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BROWN'S PATENT TYPE-SETTING AND DISTRIBUTING MACHINERY.

Several plans have been proposed for setting and distributing types, but all have failed from one cause or another; and many have concluded that this was one of the things that could not be done by machinery. But the demand for greater expedition has now become so great that there can be little doubt that the supply is near at hand.

We present to our readers illustrations of machinery, which is stated to have been working successfully for the past year, and bids fair to revolutionize this branch of the printing business.

The type-setting machine stands upon a table, and consists of a case, a stick, a justifier,and a galley. Two machines, arranged back to back, occupy a table five feet by two.

The case consists of a series of inclined channels, in which the type stand, and the case is set at such an angle that they slide downward by their own gravity, and rest upon a bar which closes the lower ends of the channels. Across the lower end of the case is placed a shield provided with openings for the type to pass through as they are set. To this shield is attached an index showing the letters and sorts which the case contains.

Openings in the rear of the case allow a thin tongue to enter, which, coming in contact with the lower end of a type, forces it from the case directly into the stick, which consists of a frame of thin sheet steel, fitted to slide easily in guides which are so placed that it will be in line with the top of the types. On the upper side of this frame is the channel which receives the type; it is a quarter circle in form, its sides of thin steel, forming springs,which, pressing against the edge of the type as it is forced from the case, hold it in place.

To the frame is also attached a pivoted lever or key, by means of which the frame is moved back and forth from letter to letter. To one end of the key, by means of a rod, is attached the tongue which forces out the types. As the tongue moves up it takes the letter before it, and forces it between the springs which are formed by the upper end of the channel of the stick.

The whole, weighing but a few ounces, is moved with the greatest ease from letter to letter. The operator, seizing the handle with thumb and finger, runs it nearly opposite the letter required. As the handle is depressed, the type is thrust out into the stick; as the handle is raised again, the follower pushes the type just lifted sufficiently down the semi-circular channel to allow the next one to be taken in the same way. At the left of the case is a handle attached to a cam which operates the gage on the case, throwing it in communication with the capitals or small letters, as the operator may desire; the case being so arranged that these stand side by side. When the stick is full it moves to the right, where its lower end connects with the horizontal channel which forms the communication between the stick and the justifier. The type slide into this channel; the arm swings back to its first position, and the stick is ready for another line.

In this channel the type stand in a long line, which can be divided into lines of the length required. This can be done by the operator who sets the type, or two can work at the same machine, as the two operations require about equal time.

The justifier operates as follows: At the outer end, a part of the horizontal channel is separated, and is attached to arms which are pivoted directly under the end of the galley. It is supported exactly in line with the stationary part of the channel; the line slides upon it, until its end rests against the adjustable stop (which can be adjusted to any length of line). The line is then divided at the proper place; the movable part is then slightly raised, bringing the line between the projecting edge of the galley and the adjustable stop, which form rigid supports for both ends of the line.

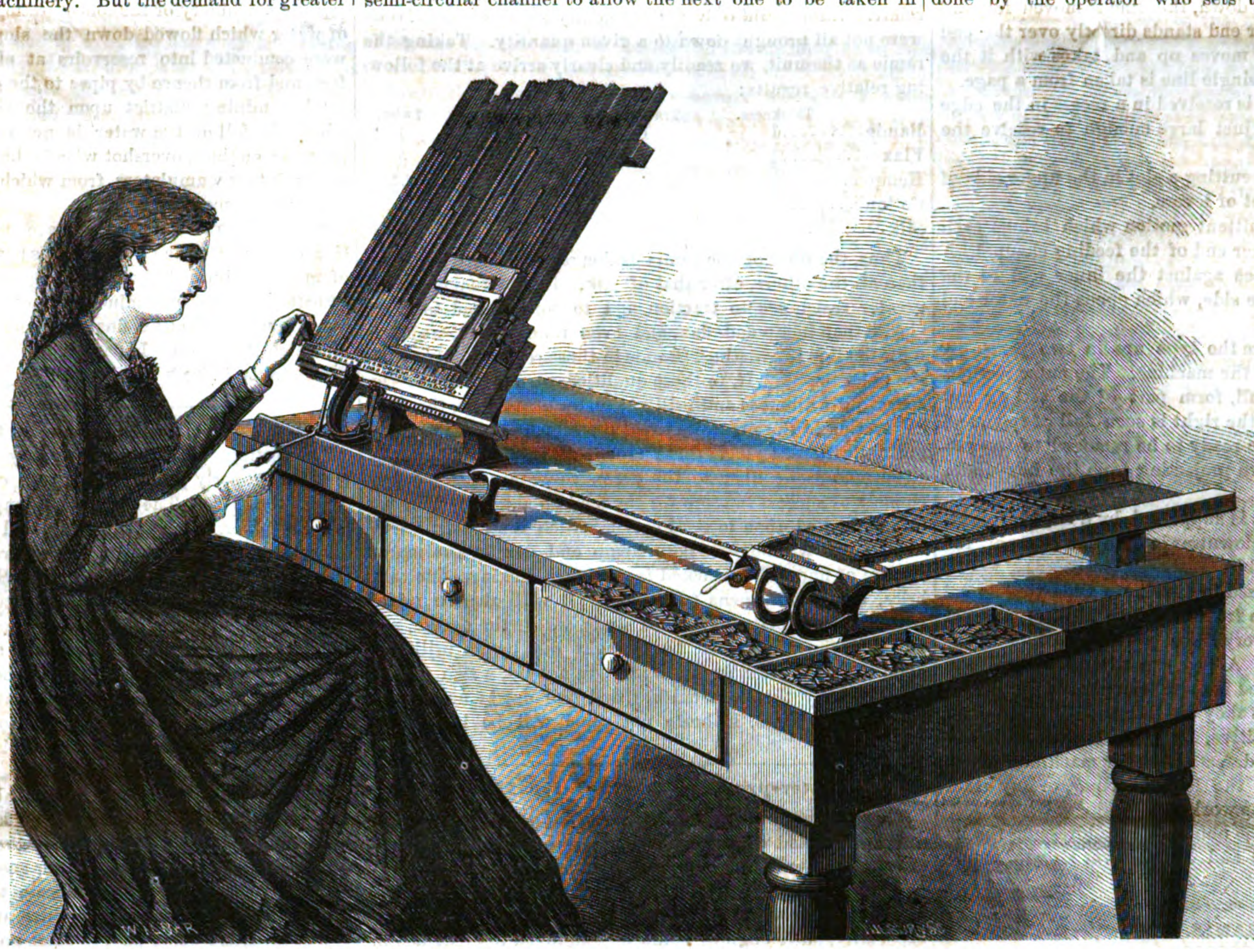
If the line be too short, the spaces between the words are taken out and replaced by thicker ones, until the line exactly fills the measure.

The line is then carried up until it stands in an upright position over the end of the galley, into which it drops. The justifier drops down to its first position, and is ready for another line.

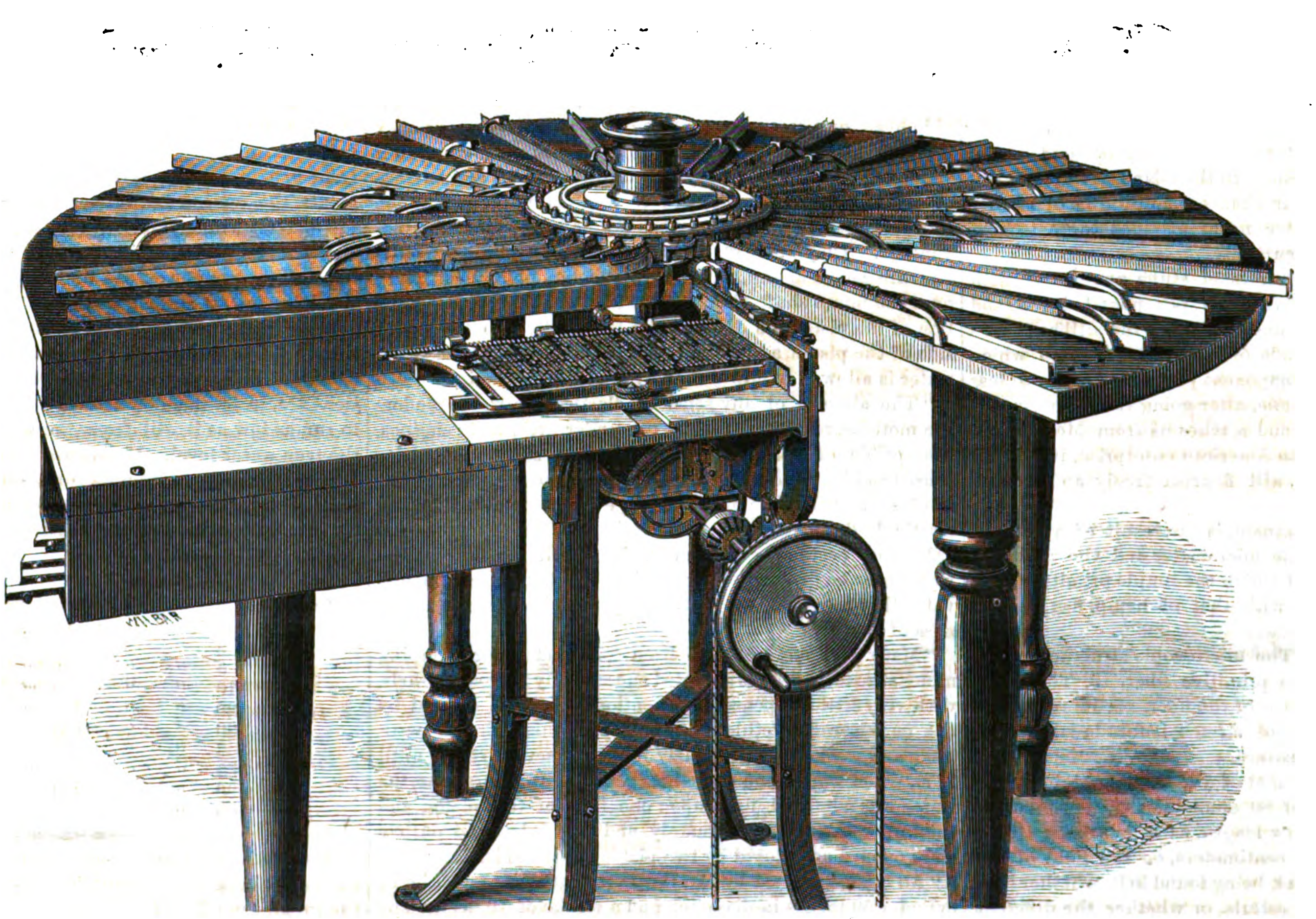
Type can be set by this method much faster than by the old, inasmuch as every downward motion of the hand places a type in the stick, while, by the common method, at least one motion must be made to pick up the letter, another to place it in the stick, but oftener several motions are required to accomplish this.

