" process.

I must say in conclusion, that the whole tenor of Mr. Lawrence's answer corroborates my former statement, that all expansion balances not adjusted are useless, except as a snare to catch ignorant customers. R. Cowles.

Cleveland, Ohio.

A Voice from Texas on Temperance.

Messrs. Editors:—Your valuable journal has had for many years, in this city, a number of constant readers and subscribers. Besides matters of most important scientific information, other subjects, no less interesting, are found in every issue.

That advertisement of "A Friend to Humanity," relative to the extirpation of a fruitful source of evil, crime, and general demoralization—the parent of 90 per cent of all the trouble in the civilized world, to wit, the legalizing of a retail traffic in intoxicating liquors—has attracted attention. The invention of a practical plan—call it machine or engine—to accomplish the desired result, would overshadow, in real value, all the inventions, ever illustrated in your publications, put together.

How would this do for the specifications of a plan? namely: Educate the girls to a horror and detestation of, and never-ending opposition to, the liquor traffic and habitual use of intoxicating drinks. Let this principle be inculcated in every public and private school, and at the lap of every mother in the land. Good results would, although slow, be effective and permanent. Humanity.

San Antonio, Texas.

Effect of Cold upon Iron and Steel.

Messrs. Editors:—In relation to articles with the above heading, before the experimenter establishes as a fact that cold cannot cause tires on wheels to break, allow me to say that that will never do!

I admit that iron will endure as much (if not more) steady pressure, without breaking or bending, when frozen as it will when in moderate temperature, but it will not stand a sudden shock as well, for this very simple reason, namely: Iron will break when forced to stretch more, or quicker, than its capacity (bending a bar of iron is evidently stretching one side of it, and pressing the other side closer) and it must be just as true that the more frozen iron is, the less it is capable of expanding, and of expanding quickly, as it is indisputable that, the warmer it is, the more and the quicker it can be made to expand. Who can deny that Fact?

A Suggestion Regarding Lamps.

Messrs. Editors:—I noticed in a recent number of the Scientific American, two or three communications on the subject of the explosion of lamps, and the shortness of the tube was noticed as one cause. I have been using for some time a "student lamp" burner on a common glass lamp. As the burner is over two inches long, there is no danger of the flame running down into the lamp; and the wick itself does not have to be moved, except when it is trimmed. As the flame is circular, it gives a much stronger light than the common flat flames. F. P. Mann.

Princeton, N. J.

Seed Drill.

Messrs. Editors:—I noticed, in the Scientific American, April 1, 1871, that an Englishman claims to have invented a seed drill that will drop a given or desired number of seeds, at such distances as are required. If he has, he has conferred a great boon on his countrymen, as well as a fortune on himself. And, in fact, the greatest objection to raising root crops in this country is the labor of thinning, and the expense attending it. Why can't an American invent one? In view of the coming cultivation of the sugar beet, and the great increase of root crops consequent to such an invention, there is a fortune in it to the inventor, who will, moreover, be a public benefactor. C. R. M.

Johnson Town P. O., Va.

A New City Railway has lately been opened in Brooklyn, N. Y., five miles in length, from Fulton Ferry to Greenwood. Each car carries fourteen passengers, and is constructed in the most approved manner. The driver acts as conductor, the fares being deposited in a patent cash box; the car door is opened and closed by the driver, by means of cords.

The Boston *Post* is authority for the report that the New Jersey watering places are rapidly filling up with mosquitoes, and never before were they so thoroughly organized and confident of success.

New Zealand Flax (Phormium Tenax.)

The plant grows, says Mr. A. M. Southworth, in the *Rural South Carolinian*, in almost every variety of soil, from the rich mud and clay along the banks and at the mouths of rivers and lagoons, in the soil of the valleys and plains, on the tops and sides of many of the hills, and all along the seashore close to high water mark, among clean white sand. I think that the soil along the banks of our Southern rivers is admirably adapted for its growth, and that it would flourish among the low lands and islands along the coast.

It grows in bunches, two leaves starting first; and when about a foot high, they are about an inch wide, double, and one clasping the other; these spread apart and two more come up inside, and so they keep increasing and side shoots starting, and get to be a large bunch from four to six feet across, with leaves from six to nine feet long and even longer.

There is a quantity of gum in the leaves, and some free gum in the fold of the two halves toward the bottom. This gum is now used in England to make "safety envelopes," as no steaming or soaking will open them. There is a large quantity of honey in the blossoms. The stalks are very light and pithy, and are used by the natives to make their canoes more buoyant, by binding bundles along the sides.

These stalks, split or chopped fine, if used in stuffing the furniture of vessels and steamers, would make each piece a life buoy. The leaves, cut green from the bush and split to the proper size, serve a great variety of purposes, as strings and small ropes; they are woven into sacks and baskets, nets and mats; the latter are stronger and more durable than those brought from China. A few pieces of a leaf steeped in hot water will raise yeast like hops; and it has been suggested, by Dr. Hector, that the latter principle in the leaf can be applied to the manufacture of beer.

The people of New Zealand have long been aware of the plant growing wild so abundantly around them, but it is only within the last few years that machinery has been invented to work it to advantage. The principle in the several machines used is the same. The leaves are cut green and fed to the dresser, which consists of two rollers, one smooth and one grooved. These are about two inches in diameter, and feed the leaves to the beater, a cast iron cylinder a foot in diameter and six inches across, with steel bars half-square, set diagonally across its surface. This drum revolves very rapidly and the bars strike the leaf and knock the fleshy substance from it and leave the fibers hanging below. This is washed and bleached and then scutched, when it brings in the English market from two hundred to three hundred dollars per ton. It is estimated that an acre of good flax land will yield from twelve to fifteen tons of green leaves and two tons of dressed fiber. There is no particular season in which it must be harvested, but in New Zealand the mills run the year round. In England, there is machinery which still further improves the value of the fiber. I have seen ropes made from it aboard several American vessels, and the captains expressed a very high opinion of it, and wished to see it introduced into the United States. Capt. Friend, of the Barkentine Adele, of San Francisco, informed me he had some canvas made from it, which he obtained in Melbourne, Aus. Once successfully growing in the country, and with American enterprise and ingenuity bearing upon the manufacture, I think there is no plant that will so add to the wealth and prosperity of the country.

Vision of 1900.

Can any one realize the exceedingly probable fact that in 1900—only twenty-nine years from now—the population of the United States will number 75,000,000 of, we trust, free and independent citizens? Yet, says the *Evening Mail*, Mr. Samuel F. Ruggles proves that this will be the case, without making allowance for annexations, North and South, that will certainly come about, Mr. Sumner and all others to the contrary notwithstanding. He shows the reasons for his prophecy in figures, and although the old saw that "figures won't lie" is the most unveracious of proverbs, Mr. Ruggles' figures have acquired a reputation of their own, and a good one at that. For the past thirty or forty years, he has been figuring about our internal and domestic commerce; and although he has often been accused of romancing in figures, the facts have always sustained his predictions. When, therefore, the ablest, most experienced and most trust worthy statistician now living, tells us that we shall have a population of 75,000,000 in 1900, the younger part of the present generation may as well consider what awaits them in their maturity and old age.

Seventy-five millions of people in the United States implies the settlement of the entire South and West by as dense a population as that of Massachusetts; the reclamation of the arid wastes of the great Plains by irrigation; the development of states as strong as Ohio, Indiana and Illinois along the Rocky mountains; the settlement of the Utah Basin by four or five millions of agricultural and pastoral people; the development of a tier of agricultural states along our northern border, from Lake Superior to the Pacific, as populous and prosperous as Missouri and Minnesota; the *growth* of of the Pacific states into commonwealths as rich and populous as New York and Pennsylvania. It means that New York will cover the whole of Manhattan Island with a population of at least two millions, to say nothing of the outlying suburbs in New Jersey and across the East River; that Chicago and St. Louis will each become as large cities in fact, as they are now in their own estimation, and that San Francisco will have half a million of inhabitants. The national debt will have become a tradition, and it will be difficult to understand how it was ever hard to raise three or four hundred millions a year by taxation. Such are the glowing visions which are excited by the prosaic and careful figures of Mr. Ruggles. If any of our readers are unduly "Bearish" in their tendencies and inclined to get the blues over our future, we advise them to indulge in the line of speculation suggested by his striking statistics, and carry our predictions more into details.

Facts in the Natural History of the Honey Bee.

There are three classes of bees in a hive, the Worker Queen and Drone.

Queens are raised by peculiar food and treatment from eggs that would otherwise produce workers.

The worker is an undeveloped female. Workers in the the absence of a queen sometimes lay eggs. These invariably produce drones.

The queen lives from two to five years. The worker lives two or three months in the working season, and from six to eight during the season of rest.

The queen is perfected in fifteen or sixteen days from the egg, the worker in twenty to twenty-one, and the drone in twenty four.

The queen usually commences laying from seven to twelve days after leaving the cell, and is capable of laying from two to three thousand eggs in a day.

The impregnation of the queen always takes place outside the hive, on the wing, and generally the fourth or fifth day after leaving the cell. Excepting in rare cases, one impregnation answers for life. The drone she has mated with dies immediately.

The eggs of an unimpregnated queen produce nothing but drones; and it is generally conceded that impregnation does not affect her progeny; consequently, the male progeny of a pure Italian queen is pure, without regard to the drone she has mated with.

The queen and worker are provided with stings; but while the latter will use it upon any provocation, the former will only use it upon her own rank. The drones have no stings.

One queen, as a rule, is all that is tolerated in a hive; but previous to throwing off "after swarms," two or more queens are permitted in the same hive for a short time; but the extra ones are soon disposed of. In case of superseding a queen, the old one is preserved until the new one is fitted to take her place. Queens have a deadly hatred for each other and will destroy, if permitted, all queen larvæ or cells in the hive, and will fight each other until there is but one living one left.

A frightened bee, or one filled with honey, is not disposed to sting.

A good swarm contains about twenty thousand bees.

A strong or medium hive, with a good laying queen, is never seriously troubled with the moth worm; but a hive without a queen or the means of raising one is sure to be taken by th m.

Bees recognize each other by their scent.

The first one or two weeks of the young bee's life is spent inside the hive, as nurse or wax worker.

The range of a bee's flight for food is generally within two or three miles; much greater range is of but little benefit to them.

Manufacture of Pig Iron in Europe.

The process of improvement in the iron manufacture is rapid and unceasing. New sources for supplies of ore are being diligently sought out, and new processes for cheapening the conversion of the ore into metal, or for improving the quality of the iron are being diligently prosecuted. Already iron ores of superior quality are being brought from Bilboa, in the north of Spain, and from Marabello, near Gibraltar; and during the last month, letters from the north of Ireland announce the energetic prosecution of iron mining in that district, primarily for sale to iron manufacturers in England, but with the intention of eventually erecting blast furnaces on the spot; for, although the coal will require to be imported to work such furnaces, yet, seeing that it requires two tuns of the best ore, to make one tun of iron, and only one tun of coal, it is believed that it will be found more profitable to import the coal than to export the ore. This announced intention corroborates the view already put forth, that the iron manufacture is in a state of transition, which suggests and implies grave issues. For if the coal be henceforth brought to the ore, instead of the ore to the coal, the locality of the manufacture will be changed in many cases, and existing works must in some instances be shut up.

In the north of Ireland there are extensive deposits of iron ores, extending along the shore from Carrickfergus to the Giant's Causeway, and some of these ores are hematites containing 55 per cent of iron. Upwards of 80,000 tuns of ore were shipped to England and Wales during the past year. But this is only a small beginning, and the trade will, no doubt, rapidly expand. In other parts of Ireland there are ferruginous deposits which may be found of still greater eligibility; and in Somersetshire and other parts of the south of England valuable ores are being worked, some of which produce speigeleisen, which is added to the decarbonized pig for the production of Bessemer steel. The existing process for puddling iron is expensive and laborious, and many projects have been propounded for superseding it. But it is the only method yet known whereby phosphorus and sulphur can be removed from the iron, and therefore the only method in use for decarbonizing the pig yielded by the large class of ores contaminated with those substances.

Sherman's method of purifying the iron by the introduction of a small dose of iodine, and Henderson's, by introducing powdered fluor spar, mixed with oxide of iron, as a floor to the puddling furnace, have been favorably spoken of; but their success cannot be said to be assured. By Heaton's plan of making wrought iron from pig, a certain quantity of nitrate of soda was introduced into a vessel, and was covered over with a perforated iron plate. Molten iron was then poured into the vessel, and in a short time the oxygen, expelled from the salt by the heat, boiled up through the metal and decarbonized it, reducing it to the condition of a pasty mass, which was afterwards rolled. Mr. Menelaus, of Dowlais, used a rotating puddlirg furnace, which, however, did not in all respects answer his expectation; and not one of the plans for superseding puddling has yet been sufficiently successful to come into general use. Nevertheless there appears little reason to doubt that that this great desideratum will be reached in a little time. Just, however, in the proportion in which the operations of the iron manufacture are abbreviated and cheapened by the employment of more compendious methods, and by reducing the present waste of heat, will the relations of the existing ironworks be affected, as the selection of localities which yield cheap coals will cease to be the most prominent necessity of the manufacture. On the whole, it appears probable that the iron trade will shift its localities, as the copper trade has already done; and it will migrate to situations in which cheap and good ores are found, or to seaports which, with cheap coal, combines the advantage of cheap freight for ores from other places.

The iron trade of South Wales has already received a severe shake by the rise of a competing industry in the north of England. Its copper trade, once so profitable, is almost extinct; and it will require great care and circumspection on the part of mineral owners and manufacturers to prevent the iron trade from following a similar course.

Meanwhile the race of improvements in pig iron suggests but one course, and that an imperative one, to consumers, namely, that they must not localize, but extend their demand all over the producing world, and test by practical experience and pecuniary confirmation which qualities of iron suit them best. The demand for pigs for America never was larger than at this moment, and as they can be laid down in New York and Boston at $25 to $26 gold per tun of 2,240 pounds (all costs and duty paid), that demand is likely to continue.—*Alex. S. Macrae.*

Base Ball.

Some idea of the popularity of this excellent out-door amusement, may be gathered from the following report of the manufacture of base balls and bats, which we find in the New York *Times:*

No less than sixteen kinds of balls are in use, from the regulation ball to the children's or fancy ball, and prices vary from $18 to 85 cents a dozen. Some half dozen regular manufactories of base balls alone, exist in this city, the largest producing just now seventy five dozen balls per diem. The town of Natick, however, in Massachusetts, is the greatest ball manufactory perhaps in the world, many hundreds of people being employed in producing these articles, and it is not uncommon for houses in this line of business to order thence 6,000 balls at a time. Their manufacture entails nothing of very special interest, the inside being of wound rubber, and the wrapping of woolen yarn, save that the winding of the yarn around the ball is principally done by men. One would suppose from the nicely shaped spheres women make when winding up worsted, they would be most adapted to this kind of work, but it seems to require a certain amount of physical strength which the weaker sex is not endowed with. The cover of horse hide is put on entirely by women, who use a saddler's needle and saddler's thread. Dark, the famous English ball maker, is an artist in his way, and, according to the best authorities, employs thirty five workmen all the year round, and uses up one and a half tons of worsted, and covers them with the hides of 500 cows and oxen. The method of securing the cover to the English ball with the triple seam, is superior to the American method. This plan is said to have made the fortune of its inventor, a certain John Small.

The total number of balls made and sold in New York is immense, one manufacturer alone having supplied 162,000 balls last year. Perhaps the United States will bat to pieces half a million of balls this season. Bats form an important business alone. They run through a dozen different varieties. It sounds somewhat preposterous to think of mills running all the year round, turning out bats. As more bats are used than balls, one can form some idea of the enormous quantity of material consumed. Orders for all base ball implements are just now at their hight, and the supply is barely up to the demand.

Improvement in Preserving Wood.

A recent patent to Nathan H. Thomas, of New Orleans, La. He says:

My method is the simple process of saturating the wood in resin oil, warm or cold, or at any required temperature, according to the circumstances. In the event of the wood being of moderate dimensions—thin board, for instance—I apply the oil cold; and for wood of large dimensions I apply the oil hot, in either of the above cases, by immersing the wood in the oil, or by applying the same to the wood with a brush, or in any convenient manner whatever, so that the wood may be thoroughly saturated with the oil.

Claim: The application of resin oil, hot or cold, for the preservation of wood from decay, and from destruction by worms and insects, substantially as described.

[It is proper for us to state that the preservation of wood by boiling the same in resin, under a pressure, is the subject of a prior patent, granted some three years ago to another party, and that it is an effective method of preservation.—EDS.

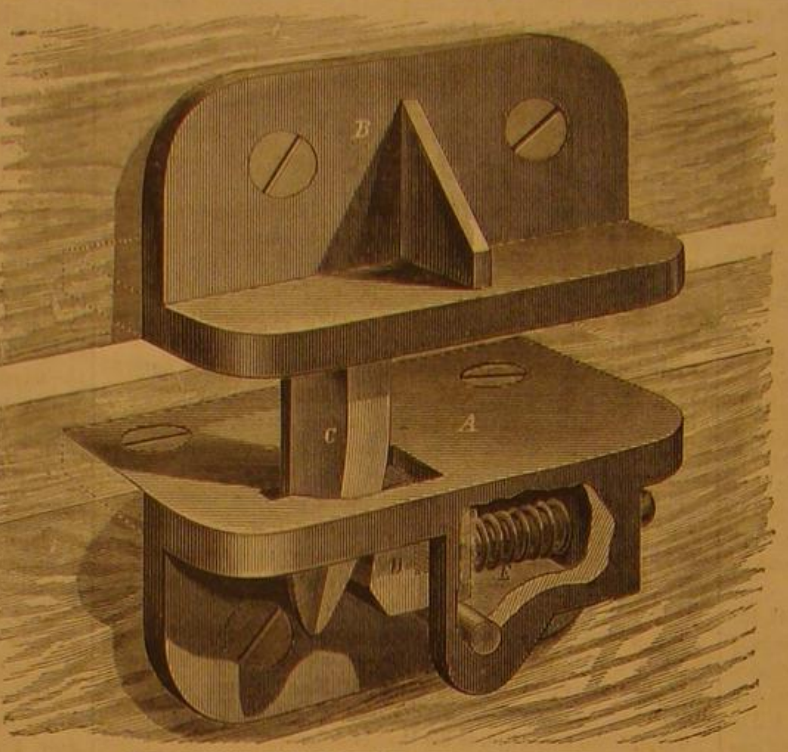
Improved Flask Guide.

All practical molders are aware of the difficulties in making castings as true as the pattern, on account of the looseness of the guide pins of their flasks, as they are ordinarily met with in foundries. If made tight, they stick or bind, and are apt to jar the sand out; and, if loose enough to work with freedom, then it is difficult to avoid lop-sided castings, because the cope cannot generally be replaced in the exact position it occupied before removal for the withdrawal of the pattern.

The accurate replacing of the cope is secured by the improved flask guide herewith illustrated; and as two sides of the pin are straight, except at the point, the cope must ascend or descend vertically, while a spring bolt, pressing against the taper side of the pin, keeps it forced against the straight sides. It is claimed that this arrangement secures a perfect guide, free from any liability to stick, and always working freely and accurately.

The construction and operation of this device will be more fully understood on reference to the engraving, in which A represents the part of the device attached to the lower part of the flask; B, that attached to the upper part of the flask; C, the guide pin, triangular in form, with one side tapering, as shown; D, a spring-bolt bearing against the pin; and E, the spring that exerts the pressure. The guides are made from right and left patterns.

The improvement was patented through the Scientific American Patent Agency, April 5, 1870, by Thos. S. Brown, of Poughkeepsie, N.Y., whom address for further information.



BROWN'S IMPROVED FLASK GUIDE.

Left-Handedness.

Various attempts have been made to account satisfactorily for the use of the left in preference to the right hand in those in whom this peculiarity exists, but, according to the *Lancet*, without success. Dr. Pye-Smith takes up the question, and, disposing of the theories that left-handedness is to be accounted for by transposition of the viscera, as asserted by Von Baer and others, or by an abnormal origin of the primary branches of the aorta, proceeds to argue that right-handedness arose from modes of fighting adopted, from being found to be followed by the least serious consequences. "If a hundred of our fighting ambidexterous ancestors made the step in civilization of inventing a shield, we may suppose that half would carry it on the right arm, and fight with the left; the other half on the left, and fight with the right. The latter would certainly, in the long run, escape mortal wounds better than the former, and thus a race of men who fought with the right hand, would gradually be developed by a process of natural selection." Of course the habit once acquired, of using the right hand more than the left, would be hereditarily transmitted from parent to child.

Frings' New Process for Preparing and Mashing Grain in Distilling.

Mr. Charles H. Frings, of Centreton, Mo., has invented an improvement in preparing and mashing grain, of which the following is a description, derived from his specification:

In this process the grain is first pulverized, or if of a horny consistency, like rice and certain kinds of corn, first steeped in an alkaline solution, containing for every bushel of grain one to one and a quarter ounce of caustic soda, or an equivalent quantity of caustic potash, and water enough to cover the grain.

After having been steeped for several hours, the horny parts will be sufficiently loose, and the grain may, after having been superficially dried, be pulverized. Grain less horny is first pulverized, and is then, in a suitable sieve or apparatus, separated from the larger (horny) parts. These are then separately moistened with an alkaline solution, like that used for the horny grain, and pulverized, after a few hours, when sufficiently dry.

To extract the proteine from the grain, the latter is steeped in another alkaline solution, which contains for every bushel of grain one to one and a quarter ounce of caustic soda, or its equivalent amount of caustic potash, and for every bushel of rice or corn about fifteen, for other grain about twenty, gallons of water.

The grain is stirred in this solution for about fifteen minutes, and then allowed to settle until about five gallons of the liquid above the sediment can be drawn for every bushel of grain. This proteine extract is reserved for fermentation.

To prevent alkaline reaction, which in the mash promotes a disadvantageous formation of lactic acid, the inventor adds to the sediment muriatic acid, in such proportion that the mash will, after addition of proteine extract, show a sour reaction. This aids in completing the disclosure of starch before saccharization, and promotes, in conjunction with the said alkaline bases, the effectivity of the diastase during saccharization, and the action of the proteine during fermentation. It also improves the quality of the alcohol, prevents the formation of acetic acid, and increases, by forming salts, in its combination with the soda or potash, the value of the slop or swill as fodder.

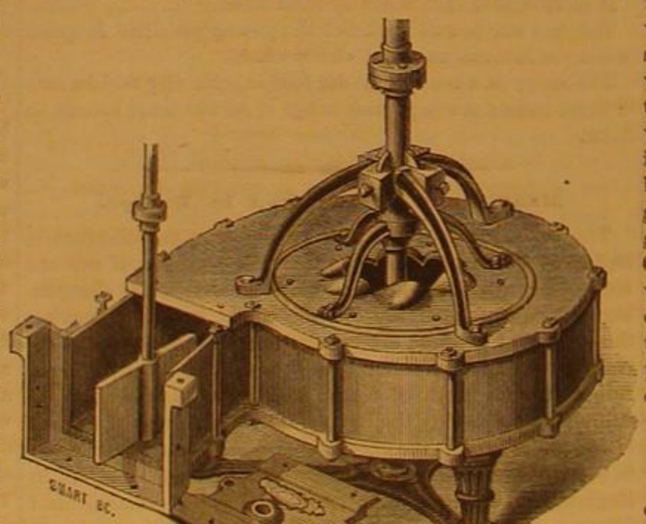
From five to six ounces of muriatic acid for every bushel of grain, diluted in three times its bulk of water, are, while the sediment is being stirred, added to the same. The mixture, after standing about fifteen minutes, is brought to the mash tub. The tub should contain sufficient hot water so that, after the addition of the grain, thirty gallons will be occupied by each bushel.

For rice and corn, the water in the tub should be about 212°, for other grain about 180° Fah. Immediately after the application of the sediment to the tub, which causes a considerable reduction of temperature, one bushel of malt is added to every one hundred bushels of unmalted grain, for the liquefaction of "paste" first formed. The temperature is then gradually raised, for rice and corn to 200°, for other grain to 170° Fah., retained for ten or fifteen minutes, then quickly reduced to about 145°, and the malt required for saccharization is added, whereof five bushels for every one hundred bushels of unmalted grain are required. The temperature is now, for about one hour, kept at 142° to 145°, after which time the process of saccharization is completed.

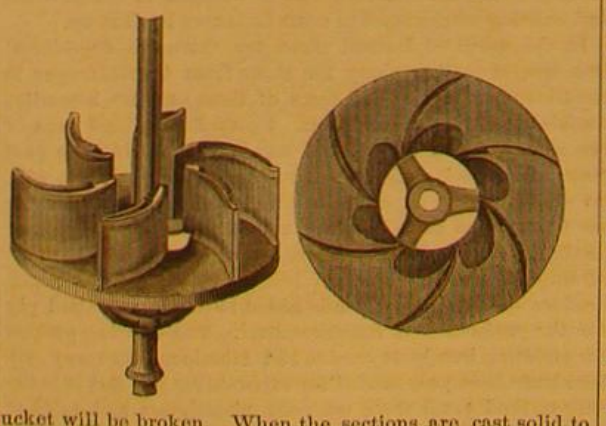
The proteine extract taken from the grain is added to the mash when the same has been cooled to about 120°. Fermentation is finally effected, after further cooling, by the customary addition of yeast, and is completed in about thirty-six or forty hours.

IMPROVED TURBINE WATER WHEEL.

It has long been recognized as desirable to so construct turbines that the buckets and gate might be easily accessible. For many reasons such construction adds to the usefulness of



this class of wheels. On mountain streams apt to be suddenly flooded by heavy rains, more or less rubbish, like stones, sticks, and gravel, will be carried down, and it is scarcely possible to avoid its occasional entrance to the wheel. When stones thus enter the wheel, should they wedge between the buckets and the case, either the wheel will be stopped or the



bucket will be broken. When the sections are cast solid to the disk of the wheel, as in the old method of making scroll turbines, the buckets cannot ordinarily be polished or finished, and consequently, by their friction in the water, absorb a notable percentage of power over those made with polished buckets. If a bucket be broken, it becomes necessary to remove an entire section, and supply its place with a new one, causing delay and expense, especially when the wheel is at a long distance from the factory. The gate cannot be removed without disconnecting the scroll from the flume, and setting the entire wheel out of its usual place.

These difficulties are removed in the construction of the wheel illustrated herewith, and another advantage is gained, namely, the power to adjust the gate so as to compensate for wear, and prevent leakage and other inconveniences attending such wear.

Another object is secured, namely, the continued reaction of the water after it has left the buckets, so as to extract as much as possible its available dynamic power before its discharge from the wheel.

These desiderata are secured by making the buckets separate and movable, so that they may be polished for the purpose of lessening friction, or removed without taking the wheel apart; and providing a flange or bead upon each bucket, made in sections or continuous the whole length of the edge of the bucket, the flange fitting into a corresponding groove in the disks of the wheel, and secured by a screw bolt passing through the disks into the flange or the edge of the bucket.

The upper portion of the mouth of the scroll is made so that it can be removed, as shown in the engraving, which gives ready access to the gate, permitting the latter to be re- moved or adjusted without disconnecting the wheel from the flume The gate is also provided with adjustable strips or bars placed on the inside by which compensation for wear is secured and leakage prevented.

The wheel is made without a hub, and the upper and lower disks have formed upon them half domes, as many on each disk as the number of buckets in the wheel. The domes are of the shape shown in the engraving, and their bases receive the water as it leaves the buckets, and by their directing power compel it to react upon the buckets for a longer time than would be the case were they dispensed with.

These improvements were patented April 18, 1871, by Elisha P. H. Capron, of Hudson, New York. For further information address the Capron Water Wheel Company, Lock Box 138, Hudson, N. Y.

Testing for Gold with Iodine and Bromine.

W. Skey, in the *Chemical News*, gives a method for detecting small quantities of gold by the use of iodine and bromine. Two grammes of roasted quartz sand, which contained 2 ounces gold to the tun, was shaken up with an equal volume of a tincture of iodine, and after the sand had settled to the bottom, and the liquid above was clear, a piece of Swedish filter paper was immersed in it, and afterwards burned. The ash was not white, but purple, and the coloring matter was quickly extracted by bromine. One gramme of the same gold-bearing quartz was taken and thoroughly mixed with other rock, so that the gold did not exceed 2 dwts. per tun, and left for two hours with constant stirring, in contact with the iodine tincture. A strip of filter paper was then immersed five times in the liquid and tried each time, then burned and treated with bromine as before, when traces of gold were made evident. Hematite ore was mixed with gold quartz in such proportions that the gold did not exceed 0·5 dwt. to the tun, and yet it was easily detected in this way. By the amalgamation method it is scarcely possible to detect gold, even when 100 grammes are put into test, where the amount does not exceed 2 dwts. to the tun. Mr. Skey's process, being easy of execution, offers many advantages over the old way of testing for gold.

Passivity of Iron, and Electrolysis.

L. Schönn states that, when a piece of iron is tightly fastened to a piece of charcoal, care being taken to make the contact between the charcoal and well polished iron as perfect as possible, and also to immerse both these substances simultaneously into nitric acid, the iron is not dissolved; but as soon as either the metal or the charcoal is touched, under the surface of the acid, with a strongly electropositive metal (for instance, zinc), the iron becomes at once active again, and is dissolved in the acid with a copious evolution of gas. When some very dilute hydrochloric acid, so weak that it hardly acts upon zinc, is poured into a platinum basin, and a piece of zinc placed in that liquid in metallic contact with the platinum, a copious evolution of hydrogen takes place at once, precisely on the spot where the zinc, platinum, and acid are in contact. If, instead of the very weak acid, an aqueous solution of corrosive sublimate be taken, and the experiment repeated, metallic mercury is separated at the point of contact between the zinc, platinum and the solution. The author finally states that, from a series of experiments made by him, he has found that all desired electrochemical actions can be called forth at pleasure by simply placing either two different metals, or charcoal and metals, in contact with a fluid.

REV. WILLIAM SPEER, D. D. (*China and the United States*) says it is amusing to witness the eagerness of the Chinese when, once in many years, a slight snow falls in the winter, to gather it into bottles, in which they suppose its precious virtues will be preserved after it melts, and be an efficacious remedy for fevers.

THE secrets of Nature are the secrets of God, and man should inquire into them with reverence and without boldness.

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. A. E. BEACH.

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

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

☞ Messrs. Sampson Low, Son & Marston, Crown Building, 185 Fleet street, Trubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

☞ A. Asher & Co., 20 Unter den Linden, Berlin, Prussia, are Agents for the German States.

VOL. XXIV., NO. 20. . . [NEW SERIES.] *Twenty-sixth Year*

NEW YORK, SATURDAY, MAY 13, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

THE ERIE CANAL.

When, in 1816, DeWitt Clinton presented his celebrated memorial, with one hundred thousand names appended, to the New York Legislature, asking for an act authorizing the construction of the Erie Canal, it is doubtful whether he foresaw the storm of opposition his proposition would raise; and when, at last, by his untiring energy, he secured an appropriation of $5,752,738, and saw the first shovelful of earth raised, at Rome, on the succeeding 4th of July, it is probable that he realized still less the brilliant future of that—at the time—stupendous project. Still less did he foresee that scarcely would the work be completed ere a new system of transportation and traffic, exceeding in rapidity anything the world had ever dreamed of, would spring up, and, stretching its "steel-shod grooves" parallel with this world-famous canal, rival the latter in carrying power for freights, and totally extinguish its passenger traffic.

Many are still living who have been huddled in the closely crowded cabins of the old-time packets, whose sharp prows no longer cut the waters of the Erie Canal. And some have, perchance, had the experience of a trip in a lazy line-boat from Albany to Buffalo.

The writer well recollects such an experience, and can call to mind the table supplied with steaks of fresh pork, flanked with boiled potatoes, tea and coffee, bread and butter, and apple sauce, which formed the standard dinner; the cabin which, the tables being removed, was crowded with sleeping berths, the males being separated from the females by a rude curtain, and mingling their *snores* in anything but harmonious concert; the long drawn cry of "Lock red—d—a—a!" easily heard half a mile away, in the still night air; the shrill cries and screams of impudent boy drivers, receiving castigation at the hands of irate captains; the startling crash of pike poles, thrown *down* upon deck immediately over the heads of the passengers, causing those in the up per berths to jump up, half awake, and bump their heads against the deck timbers; the curious sensation of sinking down unfathomable depths, in going through locks; the early rising in the moist, foggy air; the ablutions, performed in ways and by means indescribable, or, in many cases, left unperformed; the rush to breakfast; the broiling through the long summer day on the deck, the monotony only varied by occasional cries of "Bridge—Low Bridge" from the "steersman," and the general scramble and ducking of heads which followed, or by stale stories and feeble jokes, from the more humorous of the passengers, or perhaps by, what was then frequent, a fight between boatmen. These were the charms of travel over the Erie Canal, "but all these charms are fled."

The writer well recollects standing in the village of Canastota, filled with wonder at his first sight of a locomotive and train, coming on at a speed of perhaps fifteen miles an hour, over the Central Railroad, and it was not long after that the waters of the Erie practically ceased to carry passengers. From that time, destined to be only an artery for the circulation of freight, it has been sought to improve its carrying capacity. All these movements have been opposed by the railroad interest, yet the people at large have seen too clearly how much the prosperity of the State has depended, and still depends, upon this great work, to allow the defeat of such measures. Its capacity has been greatly increased by enlargement of its cross section and its locks; and many attempts have been made to give it still greater carrying power, by the substitution of steam for horse and mule power in the propulsion of boats, culminating in the bill we published last week, offering a prize of $100,000 for the best system of propulsion.

This prize will have the effect of bringing to bear upon the problem a vast deal of inventive talent, and if fairly awarded, will be quite as likely to be secured by some ingenious farmer's boy in the backwoods, as by a skilled engineer, versed in the mysteries of steam engineering. For it must be remembered that the solution of this problem does not depend upon any novel construction of steam engines, but upon means not hitherto employed for applying the power of motors to the propulsion of these boats, under the conditions specified in the law, or upon some radical modification in means already used, but as yet found defective. It is a new path that must be struck out, in which old devices will be of little use, except as elements of new combinations; and, we venture to say, there are many undeveloped Watts and Ericssons, who to-day are masters only of few tools and rude appliances, huddled together in their fathers' horsesheds, who would be even more likely to hit upon something new, than men whose minds have become accustomed to run in grooves, and who recognize, in the screw and paddle wheel, the only practical means of steam propulsion.

The effect of the prize will be, however, broader than was intended by the framers of the bill. Those who attempt the solution of the problem will stumble upon many inventions capable of useful application to other purposes. The construction of the canal banks and locks may even undergo material change, ere the anticipated system of propulsion can be applied. It may even prove that in such a modification, of the construction of the canal, lies the solution of the entire question. But these are things that time only can develop.

In our next issue we propose to resume this subject, perhaps giving more particulars, historical and statistical, of the origin and progress of the canal, and following with some account of patents issued on means of canal boat propulsion in the United States.

We shall also be glad to receive contributions from our correspondents upon this, now more than ever, important subject.

PIPES FOR DOMESTIC WATER SERVICE.

There is nothing about which we receive more numerous inquiries than water pipes. Most people are getting suspicious of lead for this purpose, it having been shown that this metal often contaminates the potable waters conveyed through pipes made of it. For a time, quite a popular impression prevailed that in zinced, or, as commonly called, galvanized iron pipes, the cheap and safe water conduit for for domestic purposes had been found. This is still maintained by some, and it is with a view to throw additional light upon the subject that the present article is written.

There is no doubt, as we have shown in previous articles, that iron pipes, thoroughly coated with zinc, and conveying perfectly pure water, will not contaminate the water to any appreciable or hurtful degree. Waters containing acids or free alkalies will, however, speedily become charged with the oxide or salts of zinc, to a greater or less extent, depending upon the character of the water. In some cases, where there does not appear to be a notable amount of alkalies, acids, or salts, the solutions of which dissolve or combine with zinc oxide, there is still rapid attack upon the metal. We have a specimen of such a pipe that is nearly filled with a deposit of metallic origin, resembling mixed metallic zinc and red oxide of iron. An analysis of this deposit would be interesting. Pure water *acts more* powerfully upon lead than upon zinc. While the oxide of lead is readily soluble in water free from carbonic acid, it is converted into a comparatively insoluble, or difficultly soluble, carbonate, whenever it is exposed to water containing carbonic acid. In experiments made by the Government commissions appointed to examine into the chemical quality of the water supply of London, the extraordinary effect produced by a small quantity of carbonic acid in the way described was most particularly noted. Pure distilled water placed in contact with lead became highly poisonous, while that containing three per cent of its volume of carbonic acid remained safe. They decided that sufficient carbonic acid is usually found in well, river, and spring waters, to render lead pipes a safe means for conducting them.