These machines are very simple, and can consequently be learned very quickly; and, we are told, actual experience proves that at least double the work can be done by the use of the machine, with an expenditure of one half the labor.

The key is of the simplest form; and if the case contain one hundred letters, only one key is required, whereas, if stationary keys were employed, one would be required for each letter, increasing the cost one hundred times; and the liability to get out of order would increase in the same ratio, to say nothing of other mechanism required to dispose of the letters as they are indicated by the keys, which has been the prime cause of



ORREN L. BROWN'S PATENT TYPE-SETTING MACHINE.



ORREN L. BROWN'S PATENT TYPE-DISTRIBUTING MACHINE.

failure in other machines. In this machine, the letters are moved the shortest possible distance (only the length and the thickness of the letter) reducing the wear and liability of damage to the lowest possible degree.

THE TYPE DISTRIBUTER.

To the full utility of a type-setting machine a distributer is essential. The machine of which we present an illustration, does the work by means of a system of levers or tumblers acting upon nicks in the edge of the type. The operation is as follows: The page being placed in the galley at the front of machine, it is lifted, one line at a time, into a feeding channel, just wide enough to receive a single line, which is fed endwise, towards the edge of the distributing ring, by a ratchet acting upon a follower, which presses against the outer end of the line. This channel is below the ring, and the wall which closes its inner end is inside the circumference of the ring, a distance equal to the thickness of the thickest type.

At the inner end of the channel is a thin tongue or plunger, which is moved up and down by a cam on the main shaft. This tongue moves down, the line is moved forward until the letter at the inner end stands directly over the end of the tongue, which then moves up and takes with it the letter; in the same way a single line is taken from a page.

As the type passes up, it is received in a recess in the edge of the ring; this recess is just large enough to receive the largest type.

This recess is formed by cutting a slot in the upper side of the ring, and inserting a set of levers.

The ring has an intermittent motion which brings each recess directly over the inner end of the feeding channel. A finger advances and presses against the inner end of the levers, moving them all one side, which opens the outer end ready to receive the letter.

The channels that receive the type are in two parts. A short section is attached to the machine. The outer sections are movable, and when full, form part of the setting machine. The fourth one on the right is seen full of type, and separated from the machine ready to be removed to the setter. Empty ones are shown projecting from the box under the galley at the left.

The outer end of the line is supported by a slight weight, one part of which projects downwards into the channel, the other end rests upon the table.

These machines can be used to distribute type that is set by hand, and will distribute from 12,000 to 18,000 types per hour. They require but very little power, and handle the type with perfect safety. A boy can attend several machines, as all that is required is to put the page in the galley, and remove the channels as they are filled.

The motions are all positive, doing their work with certainty; thus obviating the defects of other machines which depend upon the weight of the letter, springs, or any other delicate mechanism to do the work.

Further information can be obtained by addressing the inventor, Orren L. Brown, 30 and 40 Hanover street, Boston, Mass.

RAMIE.

Translated from the Gazette des Campagnes, by H. R. de La Reintre, for the Scientific American.

Dr. Ozanam, a distinguished writer and scientist, has examined the subject of the ramie, and has shown the great merits of this plant. It appertains more particularly to the species known as the white nettle of China, or China grass, of which it appears to be the most remarkable and useful variety. This plant, indigenous to the island of Java, China, and India, has been known in France for upwards of twenty years, though this knowledge never attained there to anything beyond the limits of curiosity.

In England, the manufacturers of stuffs procure it with great difficulty, pay sixty-five cents per pound for it, and keep secret the composition and texture of the brilliant stuffs —of a silky appearance—made of it, and of those into which the ramie fiber enters as a component part to a greater or less degree. At present, the ramie, after going round the world, comes by an inverse route, and reaches us from Mexico and Louisiana. There, thanks to American enterprise, it will not be long before the ramie will flourish freely and abundantly.

The following, says Dr. Ozanam, is the result of an examination of this plant with the micrometer and the microdynamometer, in the course of which the simple primitive fiber of the ramie was compared with that of hemp, flax, cotton, and silk.

This study relates to: 1. The microscopic structure of the fiber. 2. The length of the primitive fiber. 3. The width of the fiber. 4. The thickness of the fiber. 5. Its resistance to traction. 6. Its elasticity of stretch before breaking. 7. Its resistance to torsion (twisting).

The following is a statement of the results obtained, the magnifying power being of 80 diameters: 1. The fiber of ramie is, so to speak, of any length, as it has been traced throughout a length of 25 centimeters, on the field of the microscope, without any break being found in it, whether it be constituted of a continuous cellula, or whether the different cellulas which succeed each other have lost their points of separation, by reason of a more intimate fusion one with the other. Hence, the fiber of ramie possesses great strength. 2d. The fiber of flax and hemp, which appears so long, is, in fact, very short: these are cellular fusiform fibers, of about 3 centimeters long, in juxtaposition at their extremities, and imbricated one upon the other. The breaks always occur at the weak points of their junction. 3. The fiber of ordinary cotton is not more than from 2 to 3 centimeters in length. Cotton, which has a long staple, averages from 6 to 7 centimeters; hence the weakness which exists in cotton thread, notwithstanding the strength imparted to its united particles by the twisting process.

The results of the analysis are as follows:

Ramie,	50 centimeters long,	$\frac{6}{10}$	mill broad,	$\frac{7}{100}$	mill thick.
Flax,	5 "	$\frac{3}{10}$	"	$\frac{3}{100}$	"
Hemp,	5 "	$\frac{5}{10}$	"	$\frac{3}{100}$	"
Cotton,	5 "	$\frac{4}{10}$	"	$\frac{5}{100}$	"
Silk,	1 meter long,	$\frac{2}{10}$	"	$\frac{1}{100}$	"

Measurements obtained by the use of the microdynamometer, and Professor Alcan's instrument of arts and trades, upon fibers of 5 centimeters in length:

	Resistance to traction.	Stretch.	Resistance to torsion.
Ramie,	24 grains.	3 mills.	180 turns.
Flax,	8 "	2 "	140 "
Hemp,	6 "	$2\frac{1}{2}$ "	176 "
Cotton,	2 "	4 "	696 "
Silk,	1 "	11 "	1,038 "

But these several fibers being of different thicknesses, their relative value could only with difficulty be estimated, if they were not all brought down to a given quantity. Taking the ramie as the unit, we readily and clearly arrive at the following relative results:

	Thickness.	Traction.	Elasticity.	Twist.
Ramie	1	1	1	1
Flax	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{4}{5}$
Hemp	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{12}{20}$
Cotton	$\frac{1}{3}$	$\frac{1}{3}$	1	1
Silk	$\frac{1}{4}$	$\frac{1}{6}$	4	6

Thus, the fiber of the ramie is longer and more uniform, than all the others, after that of silk. It is stronger, offers greater resistance to traction and to torsion, and is more elastic than hemp and flax, and even than cotton, which is more flexible in twisting. Ramie in these respects only yields the palm to silk. If, to these qualities, we add those of the sparkling whiteness and brilliant luster of its fiber, the easy cultivation of the plant, its rapid reproduction and excessive multiplication (it yields three crops yearly, and as many as 1,000 pounds of fiber to the acre), there are surely many chances of success in store for the ramie plant. Nevertheless it is not called upon to rival cotton, which it scarcely resembles; but it will surpass both hemp and flax in the manufacture of fine and damasked table linens, tickings, fine cambrics, and body linens (shirtings). It will also be mixed with cotton, to make damasked stuffs, where the design, produced by the ramie, will be brought out by its brilliancy upon the dull cotton groundwork. In a word, a rich field is presented by this new culture, and the day is not distant when these fibers, hitherto neglected, will be in demand everywhere.

Water-pressure Engines for Mines.

There is much room for improvement yet in water pressure engines, and we know that many accomplished engineers are studying to make such advances, in this branch of engineering, as shall better adapt these engines to use under great heads of water with small flow. In many parts of California especially, such engines could be employed to great advantage, and in the mountainous regions of the west there are many other localities where the water power is of the character above mentioned. To such as are interested in this field of invention, the following remarks from Blake's "Treatise on Mining Machinery" will be of interest and value:

"In mountainous regions, where water under a considerable head or pressure can be had, it may be advantageously utilized, for pumping, hoisting, or other mining operations requiring power, by means of hydraulic engines and surface or underground wheels. There are many places on the Pacific coast where these engines can be introduced with advantage. They are usually constructed for pumping only, and are single-acting, with long cylinders placed vertically over the pump shaft, the pump-rod being simply a prolongation of the piston-rod. The water is admitted to the under side of the piston, and when it has run its upward stroke, the water is allowed to flow out and the piston descends.

"The absence of any sensible elasticity in water renders the motions, resulting from its use under pressure in engines, susceptible of perfect control; but the same inelasticity causes sudden shocks and blows to the moving parts if the inlets and outlets be made as in engines operated by the elastic fluids steam and air. It is therefore necessary to use valves of peculiar construction, by which the flow of the water may be gradually increased or slackened, and to provide other means for preventing impact and securing smoothness of action.

"Many such engines have been constructed for pumping mines abroad, and have operated successfully for long periods, with very little expense or attention. One was erected by the engineer Trevethick at the Alport mines, in the year 1803, and worked continuously for forty seven years, until 1850, when work upon the mines ceased. In this engine, the water was admitted first upon one face of the piston and then upon the other, alternately, and the inlets and outlets were opened and closed by two pistons at the side.

"An engine erected by Mr. Darlington at these mines had a cylinder 50 inches in diameter and a stroke of 10 feet. The cylinder was placed directly over the shaft, and the piston and pump-rod were continuous. The column of water was 132 feet high, and gave a pressure upon the piston of about 58 pounds to the square inch, or more than 50 tuns upon its area. Water was raised from a depth of 22 fathoms, by means of a plunger 42 inches in diameter, and when the mine was very wet, nearly 5,000 gallons of water per minute were discharged into the adit. The water under pressure was admitted under the piston only; cylindrical valves admitted a full flow for seven eighths of the stroke only, and then commenced closing, while a small valve opened and allowed enough water to pass in to complete the stroke.

"The largest engine erected by Mr. Darlington was similar in its general construction to that just described. It had a cylinder 35 inches in diameter; stroke, 10 feet; pressure column, 227 feet high. Its average speed was 80 feet per minute, and its greatest speed 140 feet per minute. The pressure of the water was 98 pounds per square inch, giving a total weight of 40 tuns upon the piston. This engine was automatic, the motion was certain and regular, and the cost of maintenance trifling.