Notwithstanding this, they admit that, from causes little understood, water will at times act with unusual energy upon lead; and we have no doubt that imperfectly understood conditions will often render it powerfully energetic in its action upon zinc coated iron pipes. The specimen of this kind of pipe, above referred to, which has almost become stopped by its deposit of mixed oxide, metallic granules, and salts, would seem to indicate this, as the water which flowed through it has always been regarded as being of ordinary purity for drinking and culinary purposes.

A prominent leader in the Shaker family at New Lebanon, N. Y., assures us that they have not succeeded in the use of zinc coated pipes; and regarding lead with disfavor, they are meditating a return to the old pump log service, once so much used in this country.

We are cognizant of another example, in a town near Boston, Mass., where a new house was piped with galvanized iron pipes. Sickness soon overtook the family, one of its young members died, and a *post mortem* examination revealed the presence of salts of zinc in the stomach and other organs. Death was directly attributed to the use of these pipes.

Mr. Robert Rawlinson testified, before the commission referred to, that galvanizing iron pipes is a delusion. He said: "If the pipes are laid in subsoils which will act upon iron, the galvanizing affords no protection against that action, and there are soils which will rapidly eat away either iron or lead. If you examine a galvanized iron pipe under a microscope, you will find that it is not an even coating; it is freckled, and there are interstices, oxidation sets up, and then the galvanizing is blistered off; it does not improve, and, even so far as it does cover it, I doubt very much whether it preserves it; it is not stronger in its texture, and it certainly does not last longer; that is my experience."

Mr. Thomas Duncan, engineer of the Liverpool Water Works, stated that "the effect of soft water upon iron pipes was to produce an infinite number of small tubercles; those have grown up, and they project, in many instances, for about three quarters of an inch, reducing the diameter of the pipe between point and point, one and a half inches, thereby increasing the friction. They form an infinite number of little eddies, and it is not only the space they occupy in the pipe, but, from my observation, I believe the effects extend much further into the interior of the pipe, and disturb the current."

A method has been recently patented for coating pipes internally by silver electroplating therein. Water containing sulphur would, of course, in time convert such a coating into the sulphide of silver; but this, being insoluble in water, would protect the pipes as well as the metallic silver. Should the water contain any alkaline hyposulphites, and also free chloride, the silver may be gradually converted into a chloride, which, being dissolved by ammonia, would, after a time, result in the denudation of the lead. Of course, the time required for this action, if it should take place, can only be determined by experiment; but in such waters as contain traces of the substances named, such action would seem likely to result ultimately. It is known that silver exposed to an atmosphere containing chlorine will gradually blacken from the formation of chloride; and it is probable that this would occur, to some extent, in water pipes coated with silver. The cost of the metal will stand in the way of using a very thick coating; and, therefore, any chemical action will be more apt to interfere with the economical application of silver to this purpose.

In Boston the lined copper pipes are coming into vogue, and are pronounced perfectly safe in all respects. The copper is tinned before being made into tubes, and the interior of the pipe is again tinned when made up. The expense of these pipes is about the same as lead pipes of equal strength.

THE BLOWPIPE AS AN AID TO THE DRILL IN OPENING SAFES.

The blowpipe, in an attack upon a *well constructed* safe, is a powerful auxiliary to the drill, but it cannot be used alone with success.

Some experiments with most skillfully constructed apparatus, performed at the Herring safe manufactory, in this city, which we witnessed last week, show that the temper may be drawn, in time, from a steel plate an inch thick, by the use of the blowpipe, so that the plate may be drilled. It may also be burned quite through when operated upon singly; but it is difficult to do this with iron plates, which burn less easily, and also conduct heat away from the point against which the flame is directed, as rapidly as the steel. Spiegeleisen burns with even less facility than ordinary iron. The flame directed against the corner of a fragment of speigeleisen fused it, but, after continued action, only produced a comparatively small amount of the oxide of iron, which coated the bead formed. The fused metal, on cooling, was as hard as before. This material, in fact, depends for its hardness upon its natural composition, and not upon any process of tempering, so that mere melting does not change its character.

It would, however, require apparatus not available to burglars to melt a hole in the center of a speigleisen plate. It follows, therefore, that while iron plates and steel plates may be successively penetrated by the use of the blowpipe, as practically capable of use in the hands of burglars, the speigeleisen plate, which practically resists drilling, defeats the use of the instrument as an adjunct to the drill.

We have recently held a conversation with Mr. John Dickinson, of 65 Nassau street, New York, manufacturer of carbon points for drills, etc., who assures us that these points will not drill speigeleisen, except by the use of appliances for obtaining speed, which cannot be used by burglars, and that to drill it at all would be a work of so much time as to prevent its adoption for safe-breaking.

The rate at which, by the ultimate use of the blowpipe and drill, a hard steel plate can be penetrated, is, we are told by Mr. Farrell, about one inch per hour; the drawing of the temper in advance of the drill occupying about two fifths as much time as the drilling. It is found that the alternate use of these instruments enables more rapid progress to be made, than when it is attempted to draw the temper entirely through the plate at a single operation.

IMPORTANT DECISION BY THE COMMISSIONER OF PATENTS.

On the 8th of July, 1870, amendments to the patent laws went into operation, providing, among other things, for the issue of patents for trademarks. Commissioner of Patents Fisher, with his customary promptness, at once established rules to facilitate the new issues; and decided, overruling the Primary Examiner, that any trademark, whether consisting of mere words or accompanied by a device, might be the subject of a patent. Under this ruling, a number of applications were filed and patents granted; soon after which, Commissioner Fisher resigned. No sooner was his back turned than the Primary Examiner began to nullify the new practice, by rejecting those applications for trademarks that consisted of words, only granting those that were accompanied by a figure or device. The acting Commissioner declined to interfere, and left the matter for settlement by the incoming Commissioner, Gen. M. D. Leggett.

The new Commissioner has just rendered his decision, and, we are gratified to be able to state, he gives to the law a broad and liberal interpretation, fully sustaining the ruling of his predecessor.

Commissioner Leggett decides that patents may be granted for trademarks of all kinds, consisting of one or more words, either with or without other devices. But the mere name of a firm or corporation cannot be patented, unless accompanied by some other word, device, or "mark." The document is clear, concise, and interesting. We publish it in full, on another page.

This decision is very timely and judicious. So long as manufacturers are assured that they may hold, as their own property, and derive benefit from, the particular marks that they place upon goods, they will take pains to improve the productions; and the patented trademark will become a certificate of genuineness and excellence.

We are glad that the narrow views of the Primary Examiner have been overruled in this instance, as in so many others during the past twenty years. The difficulty with such superannuated officers is that they are fussy, adhesive to past traditions, and unable to accommodate themselves to the progress of the age; and, as Patent Office examiners, they create delay and difficulty in the transaction of business, by unnecessary or whimsical rejections of legitimate claims. The usefulness of the Patent Office ought not to be thus obstructed. We trust that the new Commissioner, like a new broom, will sweep clean, and remove all the cobwebs that stand in the way of an enlightened, liberal, and vigorous administration of the Department.

We have been asked what is the especial value of trademark patents, in view of the fact that the State courts are ready to afford protection against infringers? We reply that a United States patent for a trademark is valid in all the States and territories; and a decision made in any one United States court is respected in all the States. The trouble and expense of separate infringement trials in each State is thus avoided. A trademark patent costs in all only thirty-five dollars; whereas a single suit for infringement in a State court often costs five hundred dollars; and the decision of one State court is not binding in another State. Moreover, the possession of a regularly issued patent for a trademark is a preventive as well as a protection against infringers. Few persons will venture to begin an infringement in open defiance of a known patent. The advantages of trademark patents are obvious.

By the terms of the new law, patents may now be had for business stamps or trademarks of all sorts, no matter how long they have heretofore been used. The proceedings are quite easy and simple. We shall be happy to communicate with any of our readers who desire further information upon the subject.

HEALTH IN OLD AGE.

William Cullen Bryant, the poet, and editor of the New *Evening Post*, is now almost seventy-six years of age, but he is as active and vigorous as most men of fifty. He is the impersonation of good health, the result of long-continued habits of good living. His stalwart form and flowing beard of gray often attract our attention as we see him passing our office window, on his way down town, after a brisk morning walk of three miles.

Mr. Bryant has lately permitted the publication of a familiar personal letter, in which he makes known his general manner of living. From this it appears that he is very frugal in diet, and very generous in the matter of bodily exercise. He rises early, and at once engages in exercise for an hour, in his room, with light dumb bells, the bar, a chair, etc. Then a bath, then breakfast, taking no tea or coffee, no meat, but simply hominy and milk, oatmeal, wheaten grits, cakes, baked apples, or other fruits. After breakfast, study for a while, then a long walk. An early dinner, taking a little meat. Supper the simplest, fruit, bread and butter. No study, no thinking, no writing of any sort in the evening. Early to bed. No toddy or stimulants of any sort. Mr. Bryant's faculties are all in good order. His mental vigor is remarkable. Not the least wonderful fact in his history is, that from early childhood his intellectual powers have been constantly worked. As a youth he was precocious. Before he was ten years old, he was a poetical contributor to the papers: and at fourteen, his first volume of poems was published. After a college education, he studied law, and became quite distinguished in Connecticut. For the last forty-five years he has been connected with the *Evening Post*, which is one of the best daily papers in the world. His literary productions rank among the very highest.

INVENTIONS MADE BY WORKMEN.—WHO OWNS THEM?

The rights of employer and employé, in respect to ownership of inventions developed during the term of service of the workman, although settled, years ago, by the ruling of United States Courts, in various cases, has been lately revived in the Supreme Court in this city, on the appeal in the case of Lawrence *vs.* Good.

The latter was a foreman in the rope factory of the plaintiff, and, while so employed, made an improvement and obtained a patent, for converting hemp into slivers. The patent was said to be worth at least fifty thousand dollars.

The plaintiff alleged the existence of an agreement, by which he was to furnish means for introducing the invention, and, in consideration thereof, was to be entitled to one half of the patent when issued. This suit was brought to compel the defendant to assign the above share of the patent; and the plaintiff also contended that, even in the absence of an agreement, he was entitled to the benefits of the invention, the same having been made while the defendant was in his employ as a workman, the improvement being also in the line of such employ.

The Court decided, first, that the existence of the contract was not proven. Second, that, while the plaintiff had a legal right to the services of the defendant in the line of his employment, he had no legal right to the results of defendant's intellectual labors, outside his ordinary duties; and that this invention was clearly outside of such duties.

This decision is in accordance with the rulings in previous cases, in which the following, among other points, have been established:

1. The employer is entitled to the patent if he directs a workman, generally, what kind of an improvement to make; the employer has the right to avail himself of the ingenuity and mechanical skill of the workman to perfect the invention, or put it in practical form; and the employer has also the right, under the circumstances named, to include in his patent such additions or improvements as the ingenuity or skill of the workman may have developed or suggested.

2. On the other hand, the employer has no claim upon any independent invention made by his workman, although such invention may relate to the special business or trade in which he is engaged; the sole right to the patent for such independent invention belongs to the workman.

Complaint is made by employers, that some workmen are so mean as to make use of time, materials, and shop conveniences, belonging to the employer, for the purpose of testing inventions, without so much as a thank-you for the facilities thus surreptitiously obtained. This is neither right nor honorable; but it is not any meaner than for an employer to bring a suit, as in the foregoing case, and attempt to deprive a man of a patent simply because he is his workman.

SCIENTIFIC INTELLIGENCE.

PREPARATION OF PURE BENZOLE.

Professor Hofmann recommends, for the purpose of procuring perfectly pure benzole, its exposure to a freezing mixture and then pressing it out. The frozen cake is put into a brass cylinder, 8 to 10 centimeters wide, and 40 to 50 centimeters deep, into which is fitted an iron plunger, pierced with numerous holes. It is better to freeze the benzole in the press. After squeezing out the liquid, the melted benzole will be found to be of unusual purity.

ADAPTATION OF UNGROUND GRAIN FOR FOOD.

At the meeting of the Academy of Sciences, of Paris, held on the 26th of September last, a discussion occurred on the application of unground grain for purposes of food. The subject was at that time one of vital importance to the Parisians.

M. Grimauld reported that, during the siege of Venice by the Austrians, the following process had been pursued. The grain was first softened in water, and rubbed to free it from the hulls, and was then boiled with vegetables, and seasoned. It produced an agreeable food, and must have been nourishing, as it was composed of a mixture of gluten and starch, and was the exclusive article of diet, of fourteen persons for two months.

Dumas remarked that the entire kernel could be eaten, and it was complete in itself; by grinding and bolting, much nourishing substance was removed and lost. It was not a matter of indifference that, of the 11,000,000 pounds of grain on hand at the commencement of the siege, only 7,700,000 pounds should be counted as food. The Romans in the first century were in the habit of roasting the kernels, grinding, and making the meal into a paste; and they regarded the baking of bread as wasteful.

The Arabs at the present time eat grain that has been hulled and boiled with steam. It is generally assumed that four parts of grain will yield three parts of flour; this is a waste of one fourth that ought to be saved. In England, brown bread, containing all the constituents of the grain, is regarded as a luxury, and is baked as often as twice a week.

Payen called attention to the fact that, according to Grimauld's proposition, 25 to 30 per cent of the nourishing properties of the grain was saved, which was ordinarily lost in the bolting; and the resulting paste afforded a more nourishing, healthier, and cheaper food, as the gluten contained certain nitrogenous substances in greater quantity than the other constituents of the grain, which were easily assimilated and were good for the digestion. Even the indigestible part of grain played a part in the digestion, as was abundantly proved in the English brown bread made from unbolted flour. The problem to make bread from the entire grain has been solved by Sezille, who slightly moistens the kernels, then rubs off the hulls, by which only a loss of 5 per cent is incurred; then he soaks for seven or eight hours in tepid water, until it can be easily crushed between the fingers, by which it takes up 50 to 60 per cent water; he then converts into paste between rollers, and bakes into bread after fermentation. Payen had eaten such bread, and pronounced it excellent.

HEALTHY SOIL AND WATER.

According to Chevreul, a soil is not adapted to the sprouting and growth of plants, unless the seeds and the spongioles of the roots can obtain access to the oxygen of the atmosphere. Substances absorbing oxygen, such as sulphide of iron, and sulphide of calcium, are therefore prejudicial to vegetation, while draining is beneficial.

Animals can only live in water that contains oxygen, and hence whatever removes this element from the water, destroys it for the lower animals. Fish improve stagnant water, by devouring organic substances, and vegetables produce the same effect by taking up organic matter, and giving off oxygen in the sunlight. Flowing water is, therefore, more wholesome than stagnant. Soil is injured by oil that condenses in gas pipes, and by dead vegetation. It is necessary to the health of a house that it be exposed to air on two sides, and that light can penetrate to the interior, and that the air of all apartments can be frequently renewed.

GLYCERIN SOAP.

In the manufacture of soap, since time immemorial, all the glycerin has been thrown away, but in later years the healing and antiseptic properties of the glycerin have rendered its combination with the fats and oils very desirable, hence we hear a good deal about glycerin soaps. Unfortunately, most of the soaps of this name contain little or no glycerin.

Fashion and the ignorance of the public demand a transparent soap, and this quality is incompatible with a considerable percentage of glycerin. Transparent soaps owe their clear property to the addition of alcohol, and glycerin produces an opposite effect.

Glycerin soaps ought to contain 25 to 30 per cent of that agent to be really valuable, but rarely show more than three or four per cent. It would be more candid if soap manufacturers would undeceive the public on this point, and make a true glycerin soap at a price that would afford them an adequate profit. A glycerin soap, with some ammonia, would be a truly valuable article for wounds and bites of insects, but its value ought not to be destroyed by attempts at fancy coloring or transparency.

ON A METHOD OF DETERMINING THE PERCENTAGE OF WATER MECHANICALLY SUSPENDED IN STEAM DELIVERED FROM BOILERS WHICH PRIME.

A Paper read before the Society of Practical Engineering, April 26, 1871, by Leicester Allen, Associate Editor of the SCIENTIFIC AMERICAN.

The second annual report of the Inspector of Boilers of the city of Philadelphia, states that out of fifty-six men who presented themselves during the year 1870, for inspection and license as engineers and boiler tenders, only four were considered first class. Out of thirty-nine who sought examination for a renewal of their licenses, only nine were first class. A large proportion were only third class. I am not aware what the standard of classification, adopted in Philadelphia, is, but it is probably none too rigid. It is, probably, also fair to suppose that those who sought examination were better than the average of those employed to take charge of boilers; since there is, in that city, no penalty imposed for the employment of unlicensed engineers or boiler tenders. I deem it, therefore, extremely probable that the four receiving first-class certificates, out of the fifty-six examined, represent even a larger proportion of thoroughly qualified men, than would be shown if a general system of examination and license were legally enforced.

In view of the general incompetence of those placed in charge of boilers, not only in Philadelphia, but throughout the country, the use of boilers, not only safe with good care and treatment, but safe even under neglect, has been gradually growing in favor, notwithstanding most of the boilers, justly regarded as being incapable of exploding disastrously, do not compete, in point of economy, with others, which, unskilfully attended, are liable at any moment to explode with destructive violence.

The year 1870 has a most appalling record of death and destruction from boiler explosions, and it is time that the question of safety *versus* economy, in the use of boilers, should be definitely settled. The first step toward settling this question is the accurate determination of the real ratio of economy in boilers admittedly safe, under all circumstances, to those admittedly unsafe, except when used with the best skill and fullest knowledge.

The safe boilers are those known as "*sectional*," in which very great strength in proportion to rupturing strain is attainable, and which—even if, under enormous pressure, they explode—cannot explode as a whole, but can only burst some minute portion of their structure. These boilers could, some of them, make a fair showing of evaporative power, in proportion to consumption of fuel, without forcing; but in trials made to ascertain their steam producing capacity, their exhibitors are apt to force them until they prime, and thus the amount of water passed through them becomes no index of their economical value as steam generators. These boilers also present such an enormous heating surface, in proportion to the water they carry, that, in practical use, they may be caused to prime by slight overfiring; and, with the ordinary care they get, it is little to be wondered at, that it is an exception to find one of them delivering dry steam.

Any boiler has a limit of steam generation, beyond which it cannot be pushed without priming; and, on the other hand, any boiler has a limit of steam producing capacity, below which it will deliver perfectly dry steam. The amount of dry steam per pound of fuel actually burned, that boilers will produce, from water at 212° Fah., is the accepted standard of comparison as to their working economy. Experiments made by myself have, however, shown that in very few cases, where boilers are thus tested, absolutely dry steam is delivered; the amount of water contained in the steam being in one case, which I now call to mind, certainly not less than forty per cent of the entire weight of mixed steam and water issuing from the boiler. This was, of course, an extreme case, in which the boiler was specially contrived, it would seem, to prime as much as possible. The evaporative power claimed for it by its sanguine inventor, was thirteen pounds of water per pound of coal consumed. All the way from this extreme, up to absolutely dry steam, you may find boilers working, if you will look for them. Boilers priming to the extent named, or even much less than that, are really unfit for service to supply engines with steam; and, I need not say, are scarcely ever used for that purpose. But boilers often prime to a much greater extent than is suspected, in the absence of means to detect the exact amount of water mechanically carried over.

A common method of testing the quality of steam is to pass the hand through the jet of steam escaping; a method so rude, that it is really a disgrace to the science, which has taught us, that, with steam as a motor everything may be reduced to mathematical certainty. I have known the estimate made by good judges to be ten per cent from the truth, in making this test. The appearance and feeling of steam, differ with the hygrometric condition of the atmosphere into which it rushes. On a clear bright day, steam appears different from the same quality educted on a moist, foggy, and obscure day.

The method I have employed for testing the quality of steam, and the instrument devised for the purpose, is based upon the fact that steam at 212° always contains 1,178 heat units per pound, and water at 212°, 212 units of heat per pound. It follows that, knowing the amount of heat issuing from a boiler in a pound of mixed steam and water, the proportions of water and steam, in the pound, can be easily determined. For if x be used to represent the water in pounds, and y the steam in pounds, a the quantity of mixed water and steam educted, in pounds, and b the total number of units of heat carried out in the mixed water and steam, we may form the equations

$$x+y=a$$
$$212x+1178y=b$$

from which we find the value of x to be $x=\frac{1178a-b}{966}$; or, to drop algebraic language, the amount of water contained in a given amount of mixed steam and water, will be, in pounds, 1,178 times the weight of mixed steam and water, minus the number of units of heat it contains, divided by 966, the number of units of heat required to convert a pound of water at 212° Fah. into steam at the same temperature.

To determine the amount of heat carried out by the mixed steam and water, I devised the following apparatus. A scale beam with a platform, and a thickly felted water chamber at one end, and a counterpoise at the other, has upon it a sliding weight, indicating pounds and half pounds. The walls of the water chamber are made of thin tinned sheet copper; there being two shells, between which, felting, an inch and one half thick, is placed. A felted cover is also provided, through which is inserted a standard thermometer, having a large bulb and easily read in fifths of degrees. A finely perforated coiled copper pipe rests upon the inner floor, and passes out at the lower part of the side wall of the chamber. This is the steam induction pipe. The bottom of the chamber is obtusely funnel shaped; and, from the lower part of the funnel, is led out an escape pipe. Both pipes are provided with cocks. A small funnel in the cover, also provided with a cock, completes the apparatus.

To use it, five pounds of water are placed in the chamber, through the funnel in the cover. The water is then raised to 80° Fah. by allowing a jet of steam—conveyed through a felted pipe—to enter through the coiled induction pipe. The surplus water thus added is drawn off through the escape pipe at the bottom of the chamber, leaving in the chamber five pounds of water at 80°, containing 400 units of heat. The sliding weight is then set along into the five and one half pound notch, and the steam to be tested is then allowed to flow in till the scale beam balances. Then the influx of steam is stopped, the thermometer is read, and the experiment is complete.

Suppose, now, the resulting thermometrical reading to be 180°. We then have 960 units of heat in the chamber, not counting in the amount absorbed by the thin copper lining—a very small amount indeed, and only noticeable theoretically; the general result is scarcely affected by its neglect. It follows that the amount of heat conveyed into the chamber in the pound of mixed steam and water is $960-400=560$ heat units. Substituting this value for b in the above formula, we have (the value of a now being $\frac{1}{2}$) $\frac{1178-560}{966\times 2}$ which, reduced to hundredths, gives $31\frac{908}{1932}$ per cent of water.

This instrument, for want of a better term, I have called the "steam hygrometer."

The standard quantity of water in the chamber, five pounds, the standard temperature, 80°, and the standard quantity of steam admitted in the experiment, one half pound, are chosen merely as matters of convenience. It is evident that, for any system of standards, the percentages for different resulting temperatures, between the minimum and maximum limits inclusive, may be computed and tabulated, so that, in testing boilers, no calculation need be made; the percentage for any resulting temperature being taken at once from the table.

REFUSE AND WASTE.

There are no such things as waste products in Nature's laboratory, but in man's workshop there are plenty of them. In fact, we make little use of the gifts that are bestowed upon us, a vast majority of them being wasted on account of our ignorance of their value.

If there be anything that characterizes the present age, it is the revolution that has taken place in this respect. We live in the era of saving, and many are the objects now turned to good account which formerly were thrown away. But, notwithstanding the boasted progress of this century, we cast away far too many substances under the names of refuse and waste.

In the cutting, sawing, and paring of cork wood, there is an accumulation of light material, which is used for packing, filling life preservers, and manufacture of mattresses. This refuse, if burned, would produce a smoke that might prove of value in preserving meat and fish; if distilled, it would yield peculiar products; and, if chemically treated, would furnish corkic acid, the properties of which are not well understood. The charred cork has long been used for its fine black color, and it is possible that, for disinfecting and filtering purposes, it is capable of application. Here is quite a field of research for any one who has the knowledge and leisure.

What becomes of the buttermilk, after the fatty matter is separated from it? We know that it is extensively fed to the pigs, and not a few people eat and drink it. It has peculiar chemical properties, and is said to work up into cements. Could we not, also, by blowing air through the milk, as well as agitating it, add to the yield of butter, and otherwise modify the character of the sour curd? The fermentation of the buttermilk is not understood by our farmers, nor do they pay much attention to other possible uses of this refuse. As there are enormous quantities of milk used in butter making, it would be well to look into this matter.

So, too, in the cheese industry; in Europe they save the whey to convert it into milk sugar, and this article of sugar can be fermented, and used for many purposes. In homeopathy it already plays an important part.

The root plants growing wild all over our country ought to be examined and experimented upon by agriculturists. We have abundant encouragement in favor of such a course, in the history of the tobacco, potato, sugar beet, peppermint, spearmint, wintergreen, and a host of other natural products that, by judicious culture, have been raised from the rank of weeds to a first class position among profitable crops. The sugar beet especially is worthy of note; it was originally an unsightly plant growing wild in Southern Europe. By culture it has been improved and changed in character, and now yields nearly one third of the total sugar crop of the world, and represents an industry worth some hundreds of millions of dollars. As the Government of the United States has set aside large tracts of land to endow agricultural colleges, it is not asking too much for some of these institutions to cause experiments to be made upon what are now called weeds. Many of these wild plants contain alkaloids, sugar, tannic acid, and fiber for paper, and could, by culture, be converted into valuable products. The example of the Massachusetts Agricultural College in this direction is well worthy of imitation.

Sawdust, which was formerly thrown away, is now converted to many useful purposes. The manufacture of oxalic and formic acids from it, is extensively prosecuted in England, and is the source of wealth to all who are engaged in the business; but that is not the only invention that has been sought out with this unpromising material. The hard boxwood sawdust makes an excellent polish for jewelry, and mahogany sawdust is good for smoking fish. Westphalia hams owe their admirable flavor to the wood used in preparing them. Sawdust from the birch cleanses furs; that of sandal wood, cedar, butternut, and black walnut, affords volatile oils that find favor as perfumes or to destroy insects. They have a way in France of compressing sawdust into molds suitable for use as artificial wood; and it could also be distilled for the production of creosote, acetic acid, and wood gas. Some of it could be used for paper, but in general the fiber is too short. A new industry has arisen in converting the sawdust into gun cotton for the use of photographers, and in the manufacture of a coarse blasting powder. It will thus be seen that sawdust is hardly any longer to be considered a waste product, but it is a great help in many industries.

Vulcanized rubber was long an object of study and experiment, to see what uses could be made of the waste; after the sulphur had been added, it was thought that it could not be worked over, and in this event, the price was likely to remain at a high quotation for many years. Fortunately, the difficulty yielded to the stubborn will of our manufacturers who do not like to throw anything away, and a process was discovered by which the old rubber could be mixed with the fresh in certain proportions, and thus changed to a useful article. Ivory dust and shavings have found favor in the manufacture of steel plates, and as an article of food. Iron filings, tin scraps, refuse from galvanized iron, furnace slags, photographer's slops, chimney soot, dead oil, rags, galls, bones, fat, brine, oil from wool, coal dust, cotton seed, sponge, sea weed, leather scraps, and a host of other things that were useless in former times, are now economized to a considerable extent.

There is a waste in large cities for which there is really no necessity, and that is of the sewage. A vast amount of valuable phosphate goes to feed the fish off the banks of Newfoundland; and if we had the monopoly of the fish, there would be some recompense; as the case now stands, we have the consolation of knowing that we feed the fish for other people to catch: and then as a sort of compensation, we send to the islands of the Pacific for guano with which to enrich our lands. There is enough compost annually thrown away to increase the value of our crops many million of dollars. The vastness of this waste has probably deterred our engineers from attempting to grapple with it, but that is no reason why the loss should go on forever.

We have thus presented some considerations on the topic of refuse and waste, which may awaken inquiry in the minds of inventors, and lead to practical results.

MAGGOTS IN THE EAR.—Dr. C. Robertson of Albany, N. Y. at a meeting of the Albany County Medical Society, spoke of the case of a lady, who, while on a picnic, heard a fly buzzing about her ears, but did not think of the circumstance again until after the lapse of a few days, when she felt some irritation in one ear. A physician removed some parasites with aural forceps, which had penetrated beyond the membrana tympani. Sweet oil was poured into the ear, and retained for awhile; shortly, a maggot came to the surface, apparently in search of breath; this gave relief for ten minutes. More were observed, which were extracted with the forceps. The after-treatment consisted in syringing the ear with warm water. The opening in the tympanum closed, and her hearing became perfect.

No person should allow a tooth to be extracted till every possible means have been tried to save it.

NATURE—"the garment of God, by which thou seest Him."—GOETHE.

THE man who possesses good health is always rich.

IMPORTANT DECISION OF THE COMMISSIONER OF PATENTS—TRADE MARK PATENTS.

In the matter of the application of Porter Blanchard's Sons, for the Registering of a trade mark for churns.—The applicants seek to have registered as a trade mark the words, "The Blanchard Churn," to be stencilled on the churn they manufacture and sell.

The examiner refused the application, and gave as a reason for the refusal, "the label of applicant is not sufficient to entitle it to registry as a trade mark; the words should be accompanied by some sign or mark to distinguish the same from the mere words alone, to the use of which latter, other possible parties of the name in like business might have an equal right."

Section 79 of the Act, approved July 8, 1870, in the second clause provides that "the Commissioner of Patents shall not receive and record any proposed trade mark which is not, and cannot, become a lawful trade mark, or which is merely the name of a person, firm, or corporation only, unaccompanied by a mark sufficient to distinguish it from the same name when used by other persons," etc.

The question, what constitutes a lawful trade mark, is left by the statute just where the common law leaves it, with the single limitation, that it shall not be the mere name of a person, firm, or corporation, unaccompanied by a mark sufficient to distinguish it *from* the same name when used by other persons.

The only thing about this limitation that is at all ambiguous, is the meaning of the word "mark." The examiner seems to understand by this word some device, figure, or emblem, something other than mere words. In this interpretation of the word "mark," I am clearly of the opinion that the examiner is wrong.

Every man in the United States who is engaged in trade or manufacturing, is entitled to the registry of a trade mark if he chooses to adopt one; and to require each person to invent a device or symbol differing from all others in the same trade, would be to require an impossibility, and Congress certainly never thought of attaching such a meaning to the word "mark." This word had obtained a technical meaning before the act of July 8, 1870. The term "trade mark" was in very general use, and by such use, and by the constructions and rulings of courts, was made to include, not only devices and emblems and symbols, but single words, and all manner of combinations of words, without devices. Congress took this word "mark," with the meaning it had obtained in the compound word "trade mark," and introduced it into the statute.

Previous to the passage of this law, the courts had not been uniform in their decisions as to the mere names of persons, firms, or corporations being legal trade marks, and the statute settled this question by saying that the mere name of a person, firm, or corporation only, unaccompanied by some other "mark," that is, some other word, or words, or letter, or figure, or sign, or symbol, or device—in short, something in addition to the mere name only—should not be registered as a trade mark.

I am clearly of the opinion that any word or any combination of words, with the single exception named, that would constitute a trade mark under the common law, may be registered as such under the statute of July 8, 1870. The expression, "The Blanchard Churn," certainly is not the mere name of a person only, but the name is accompanied by the marks "The" and "Churn," hence it is not excluded by the limiting clause of the statute. The only question then is, as to whether it is a legal trade mark at common law.

In the case of The Amoskeag Manufacturing Company, 2 Sand, S. C. R., 599, the Court says: "Every manufacturer and every merchant for whom goods are manufactured, has an unquestionable right to distinguish the goods that he manufactures or sells, by a peculiar mark or device, in order that they may be known as his, in the market for which he intends them, that he may thus secure the profits, that their superior repute as *his*, may be the means of gaining.

"The principle is well settled that a manufacturer may, by priority of appropriation of names, letters, marks, or symbols of any kind to distinguish his manufactures, acquire a property therein as a trade mark." Stokes *vs.* Landgraff, 17 Barb. 608.

"A manufacturer of goods who, in order to designate his own manufacture, has adopted names, marks, or labels, which are peculiar, and not before used, is entitled to be protected in a court of equity in their use." Williams *vs.* Johnson, 2 Bosworth 6.

"Though the mark has no other meaning than to distinguish their manufacture from others, if the party has given it out as his mark, and by it the article has acquired reputation and sale, he is entitled to protection in it."—*Ibid* 6.

"Any contrivance, design, device, name, or symbol which points out the true source and origin of the goods to which it is applied, or which designates the dealer's place of business, may be employed as a trade mark, and the right to its exclusive use will be protected by the Courts." Filley *vs.* Fassett *et al.* Supreme Court of Missouri. Vol. 8, "U. S. Am. Law Reg.," 402.

"The books are full of authority establishing the proposition that any device, name, symbol, or other thing may be employed as a trade mark which is adapted to accomplish the object proposed by it; that is, to point out the true source and origin of the goods to which said mark is applied." —*Ibid.*

These quotations state the broad doctrine on the subject of trade marks as held by the courts.

The following are a few among many trade marks that have been sustained by the Courts, and that would not be excluded by the limiting clause of the law of July 8, 1870, namely: "Cocaine," as the name of hair oil, Burnett *vs.* Phalon, 9 Bosworth, 192; "303" as a mark for pens, Gillott *vs.* Esterbrook, 47 Barb. 545; "Sykes' Patent" as a mark for shot bolts, Sykes *vs.* Sykes, 3 Barn G. Cress, 542; "Bell's Life" as the name of a newspaper, Clement *vs.* Maddick, 22 Law Rep. 428; "H. H. 6," as a work on plows, Remsen *vs.* Bental, 3 Law of U. S., 161; "Roger Williams Long Cloth," Burrows *vs.* Knight, 6 R. I. 434; "Anatolia" as a brand for liquorice, McAndrews *vs.* Bassett, 10 Jurat, N. S. 550; "Revere House" as the name of a hotel, Marsh *vs.* Billings, 7 Cush. 322; "Burgess' Essence of Anchovies," Burgess *vs.* Burgess, 17 Eng. Law and Eq. R., 257; Morrison's Universal Medicines," Morrison *vs.* Salmon, 2 Man and Grau, 385.

It is proper here to remark that most of the trade marks here referred to were used in connection with the names of the persons claiming them, or with their place of business, or both, and sometimes in connection with other words.

There seems, then, to be no more restriction against the choice of words, combinations of words or names (other than the mere name of a person, firm or corporation only), for a trade mark, than of symbols or devices. The only limitation at common law in the selection of words or devices for trade marks is, that they be so far original, as, when known in the market, to distinguish the goods of one merchant or manufacturer from those of another, and that they be not generic in their use, nor description of quality nor calculated to deceive the public as to their true origin or ownership.

The object of a trade mark is to point out the origin and ownership of the article offered for sale, and the more clearly the words or devices selected do this, the less objection there should be to their selection and registration and trade marks, so they avoid the limitations named.

The combination of the three words, "The Blanchard Churn," seems to possess the necessary characteristics of a trade mark, and is not excluded by the limitations. The decision of the examiner is therefore reversed.

(Signed) M. D. LEGGETT, Commissioner.

April 24, 1871.

Responsible Advertising Agencies

Are a great advantage to both advertiser and publisher. That of George P Rowell & Co., No. 40 Park Row, New York, is considered by many the most complete establishment of the kind in the United States.

Business and Personal.

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

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

For the best, purest, and most economical Machinery Oils, of all kinds, send to Oil House of Chard & Howe, 134 Maiden Lane, N.Y.

Wanted.—A small wire Staple Machine, for Blind Staples. Manufacturers will please send their address to Laughland & Co., 213 Franklin st., New York.

Wanted.—Situation as foreman, by a machinist of 22 years' experience at the trade, and 15 years as foreman in building locomotives, and stationary and portable engines. Understands drafting. References exchanged. Address Box 26, Bryan, Ohio.

Map Surveyor wanted. Address H.F.W., Box 4118, Boston, Mass

Wanted to buy, an interest, on easy terms, in some shop, to start the Thresher business. Address "Machinist," Box 805, Canton, Ohio.

New Railroads are fully described in the Railroad Gazette

Tin Presses and Hardware Drills. Ferracute Mch. Works, Bridgeton, N.J.

A. G. Bissell & Co. manufacture packing boxes in shooks at East Saginaw, Mich.

Small Portable Steam Engines, cheapest and best in market. For Circulars address Skinner & Walrath, Chittenango, N.Y.

Two experienced young men desire situations to design and superintend the building of first class machinery. The best of references given. Address W. C. H., Springfield, Mass.

For Sale.—To a practical man, or manufacturer, one half of a Patent for a Bottle and Demijohn Lock. Address Sam'l L. Gouverneur, Frederick, Maryland.

Wanted.—A responsible dealer in every town in the United States, to sell "The Tanite Co.'s" Emery Wheels and Emery Grinders. Extra inducements from May 1st. Send for terms to "The Tanite Co.," Stroudsburg, Pa.

Wanted, on a salary, an experienced traveler, to sell Mechanical Goods. Address, with full details and references, Morgan, Box 2874 New York.

A.M.Towl, Sevastopol, Ind., wants a Machine to make shoe pegs.

To Builders of First-class Houses.—"Broughton's" Faucets cannot leak, never want repairs, and are the most durable made. Send to H. Moore, 41 Center st., for Circulars.