"Sir William Armstrong has made use of water pressure, obtained from natural falls, to produce rotary motion by means of a pair of cylinders and pistons, with slide valves, in some degree resembling those of high pressure steam engines, but provided also with relief valves. Water-pressure engines of this description were erected at the lead mines at Allenheads, in Northumberland, and are used for the various operations of crushing the ores, hoisting, pumping, and driving the machinery of the concentrating works. Small streams of water which flowed down the slopes of adjoining hills were conducted into reservoirs at elevations of about 200 feet, and from thence by pipes to the engines.

"In a mining district upon the river Allen, in England, where the fall of the water is not sufficient to work water-pressure engines, overshot wheels have been used to force water into accumulators, from which it can be conveyed in pipes to the required points.

"Underground water wheels are used in various parts of Germany, where the circumstances permit. Where a system of mines is drained through a deep adit, the water can be transferred from one mine to another, and its fall utilized by such wheels, until it finally reaches the level of the adit by which it escapes. Instances of this may be observed in the district of Freiberg, Saxony."

Testing Gas Meters.

The testing of gas meters is a very nice operation, and can only be properly performed by the constant observance of certain conditions. The instrument employed, called a prover, is a gasholder, inverted in water, and made to hold a given quantity of air, under conditions, hereinafter set forth, extracted from Harris & Bro.'s *Gas Superintendent's Pocket Companion*. The prover is constructed like an ordinary gasholder, but smaller, and it has a compensating balance, which adjusts for the variation in pressure, as the holder sinks in the water cistern. The conditions to be strictly observed are:

1st. The prover should be mathematically correct.

2d. For a uniform pressure from top to bottom, the meter prover should be carefully counterpoised and adjusted with a compensating balance.

3d. The air in the proving room, also the air or gas, and the water in the holder, should be kept uniformly of the same temperature.

4th. A thermometer in the air or gas holder, and one in the proving room, will always indicate the uniformity of the temperature, or any variation which arises.

Due attention being paid to these points, connect the meter to the holder. Then try your connections if they be tight. To do this, you require a pressure gage between the meter prover and meter.

Place your hand tightly upon the outlet of the meter, turn on the air or gas from the holder, then turn it off, and if the pressure gage stands at its initial point, you are ready to go on with the proving; after having brought the hand on the index of the meter to a designated point, the holder starting from 0, or any other fixed point, observe carefully these two points, the one on the holder and the other on the index of the meter. Thus prepared, turn on, to the meter, the gas or air from the holder, and make one or more complete revolutions of the pointer on the dial, always stopping exactly on the point started from.

If the meter and holder exactly correspond, the meter is correct; if they vary, the percentage of error is easily calculated. To prove wet meters, the only additional observations are, to set them on a level plate and allow the water to run as low as it will from the water line or side screw—the true water level. Meters are usually proved under from 1 to $1\frac{1}{2}$ inch pressure at inlet pipe, which should be well supplied with air or gas, and the outlet reduced to a given quantity per hour, according to the English standard, as per table below.

The English standard of outlet openings, after testing, is as follows:

2	light	Meter=	12	feet	per hour.
3	"	"	18	"	"
5	"	"	30	"	"
10	"	"	60	"	"
20	"	"	120	"	"
30	"	"	180	"	"
45	"	"	270	"	"
60	"	"	360	"	"
80	"	"	480	"	"
100	"	"	600	"	"

IRON IN NEW JERSEY.—The annual yield of iron ore, from the mines in Morris county, N. J., is over 600,000 tuns; and the greater portion of this is sent to the Lehigh valley, Pa., to be smelted. The value reaches $3,000,000 per annum. The ore deposits are continuous, and follow the course of the granitic strata, in a northeast to southwest direction. The mines have long been in work, and are some of them as deep as 700 feet. The supply of paying earth is inexhaustible.

THERE are six millions of real estate owners in the United States, the farmers being four millions of the number.

DYERS' RECIPES.

From Haserick's Secrets of Dyeing.

PONCEON.—100 pounds of fabric. Color scarlet first, as given in recipe for scarlet on wool, in previous issue, but leave out the flavine, or yellow dyestuff. After the goods are well rinsed, prepare a kettle with fresh water; heat it to 180° Fah.; strain into it 5 pounds of cochineal paste; stir all well together, and enter the fabric; handle it for half an hour without boiling; rinse and dry. Instead of ammoniated cochineal, 8 ounces of magenta crystals may be used.

PINK FOR LISTINGS.—To 100 pounds of wool use 8 pounds of cochineal, 5 pounds of tartar, 10 pounds of scarlet spirit, ½ pound of tin crystals. Boil all together until dissolved; then cool off the dye to 170° Fah.; enter and handle well; boil for half an hour. If the wool should not color even in ten minutes, use a few pounds of muriatic acid. (See scarlet on wool, as above.) If this color be used for listings on white flannels, add about 6 pounds more scarlet spirit to the wool, just before taking it out. This additional tin acid will fasten the cochineal more, without rotting the wool. The color will stand the soap better; and to keep the color from running before bleaching entirely, the scourer must add a solution of 1 pound of muriatic acid to the last rinsing of the flannel. If the cochineal should have stained the white, then rinse in cold water before fastening the spots, by the sulphur, when bleaching.

MADDER RED.—This color is mostly used for army uniforms. To 100 pounds of fabric, use 20 pounds of alum, 5 pounds of tartar, and 5 pounds of scarlet spirit. After these are dissolved, enter the goods, and let them boil for two hours; then take them out, let cool, and lay over night. Into fresh water stir 75 pounds of good Holland madder. Enter the fabric at 120° Fah., and bring it up to 200° in the course of an hour, during which time it must be handled well to secure evenness; then rinse and dry.

HYPERNIC RED is generally used for carpets and zephyrs. 100 pounds of yarn are boiled in a solution of 15 pounds alum, and 8 pounds half-refined tartar, for one hour, or, what is just as well, laid over night in the hot liquid. The color is much improved if this prepared yarn can lay a few days in the atmosphere before coloring it red. In fresh water, boil 80 pounds of hypernic, or beechwood, for ten minutes. Cool the liquid to 170° Fah.; then add 3 pounds of whiting, or chalk; handle in this the prepared yarn, for ten minutes; bring up the heat to 200°, when the yarn will be a fine red; in half an hour it will be ready to take out and cool. For carpet yarn, it is not necessary to rinse, but to dry as it is. If hard water is to be used, as in some localities, the chalk is unnecessary; but the latter surely adds brilliancy to the color, equaling cochineal. Use in the preparation no blue vitriol, which dulls the color.

Indian Mode of Casting Delicate Objects in Metal.

Many of the ornaments brought from India, are cast in a very delicate and refined manner. Those curious to know how they are made will gain some information from the following extract, communicated to the *English Mechanic* over the signature "Eos:"

The goldsmiths and silver workers always prefer the curious clay compound prepared by the white ants, and taken out of their huge honeycomb abodes, for forming the tiny crucibles used in their arts; it burns beautifully without cracking, when taken from a proper locality, but is more frequently found as here—in Jubbulpoor—full of grit, and too friable after repeated washings, to hold together. The stomachs of these "white ants" are evidently supplied with a powerful chemical secretion, and this, doubtless combining with certain clays and earths, constitutes the useful crucible product I now speak of. It burns to a hard white vessel, on which the borax of the artisan gives a brilliant internal glaze; but I have never seen this earth used for any but the diminutive melting pots alluded to. White ants, if they "swarm" or "lodge" for a short time on sheet glass, corrode the same in zigzag patterns, as if etched by fluoric acid; occasionally these marks resemble Persian characters or Egyptian hieroglyphics. Hence some potent chemical acid enters into their building composition, of which the tenacity in some countries, when it has been well kneaded, pounded, and sun-dried, renders it a fine cheap flooring for settlers' houses. It is very generally used in South Africa, where I employed it for the upper portion of a rough stone floor to my verandah.

But I must return to my artistic Indians and their primitive "dodges." In casting small articles in brass and the cheaper metals, they fix the mold with iron wire to the mouth of the melting pot, well luting the connections repeatedly with a mixture of stiff clay and cow-dung kneaded together till quite strong and safe, gradually warming the luting at the mouth of the furnace, and repairing all cracks and fissures as they may appear; when thoroughly dry, the whole mass is put in the rude native furnace of common clay; and on the contents of the melting pot being fused, it is turned gently "topsy turvy" and the metal runs from its inverted mouth into the attached mold. For articles of ornament and elaborate design, of any size, even to a field piece, the native workman makes a composition of two parts "dammar" resin, and one part beeswax (common resin will replace the first in England); these are very slowly and carefully melted over charcoal, and stirred together (in the open air, and not under a roof), and when almost hard are molded by the hands, the lathe, or in metallic shapes. These models in their turn are then encased in suitable mold clay, and very carefully and slowly dried in a shady spot until perfectly hard and seasoned. The workman then, over charcoal, gently heats the mold and pours out the composition from the hole he left as a future "ingate;" when every particle of the mixture has flowed out into a vessel held to catch it for future use, he increases his fire till smoke rises from the interior of his mold, and it is gradually brought to a condition to receive the molten metal. From an earring to an idol this is the favorite *modus operandi* of casting, and I can most thoroughly recommend it to the ingenious amateur, if he be not already practising it. Bismuth is so very highly priced in India that I never employ "fusible metal;" the present mode, besides being cheaper, gives a sharper casting, especially for small jewellery, and tiny silver ornaments, to say nothing of avoiding the contamination of precious metals by the lead of the alloy.

There is great reason for supposing that in the days of "human sacrifices," models of the entire figure were obtained by casts of the victims who were immolated, in substantial clay coverings, which, when red hot, were filled with molten gold or silver, and gave the perfect images required by the priesthood. The delicate German castings of flowers and insects are nowadays cast in the same fashion—"burning out." Fish and reptiles, such as snakes and lizards, may be so cast very life-like in tin, and afterwards bronzed. I lately amused myself by getting the perfect nature model of a water snake about 2ft. long, in the above manner. I got a split bamboo equally divided; I placed good fire-clay in each half of this bamboo; I then put the snake carefully between the two pieces, secured the halves of bamboo firmly by binding wire at intervals of a few inches; I dried the whole slowly before a fire; I then slowly in a long charcoal stove of clay gradually burnt out the snake, and poured in pewterer's solder—that is 2 parts tin, 1 part lead.

I have a small box in "ormolu" of foreign manufacture, surmounted by a "horned beetle," evidently modelled in this fashion, which I recommend to the amateur mechanic as a most satisfactory and interesting amusement.

Water Power on Steam Vessels.

An important auxiliary in the working of large steam vessels consists in the use of hydrostatic engines or turbines, set in motion by a current of water, admitted through pipes in the bottom of the hull.

Many of the large war steamers draw from 20 to 30 feet of water, so that the hydrostatic force, applicable to the turbine, will be equal to a column of water of the above hight.