The "Broughton" Lubricators are the most durable and effective. The tendency of the valve is to improve and tighten by wear. Send to H. Moore, 41 Center st., for Circulars.

Hardware and House Furnishing Patents wanted. Inventors' Co-operative Manufacturing Co., 258 and 260 Broadway, New York.

"American Manufacturer's Review," Pittsburgh, goes over the whole country. Subscription, $4. Advertisements, 15c. per line. Try it 1 year.

A Company, with a large cash capital, wish to add to their business the manufacture of some small patented articles of hardware. Address, with full particulars, J. W. W., Box 1971, New York.

Important to Painters, Grainers, etc.—New, quick, clean, and easy mode of wiping out the hearts, lights, crotches, knots, veining, etc., of all kinds of wood, through perforated metal plates cut from choice natural designs. Price of 10 plate set, $40; 7 do., $30; single plates, $5 each. Rights for sale. Address J. J. Callow, Cleveland, O.

For Hydraulic Jacks, Punches, or Presses, write for circular to E. Lyon, 470 Grand st., New York.

The new Stem Winding (and Stem Setting) Movements of E. Howard & Co., Boston, are acknowledged to be, in all respects, the most desirable Stem Winding Watch yet offered, either of European or American manufacture. Office, 15 Maiden Lane, New York.

Belting that is Belting.—Always send for the Best Philadelphia Oak-Tanned, to C. W. Arny, Manufacturer, 301 Cherry st., Phil'a.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Balloons made to order, with instructions, by John Wise, Lancaster, Pa.

Ashcroft's Low Water Detector, $15; thousands in use; can be applied for less than $1. Names of corporations having thirty in use can be given. Send for circular. E. H. Ashcroft, Boston, Mass.

To Cotton Pressers, Storage Men, and Freighters.—35-horse, Engine and Boiler, with two Hydraulic Cotton Presses, capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

Use Rawhide Sash Cord for heavy weights. It makes the best round belting. Darrow Manufacturing Co., Bristol, Conn.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D.Andrews & Bro, 414 Water st., N.Y.

American Boiler Powder Co., P. O. Box 315, Pittsburgh, Pa.

See advertisement of L. & J. W. Feuchtwanger, Chemists, N.Y

Carpenters wanted—$10 per day—to sell the Burglar Proof Sash Lock. Address G. S. Lacey, 27 Park Row, New York.

Manufacturers' and Patentees' Agencies, for the sale of manufactured goods on the Pacific coast, wanted by Nathan Joseph & Co., 619 Washington street, San Francisco, who are already acting for several firms in the United States and Europe, to whom they can give references.

All parties wanting a water wheel will learn something of interest by addressing P. H. Wait, Sandy Hill, N. Y., for a free circular of his Hudson River Champion Turbine.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Twelve-horse Engine and Boiler, Paint Grinding Machinery Feed Pumps, two Martin Boilers, suitable for Fish Factory. Wm. D. Andrews & Bro., 414 Water st., New York.

Improved Foot Lathes. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc Catalogue free. N. H. Baldwin, Laconia, N. H.

Cold Rolled-Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

The Merriman Bolt Cutter—the best made. Send for circulars. H. B. Brown & Co., 25 Whitney ave., New Haven, Conn.

Glynn's Anti-Incrustator for Steam Boilers—The only reliable preventive. No foaming, and does not attack metals of boilers. Price 25 cents per lb. C. D. Fredricks, 587 Broadway, New York.

For Fruit-Can Tools, Presses, Dies for all Metals, apply to Bliss & Williams, successor to May & Bliss, 118, 120, and 122 Plymouth st., Brooklyn, N.Y. Send for catalogue.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N.Y.

English and American Cotton Machinery and Yarns, Beam Warps and Machine Tools. Thos. Pray, Jr., 57 Weybosset st. Providence, R.I.

Taft's Portable Hot Air, Vapor and Shower Bathing Apparatus. Address Portable Bath Co., Sag Harbor, N.Y. (Send for Circular.)

Winans' Boiler Powder.—15 years' practical use proves this a cheap, efficient, safe prevention of Incrustations. 11 Wall st., New York.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Answers to Correspondents.

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

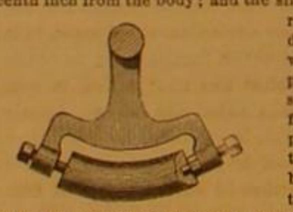
ALL reference to back numbers must be by volume and page.

D. D., of Ind.—Put in flues 8 inches in diameter behind the bridge wall of your furnace. The size of the perforations should be about one half inch, but there should be plenty of them. Provide them with first class dampers, and arch over your mud drum. It is a too common practice not to have dampers in furnace doors, but to keep steam from getting too high by opening the furnace door. Such practice is a disgrace to engineering. Your ideas in reference to setting boilers and cleaning them are right; stick to them.

J. B., Jr.—An extension bridge of ordinary width and construction requires the aid of machinery in laying up the cables, but one may be made by stretching single wires by hand over a stream a quarter of a mile in width, if only enough wires are used, and all are made to receive their share of the weight to be supported.

Tanning Sheep Skins with the Wool on.—Take one part of alum and two of saltpeter; pulverize and mix well together; then sprinkle the powder on the flesh side of the skin, and lay two flesh sides together, having the wool side out. Then fold up the skins as tight as you can, and hang or lay them in a dry place. As soon as they are dry (which will be in two or three days), take them down and scrape them with a blunt knife till they are supple, and rub them over the edge of a board, if necessary, to make them soft. Other skins, which you wish to cure with the fur on, may be treated in the same manner.—H. A. C., of N. Y.

Turning Curved Plunger.—In regard to "turning curved plunger," I would state for the benefit of S. G. S. (whose inquiry is given in your issue of 15th ult.), that the flange plate can be cut nearly off with safety, after the body of the plunger is finished, by using an acute angular-pointed turning tool. By proper care the body of the plunger can be finished over the reduced part, the flange plate being cut away, or reduced on each side. The plunger can then be separated from the plate by scoring with a square-nosed tool, on each side of plate, about one-sixteenth inch from the body; and the slight projection, or fin edge, can be removed with a file and scraper. If desired, a carrier can be used, that will allow the entire body of the plunger to be turned. I enclose sketch of the device; it consists of a flange plate and center shaft, the plate being furnished with bosses that are drilled and tapped for set bolts, that support and retain in position the plunger to be turned. One of the bolts has its end squared, to enter a similar shaped hole cast in end of plunger, a jamb nut on the bolt preventing its turning. The set bolt in the other boss, upon being screwed up, secures the plunger in position in the carrier. The turning tool can be fed through from each side, by working the lathe, by hand, the thickness of the flange plate of the plunger carrier.—W. P. P., of Pa.



Leaky Faucets.—Let C. H. K. take pulverized grindstone (procured at any place where a stone is being turned up to true) and use it with water. File off the plug of the faucet (in diameter) above the seat or shell, so there shall be no shoulder to prevent the plug going to its seat after it has been cleaned off.—C. H. J.

Cutting the Teeth of Small Wheels in a Lathe.—Let B. B. L. turn a rod or cylinder of the material, to the diameter he wishes his wheels to be, and as long as he likes. Keep it on the centers where turned. Allow it no play in the driving connection with the face plates. Have the dial plate on the lathe spindle, attached to the face plate or otherwise. Make a tool the exact size and shape, inversely, of the space between the teeth. Make the tool to use in the chisel stock (or tool stand of the lathe) as a planing or grooving tool; flute the cylinder around, space by space, to the depth proper for the length of the teeth. Then with a thin cutting-off tool, cut off the wheels the thickness wanted, after which they may be chucked and bored, as required. Internal gears are cut in the same way. Keep the chuck where bored until cut. He had better procure a small gear cutter to attach to his lathe. They may be procured at reasonable rates, of many of the tool makers of the Eastern states. I have one of my own arrangement and make, with which, with one row of one hundred holes, I can get quite a goodly number of divisions, from one up to ten ten thousand.—C. H. J., of N. Y.

H. L. C., of Mich.—When air is taken under water, its bulk, submitted to the pressure of the water, is reduced more than is that of the water by the same pressure. Its relative buoyancy is therefore lessened as it is sunk deeper. At a depth of 33 feet, it would only be about half as buoyant as just beneath the surface; at 99 feet only about one fourth, and so on. At a depth at which it would receive a pressure of 814 atmospheres, it would become as dense as water, provided Mariotte's law of the relative volumes and pressures, held good for such high pressures; but it has been shown that it does not apply exactly, as pressures increase.

Plating on Iron or Steel.—If your inquirer will follow the directions below, he will have no trouble in plating on iron or steel. Take two quarts rain water, dissolve two pounds cyanide of potassium, and filter. This solution is only for steel or iron. In order to plate steel or iron, dip it into pure sulphuric acid for one minute, then clean with pumice stone and brush; rinse, and hang in cyanide solution of potassium for three minutes, or until it becomes white; then hang in silver solution until plated heavy enough.—C. E. B., of Ill.

H. W. C., of Vt.—You are right in supposing the principal difficulty in the direct application of steam to the raising of water, without the intervention of pistons, is the condensation and consequent loss of power. Attempts to avoid this have been made in various ways, such as lining the pump cylinder with non-conducting material, the introduction of flexible non-conducting diaphragms, to separate steam and water, etc. Were it not for this loss, the most economical application of steam to raising water, would be directly upon the water surface in the cylinder, provided we were confined to the use of steam non-expansively; but to use steam expansively necessitates the use of a cylinder and piston, or their equivalent, as it is obvious that steam pressing directly upon water, even if it would not condense, could never expand below the pressure of the water. With the use of a steam cylinder and piston, and a smaller piston in the pump, we can expand the steam to any limit desired.

D. C. A., of N. H., asks "what is considered, by scientific men, to be the strictly true definition of the word "machinery?" In other words, what is a machine? Is a planer, or lathe, or drill (for either iron or wood) a machine, or simply a tool? The question is of importance to mechanics here, from the fact that machinery is taxable, while tools are exempt." The courts, or other authorities, in whom the power to regulate the working of the tax law is vested, must decide what is the distinction between the terms "tools" and "machines" within the meaning of the law. Scientifically speaking, any instrument, if only a simple lever, by which power is applied to the performance of work, is a machine.

T. P. M., of N. J.—The scales of pyrometers are marked either in degrees centigrade or Fahrenheit, to which they are reduced by immersing the instrument in boiling mercury, and noting the degree of expansion (contraction, in Wedgewood's pyrometer), and dividing the rest of the scale proportionally. The Wedgewood pyrometer is very inaccurate; Daniell's is the best of the older instruments, while the new one of Siemens, not long since described in these columns, is probably better than either.

W. B., of Mass.—Glucose and starch sugar are the same thing. It is made by the action of dilute sulphuric acid upon starch. For particulars of the process, we refer you to Miller's "Organic Chemistry," Dr. Ure's "Dictionary of Art and Manufactures," etc. The constituents of glucose are 72 parts carbon, 14 parts hydrogen, and 12 parts oxygen, by weight.

Imitation of Ebony.—If E. E. B. will take a solution of sulphate of iron, and wash the wood with it two or three times; let it dry, and apply two or three coats of a strong decoction of logwood; wipe the wood when dry, with a sponge and water, and then polish with oil; he will have a very good imitation of ebony.—W. A. P.

NEW BOOKS AND PUBLICATIONS.

Part II. of "The Dictionary of Words and Phrases Used in Commerce," has come to hand, and gives increased evidence of the ultimate value of the work. Several items, among which is one on carpets, another on camel's hair, etc., will be found in our issue this week. They illustrate the real character of the work better than we can describe it in a notice like the present. The editor is Mr. Thomas McElrath, and the publishers are N. Tibbals & Son, 37 Park Row, New York.

American Horticultural Annual. Orange Judd & Co., 245 Broadway, New York. Price, 50 cents.

This is a valuable hand-book for gardeners and horticulturists, full of well executed engravings of new varieties of fruits, flowers, and vegetables with practical hints on growing them.

Recent American and Foreign Patents.

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

Telegraph Sounders, Relays, etc.—This invention consists in arranging, in an open rectangular wooden box, the usual coils and magnets, having between them and parallel to them, a straight, solid or hollow cylindrical bar, hung on two pivoted arms, which extend from shafts, having their bearings attached to the side of the wooden case. Both arms being of the same length, the bar which they carry, will, in any position, be parallel to the line it occupies in any other position. At right angles to this bar, is attached to it, the armature, which in its motions must, therefore, also move in parallel lines, and strike the magnets square on their faces. The ends o he bar which carries the armature, strike upon sounding pivots, and the arrangement enables the instrument to give a very clear and distinct sound. The bar is operated by springs which pull against each other in such a way that when no current is passing about the magnets, the armature is held at the proper distance from the poles. In the vertical position of the apparatus the weight of armature and bar are made to aid in imparting force to the blows upon the sounding points, but the instrument may be used in any position. This instrument has been patented by Hugh Swinton Legare Bryan, of Cedar Rapids, Iowa.

Dividing Wheels of Weft Thread Knitting Machines.—This is an improvement upon the dividing wheels of the weft thread knitting machine or loom, patented July 19, 1870, by William H. Abel, and which our readers have noticed recently in this journal. The invention is to increase the capacity of such looms to weave or knit a variety of patterns. To this end, the teeth of the dividing wheel are made radially adjustable, so as to throw out of line one or more needles, as may be desired, at intervals to form stripes, etc. The invention has been patented by Horace Woodman, of Saco, Me.

Washing Machine.—James M. Noble, of Delhi, Iowa.—This machine consists of a cylindrical rocking suds-box, with a funnel-shaped opening in the top, the ends of the funnel forming flanges for arresting the motion of the suds. It also has a perforated false bottom, through which, when the cylinder is rocked, the suds rush backward and forward, to act forcibly upon the goods to be cleansed.

Wire Fences.—This is an improvement in fences, invented and patented by Zebedee Nicholson, of Haddenfield, N.J. The fence is formed of a series of straight strands of wire, between which other strands of wire are made to assume a curvilinear zigzag course, crossing each other at points lying in vertical lines, over which intersections are placed "stiffeners," or plates of iron riveted together. The "stiffeners" occupy a position midway between the wooden posts which support the fence. This makes an apparently strong and secure, as well as a neat looking fence.

Millstone Dressing Machine.—Samuel East, Memphis, Mich.—This invention relates to a millstone dressing machine, which operates a common mill pick for cracking, facing, and furrowing, in which the pick is supported on a handle in such a manner that it can be moved laterally to any desired point, said frame being made to slide, by means of a screw, so that it can be moved forward or backward, for the purpose of setting the pick in position to make fresh "cracks" in the "land" of the stone.

Life Preserving Trunk.—Lawrence Rebstock, Hollidaysburgh, Pa.—This invention relates to a trunk, so constructed that it may be converted at pleasure into a boat, and thus serve as a life preserver in cases of shipwreck.

Breech Loading Cannon.—The construction of the barrel is that of longitudinal bars, hooped by iron bands shrunk on, a collar over all carrying the trunnions. The barrel is hung in a U-shaped frame, and is provided with a grooved breech block, actuated by a lever in such a way, that when the lever is swung down, the breech end of the barrel is raised above the block, so that the charge or cartridge can be inserted, and *vice versa*. The inventor and patentee is H. J. Allen, of Arkadelphia, Ark.

COAL SCUTTLE.—James C. Parrish, Petersburg, Va.—This invention relates to that class of coal scuttles that are provided with a sifter within the scuttle, situated above and parallel with the bottom, and the invention consists in the peculiar connection or combination of a handle with the door or hinged cover for the outlet of the ash pit.

WASHING MACHINE.—John Hilger Doll, of Etna, Ill.—This consists of a rubbing board, having a similar surface to that of ordinary rubbing boards, but placed so that the rubber surface is uppermost, and in a horizontal position. Upon the rubbing board are brought to bear a series of rubbing rollers, attached to a swinging frame, pivoted at some distance above it. The whole is fitted into a suitable tub or receptacle.

BABY TENDER.—This consists of a cloth seat, with an open dress, which is designed to be hooked or buttoned about the waist of the child, and is attached to a hoop a little distance above by means of cords or chains, the hoop being in turn attached by cords or chains to a swivel at the end of a rod, which is attached to a coiled spring, the whole being suspended from a hook in the ceiling. The cloth seat is passed through between the legs of the child, and hooked to the waist of the loose dress. This arrangement gives great freedom of movement to the limbs of the child, and holds it in a comfortable position. This is the invention of Alexander H. Carson, of Newport, R. I., and Andrew Brown, of Troy, N. Y.

DOUBLE CHURN DASHER.—William F. Jones, of Easton, Kansas.—The lower end of the vertical dasher shaft is pivoted to the bottom of the churn. A transverse pin or round passes through the shaft, to the ends of which are attached curved wings of peculiar form, and within these wings are two other blades or wings, which force the milk or cream upward and outward, while the outer ones force it downward and inward. The several parts are all detachable, so that they can be thoroughly cleaned.

FURNITURE CASTER.—Augustus G. Stevens, of Manchester, N. H., has invented a furniture caster, in which the outer surface of the socket is notched or serrated, so that when driven into the wood the notches will hold the socket fast by the expansion of the wood into them. The screws driven into the ends of the furniture legs frequently get loose; the notches are intended to hold the socket without the screws, should the latter get loose. The stirrup and socket are held together by a hook which engages with a collar on the bottom of the socket.

ADJUSTABLE SCAFFOLD BENCH.—An improvement in scaffoldings made by James Pettit, of Rochester, Indiana, consists in making bench pieces, braces, and legs, movable independently, so that adjustments in length and hight may be made either simultaneously or separately as may be desired. To this end he uses slotted legs and slotted sliding pieces at the top, which allow the pieces to be slipped in either direction; and adjustable braces to hold them in place, the scaffolding being self supporting.

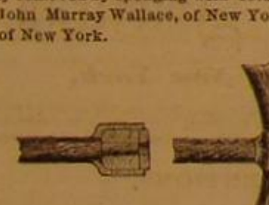
WAGON BRAKE.—In this invention, the brake beam is hinged to the reach of the wagon, and connected with the draft bar, so that, whenever the team ceases to pull, the brakes are brought into instant and forcible contact with the wheels, the weight of the brake bringing it down against the face of the wheel. The connection between the double tree and the hinged brake is effected by rods and links. Patented by R. C. Shockley, of Fayette, Wis.

NEWSPAPER ADDRESSING MACHINE.—Patrick O'Connor, of Youngstown, Ohio.—The principle of this machine is that of stencil plate printing. An endless stencil plate belt is moved around rollers, the impression being given by a hammer, as the plates of which the belt is composed pass over the upper roller. Instead of an endless belt, the inventor uses, when desired, a ribbon belt, winding upon one roller, as it unwinds from another.

DUMB BELLS.—Ellis Ballou, of Zanesville, Ohio.—The essential feature of this invention is the protection of the hand by placing the handle within a cavity of a shell formed between the balls or spheroids of the bell.

VALVES AND STEAM CHESTS.—The chief feature of this invention is the employment of a conical steam valve, flattened on two sides, within a steam chest that has four parts, two of which admit steam to the cylinder, and the other two of which are respectively the inlet and outlet. The parts are all equal distances apart, so that the proper connections of the parts with each other are established either by oscillating or by rotating the valve, in the latter case acting as a cut-off. The improvement is the invention of Peter N. Woods, of Fairfield, Iowa.

RECOLORING FABRICS.—After the fabric to be recolored has been properly dusted and freed from grease marks and stains, by the usual means employed for the purpose, it has applied to it a hot solution of aniline color, dissolved in alcohol and diluted with boiling water, in the proportion of one part dry color to ten parts alcohol, and as much water as may be required to obtain the desired tint, or shade. While the fabric is still damp from this application, the inventor applies, by another sponge, a suitable mordant, such as bromide of potassium, or other equivalent, the surplus mordant being finally removed by sponging with cold water. This process is the invention of John Murray Wallace, of New York city, assignor to Bernhard Weber, also of New York.



CARRIAGE WHEELS.—The invention of James Y. Silton, of Due West, S. C., is illustrated by the accompanying diagram. It consists in making the spokes of carriage wheels with clamps for the felly and tire, as shown, and metal sockets for the spokes, each being cast in one piece, and one being used for each spoke. The engraving shows an elevation, and also a section through the device, which will give a clear idea of the invention.

MACHINE FOR MAKING SKEWERS.—This is the invention of Chauncey Andrews, of Patterson, N. J. By its use skewers are split out, smoothed off, and pointed conveniently and rapidly. The parts of the machine cannot be intelligibly described without drawings.

BRICK LIFTER.—In certain kinds of brick machines, where the clay is pushed by a piston through a nozzle upon a table or set of rollers, to be subsequently cut into blocks by wires or cords, the rapid removal of the blocks or unburnt bricks is difficult. It is the design of this implement, invented by K. Julius Rugg, of Cincinnati, Ohio, to facilitate this operation. It consists of two parallel wooden board jaws, with arms pivoted together, after the manner of tongs, to which another set of bars are pivoted, so as to form lazy tongs, the upper ends of the latter bars being attached to the hoisting rope by a ring, which passes through suitable sheaves. This enables the block of clay to be rapidly removed to a truck, so as not to interfere with the action of the machine.

CHURN.—Henri Schuldtdrees, of Brookville, Ind.—This invention consists in an arrangement for the bearing of a horizontal beater shaft, to be raised as the butter begins to form for gathering it, and also for supporting the shaft at an elevated position.

VAPORIZING VOLATILE HYDROCARBONS.—This invention provides an apparatus for vaporizing volatile hydrocarbon oils, in such a way that only a small quantity of the oil may be in the gas house at a time, and which prevents the escape of the vapor into the gas house. The main body of the oil is kept outside the gas house, and is led in, through a pipe, to be vaporized in a coil heated by a hot water bath. A cold water condenser also surrounds the pipe, just previous to its reaching the vaporizer, which condenses any vapor that might seek to return through the pipe, and thus prevents its escape into the room. The oil is thus vaporized in small quantities as it flows into the gas house. The inventor is John Butler, of New York city.

PISTON PACKING.—Philip Estes, Leavenworth, Kansas.—This invention relates to piston-heads provided with expansible packing rings, and it consists in the means employed for forcing said packing ring outward, whenever it may be necessary, in order to the preservation of a steam-tight joint between the piston and cylinder.

PENDULUM LEVEL AND CLINOMETER.—This invention has for its object the adaptation of a stand pendulum pointer and scale (such as are used for ascertaining the deviations of the earth's surface, of the surfaces of other objects, from a horizontal line) to use as a plumb for determining the lines of objects standing vertically, or nearly so, and of overhead walls and ceilings. It has for its distinctive feature a scale arranged relatively to the hight and stretch of the forked measuring legs of the stand, so that measurements in right lines vertically, of the inclinations of the surface may be indicated on the curve which the index describes. It was invented by Rev. William Johnson, of Edisto Island, S. C.

HINGES FOR TABLE LEAVES.—The invention of Philip Hires, of Columbus, Ky., has for its object an improved hinge for table leaves, etc., which shall render the knuckle in table leaf joints unnecessary, while the hinge will be out of sight, and will hold the leaf firmly.

APPLICATIONS FOR EXTENSION OF PATENTS.

METALLIC BRIDGES FOR PIANOFORTES.—G. Henry Hulskamp, New York city, has petitioned for an extension of the above patent. Day of hearing, July 5, 1871.

SAWING MILL.—William M. Ferry, Grand Haven, Mich., has petitioned for an extension of the above patent. Day of hearing, July 5, 1871.

ARTIFICIAL LEGS.—Robert H. Nicholas, Chicago, Ill., and Douglas Bly, of Rochester, N. Y., have petitioned for an extension of the above patent. Day of hearing, July 12, 1871.

COMPOUND CAPSTAN FOR SHIPS.—Charles Perley, New York city, has petitioned for an extension of the above patent. Day of hearing, July 19, 1871.

CARRIAGE PROPS.—Chauncey Thomas, Boston, Mass., has petitioned for an extension of the above patent. Day of hearing, Sept. 6, 1871.

BOBBINS FOR ROVING AND SLUBBING.—Isaac Hayden, Boston, Mass., has petitioned for an extension of the above patent. Day of hearing, July 19, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

MUNN & CO., 37 Park Row.

Queries.

[*We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.*

1.—CEMENT.—How can I make a cheap waterproof cement for roofs, and to be used about chimneys, and other crevices?—H. A. C.

2.—CREOSOTING BOAT BOTTOMS.—I noticed in your issue of the 1st inst. that creosote oil is mentioned as a preventive for the sea worm. What would be the cost of same per gallon, and could it be successfully applied to old boats just hauled out, whose bottoms are thoroughly soaked with salt water? Or should the wood be in a comparatively dry state, before using the oil? A preventive of this kind is very much needed in the bays here, as we have a large number of small vessels which have to be hauled out frequently and repainted with verdigris, etc., to preserve the timber from the worms.—J. E. M.

3.—HONING RAZOR.—In honing my razor, I always get a rough wiry edge. What is the reason? If any one will tell me how to do this, so that I can at last get a good, smooth, satisfactory shave, they will confer a favor upon—P. R.

4.—STAMPS FOR PRINTING CARDS.—How are the elastic hand stamps for printing cards made?—C. F. M.

5.—ASPHALTE WALKS.—What is the experience of Southerners in the use of asphalte walks? How does heat affect them, and how do they compare in point of cost with other walks?—N.

6.—SMOKED BRICK WALLS.—How can wood smoke stains be removed from a new brick wall?—D. P. S.

7.—MENDING CAST IRON PATTERNS.—How can a broken piece of cast iron be so mended that a founder may use it for a pattern in molding a new piece?—J. G. G.

8.—STRENGTH OF BEAMS.—I would suggest to those having so much controversy about the strength of beams, that a beam will support its own weight inversely as the square of its length. For, as you double the length (which is its breaking leverage) you double the load. But for a uniform load, supposing the beam to weigh nothing of itself, the strength decreases as the length increases. If I am not right, will some one tell why?—W. G. B.

9.—DRAFT OF VEHICLES.—If a wheel be rolled over a plain of mud, of uniform consistency, and so loaded that it sinks a part of its diameter into the mud, should the line of traction be horizontal or inclined upwards? Suppose a block weighing 100 pounds rests on a level surface, and requires a force of 100 pounds exerted horizontally to move it: can it be moved more easily by pulling in any other direction? If so, what angle does the line of traction make with the base, and what is the force necessary to move the block?

10.—GEARING SLIDE REST.—I am an amateur turner, and I want to gear my slide rest to my lathe mandrel, to cut small screws. I don't know very much about gear wheels, and would like to ask one or two questions in regard to them. What would be the best number of teeth, to the inch of the diametrical pitch, for a lathe like mine, which is small (10 inch swing) and light? Would 16 teeth to the inch of the diameter of the pitch circle be too small or too large? If so, what would be a good number? Sixteen teeth to one inch of the diameter of the pitch circle would give, on a wheel of 3 inches in diameter of pitch circle, 48 teeth on the pitch circle, would it not? And would a wheel so small as 1¼ inches, with 20 teeth, work well with one of 2½ inches with 40 teeth? In giving the size of the wheels, I mean the diameter of the pitch circle. I have made all the calculations as to the size of the wheels I want but do not know how to get at the number of teeth to the inch that will work nicely on so small a lathe as mine?—G. J. Van D.

11.—ELECTRIC LIGHT.—What is the most economical way to produce the electric light? The direct way, by a Grove battery, or by a revolving magnet, or by Rhumkorff's coil? Has an estimate been made as to the cost of its production, compared with that of any other illuminator? What would be the cost of apparatus, and are there persons in New York who sell the proper apparatus? This subject has been discussed by several scientific men and subscribers to your valuable paper, and all are anxious to hear what light can be thrown upon the subject.—L. K., M. D.

12.—CHEAP BATTERY.—In your issue of March 11, 1871, there were directions to make a cheap galvanic battery. I undertook, in company with a friend, to construct one of these, and although we followed the instructions to the letter, as we thought, yet the result was an ignominious failure. It did not generate one particle of electricity, not even so much as is produced in the humble experiment of a silver coin and piece of zinc placed on the tongue. We first procured a glazed earthen bowl, holding about a gallon; inside this was fitted a cylinder of sheet zinc; within this cylinder we placed an unglazed earthen flower pot, medium size, the hole stopped with shoemaker's wax, and inside this again was a cylinder made from the bottom of an old copper wash boiler. Then, dissolving nearly half a pound of sulphate of copper in water, we poured it into the flowerpot containing the copper, filling it full, and also filled the outer earthen pot with a strong solution of salt and water. Having attached copper wires to both zinc and copper, we now naturally expected the machine to work, but never a bit of it. Up to this writing, it has stood as complacently innocuous as a barrel of slop. Is anything wrong with our apparatus? We have modified, altered, improved and experimented, all to no purpose. So let A. G. please inform us where the difficulty is, or we shall be confirmed in the opinion, gradually gaining ground in our minds, that his directions are a fraud, or at least of no use to novices like—F. R. S.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING MAY 2, 1871.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT FEES:

On each Caveat	$10
On each Trade-Mark	$25
On filing each application for a Patent, (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On an application for Design (three and a half years)	$10
On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30

For Copy of Claim of any Patent issued within 30 years $1

A sketch from the model or drawing, relating to each portion of a machine as the Claim covers, from .... $1 *upward, but usually at the price above-named.*

The full Specification of any patent issued since Nov. 20, 1866 at which time the Patent Office commenced printing them .... $1·25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case, may be had by addressing

MUNN & CO.,
Patent Solicitors, 37 Park Row, New York.

114,248.—WEIGHING SCALES.—D. D. Allen, Adams, Mass.
114,249.—MILLSTONE.—J. A. Althouse, New Harmony, Ind.
114,250.—WASHING MACHINE.—A. Assmann, Rahway, N. J.
114,251.—GRAIN SEPARATOR.—S. K. Ayres, Dellton, Wis.
114,252.—STALK CUTTER.—Josiah Babcock, John F. Stilson, and James C. Leidy, Galesburg, Ill.
114,253.—SASH HOLDER.—W. Bacheller, West Newbury, Ms.
114,254.—SEWING MACHINE.—N. and R. S. Barnum, Chicago, Ill.
114,255.—BOILER FEEDER.—Robert Berryman, Hartford, Ct., and R. N. Pratt, Philadelphia, Pa.
114,256.—FIRE EXTINGUISHER.—C. Blake, Boston, Mass.
114,257.—STEAM TRAP.—J. H. Blessing, Albany, N. Y.
114,258.—THILL COUPLING.—G. I. Bradley, Boston, Mass
114,259.—FIREARM.—Heinrich Buchner, New York city.
114,260.—STOVE.—E. Bussey and A. Hamlin, Troy, N. Y.
114,261.—INFANT'S SHOE.—W. M. Carpenter, Rowley, Mass.
114,262.—INKSTAND.—C. C. Catlin, Cleveland, Ohio.
114,263.—CHEESE HOOP.—Azer Chandler, Rome, N. Y.
114,264.—MEDICAL COMPOUND.—A. R. Clapp, Boston, Mass.
114,265.—NEEDLE SHARPENER.—C. P. Clark, Lock Haven, Pa.
114,266.—HOE.—Isaac Cook and J. T. Bever, Haynesville, Mo.
114,267.—METER.—T. Kent, Old Kent Road, and J. Watson Victoria Chambers, Westminster, London, Eng.
114,268.—PRINTING PRESS.—C. B. Cottrell, Westerly, R. I.
114,269.—WHIFFLETREE.—H. Crocker, Jr., Montrose, Pa.
114,270.—STENCH TRAP.—Thomas Dark, Buffalo, N. Y.
114,271.—COTTON PRESS.—Henry J. Davis, Wetumpka, Ala. Antedated April 26, 1871.
114,272.—GAS REGULATOR.—Otis Dean, Richmond, Va.
114,273.—PRINTERS' CASE.—A. T. De Puy, New York city.
114,274.—MULE.—John Dodd, Oldham, England.
114,275.—GAS PURIFIER.—E. Duffee, Haverhill, Mass.
114,276.—TUCK MARKER.—G. L. Du Laney, New York city.
114,277.—IRON AND STEEL.—Z. S. Durfee, New York city.
114,278.—EVAPORATOR.—S. P. Dyer, Ankney Town, Ohio.
114,279.—PIPE SHELF.—J. P. Elliott, Bridgeport, Conn.
114,280.—GRATE BARS.—W. H. Farris, Cairo, Ill.
114,281.—NIPPLE SHIELD.—S. C. Foster, New York city.
114,282.—INVALID CHAIR.—G. T. Fowler, East Somerville, Ms.
114,283.—HYDRANT.—J. P. Gallagher, St. Louis Mo.
114,284.—PUMP.—J. P. Gallagher, St. Louis, Mo.
114,285.—PRINTING PRESS.—M. Gally, Rochester, N. Y.
114,286.—BOOK BINDING.—John Glass, Greenpoint, N. Y.
114,287.—RUBBER.—John Greacen, Jr., New York city.
114,288.—SPINNING MULE.—P. W. Greenwood, Landenburg, Pa
114,289.—SLATE FRAME.—W. W. Hamilton, Flushing, N. Y.
114,290.—GRATE.—C. R. Harvey and J. H. Foote, New York
114,291.—DRAFT.—B. A. Haycock, Richmond, Iowa.
114,292.—CRIB.—W. T. Hazard, Randolph, Mass.
114,293.—OIL.—S. A. Hill and C. F. Thumm, Oil City, Pa.
114,294.—SEWING MACHINE.—J. A. and H. A. House, Bridgeport, Conn.
114,295.—APPARATUS FOR EVAPORATING LIQUIDS.—J. Howarth, Salem, Mass.
114,296.—ENGINE GOVERNOR.—R. K. Huntoon, Boston, Mass.
114,297.—PUNCHING MACHINE.—W. H. Ivens and William E. Brooke, Trenton, N. J.
114,298.—LUBRICATOR.—James Ives, Mt. Carmel, Conn.
114,299.—CAST STEEL.—P. E. Jay, J. A. Rafter, Montreal, Can.
114,300.—STEAM ENGINE.—Asa Johnson, Brooklyn, N. Y.
114,301.—PAPER PULP.—M. L. Keen, Jersey City, N. J.
114,302.—LAMP.—H. Kelley and W. H. Locke, Boston, Mass.
114,303.—GRINDER.—F. J. Kimball, Philadelphia, Pa.
114,304.—DRYER.—F. J. Kimball, Philadelphia, Pa.
114,305.—WASHING MACHINE.—J. M. Kimball, Woodstock, Ill.
114,306.—CHURN.—J. J. Kimball, Naperville, Ill.
114,307.—WEFT FORK.—J. H. Knowles, Lawrence, Mass.
114,308.—STALK CUTTER.—M. K. Lewis, J. Munger, Malcom, Iowa.
114,309.—WINDMILL.—G. Mabie and T. C. Little, Dixon, Ill.
114,310.—BELT SHIPPER.—H. Macon, Providence, R. I.
114,311.—CUTTING METAL.—J. R. Maitlank, Little Rock, Ark
114,312.—COAL BOX.—John Mallin, Chicago, Ill.
114,313.—THRASHING MACHINE.—M. H. Mansfield, Ashland, O
114,314.—BIT STOCK.—Charles Manson, Boston, Mass.
114,315.—CORPSE PRESERVER.—M. R. Margerum, Trenton, N. J
114,316.—CARBURETER.—L. Marks, San Francisco, Cal.
114,317.—LUBRICATOR.—C. Mather, Steubenville, Ohio.
114,318.—HAME.—Asa McCracken, South Byron, N. C.
114,319.—EXTENSION TABLE.—F. Menzer, Flint, Mich.
114,321.—BARREL MACHINE.—Wm. R. and E. Middleton, Cleveland, Ohio.
114,322.—SHINGLE MACHINE.—U. D. Mihills, Fond Du Lac, Wis.
114,323.—MATCH SAFE.—J. Musgrove, Newark, N. J.
114,324.—HUB CAP.—G. H. Nevins, Liverpool, Cal.
114,325.—ROOFING.—E. P. Newton, Clintonville, Pa.
114,326.—MILLSTONE GUIDE.—J. North, New York city.
114,327.—HAT.—J. Northrop and J. F. Emmons, Bridgeport, Ct
114,328.—LIFTING LOCOMOTIVES.—G. T. Nutter, Jersey City, N. J.
114,329.—GAS BURNERS.—R. Nutting, Randolph, Vt.
114,330.—COFFEE ROASTER.—A. Obst, Cambridgeport, Mass
114,331.—CORN SHELLER.—C. M. O'Hara, Cincinnati, Ohio.
114,332.—NEEDLES.—C. H. Palmer, New York city.