The British war steamer *Achilles*, and other vessels, have had these water engines attached to their steering gear, with great success; and it is proposed to apply them to the rotating of the turrets.

A more recent application of the idea relates to the propellers. Says the London *Artizan:*

"One of the great inconveniences in screw vessels when sailing is the dragging of the propeller. There are other obstructions and difficulties encountered in navigating, which are only to be got rid of by a temporary application of force. Steam cannot be expected to be constantly maintained against every emergency, and, indeed, is not always available. The hydrostatic pressure is always at hand, and requires no lighting of fires or any other preparation. It is not only ever present, but economic. It has only to be applied when required, and the waste water discharged into the bilge can be pumped out at any convenient opportunity. When the screw shaft has been some time at rest it cannot be started unless a considerable speed has been got upon the ship, not, indeed, less than five or six knots; but once started, the screw would continue to revolve until the ship's speed had fallen to about three knots. Indeed, every practical sailor will be very well aware of the immense advantages of being able to start the end of the screw shaft into motion or to continue it in action, under occasional circumstances, for a short period.

"An apparatus proposed by Admiral Inglefield has been manufactured at the works of Messrs. Kittoe and Brotherhood, in Clerkenwell, and was tested a short time ago. It consists of a hydraulic cylinder, to be placed on the keel of the ship, with a piston and rod, very much after the manner of the ordinary steam cylinder. Into this the water will be admitted, through an ordinary Kingston valve. The diameter of the cylinder is 30 inches; the length of stroke 12 inches; and the machine is capable of making from 18 to 20 strokes a minute. To the piston-rod of this cylinder is attached a plunger pump, of the diameter of 3 inches, thus giving an accumulated force in the pump of say 100 times the pressure in the working cylinder, or equal to 1,000 pounds on the square inch. The water is conveyed, from a chamber surrounding the pump, by a pipe to a 4-inch hydraulic ram attached to the end of the lever of a ratchet brace, the ratchet-wheel of which is keyed fast to the stern shaft of the propeller. There is a valve box attached to the ram cylinder, which is actuated by a pin in the ratchet lever, to which is connected a rod working the valve, thus causing a continuous action of the ram as long as the water pressure is permitted to act. When the screw is started into motion the ratchet wheel runs away from the pawl, and leaves it behind in its revolutions. To prevent the clicking noise under such circumstances, and to guard against accidents to the gear when the ship's main steam engines are started, the pawl is lifted out of the way, and secured by a pin specially provided for the purpose. The joints in the hydraulic pipes are exceedingly well made, upon a patented principle. The two ends are merely placed together and secured by a nut packed with an india-rubber ring, which, pressed upon by the water, packs the joint as close and as tight as in the case of the leather packing in a hydraulic ram gland. These joints are part of the highest merit, as one of the great difficulties to be overcome, in the application of the hydrostatic machines, has been that of securing good connections in fitting the apparatus so low in the hull, and in making perfect the orifices where the pipes have to pass through bulkheads.

"During the testing of the machine, the pressure gage steadily registered 1,000 pounds to the inch, and was brought to a standstill at very considerably higher pressure when the discharge cock was shut off. Under this pressure the whole machine and its accessories were perfectly tight, not "weeping" at any of the points, nor was a "tear" anywhere to be discovered.

"The value of such a power, always ready as soon as the valve is opened, for any work, steering, turning turrets or screw shafts, raising guns, or, in ships provided with the proper wells, raising the screw bodily, is scarcely to be over-rated."

Prevention of Fermentation.

Professor Williamson, in a lecture on Fermentation, speaks of substances which prevent it. Among the foremost is creosote, the active material of smoke; and there is no doubt that the antiseptic action, which smoke is said to exert upon ourselves, is due to the presence of this creosote, or carbolic acid. Every one is aware that one process, for preserving meat, which has long been in use, is to suspend it in a chimney in which the smoke of wood is present. The smoke of wood, like that of coal, contains this substance, or one nearly allied to it; and, among antiseptic agents, it is one of the most energetic. A small quantity of this carbolic acid, thrown into a fermenting liquid, would completely kill the organisms. In the same way, if a little sulphuric acid were introduced into any of these mixtures, it would immediately kill the organisms and arrest the fermentation. Sulphurous acid is now largely used for this purpose, being employed, in combination with lime and water, to saturate the casks in which beer is to be stored, so that the wood being impregnated with it, any germs which might find their way from the atmosphere, and set up a process of decomposition, are arrested and destroyed.

Another very powerful antiseptic agent is prussic acid, one of the most powerful of poisons to all animal organisms; and it is particularly powerful in stopping the action of these ferments. Another substance worthy of consideration, in the same point of view, is a mixture which is, to a great extent, of unknown composition, namely, the poisonous matter which is given off in tobacco smoke. It must, when present in the air, exert a very powerful antiseptic action upon these organisms. It has been shown, by the experiments of Professor Tyndall, that in the lower vessel of the lungs there are considerable deposits of the dust which floats about in the air; and we are, of course, exposed in that manner to the action of a number of the seeds of these ferments, and, for aught we know, of diseases, because many malignant diseases are attributed to processes of decomposition analogous to those which we have been considering; and they may be, and, as some persons think, are, carried by germs in the air. Now, any powerful substance which would kill these germs must of course exert a beneficial action, and when persons are exposed to the smoke of tobacco, there is no doubt that some of it enters the lungs with the air which is vitiated, and that some of the smoke must be deposited in the lower passages of the lungs, with these little mischievous germs, and must certainly somewhat astonish them. It would seem, then, that, although tobacco smoke is, on the whole, injurious to the human system, its effects are not wholly bad.

Manufacture of Hair Cloth.

Our readers have, no doubt, often wondered where all the hair is obtained for the manufacture of hair cloth, and how the manufacture is conducted. There is a hair cloth factory in Central Falls, R. I. The hair used is that of horses' tails, and is imported from South America and Russia; mostly from the latter country. It is purchased at the great annual fairs of Isbilt and Nijni Novgorod. That purchased in June, at the latter place, will be received in about sixty days; and that bought at Isbilt, in February, in about six months. As it comes of various colors, it is, for the purpose of this manufacture, all dyed black. A certain proportion, however, is purchased in England and France, already prepared for the loom. It is worth from fifty cents to four dollars per pound, according to length, the price increasing in rapid ratio after the length attains twenty-four inches.

The "rough hair," or that which is imported in its natural state, is hackled, and the shortest sold to the manufacturers of mattresses, it being first curled. After being hackled, the different lengths are combed out, assorted, tied in bunches, and made ready for coloring. After this process, the bunches are carefully inspected, measured, and put away for the loom. The cloth is made in widths of from fourteen to thirty-two inches.

Contrary to the popular idea, the hair is not, as a rule, round. A section under the microscope shows a form as though a third of a circle had been cut off, and the flat portion slightly indented. This conformation causes some difficulties in the manipulation, which require great skill and the most delicate machinery to overcome. The warp used is made of cotton, and prepared with great care. A bunch of hair which has been soaked in water is placed in position, and the individual hairs are picked up, to be, by the shuttle, laid carefully in the weft. If the machine fail to take a hair, which occasionally happens in practice, it continues its efforts until it succeeds, the other portions of the machinery standing still in the mean time. The shuttle is an awkward looking, but most delicately operating implement. The hair must not be bruised, and it must not be stretched; the necessity for such gentle manipulation has led to the idea that no machinery could be constructed capable of performing the operation with sufficient exactitude and regularity; but this, as we have seen, is now shown to be a fallacy.

Steam Water Elevator for Raising Water in Houses.

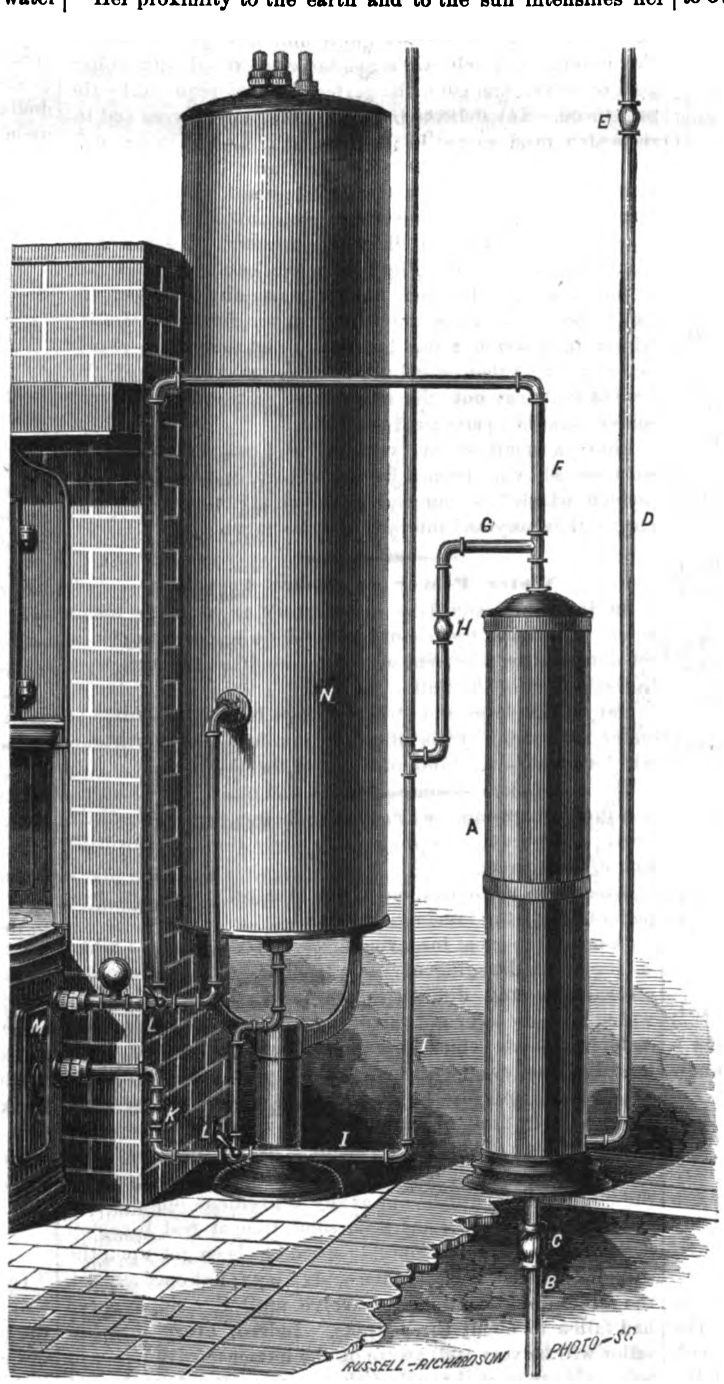
The pump here described is a simple and durable apparatus, by which steam, generated in the ordinary fire of a cooking range or stove, is made to act directly on the water to be raised, without the intervention of machinery, and to force it to the tank at the top of the house. In the engraving annexed, the kitchen range, L, and usual hot-water boiler, M, are shown on the left, the pump standing at the right.