114,333.—Tackle Block.—I. E. Palmer, Hackensack, N.J.
114,334.—Plow.—W. F. Parker, Troy, Ala.
114,335.—Coal Scuttle.—J. C. Parrish, Petersburg, Va.
114,336.—Stove.—J. S. Peckham, Utica, N. Y.
114,337.—Play Pipe.—E. L. Perry, New York city.
114,338.—Valve.—George Pierce, Boston, Mass.
114,339.—Hydraulic Apparatus.—P.E. Powers, Genoa, Nev.
114,340.—Shoes.—W. F. Prusha, E. L. Wales, Marlborough, Mass.
114,341.—Polisher.—P. F. Randolph, Jerseyville, Ill.
114,342.—Chimney.—W. Richards, London, England.
114,343.—Trap.—J. H. Richardson, Westport, Mo.
114,344.—Slide Valve.—A. K. Rider, New York.
114,345.—Clothes Line.—J. Ripley, Cincinnati, Ohio.
114,346.—Saw Guide.—A. Rittenhouse, Smithville, Ohio.
114,347.—Plumber's Water Boiler.—A. R. Robb, Brooklyn.
114,348.—Pipe Wrench.—E. H. Robbins, Pittsfield, Mass.
114,349.—Car Heater.—H. R. Robbins, Baltimore, Md.
114,350.—Paper Cutter.—T. C. Robinson, Boston, Mass.
114,351.—Dust Pan.—Thomas F. Rooney, Chicago, Ill.
114,352.—Tobacco.—A. S. Rosenbaum, New York city.
114,353.—Car Coupling.—S. S. Sartwell, Camden, N. Y.
114,354.—Polish.—H. A. and R. G. Sawyer, Milwaukee, Wis.
114,355.—Mats.—C. S. Schenck, New York city.
114,356.—Iron Furnaces.—E. G. Scovil, St. John, Canada.
114,357.—Sled Knee.—C. Shaw, Milledgeville, Pa.
114,358.—Gas Machine.—W. A. Simonds, Boston, Mass.
114,359.—Stave.—Wm. Sisson, Fulton, N. Y.
114,360.—Canister.—W. H. Smith, Portland, Conn.
114,361.—Oil Tank.—H. F. and G. S. Snyder, Williamsport, and A. Snyder, Freeport, Pa.
114,362.—Sprinkler.—J. I. Spear, San Francisco, Cal.
114,363.—Bridge.—C. B. Sreeves, Atchinson, Kan.
114,364.—Hub.—H. W. Stow, New Haven, Conn.
114,365.—Scaffold Bracket.—J. W. Tallmadge, Plainville, Conn.
114,366.—Bib.—Adaline L. Thomson, Hudson city, N. Y.
114,367.—Dish Washer.—H. B. Todd, Plymouth, Conn.
114,368.—Hay Rake.—R. M. Treat, Morris, Conn.
114,369.—Traction Engine.—C. W. Tremain, Chicago, Ill.
114,370.—Lunch Box.—D. Troxell, Newark, N. J.
114,371.—Mold for Belting.—S. W. Tyler, Troy, N. Y.
114,372.—Watches.—A. Wadsworth, Newark, N. J.
114,373.—Leather Fabric.—E. Waite, Franklin, Mass.
114,374.—Firearms.—D. B. Wesson, Springfield, Mass.
114,375.—Salve.—W. Wheelock, Boston, Mass.
114,376.—Tilting Chair.—E. R. White, Milford, Mass.
114,377.—Roll.—E. Wight, Philadelphia, Pa.
114,378.—Combined Square.—M. M. Wilson, Elwood, N. J.
114,379.—Door Spring.—L. R. Witherell, Galesburg, Ill.
114,380.—Washing Machine.—J. A. Wood, Chemung, Ill.
114,381.—Wind Wheel.—Horace Woodruff, Sandwich, Ill.
114,382.—Canal Boats.—G. G. Wyland and T. M. Rathmell, Williamsport, Pa.
114,383.—Bolt Cutter.—W. E. Yeager, Lawrence, Kansas.
114,384.—Grain Drill.—J. P. Zeller, South Bend, Ind.
114,385.—Shearing Metal.—W. J. Adams, Grand Rapids, Mich.
114,386.—Padlock.—W. H. Akins, Ithaca, and H. E. Abell, Brooklyn, N. Y.
114,387.—Binder.—W. Allebaugh and J. M. Cuffell, Norristown, Pa.
114,388.—Knife.—J. W. Androvatt and T. W. Joline, Tottenville, N. Y.
114,389.—Lamp.—W. W. Batchelder, Boston, Mass.
114,390.—Corn Planter.—Harry Baughman, Sandusky, O.
114,391.—Hay Fork.—Charles Bean, Pawtucket, R. I.
114,392.—Stable Fixture.—S. S. Bent, Port Chester, N. Y.
114,393.—Soap.—J. T. and P. S. Bever, Lathrop, Ill.
114,394.—Grain Drill.—J. R. Bird, Brooklyn, N. Y.
114,395.—Ditching Machine.—I. Boas, New Orleans, La.
114,396.—Preparing Beefsteak.—A. M. Bond, Concord, N.H.
114,397.—Knitted Fabric.—Henry Boot, Philadelphia, Pa.
114,398.—Roller Skate.—P. R. Borein, San Leandro, Cal.
114,399.—Hoist.—P. J. Borger, Cincinnati, Ohio.
114,400.—Fibrous Plants.—A. Bouchard, New Orleans, La.
114,401.—Bridge.—T. C. Boutet, Baris, France.
114,402.—Shaft Coupling.—S. Broadbent, Scranton, Pa.
114,403.—Pump.—A. P. Brown, New York city.
114,404.—Pocketbook.—Jefferson Brown, Jr., New York city.
114,405.—White Lead.—T. H. Burridge, St. Louis, Mo.
114,406.—Burglar Alarm.—J. G. Butler, Glen's Falls, N. Y.
114,407.—Corpse Preserver.—J. T. Carpenter, Downington, Pa.
114,408.—Reaper.—G. H. Clark, Cleveland, Ohio.
114,409.—Railway Frog.—J. W. Close, Buffalo, N. Y.
114,410.—Billiard Cushion.—H. W. Collender, New York city.
114,411.—Meter.—Thomas Cook, New York city.
114,412.—Window Blind.—A. Cooper, Twickenham, Eng.
114,413.—Nail Machine.—H. D. Cowles and G. Stacy, Montreal, Canada.
114,414.—Bridge Gate.—E. R. Coyne, Chicago, Ill.
114,415.—Water Meter.—J. W. Cremin, New York city.
114,416.—Fanning Mill.—L. M. Crosby, Ashtabula, Ohio.
114,417.—Raisin Seeder.—W. Curtis, Jr., Wolcottville, Ct.
114,418.—Toilet Case.—F. E. Dapron, Davenport, Iowa.
114,419.—Water Meter.—J. F. de Navarro, New York city.
114,420.—Liquid Meter.—J. F. de Navarro, New York city, and H. C. Sergeant, Newark, N. J.
114,421.—Fire Escape.—William De Pew, Paris, Canada.
114,422.—Cupola Furnace.—J. Dougherty, Philadelphia, Pa.
114,423.—Mixing Machine.—Robert Duff, New York city.
114,424.—Sewing Machine.—G. L. Dulaney, New York city.
114,425.—Dressing Millstones.—S. East, Memphis, Mich.
114,426.—Saw Mill.—M. J. and T. J. Egery, Bangor, Me.
114,427.—Piston Packing.—Philip Estes, Leavenworth, Kan.
114,428.—Division Plate for Stoves.—S. C. Ewing, Hill's Ferry, Cal.
114,429.—Steam Engine.—H. Fontaine, Paris, France.
114,430.—Gun Carriage.—J. G. Foster, Boston, Mass.
114,431.—Wash Boiler.—J. H. Garner, Pontiac, Ill.
114,432.—Lantern.—N. Gear, Newark, Ohio.
114,433.—Rail Joint.—W. F. Grassler, Muncy, Pa.
114,434.—Earth Closet.—W. H. Grove, Philadelphia, Pa.
114,435.—Sewing Machine Stand.—W. H. Grove, Philadelphia, Pa.
114,436.—Support for Window Sashes.—C. Ham, New York city.
114,437.—Boiler Furnace.—C. J. Harris, Bloomington, Ill.
114,438.—Candle.—Charles Havard, New York city.
114,439.—Bedstead.—J. F. Hollister, Plano, Ill.
114,440.—Steam Heater.—A. L. Ide, Springfield, Ill.
114,441.—Harvester Rake.—B. Illingworth, Le Roy, Minn.
114,442.—Bobbin Winder.—T. M. Jenks, New York city.
114,443.—Shingle Machine.—Joseph Jimo, Vergennes, Vt.
114,444.—Baking Pan.—Amos Jones, Lebanon, N. H.
114,445.—Sash Holder.—G. N. Kendall, Wooster, Ohio.
114,446.—Awl.—Thomas Kenney, Lynn, Mass.
114,447.—Electro Mold.—S. P. Knight, Brooklyn, N. Y.
114,448.—Wagon Tongue Support.—J. Krehbiel, Williamsville, N. Y.
114,449.—Fire Bricks.—B. Kreischer, New York city.
114,450.—Safety Can.—W. H. Lawrence, Williamsburg, N.Y.
114,451.—Match Hook.—Jos. D. Leach, Penobscot, Me.
114,452.—Securing Wheels to Axles.—George Granville Lobdell, Wilmington, Del.
114,453.—Stove Damper.—Ernest Lohsand, La Porte, Ind.
114,454.—Securing Dental Fillings.—C. H. Mack, Portland, Oregon.
114,455.—Spindle Step Box.—L. Maish, Minneapolis, Minn.
114,456.—Fruit Box.—Joshua H. Marvil, Laurel, Del.
114,457.—Wash Boiler.—D. McCleary, Allegheny City, Pa.
114,458.—Wheel.—R. W. McClelland, Springfield, Ill.
114,459.—Sail Hank.—Wm. E. Meyer, New York city.
114,460.—Elevator.—Charles E. Moore, Boston, Mass.
114,461.—Buckle.—John H. Morris, Paxton, Ill.
114,462.—Washer and Wringer.—J. H. Murray, Kirkwood, N. Y.
114,463.—Grain Separator.—W. A. Myers, York, Pa.
114,464.—Washing Fluid.—E. H. Neill, San Francisco, Cal.
114,465.—Puddling Furnace.—J. Neville, Brooklyn, N. Y.
114,466.—Sleigh Heater.—Alfred Norton, Kokomo, Ind.
114,467.—Nozzle Stopper.—J. H. Noyes, Abington, Mass.
114,468.—Rolling Paste.—C. A. Oehl, New York city.
114,469.—Chill Castings.—James Oliver, South Bend, Ind.
114,470.—Enameling Boot Heels.—C. H. Orcutt, Leominster, Mass.
114,471.—Lantern.—John Orphy, Buffalo, N. Y.
114,472.—Plow and Marker.—O. M. Pond, Independence, Iowa.
114,473.—Lubricator.—J. M. Porter, Frostburg, Md.
114,474.—Nut Lock.—P. F. Randolph, Jerseyville, Ill.
114,475.—Life Preserving Trunk.—L. Rebstock, Hollidaysburg, Pa.
114,476.—Bending Machine.—G. J. Riblet, Bootheville, W.Va.
114,477.—Hair Crimping Device.—F. C. Richardson, New York city.
114,478.—Churn Dasher.—Julius M. See, Griffin, Ga.
114,479.—Bridge.—Jacob Seebold, Kantz, Pa.
114,480.—Liquid Meter.—H. C. Sergeant, Newark, N. J.
114,481.—Bottom for Metal Ware.—H. W. Shepard, Mannsville, N. Y.
114,482.—Atomizing Liquid.—A. M. Shurtleff, Boston, Mass.
114,483.—Cultivator.—M. P. Simpson, Rosemond, Ill.
114,484.—Stovepipe Thimble.—H. G. Smith, Meriden, Ct.
114,485.—Trunk.—Joseph Stanton, Buffalo, N. Y.
114,486.—Ore Concentrator.—W. C. Stiles, Nevada City, Cal.
114,487.—Snap Hook.—O. O. Storle, North Cape, Wis.
114,488.—Saddletree Mold.—J. Straus, St. Louis, Mo.
114,489.—Blower and Rotary Engine.—H. P. Tenant, Germantown, Ind.
114,490.—Fabric for Cuffs.—H. H. Thayer and W. H. Hart, Jr., Philadelphia, Pa.
114,491.—Automatic Fan.—B. D. Thompson, New York city.
114,492.—Clarifying Coffee.—C. L. Tucker, Chicago, Ill.
114,493.—Harvester.—B. G. Turner, Fremont, Neb.
114,494.—Curtain Fixture.—E. Turner, Wolcottville, Conn.
114,495.—Ice Machine.—A. Vaass and F. Littmann, Halle, Prussia.
114,496.—Hay Elevator.—J. M. Van Demark and Moses Barlow, Phelps, N. Y.
114,497.—Draught Regulator for Stoves.—W. W. Waddell, Hillsborough, Ohio.
114,498.—Rolling Hoe Blanks.—H. Waters, Boston, Mass.
114,499.—Kiln.—G. A. Wedekind and H. Dueberg, Baltimore, Md.
114,500.—Grain Separator.—H. L. Whitman, St. Louis, Mo.
114,501.—Lawn Mower.—A. W. D. Williams, London, Eng.
114,502.—Soda Water.—J. B. Wood, Richmond, Va.
114,503.—Steam Boiler.—F. A. Woodson, Selma, Ala.
114,504.—Paper File.—S. W. Young, Providence, R. I.
114,505.—Wrench.—A. C. Coes, Worcester, Mass.
114,506.—Steam Pumping Engine.—L. J. Knowles, Worcester, Mass.
114,507.—Steam Pump.—L. J. Knowles, Worcester, Mass.
114,508.—Fertilizer.—H. A. Hogel, New York city.
114,509.—Meat Saw.—P. J. Hogan and A. Sowden, Cincinnati, Ohio.

REISSUES.

4,359.—Stove Lid and Damper.—Wm. Doyle, Albany, N.Y. Patent No. 89,861, dated May 11, 1869.
4,360.—Preserving Wood Railroad Ties, etc.—B. S. Foreman, Morrison, Ill. Patent No. 43,197, dated June 21, 1864; reissue No. 1,951, dated May 9, 1865.
4,361.—Oil Cup.—J. P. Haines, New York city. Patent No. 92,820, dated July 20, 1869.
4,362.—Sad and Fluting Iron.—F. Myers, New York city. Patent No. 112,482, dated March 7, 1871.
4,363.—Printing Cloth.—Alfred Paraf, New York city. Patent No. 95,040, dated Sept. 21, 1869.
4,364.—Concrete Pavement.—J. J. Schillinger, New York city. Patent No. 105,599, dated July 19, 1870.
4,365.—Metal Corner Piece.—E. A. Stratton and C. M. Stratton, Greenfield, Mass. Patent No. 100,463, dated March 1, 1870.
4,366.—Distilling Petroleum, etc.—A. H. Tait and J. W. Avis, New York city. Patent No. 53,359, dated March 20, 1866.
4,367.—Distilling Petroleum, etc.—A. H. Tait and J. W. Avis, New York city. Patent No. 63,115, dated March 19, 1867.
4,368.—Cattle Car.—The National Cattle Car Co., Salem, O. Patent No. 29,409, dated July 31, 1860.
4,369.—Package for Lard.—Chas. L. Tucker, Chicago, Ill. Patent No. 66,368, dated July 2, 1867; reissues Nos. 3,037 and 3,038, dated July 14, 1868.

DESIGNS.

4,853.—Bracket.—J. H. Bellamy, Charlestown, Mass.
4,854.—Front of a Catch-All.—J. H. Bellamy, Charlestown, Mass.
4,855.—Gate Hinge.—Chas. B. Clark, Buffalo, N.Y.
4,856.—Bottle.—Wm. A. Demuth, New York city.
4,857.—Chain Link.—Virgil Draper, Attleborough, Mass.
4,858.—Handle Cap for Satchels.—G. Havell, Newark, N.J.
4,859.—Palm and Back Pieces of Gloves.—F. E. Hotchkiss, Gloversville, N. Y.
4,860.—Knitted Trimming.—M. Landenberger, Philadelphia, Pa.
4,861 and 4,862.—Rubber Shoe.—C. Meyer, New York city. Two patents.
4,863.—Muff and Collar Box.—R. M. Seldis, New York city.
4,864.—Woven Cloth.—R. C. Taft, W. B. Weeden and J. W. Taft, Providence, R. I.
4,865.—Thumb Piece for Gloves.—I. B. Whipple, Gloversville, N. Y.
4,866.—Bow Instrument.—L. P. Wildman, Danbury, Conn.

TRADE-MARKS.

231.—Tobacco.—L. L. Armistead, Lynchburg, Va.
232.—Balm.—Demas Barnes, Brooklyn, N. Y.
233.—Liniment.—Demas Barnes, Brooklyn, N. Y.
234.—Insect Powder.—Demas Barnes, Brooklyn, N. Y.
235.—Preparation for the Hair.—D. Barnes, Brooklyn, N.Y.
236.—Billiard Cushion.—H. W. Collender, New York city.
237.—Jewelry.—Wm. M. Elias & Brother, New York city.
238.—Medicine.—T. S. Hodgson & Co., McKeesport, Pa.
239.—Twine, Warp, Yarn, etc.—E. W. Keeler, Yardville, N.J.
240.—Tea.—C. A. Low & Co., San Francisco, Cal.
241.—Whisky.—Mills, Johnson & Co., Cincinnati, Ohio.
242.—Billiard Table.—Phelan & Collender, New York city.
243.—Wood Pump.—Rich & Burlingham, New York city.
244.—Cigar.—Smith, Crosby & Co., New York city.
245.—Fertilizer.—Smith & Harris, Philadelphia, Pa.
246.—Toys and Fancy Goods.—Strasburger, Fritz & Pfeiffer, New York city.
247.—Medicinal Preparation.—G. B. Thurston, Lynn, Mass.

EXTENSIONS.

Paper Bags.—Roxanna Rice, South Lancaster, Mass. Letters Patent No. 17,184, dated April 28, 1857; reissue No. 920, dated March 6, 1860.
Harvesters.—Chas. Crook, New Hope, Pa. Letters Patent No. 17,205, dated May 5, 1857; reissue No. 548, dated May 4, 1858; reissue No. 3,393, dated April 20, 1869.
Harvesters.—Chas. Crook, New Hope, Pa. Letters Patent No. 17,205, dated May 5, 1857; reissue No. 548, dated May 4, 1858; reissue No. 3,394, dated April 20, 1869.

DISCLAIMER.

Harvesters.—Chas. Crook, New Hope, Pa. Letters Patent No. 17,205, dated May 5, 1857; reissue No. 548, dated May 4, 1858; reissue No. 3,394, dated April 20, 1869.