A chamber, A, which may be of any form most convenient (preferably a cylinder 6 to 8 inches in diameter, and 4 to 5 feet long), is a receptacle, alternately for water and steam. A suction pipe, B, from the chamber, A, reaches to the bottom of the cistern or well, from whence the water is to be drawn. This pipe has a valve, C, opening upwards, which is held closed by the pressure above, and prevents the water from returning to the cistern or well. An outlet pipe, D, from the bottom of the chamber, A, leads to the tank to be filled at the top of the house. This also has a valve, E, opening upwards, which prevents the return of water from above. A steam generator, in the firebox of the cooking range or stove, L, which may, and usually will, be the hot-water back by which the water in the boiler is heated, is connected by a steam pipe, F, with the top of the chamber, A. A condense pipe, G, which may be brought from the tank at the top of the house, or from any cold-water pipe leading from the tank, is carried down a little below the top of the chamber, A, and turning upwards, is entered into it through the steam pipe, F. In this condense pipe is a valve, H, opening upwards, which will prevent the escape of steam or water up the pipe.

There is also a water supply pipe, I, shown in the engraving, through which a supply of water is maintained in the hot-water back in the range, L; and in this pipe, I, is a valve, J, opening upwards, and towards the hot-water back, which prevents egress of steam or water through the pipe. This pipe, I, is taken from the lower bend of the condense pipe, G, or the bottom of the boiler, M, as shown. The supply for the hot-water back, when pumping, may be drawn from either.

At the junction of the pipe, F, and the upper opening of the hot-water back, and the pipe leading from the hot-water back to the boiler, M, there is inserted a cock, K, which will close either the steam pipe, F, or the pipe to the hot-water boiler, but will not close both of them at once, and will not close the opening towards the hot-water back; so that the passage to the hot-water back, and through one of the pipes mentioned, will always be open. There is also a similar cock, K, at the junction of the pipe, I, and the pipe from the bottom of the boiler, M.

The apparatus, being properly connected, as shown in the engraving, will fill with water through the pipe, G. The cock, K, is turned to open a connection from the hot-water back through the steam pipe, F, to the chamber, A. Steam, being generated in the hot-water back, will then pass through the pipe, F, into the chamber, A, and expel the water therefrom up the outlet pipe, D, to the tank at the top of the house. The steam, having expelled the water from the chamber, A, will also follow, and expel it from the outlet pipe, D. When the water has been all expelled from the outlet pipe, D, or with a light pressure of steam, when it has been driven above the valve, E, the pressure of steam in the chamber, A, will not be sufficient to sustain the column of water in the condense pipe; and a small jet of water will flow through it into the chamber, A, and condense the steam there; at the same time, water will flow into the hot-water back through the pipe, I, replenishing what has been expended in steam. A vacuum being produced by condensation of steam in the chamber, A, and the hot-water back, water from the well, or cistern, flows past the valve, C, through the inlet pipe, B, and fills the chamber, A. The hot-water back having been filled, as described, steam is again generated; and the water in the chamber, A, is again driven to the tank at the top of the house. Condensation again takes place; and the operation will be repeated as long as steam is generated, or until a supply of water is raised, when the cock, K, is turned, and connection with the hot-water boiler, M, made, and the heating of water in it goes on.



HOUGHTON'S AUTOMATIC STEAM WATER ELEVATOR.

The operation of this apparatus is certain and uniform, but not rapid; the size here described raises about sixty gallons of water an hour, which is amply sufficient for the wants of ordinary houses.

The economy of its use is apparent, as it requires no extra fuel. It will not wear out, having no working part. It is not liable to get out of order, and is not dangerous, as the pressure of steam is never greater than the pressure of water in the hot-water boiler, M. Should any greater amount of steam be generated than is needed to raise the water, it escapes up the outlet pipe; the water to be raised being the only obstruction between it and the open air.

We are informed that this apparatus has been used, under circumstances calculated to test its efficiency and utility, for several months, in a number of dwellings in Boston, and has given good satisfaction. It was patented, Feb. 7, 1871, by Charles Houghton, who may be addressed, for further particulars, at 41 State street, Boston, Mass.

The Planet Venus.

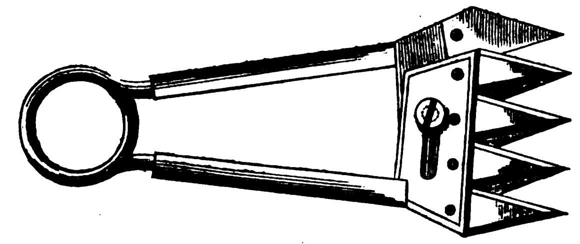
A provincial astronomical society in England has decided to make a series of observations of the planet Venus, to extend throughout a complete revolution of that planet, which occupies about 225 days of our time. Venus, being the nearest of all the planets to the earth, affords observers an opportunity of using the powerful instruments of modern times to the greatest advantage, and of obtaining information concerning planetary phenomena which must be of the highest interest to all students.

Her orbit is more nearly a circle than that of Mercury, and consequently her distance from the sun is more nearly uniform. Her phases are easily visible with a telescope of very low power. Her light is frequently brilliant enough to cast a distinct shadow; and she may be, during her perihelion, seen in the daytime. She was conspicuous at two o'clock in the afternoon, in Massachusetts, in January, 1870, the sun shining brilliantly at the time.

Her proximity to the earth and to the sun intensifies her light so much that an accurate observation of her disc is very seldom to be obtained. The irregularities of her surface, the mountains and valleys, are sufficiently obvious, however, to decide, by their appearance and disappearance, the duration of her axial rotation, which is a little shorter than the earth's, namely, twenty-four hours. The diminishing of the shadows on the margin of her illuminated portion is distinctly visible, and shows the fact that there is a dispersive medium for light, that is, an atmosphere, upon the planet.

IMPROVED SHEEP SHEARS.

These shears are the invention of Ebenezer Mathers, of Elderville, Pa. They are formed with four reversible blades



on each handle, and each edge of the blades is a cutting edge. The handles are connected by a coiled spring, instead of the ordinary flat spring, by which, it is claimed, sufficient strength is obtained to open the shears after the clip, while it is so flexible that the hand is not fatigued by its use. One of the plates, to which the blades are fastened, is slotted; and through the slots a broad-headed set screw is inserted, which holds the edges of the blades in close contact with each other, so as to make a clean, sharp cut.

Farming stock in California has lately been increased by the addition of ninety-eight sheep of pure merino breed, selected in Vermont, and forwarded overland.

How to Prevent Spring Sickness.

Dr. A. L. Wood, in the *Herald of Health*, writes:—There are a great many people who are subject to a "bilious attack" every spring, and who expect it as a matter of course. Now there is no more need for people being thus sick in the spring, than at any other time of the year, if they only know how to live. This periodical sickness can be prevented simply by regulating the diet. Not that all persons, who have been subject to such attacks year after year, for a long time, can always overcome the difficulty at once. We are all such creatures of habit, that when any thing becomes established in this way, it has a strong tendency to return at the regular time, even after the producing cause has ceased to operate; consequently, in bad cases, it sometimes takes several years to overcome it entirely. Under a proper regimen, the attacks will grow less severe every year, until they entirely disappear.

During cold weather people eat larger quantities than usual of carbonaceous food, such as fat meats, sugar, butter, bread, cakes, and other preparations of white or superfine flour, nuts, fats, sirup, etc. Of course, a much larger quantity of carbonaceous food is required by the system in cold weather than in warm, but as a general thing people eat too much of it, clog up their systems with the excess, and overburden the excretory organs, particularly the liver, in vain efforts to get rid of it. Those who take a great deal of out-door exercise are usually enabled to work it off, and seldom suffer much in consequence, except in hot weather; while those who lead a sedentary in-door life suffer most. When warm weather comes on in the spring, people require much less carbonaceous food, but instead of changing their diet, as the weather changes, they continue to eat the same kinds of food they have been eating during the coldest weather of the winter, and the consequence is that the already overburdened liver is unable to bear up under this extra load, and utterly refuses to perform its function until it has had a chance to rest and to throw off its accumulated burdens. Now, to prevent this state of things, two things are necessary First, people must eat a less proportion of carbonaceous food at all times. Second, as the weather grows warmer in the spring, they must eat a much less quantity of it than they do in cold weather, and substitute, instead, more vegetables and acid fruits. Every family should have a large supply of canned fruits and green vegetables to use at this time of year. For a single article, there is nothing so good as tart apples, and they should be used in unlimited quantities.

Manufacture of Vegetable Parchment.

The artificial parchment, made by the well known process of dipping sheets of unsized paper in dilute sulphuric acid, is likely to fall into disuse, as a very superior mode of preparing this useful substance has been discovered and patented by Mr. Colin Campbell of Buffalo. The old method was too delicate in operation for ordinary use, as, if the dilution were, in the slightest degree, too weak, or the least variation from the correct time of immersion were made, the attempt would lead to failure. In the new process, the paper is dipped in a strong solution of alum, and thoroughly dried; it is then passed through undiluted sulphuric acid, the alum protecting the paper from undue action of the corrosive fluid. The patentee proposes to make the parchment in continuous lengths, by attaching the baths of alum and sulphuric acid to a paper-making machine. Apart from the protection of the paper by alum, the effect of the acid can be adjusted by running the web through an alkaline solution. The process is simple, and can be made generally available, as documents and writings worthy of preservation can be treated by it, without injury to the printing or writing ink, or the paper.

Sickness a Nuisance.

The *Herald of Health*, for April, has many interesting articles, and, among other things, it says:—"The truth is, sickness is the most expensive nuisance on the face of the globe. There may be instances where it makes people better, but generally it makes people selfish, sad, misanthropic, nervous, mean, and miserable. The best way to make ourselves happy and good is to keep ourselves well. Then we are apt to be sweet and kind and wholesome.

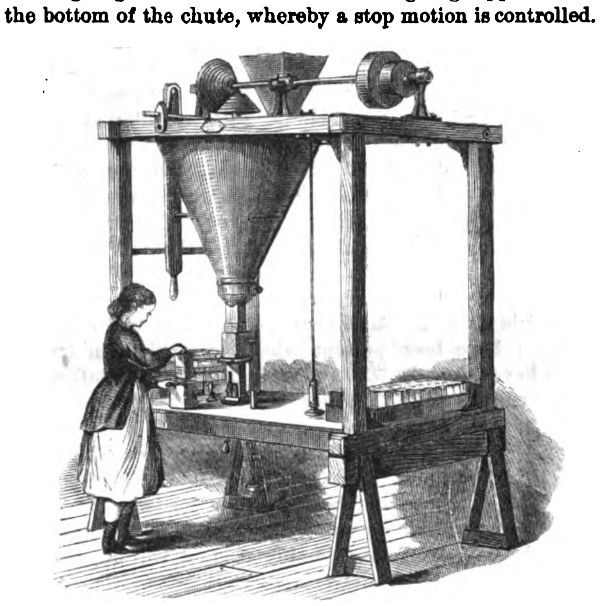
The Growth of Pittsburgh.—The journals of this city keep the world informed of the constant improvement of its vast manufacturing capabilities. We are assured that there has not been so busy a time as the present, in making additions and extensions to buildings and factories. Sixty new puddling furnaces have been, and are being, erected; and new blast furnaces are in contemplation. The owners and manufacturers are all busy, and expect a most prosperous trade throughout the year.

Oxygen Gas from Bleaching Powder.—Oxygen gas can be readily prepared by boiling bleaching powder and nitrate of cobalt in a flask. Make a clear solution of the powder in water, put it into any convenient flask provided with a perforated cork and tube, and pour in a few drops of a solution of nitrate or chloride of cobalt, and set it to boil. The oxygen of the hypochlorous acid is expelled, and chloride of calcium remains in the flask. It is difficult to explain the reaction, but it is generally supposed that the oxygen first goes to the cobalt, from which it is subsequently expelled by heat.

MATTISON'S IMPROVED PACKING MACHINE.

This is an ingenious machine for automatically packing and uniformly weighing small packages of flour, starch, saleratus, soda, and, in short, any pulverulent material required to be put in small packages, having cloth, wood, tin, starch-board, paper, or foil wrappings, of cylindrical, angular, or other shapes.

The general principles of the machine are, first, a beater, situated at the top, whereby the substance to be prepared is made to descend through the hopper in a granular state, and free from lumps, which might interfere with nice graduation in weighing; second, an automatic weighing apparatus at the bottom of the chute, whereby a stop motion is controlled.



The paper bags, or folded papers, sustained by a suitable case, being placed upon the weighing apparatus, in such a manner that the chute discharges its contents into them, upon receiving their proper charge, cause the platform on which they stand to descend. This movement cuts off the discharge of the chute until the filled package is removed and replaced by an empty one.

The machine is in full operation, putting up the celebrated Oswego starch and maizena, in which operation it has, we are assured, demonstrated the truth of the claims made for it. For further information, address J. Mattison, Oswego, N. Y.

Is Electricity produced by the Living Body?

Mr. Cromwell F. Varley, the well-known English electrician, has published some valuable remarks on the supposed production of electricity by the living human body. He first remarks that the sparks produced in certain cases, by combing the hair, by drawing off silk stockings, or by rubbing the feet on a carpet, are illustrations of frictional electricity, which in no way depend on vitality, but are due solely to proper conditions in the substances rubbed together and in the atmosphere. He then comments on another form of supposed bodily electrification, which has led many people to suppose that the brain was an electrical battery sending electricity through the nerves to contract the muscles, and which is produced as follows: The two terminals of a very sensitive galvanometer are connected each with a separate basin of water. If the hands be then placed one in each basin, on squeezing one hand violently a positive current is almost always found to flow from that hand, through the galvanometer, to the other hand, which is not compressed. While experimenting night after night on this subject in 1854, Mr. Varley found that, after squeezing the hand, opening the clenched fist produced a momentary increase of power instead of a decrease; and when the wind is from the south-west, the power is less than one fourth as strong as when it was from the north-east. The former wind was found to be slightly negative to the earth; the latter was invariably powerfully electro-positive. On trying to exhibit these currents on one occasion, and finding them to be very weak, Mr. Varley washed his hands thoroughly in water containing a little liquid ammonia, in order to decompose the grease in the pores of the skin. The result was a diminution instead of an increase of the power. On washing his hands, however, with very weak nitric acid, and afterwards with water, he obtained more power on squeezing his hands than he had ever done during the most persistent east wind. This lead to an explanation of the phenomena as one due to chemical action alone, the act of squeezing the hand violently forcing some perspiration out of the pores. By dipping one hand in a solution of ammonia and the other in one of nitric acid, and then washing both in water, squeezing either hand produced a current in the *same* direction; and when both hands were placed in the water and a little acid dropped on one of them, a current was instantly generated without any muscular exertion. Mr. Varley finds no evidence that electricity exists in or about the human body, either as a source of motive power or otherwise; and would explain all the feeble electricity which has been obtained from the muscles as due to different chemical conditions of the parts of the muscle itself. The nerves are bad conductors, and are not insulated. The force which is transmitted by them cannot therefore be electricity; and the fact that this force is transmitted at a rate about 200,000 times slower than an electric current is additional proof of their non-identity. It is to be hoped that a detailed account of Mr. Varley's experiments on this interesting subject will soon be given to the scientific world.

The Geological Museum of the School of Mines.

The trustees of Columbia college have purchased the entire geological collection of Dr. John S. Newberry, Professor in the School of Mines, and State geologist of Ohio. This collection, which represents the labor of a lifetime, is believed to be one of the most complete in the country, and in certain departments is not equaled by any cabinet at home or abroad.

It consists of over 60,000 specimens, forming the following groups;.

1st. A systematic series of the rocks and fossils characteristic of each geological epoch, numbering over 20,000 specimens.

2d. A collection of ores, coals, oils, clays, building materials, and other useful minerals, illustrative of the course of lectures on economic geology, and believed to give the fullest representation of our mineral resources of any collection yet made.

3d. A collection of 5,000 specimens of rocks, and the minerals which form rocks, to illustrate the lectures on lithology.

4th. A palæontological series, which includes specimens of recent and fossil vertebrates, articulates, mollusks, radiates, and plants. In this series is to be found the largest collection of fossil plants in the world, including many remarkably large and fine specimens, and over 300 new species of which other representatives are not known to exist. Also, the most extensive series of fossil fishes in the country, including, among many new and remarkable forms, the only specimens known of the gigantic *dinichthys;* also a suite of Ward's casts of extinct saurians and mammals.

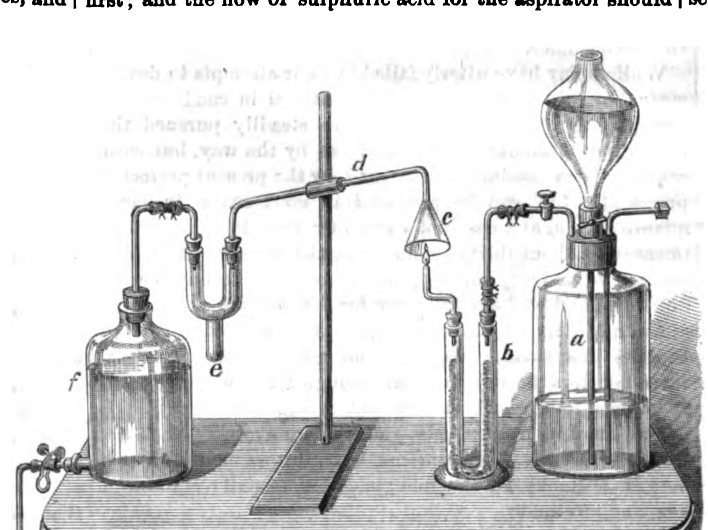
A perfect skeleton of the Irish elk was presented to the cabinet by Mr. George Cabot Ward; and remarkably fine specimens of fossil plants were given by the Delaware and Hudson Coal Company, and by Mr. Percy R. Pyne.

The trustees have been at great expense in providing suitable wall cases and tables for the exhibition of the specimens; and we understand that the museum is opened to the public every day, and that many of the pupils of our schools avail themselves of the opportunity thus freely offered to study the specimens in company with their teachers. It is a pity that so valuable a collection could not be placed in a fire-proof building of some architectural merit, rather than in its present unsightly barracks.—*The Cap and Gown.*

PRODUCTION OF WATER FROM HYDROGEN.

The cut represents a very simple form of apparatus, for demonstrating the formation of water by burning hydrogen, invented by Professor Woehler, of Göttingen. *a* is the gas holder for hydrogen; *b*, a chloride of calcium tube; *c*, a glass funnel, 6 to 8 centimeters in diameter at the mouth; *d*, a tube about 1 centimeter in diameter, and ½ to 1 meter long, attached to the funnel, and connected with *e*, designed to catch the water; *f* is an aspirator filled with sulphuric acid.

The flame of hydrogen at *c*, ought to be made small at first; and the flow of sulphuric acid for the aspirator should be so regulated as to prevent the passage of unconsumed hydrogen into the apparatus.



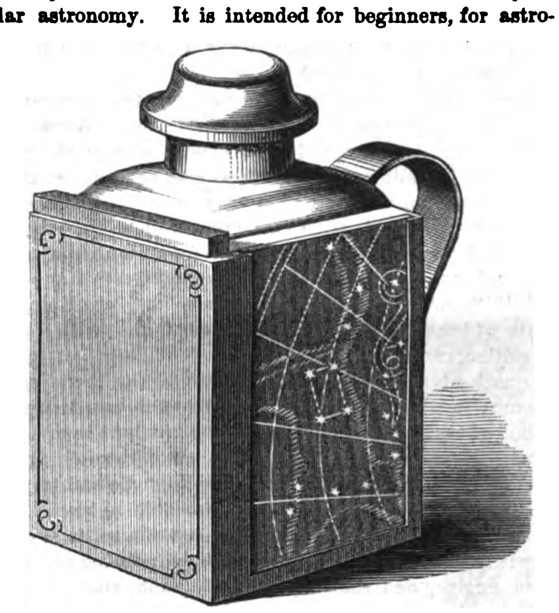
From 20 liters of hydrogen, Woehler obtained 15 to 16 grammes of water, in the course of half an hour. A slight modification of the apparatus admits of its being used to show the products of combustion of illuminating gas, carbonic oxide gas, or of a candle.

A Liberal Education.

That man, I think, has had a liberal education, who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth, working order, ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature, and of the laws of her operations; one who—no stunted ascetic—is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art; to hate all vileness, and to respect others as himself. Such an one, and no other, I conceive, has had a liberal education; for he is, as completely as man can be, in harmony with nature. He will make the best of her, and she of him. They will get on together rarely; she as his ever beneficent mother; he as her mouthpiece, her conscious self, her minister and interpreter.—*Huxley.*

ASTRONOMICAL LANTERN.

The object of this invention is to facilitate the study of stellar astronomy. It is intended for beginners, for astronomical classes in the high schools or private schools, and, in fact, for all who desire to become acquainted with the constellations.