Inventions Patented in England by Americans.

April 12 to April 17, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.]

Axles and Axle Boxes.—C. W. M. Smith, San Francisco, Cal.
Button Holes.—G. M. Wells, Boston, Mass.
Clothes Wringer.—August Albrecht, Philadelphia, Pa.
Elastic Compound.—A. G. Day, Seymour, Conn.
Fabrics for Mattresses.—G. C. Perkins, Hartford, Conn.
Frame for Hop Bines.—J. T. Parlour, Brooklyn, N. Y.
Hair Washer.—M. L. Winn, New York city.
New Fiber.—J. H. McConnell, Springfield, Ill.
Phosphates of Lime.—C. Morfit, Baltimore, Md.
Preparation of Meat.—M. S. Valentine, Richmond, Va.
Propeller.—Dr. R. Hunter, Cincinnati, Ohio.
Sash Fastener.—Nathan Thompson, Brooklyn, N. Y.
Stretching Picture Frames.—James Fairman, New York city.
Stringed Instruments.—L. P. Wildman, Danbury, Conn.
Superphosphate of Lime.—C. Morfit, of Baltimore, Md.
Treatment of Bone.—N. B. Rice, E. Saginaw, Mich., S. Driggs, New York.
Whip.—Charles T. Shelton, New Haven, Conn.
Window-blind Holder.—Nathan Thompson, Brooklyn, N. Y.

Foreign Patents.

The population of Great Britain, is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address Munn & Co., 37 Park Row, New York. Circulars, with full information on foreign patents, furnished free.

Advertisements.

Value of the SCIENTIFIC AMERICAN as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading-rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth $2.50 per line to advertise in one of thirty thousand.

RATES OF ADVERTISING.

Back Page - - - - 1·00 a line,
Inside Page - - - 75 cents a line,
for each insertion.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

City Subscribers.—The Scientific American will be delivered in every part of the city at $3·50 a year. Single copies for sale at the News-stands in this city, Brooklyn, Jersey City, and Williamsburgh, and by most of the News Dealers in the United States.

Advertisements.

Advertisements will be admitted on this page at the rate of **$1·00** *per line for each insertion. Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.*

TO ELECTRICIANS.—For sale, the secret of manufacturing Magnets, much more powerful than any kind known heretofore, for electric motor, or any other kind of application. Price $10,000. Address A. RABLAY, 34 East Houston st., New York.

FULL INSTRUCTIONS to Stuff Birds, Preserve Butterflies, Insects, and Animals. Full instructions and preparations for preserving the skins. Sent postpaid on receipt of $1.00. Address E. M. CRAIG, No. 19 Ohio st., Cleveland, Ohio.

PAPER PULP, made of Straw, Wood, etc., by Deininger's Process, better than by any other, and with only one fourth of the Chemicals formerly required in boiling and bleaching. Address WEDEKIND & DUEBERG, cor. Biddle and Ann sts., Baltimore.

Travelers Record.

NEATEST and liveliest insurance paper published. A copy mailed free, postpaid, on application. Address TRAVELERS RECORD, Hartford, Conn.

WANTED.—A responsible dealer in every town in the United States, to sell "The Tanite Co.'s" Emery Wheels and Emery Grinders. Extra inducements from May 1st. Send for terms to "THE TANITE Co., Stroudsburg, Pa.

SHORT HAND. 150 words per minute in four weeks. Send stamp for Circular. Prof. Gray, P.O. Box 4817, N.Y.

EDISON & UNGER,
EXPERTS IN ELECTRICITY.
The application of MAGNETISM to Machinery a SPECIALTY. Factory **4 & 6 Ward st.**, Newark, N.J.

TRADE MARK. **Union Stone Co.,**
Patentees and Manufacturers of **ARTIFICIAL STONE & EMERY WHEELS,** and Artificial Stone and Emery Wheel Machinery and Tools. Send for circular. **32 Pemberton Square, BOSTON, MASS.**

Hard Wood Boards AND SPANISH CEDAR
FOR CIGAR BOXES,
And a large and magnificent assortment o.

VENEERS,

Comprising everything in their line, both Foreign and Domestic, to which they invite the special attention of all dealers. Send for Catalogue and Price List.
GEO. W. READ & CO.,
Factory, {291 Monroe st. / 398 Madison st.} 168, 170, and 172, Center st., New York city.

STEAM ENGINES,

CASTINGS, Forgings, and Machinery of all kinds. Address FISHKILL LANDING MACHINE CO., Fishkill-on-the-Hudson, N.Y.

POWER PLEDGED
Equal to any Overshot, with
N. F. BURNHAM'S
NEW TURBINE
WATER WHEEL.
Illustrated Descriptive Pamphlet and Price List sent free, by N. F. BURNHAM, York, Pa.

THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF new and useful Contrivances, or Machines, or Engineering works, of whatever kind, can have their Inventions illustrated and described in the columns of the Scientific American, on payment of a reasonable charge.

The cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no second-hand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills, can be admitted into the reading columns. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation we shal respectfully decline. Estimates as to cost of engraving and publication will be given, on receipt of photograph, model, or drawing, and description.

For further particulars address

MUNN & CO.,
Publishers of Scientific American,
New York city.

BEST DAMPER REGULATOR for Steam Boiler. Send for Circulars. Agents Wanted. MURRILL & KEIZER, Baltimore, Md.

HEAVY CASTINGS For Forge and Mill Work. The M. & T. SAULT CO., Steam Engine Builders & Founders, New Haven, Conn.

THE Tanite Emery Wheel.

Does not Glaze, Gum, Heat, or Smell. Address THE TANITE CO., Stroudsburg, Monroe Co., Pa.

PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than **900** being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address J. C. HOADLEY & CO., Lawrence, Mass. 46, Cortlandt st., New York.

PRATT'S ASTRAL OIL — Safest AND Best. — OIL HOUSE CHS PRATT 1770–1871

UNION
Spoke Works.

SPOKES, RIMS, AND PLOW HANDLES. All goods warranted seasoned, and of the best quality. JOHN G. DAVIS & SON, Southwest cor. of Leopard and Otter sts., Philadelphia.

IRON STEAMSHIP BUILDERS.
NEAFIE & LEVY,
PENN WORKS,
MARINE ENGINES, BOILERS, ETC., PHILADELPHIA, PA.

STEAM ENGINES & BOILERS

From 4 to 500 horse power including Corliss Engines, Slide Valve Stationary Engines, Portable Engines, etc. Also, Circular Saw Mills, Shafting, Pulleys, etc. Wheat and Corn Mills, Circular Saws, etc.
Send for Price List.
WOOD & MANN Steam Engine Company, WORKS—UTICA, N.Y.
Principal Office—**42 Cortlandt st., New York.**

WATER-PROOF
BUILDING PAPER

(No Tar), for Roofing, Sheathing, Ceilings, Oil-cloths Shoe Stiffenings, Tags, Trunks, Cartridges, Blasting Pass-book Covers, Grain and Flour Bins, etc., for sale by J. HUNTER, Jr., Paper Warehouse, 59 Duane st. New York.

American Saw Co., Manufacturers of

And Perforated Circular and Long Saws. Also Solid Saws of all kinds. No. 1 Ferry st., cor. Gold street, New York. Branch Office for Pacific Coast, No. 606 Front street, San Francisco, Cal.

Patents on Designs.

Citizens and aliens can now secure design patents for three and a half, seven, and fourteen years. The law on this subject is very liberal. Foreigners, designers, and manufacturers, who send goods to this country, may secure patents nere upon their new patterns, and thus prevent other makers from selling similar goods in this market.

These patents cover all novelties of form or configuration of articl of manufacture.

For further information address
MUNN & CO.,
No. 37 Park Row, New York.

LeCOUNT'S PATENT Lathe Dogs & Clamps,
Of both Iron and Steel.
LeCount's Patent EXPANDING MANDREL,
For use in the Lathe.
Send for latest Circular.
C. W. LeCOUNT, South Norwalk, Conn.

An Important Fact.
• MARVIN & CO.'S
SPHERICAL SAFES
Have never been Robbed.
Hundreds are in use by Banks, Bankers, and Merchants.
Warehouses, {265 Broadway, New York. / 721 Chestnut st., Philadelphia. / 108 Bank st., Cleveland. / 93 Main st., Buffalo.}

CARBOLIC (HEALING C.S. COMPOUND) **SALVE**

CURES Cuts, Burns, Wounds, and all disorders of the Skin. Recommended by Physicians. Sold by all Druggists, at 25 cts. JOHN F. HENRY, Sole Proprietor, 8 College Place, New York.

WIRE ROPE.
JOHN A. ROEBLING'S SONS,
MANUFACTURERS, TRENTON, N. J.

FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays, or Guys on Derricks & Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information. Send for pamphlet on Transmission of Power by Wire Ropes. A large stock constantly on hand at New York Warehouse, No. 117 Liberty street.

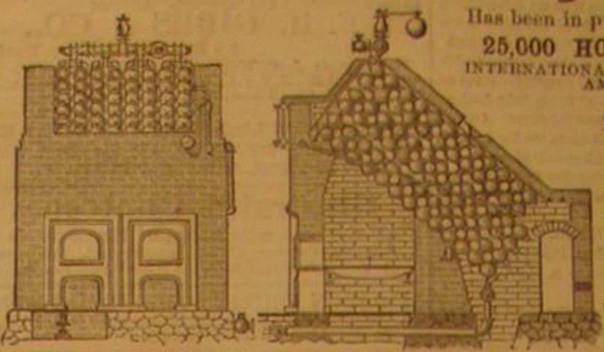
VENEERS.
A. PARKER & CO.,
Nos. 166 and 168 Center st., cor. Canal, NEW YORK,

DEALERS in Foreign and Domestic Cabinet Woods, in Boards, Planks and Veneers, have a large and choice assortment, to which they invite the attention of Manufacturers and Dealers.

L. L. SMITH & CO., Nickel Platers,
6 HOWARD ST., New York,
Between Elm and Centre.

PAT. SOLID EMERY WHEELS AND OIL STONES, for Brass and Iron Work, Saw Mills, and Edge Tools. Northampton Emery Wheel Co. Leeds, Mass.

Harrison Safety Boiler.



Has been in practical use for than ten years.
25,000 HORSE POWER IN USE.
INTERNATIONAL MEDAL, LONDON, 1862.
AMERICAN INSTITUTE MEDAL, 1869.
SEND FOR CIRCULARS TO
HARRISON BOILER WORKS
Philadelphia, Pa.

Weston's Patent Differential
PULLEY BLOCKS.
75,000 in use. Address HARRISON BOILER WORKS, Philadelphia, or **JOHN A. COLEMAN, Agent,** 110 Broadway, New York, or 139 Federal St., Boston, Mass.

L. W. Pond---New Tools.
EXTRA HEAVY AND IMPROVED PATTERNS.

LATHES, PLANERS, DRILLS, of all sizes; Vertical Boring Mills, ten feet swing, and under; Milling Machines, Gear and Bolt Cutters; Hand Punches and Shears for Iron.
Office and Warerooms, 98 Liberty st., New York; Works at Worcester, Mass.
A. C. STEBBINS, New York, Agent.

BUILDING PAPER
OF THREE GRADES.
TARRED SHEATHING.
For outside of Studding, under Clapboards. A non-conductor of cold, heat, and dampness.
PREPARED PLASTERING BOARD,
a cheap and perfect substitute for lath and plaster; makes a smooth, warm, and substantial wall, at less than half the usual cost.
DOUBLE THICK ROOFING
and Quartz Cement, make a good water and fire-proof roof, for less than $3.50 per square.
Sample and Circulars sent free; by ROCK RIVER PAPER CO., Chicago; or B. E. HALE, 22 & 24 Frankfort street, N. Y.

THE
Allen Engine Works
THE ALLEN ENGINE.

Fourth avenue and 130th and 131st sts. New York city Manufacturers of
Porter's Governor,
The Allen Boiler, and
Standard Straight Edges, Surface Plates, and Angle Plates.
Four first premiums were awarded to us at the Fair of the American Institute, 1870.
Send for our illustrated circular.

Vertical & Horizontal CORN MILLS.
30-inch grinds 30 bus. per hour, and 20-in. 15. Price $280 and $140.
EDWARD HARRISON, New Haven, Conn.

$2.50 A LINE for an advertisement in Kellogg's Inside Track List of 265 Western Country Newspapers. Best and cheapest medium of its kind in the world. Address A. N. KELLOGG, 110 and 112 Madison st., Chicago.

SCHLENKER'S PATENT
BOLT CUTTER
NEW INVENTION. ADDRESS,
HOWARD IRON WORKS, BUFFALO, N.Y.

Newspaper Advertising.

A Book of 125 closely printed pages, lately issued, contains a list of the best American Advertising Mediums giving the names, circulations, and full particulars concerning the leading Daily and Weekly Political and Family Newspapers, together with all those having large circulations, published in the interest of Religion, Agriculture, Literature, etc., etc. Every Advertiser, and every person who contemplates becoming such, will find this book of great value. Mailed free to any address on receipt of 25c.

GEO. P. ROWELL & CO., Publishers, No. 40 Park Row, New York.

The Pittsburgh (Pa.) Leader, in its issue of May 29, 1870 says:

"The firm of G. P. Rowell & Co., which issues this interesting and valuable book, is the largest and best Advertising Agency in the United States, and we can cheerfully recommend it to the attention of those who desire to advertise their business SCIENTIFICALLY and SYSTEMATICALLY in such a way: that is, so as to secure the largest amount of publicity for the least expenditure of money."

PATENT COLD ROLLED SHAFTING.

The fact that this Shafting has 75 per cent greater strength, a finer finish, and is truer to gage, than any other in use, renders it undoubtedly the most economical. We are also the sole manufacturers of the Celebrated Collins Pat. Coupling, and furnish Pulleys, Hangers, etc., of the most approved styles. Price Lists mailed on application to JONES & LAUGHLINS, 120 Water street, Pittsburgh, Pa.

☞ Stocks of this Shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass. GEO. PLACE & CO., 126 Chambers street, N. Y.

BUERK'S WATCHMAN'S TIME DETECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat. Send for a Circular. J. E. BUERK, P. O. Box 1,057 Boston, Mass.
N. B.—This detector is covered by two U. S. Patents. Parties using or selling these instruments without authority from me will be dealt with according to law.

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of superior quality, on hand, and finishing. For sale low. For Description and Price address NEW HAVEN MANUFACTURING CO New Haven Conn.

RAILROAD MEN, who hope for promotion, read the Railroad Gazette, published at 72 Broadway, New York, and 112 Madison st., Chicago. Sample numbers, 10 cts.

☞ T. V. Carpenter, Advertising Agent. Addres hereafter, Box 773, New York city.

Swain Turbine.
"Our Low-Water Wheel from this on"

WILL DO TEN PER CENT MORE WORK on small streams, in a dry season, than any whee ever invented. Gave the best results, in every respect, at the Lowell Tests.
For Report of tests at Lowell, with Diagrams and Tables of Power, address
THE SWAIN TURBINE CO., North Chelmsford, Mass.

Patent Vertical Portable Engine.

Our guarantee is—more steam, less fuel, stronger in running, safer to run, less friction, and more durable, than any Old Style Portable, with Engine on Boiler, of same dimensions. Our Saw Mills are strong and well made—Lever Head Blocks, with Patent Roller set; quick setting, and correct when sawing. Stationary Engines and Boilers. Address GRIFFITH & WEDGE, Zanesville, Ohio.

RUMPFF & LUTZ,

IMPORTERS and Manufacturers of Aniline Colors and Dyestuffs, Colors for Paperhangers an Stainers. Reliable recipes for Dyeing and Printing on Silk, Wool, and Cotton. All new improvements in the art of Dyeing, and new Colors are transmitted to us b our friends in Europe, as soon as they appear. 42 Beaver street, New York.

Steam Super-Heater,

FOR Saving Fuel, and supplying Dry Steam of any desired temperature. Safe, durable, easily attached. H. W. BULKLEY Engineer 98 Liberty st., N.Y.

MACHINERY.—SHAFTING PULLEYS and Hangers, Paper Box and Paper Collar Machines, Machines for Plaiting Bosoms, an improved apparatus for running Sewing Machines by power, Brothers' Patent Self-operating Spinning Jack Attachment, Models, and Experimental Machinery. W. H. TOLHURST, Machine Shop No. 7, 9 & 11 Union Building, Troy, N. Y.

Working Models

And Experimental Machinery, Metal, or Wood, made to order, by J. F. WERNER 62 Center st. N.Y.

HOTCHKISS BRICK AND TILE MACHINE.—Send for Circular to Room 7, No. 19 Cliff street, New York.

EMPLOYMENT.
$250 A MONTH with Stencil Dies. Samples free. Address S. M. SPENCER Brattleboro Vt.

SPERM OIL, *strictly pure*, for SEWING MACHINES and fine Machinery, in bottles, cans, barrels, and casks. W. F. NYE New Bedford, Mass.

A. S. & J. GEAR & CO., Boston, furnish every description of Wood and Iron Working Machinery and Supplies. The best in use, regardless of maker, at lowest possible rates.

GOLDEN HILL Seminary for young ladies, Bridgeport, Conn. Miss Emily Nelson, Principal.

Scientific American *For 1871.*
TWENTY-SIXTH YEAR.

EVERY NUMBER is printed on fine paper, and elegantly illustrated with original engravings representing

New Inventions, Novelties in Mechanics Manufactures, Chemistry, Photography, Architecture, Agriculture, Engineering, Science, and Art.

Farmers, Mechanics, Inventors, Engineers, Chemists Manufacturers and People of all Professions or Trades will find the

SCIENTIFIC AMERICAN

of great value and interest.

The Editors are assisted by many of the ablest American and European Writers, and having access all the leading Scientific and Mechanical Journals of the world, the columns of the Scientific American are constantly enriched with the choicest Information.

An Official List of all the Patents Issued is published Weekly.

The Yearly Numbers of the Scientific American make two splendid Volumes of nearly One Thousand Pages equivalent in size to FOUR THOUSAND ordinary book pages.

SPECIMEN COPIES SENT FREE.

Terms—$3·00 a year, $1·50 half year; Clubs of Ten Copies for one year, at $2·50 each, $25·00, With a SPLENDID PREMIUM to the person who forms the Club, consisting of a copy of the celebrated Steel Plate Engraving, "Men of Progress."

Address
MUNN & CO.,
Publishers of the Scientific American.
37 Park Row, New York.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and Lombard sts. Philadelphia and 59 Gold st. New York.