The difficulty hitherto experienced in this study, and which will be obviated by the use of the lantern, is this: In order to study the starry heavens, it has been necessary to use an astronomical atlas, or a celestial globe. These must be examined in the house, by the light of a lamp. The observer, having found his constellation on the atlas, goes out to look for it in the sky. But, by the time he gets out of doors, he has forgotten how it looked on the atlas. And when he has found it in the sky, he has forgotten how it looked there, before he gets back to his atlas or globe. All who have studied the constellations have met with this difficulty.

Now, the astronomical lantern will make the study of the stars perfectly simple and easy. It is constructed like a dark lantern, dark on three sides, and on the fourth provided with a ground glass, in front of which slides can be inserted. On each of these slides, which are semi-transparent, is represented a constellation, the places of the stars being indicated by perforations, through which the light shines. The largest perforations in these slides are for the stars of the first magnitude, and they are made smaller, in due proportion, for the lesser stars. The student, therefore, wishing to observe any particular constellation or cluster, has only to light the lamp within the lantern, insert the appropriate slide, and go out into the night. He holds up the lantern in one hand, and can compare, at his leisure, the constellation as it appears on the lantern, with that in the sky, until he becomes perfectly familiar with the latter.

It is easy to see how much the use of such a lantern must facilitate the whole study. In fact, we think that henceforth no one wishing to become acquainted with the heavens can afford to dispense with it. The increased ease of the study will probably also enlarge the number of students in this interesting department of science. We all would be glad to know the names and positions of the stars. For, though Shakespeare has said:

> " Those earthly godfathers of Heaven's lights,
> Who give a name to every wandering star,
> Have no more profit of their shining nights
> Than we who walk and know not what they are:"

yet it must be confessed that to recognize the famous stars and groups which have been referred to since the days of Job, in the literature of all nations, is no small satisfaction.

This invention was patented December, 1870. We give a diagram, showing the lantern with its slide. It is, however, not yet for sale; but we understand that any one wishing to purchase the patent can apply to the patentee, James Freeman Clarke, Boston, Mass.

A Shower of Insects.

Charles W. Libby, of Cambridgeport, Mass., writes us as follows: " In May, 1867, while at Panther Springs, Western Texas, I observed a curious phenomenon. Early in the morning, after a heavy thunder shower had passed over, the air appeared to be full of snow flakes, which gave the appearance of a driving snow storm. Upon examination, I found the white objects, which were descending, were small insects, and the instant they touched the ground, their white wings dropped off, and left them in the form of small worms, resembling maggots. This continued for twenty minutes, when the insects disappeared."

THE first knitting mill in the United States was erected at Cohoes, N.Y., in the year 1832.

Correspondence.

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

Ancient and Modern Brick-Making.

Messrs. Editors:—In your issue of March 25, there appears an article entitled "Artificial Roman and Egyptian Stones," in which the writer enters into a dissertation upon brick-making, "and the best mode of burning bricks generally;" indulging, also, in some rather questionable statements, and including the burning of bricks in the category of the "lost arts," which he, fortunately, is able to remedy by means of his "self-regulating" patent back action kiln, built "on natural principles."

I pause to protest against the popular fiction regarding "the lost arts;" against the disposition to exaggerate the stupendous achievements of the ancients; against the pernicious habit of railing over the degeneracy of modern times.

I have no patience nor sympathy with those who indulge in mournful platitudes over the past; on the contrary, I believe the world has steadily advanced, instead of retrograding, in wisdom. It is true, a personal secret may perish with its possessor, but I hold that no art, principle, nor science of general utility, having once met with public recognition, can be lost.

A quacksalver may die and never reveal the secret of his nostrum; a solitary artisan may discover some superior method of tempering copper, and never divulge the mystery; or another may devise some novel means for staining glass, and, after decorating palaces and temples, "die and leave no sign." Yet it would scarcely be reasonable to argue from such premises any general decline in the world's stock of knowledge. On the other hand, take the printing press, the steam engine, and the magnetic telegraph, that "mighty trinity" of human inventions: can the possibility of their loss be anticipated, or even conceived? Impossible. The very nature of these inventions perpetuates their use.

Nations, it is true, like those of ancient Greece and Rome, may languish and decay, but all that has really been worth preserving among the useful sciences, has been transplanted into younger and more vigorous soils, and to-day is nourishing higher and nobler races of men. The burden of your correspondent's story is, what he has been able to accomplish by following out the ancient Egyptian and Roman modes.

His researches in that direction lead him to some queer conclusions; among others, he informs us "that it is not so much the materials of which the bricks are made, as the right composition of the ingredients, and the manner in which the burning is done," which give certain desirable qualities to the brick. He then proceeds to give a formula of the "ancient Egyptian and Roman" modes of preparing the material, by aid of "one of James Bogardus' machines." At this announcement we can almost fancy we behold the gummed visage of some embalmed brick-making descendant of Pharaoh relaxing with "a smile that is childlike and bland."

Modern brick-makers have heretofore found it quite a difficult matter to obtain just the right material to produce certain qualities of brick. Every region furnishes materials requiring different treatment, both in composition and burning, and preserving distinct peculiarities.

Your correspondent volunteers the assertion that the ancient built their kilns on principles "pure, simple, natural, and scientific;" and he goes on to assume that the main features consisted in "burning the gases arising from the fuel," and in "drawing the flame, by a very simple and scientific arrangement, through every portion of the furnace or kiln, on the natural principle, that when a vacuum is formed by the atmospheric or damp air becoming rarefied and expelled by the heat, so surely will the preparing heat rush to the vacuum formed," etc.

We are grateful for this simple and lucid explanation of the "ancient Egyptian and Roman" methods, but so far as the description goes, it seems precisely the traditional method employed ever since the descendants of Noah assembled upon the plains of Shinar, and said, one to another, "Go to, let us make brick and burn them thoroughly."

This is exactly the *modus operandi:* when fires are built in arches underneath, the heat rises, comes in unequal contact with the materials contained in the kiln, and escapes speedily into the open air, without completely doing the work, as is evinced by very imperfect results, familiar to every manufacturer. Heat "rushes to fill a vacuum" today, just as it did before the tower of Babel was built, and will continue so to do, while permitted to pursue a course "pure, simple, and natural;" but both phenomenon and ultimate results are entirely different when the heat is harnessed, and becomes your obedient servant, as it may be forced to do by more modern improvements, by inverting the traditional mode of burning from below upwards, in accordance with natural law and scientific guidance.

The fire may be built entirely outside the chambers containing the material to be burned, and the products of combustion caused to enter the kiln proper, at the top of the room; while exhaustion may be effected from the bottom, underneath a substantial and elevated floor. This process of burning takes place from above downwards, the entire contents of the kiln being immersed in a steady bath, of an uniform temperature of a sufficiently high degree to accomplish any desirable object, up to complete fusion if necessary.

The contents of a kiln, constructed in this way, by being exposed to a steady uniform heat throughout, will turn out stock of an even grade, without depreciation. Such a kiln is exceedingly simple in construction, consisting merely of a series of chambers (tight rooms) with an aperture leading from the furnace into the room, for an inlet, and an aperture under the floor (connecting with a chimney) for an outlet.

Then again, it may be so constructed as to accomplish perfect combustion, igniting all the gases, and consuming every vestige of smoke; also so as to economise or utilize all that enormous amount of heat remaining in the incandescent mass just burned. The heat contained in the chamber just burned may be transferred to an adjoining compartment, filled with green material, where it will carry the process of driving off "the water smoke" and of burning half way to completion before it is necessary to resort again to fire in the furnace. In this way, the process of burning brick may be carried on continuously, cooling in one compartment, burning in another, charging the third and discharging the fourth, all at the same time.

This method, if faithfully carried out, is preferable, in my judgment, to any other mode, either of Egyptian, Jew, or Gentile, "wheresoever dispersed." A. R. Morgan, M.D.

New York city.

Peat Fuel.

Messrs. Editors:—The subject of peat fuel is again attracting public attention all through the country, not so much among speculators, as was the case a few years ago, but among the more sober-minded, practical consumers of fuel, with whom it is an item of prominent importance, as relating to the cost and quality of their wares, and the power required to prosecute their operations.

Irrespective of the present difficulties in the coal market, which, however, can hardly fail to give additional interest to any new source of fuel supply, especially if it be free from the curse of monopoly, the merits of peat, as discovered and demonstrated, have slowly but steadily won for it a degree of favor which is rapidly becoming manifest, and seem now likely to command, for the enterprise, that substantial encouragement which shall place the production of the fuel among the prominent industries of the land, and by the supply of it, secure beneficial results to numerous interests.

An account of what has been done during the past season, by numerous parties, in various sections of the country, would form a narrative of no little interest to fuel consumers, owners of peat properties, and perhaps to inventors and builders of machinery.

The quantity of peat fuel actually produced during the last season has, in many cases, been small; in others, considerable, amounting to thousands of tuns; but the very general and almost universal expression of opinion, among those who have used it, is, that it is an excellent fuel, possessing many characteristics which give it just claim to public favor, and that, when once fairly introduced, it cannot fail to be largely in demand. This question of demand, however, may be considered as fairly settled, for a good fuel at a low price commands purchasers, and there are now numerous large concerns which would gladly use peat, and give it preference over coal, if they could be assured of a constant and steady supply equal to their requirements, which are satisfied only by thousands of tuns; and many who use only hundreds and less, are equally anxious.

This, then, opens a large field for a legitimate business in the production of an article, the demand for which is universal and enormous, and which, while it gives promise of large gains to the producer, is also a source of relief and economy to the consumer.

While many have utterly failed in their attempts to devise means by which to prepare the material in condition for transportation and sale, others have steadily pursued the matter, not without serious difficulties by the way, but with continually increasing success, until, by the present perfected process, the fuel can be produced in good shape, in large quantities, and at a cost not exceeding two dollars per tun (measuring about thirty-six bushels), at the works; to which add cost of delivery, and a profit satisfactory to any reasonable man, and we have the price for the consumer.

A tun of this fuel is fully equal in service to a cord of the best oak wood, sawn, split, and ready for use, or about three quarters the value of coal; though for some purposes it is claimed to be equal, and for others superior, to coal. It ignites quickly, burns freely, yields a large volume of flame, gives a quick, clear, and intense heat, throws off no sparks, very little smoke, no soot, and yields but a small residuum of ash, and no clinker.

Reliable information concerning the manufacture of peat is available, and can be obtained as readily as upon any other subject. The whole process is reduced to a well demonstrated system, and the business can be entered upon as prudently and understandingly, and on as fair an estimate of expenditure and return, as any other; and it is to be hoped that it may be prosecuted for practical ends, untainted or disturbed by speculation.

Did space permit, abundant testimony could be recounted as to the value of this fuel for locomotive, and steam purposes generally; for the smelting, re-heating, working, welding, tempering, and annealing of metals; for burning bricks and lime; in the composition of gunpowder; for generating illuminating gas, and for all domestic purposes.

Not only does the intolerable oppression of coal monopolies give cause for attention to other sources of supply, but the immense destruction of our forests by fires, and the rapid consumption of wood, which, for railroad purposes alone, amounted in 1869 (according to published reports) to upwards of $56,000,000 in value, afford additional reason why prudent men should be awake to the importance of utilizing any other available combustible substance.

Facts bearing upon this whole subject are rapidly accumulating; the indications of public favor are plain and unmistakable, and there is probably no one enterprise now before the community which may be made to tell so directly and powerfully as this, upon the great question of cheap fuel for the people. T. H. Leavitt.

Boston, Mass.

Hydrocarbon Oil Lamps.

Messrs. Editors:—I have read with interest the articles in your paper, on the explosions of carbon oil, and suppose that a considerable portion of the oils sold, does not come up to the required standard; but I think that one reason of so many lamps exploding, has been overlooked. When lamp burners are new, the holes that are punched in all of them, to admit air to the flame, are open, and allow the air to pass through freely, and thus keep the burner and collar on the lamp cool; but after being used for some time, they get gummed up (and in the old-fashioned or cross-shaped burners, the cinders falling from the wick are allowed to accumulate) until sufficient air cannot get through the burner to keep it cool and support combustion. Then two things occur; the light is not perfect, and the burner heats to such an extent that gas is formed rapidly, and where fragments are allowed to accumulate, they take fire and result in an explosion.

If lamps were examined, I think, and, in fact, know that many would be found in the dangerous state above mentioned. I have been present when the cinders in lamp burners have taken fire, and the flame had to be smothered to prevent its bursting the lamp, and perhaps endangering the house.

I would recommend that all persons using carbon oil lamps should see that they are kept clean, the air holes kept open, and the top of the wick tubes free from cinder. By this means, they will have a pure white light; and the danger from explosions, with even tolerably good oil, will be greatly lessened. A.

Freeport, Pa.

Singular Effects of a Tornado.

Messrs. Editors:—The terrible tornado which swept through this place on March 8th, the general account of which appeared in the papers, would, I think, puzzle scientific men attempting to explain some of its strange freaks.

How can it be accounted for, that one house in a row (and the row in a line with the course of the tornado) is utterly demolished; and the others not touched? I have seen two such instances.

Will wind alone drive the little iron rods, used to expand umbrellas, through a ½-inch, well-seasoned poplar board? I have seen that; and the rods were not even bent. Or, will the wind drive sixpenny nails through a similar board? Or will it drive small stones through glass without making cracks? Will it lift a thirty-tun locomotive up, and pitch it entirely off the track? or drive a small piece of shingle through a thick rubber belt? Is it possible for wind to demolish a building just as if it were full of steam boilers, and they all exploded at once? The well-built system of derricks, at the east abutment pier of the great bridge, was shivered to atoms. The splendid freight house (new, and second largest in the State), of the St. Louis and Vandalia Railroad, was knocked down. Three round houses, and several freight depots belonging to other railroads were destroyed.

I have also seen a piece of glass driven into a board edgeways, about an inch, and there it remained in powder. Do scientific men know all the elements that are in the atmosphere? John O'Connell.

East St. Louis, Ill.

Effect of Heat and Cold on Iron.

Messrs. Editors:—I was much pleased with your remarks upon the effect of "heat and cold upon iron and steel." They showed the incompleteness of the experiments in question; and incomplete observation or experiment leads investigators astray.

Not only the suddenness of the strain, but, in my opinion, the suddenness of change of temperature, has to be taken into account in this matter. My experience with watch springs shows that sudden changes, colder or warmer, will start the flaw (who knows how minute?) which leads to subsequent breakage. Want of stop-winding works has nothing to do with these particular cases, as there will, in sudden changes, be just as great, if not greater, proportion of springs broken in watches with stops as in those without them.

Philadelphia, Pa. J. A. Solliday.

Lamp Wicks.

Messrs. Editors:—In a recent number of the Scientific American, a call was made for longer wicks, to be used in the common coal or kerosene oil lamps. During an experience of five years in the sale of lamp burners, etc., I have found that where burners have been thrown aside as worthless, on account of the difficulty of raising and lowering the wick, the fault has been almost invariably with the wick itself. After remaining in the oil some time the wick becomes hard, and thickens to such an extent that it will not pass up the tube, while a new wick would work perfectly well in the old burner.

Unless a wick can be made which will not be affected by the oil in this respect, no longer wicks than those now in use are needed. E. W. B.

Pocket Chronometers.

Messrs. Editors:—The challenge published in the Scientific American of November 26, 1870, has not yet been accepted; and, although there is plenty of time, and the trial is to extend over many years (the watches to be examined twice in 24 hours), I will make the following concession: I am not to use rounded teeth in any of the wheels of an eight-day train, nor rounded leaves in any of the pinions—no metal outside the "primitive circle."

Hanover, Pa. J. MUMA.

Reciprocating Parts of Steam Engines.

MESSRS. EDITORS:—I did not propose to say anything further on this subject, but cannot omit to express the gratification with which I have read the note of Mr. Hendricks, in your issue of March 25. It is refreshing to meet with such a candid, straightforward admission of error, exhibiting a love of truth and fairness.

Now, I would ask your correspondent to go a little further: Is not the acceleration greatest precisely at the commencement of the stroke?

Is not the retardation greatest precisely at the termination of the stroke?

Is not the force producing retardation, and then acceleration in the opposite direction, the same force?

At the instant when the crank passes the centers, is not the direction of this force radial?

Can the resistance of the piston to this force, at this point, be distinguished from the resistance to deflection, or the centrifugal force of a revolving body?

New York city. CHARLES T. PORTER.

THE PRESENT AND THE PAST.

NUMBER VII.—RECONSTRUCTION.

Now let us turn to those mineral substances, contributing to form rocks, which are held in solution by the waters of rivers and of the sea; or, rather, to one of them, the one which is of the most universal importance in this connection, and to which, alone, we have here space to devote our attention. Carbonate of lime, derived from the disintegration and decomposition of calcareous rocks, is held in solution by the presence of free carbonic acid; drive this off, by boiling, and the lime-salt is deposited in your kettle. Let it be set free by gradual evaporation of the water, and you have formed the stalagmites and stalactites that ornament caverns in limestone regions, or in such a rock as "travertine," or "calcareous tufa." It seems, however, that comparatively little carbonate of lime is thus disposed of. It has another office to perform in the economy of nature; the myriads of fish that people the waters require it to give a certain amount of firmness to their bones; countless mollusca and crustaceans need it for their shells; the tiny polyp segregates it to form the plant-like coral; while the vegetable corallines disguise their seaweed hues beneath a coat of it, and thousands of square miles of lowly organisms, standing on the confines of the two kingdoms of life, are covering the bed of the ocean with calcareous particles secreted by their vital power.

Think, but for a moment, of the mass of this carbonate of lime contained in the shells of a single oyster bed of recent growth; think of the tuns annually added to a single coral reef by the incessant labors of the vast community, and then consider how many thousands of miles of such reefs gird the coasts of tropical continents and islands; how vast the surface of the ocean is, as compared to one oyster patch, and how it teems with manufacturers, large and small, from high water to its lowest depths, and you will realize that the amount of material held in solution, invisible to your eyes, in the waters of the earth, must be enormous.

But the wonders of this submarine manufactory do not cease with the production of the organic bone, or shell, or coral. Nature allows no waste in her workshops; and when these bones, and shells, and corals, have ceased to be of use to the animals which formed them, they are worked up again into the framework of a future continent. The shells, water-worn, and frequently ground to fragments by the waves, are accumulated in beds, which will hereafter appear as shell limestones; the skeletons of the deep sea organisms are being massed into vast deposits of chalk; while the coral reef is a nucleus for what will, in the course of time, become crystalline limestone, marble for the builder and the statuary.

To the contemplative mind, the ocean appears not less sublime in its calm than it does in its anger. Grand and terrible as it is when, urged by the winter's storm, it rears itself in foam-crowned masses, and rushes headlong against the trembling rocks, roaring and bellowing in their caverned sides, holding the largest ship at its mercy, and quenching the agonies and hopes of hundreds, as it drowns their death cry, there is something yet more awful in its smiling slumber. Its duty, of working vast and perpetual changes, is performed unceasingly, though it does appear to be so quiet. The secrets of countries, of nations, and of ages, lie buried in its unrevealing depths; the last thoughts of the dying, and the fluttering hope of those in whom life is still strong, are untold and unsolved by its laughing ripples. These thoughts oppress the mind with undefined images, many of which are saddening to our feelings, and create within us a sensation of awe unequaled by anything in nature. Man's pride in his manhood rises above the storm. He can brave it or perish in it, if required; but, in the calm, he looks upon a boundless and unfathomable world, whose depths he cannot pierce, whose history he cannot read, and upon which, he himself lies a helpless waif, uncertain of an hour. But to the naturalist and geologist this world partially reveals its secrets and its history; to him it is, from the pebbly beach to those depths

"Where the line sounds not, and the wrecks lie low,"

a world of life and of labor; and its history to him, from the pregeologic periods of its early existence to the present day, has ever been uniform; its wasted shores have changed, and are unceasingly changing, but, to the ocean itself he well may say,

"Such as Creation's dawn beheld, thou rollest now."

He sees the same handiwork in the coral reefs of the coast of Florida that formed the Silurian limestones; and, in the depths of the Atlantic, he reads, repeated, the story that is preserved in those most ancient of records, the Laurentian rocks of Canada.

From the mode of origin of limestone rocks, their presence, even though so metamorphosed as to have lost all vestiges of fossils, is, now-a-days, held to indicate the existence of life at the time of their formation, and this although the rocks with which they are associated are equally destitute of organic remains. Hence no "Azoic," or absolutely lifeless period in geologic history, is now recognized, by many geologists, who have substituted the term "Eozoic," signifying "the dawn of life," as more appropriate to the most ancient of known formations. "But, surely, you do not mean to intimate that life had no commencement on this earth?" Certainly not; we merely infer that its introduction dates back to a period anterior to the earliest records accessible to the geologist; to a mythical period, which we leave to the researches of that geological archæologist, the cosmogonist.

As regions of the sea, thick with sediment, are unfavorable to the existence of shell and coral forming animals, and as, consequently, the greatest variety of molluscs, as well as of those forming the most massive shells, are to be found in clear waters, where also, in tropical regions, coral reefs alone are constructed, the existence of limestones in a geological formation indicates a different set of conditions, as existing over the region in which they occur, from those which obtained while sediments were deposited from suspension. They tell us that they were formed either far from shore, or around coasts where no large rivers sullied the clearness of the neighboring waters.

But as coral reefs and most shell accumulations are first formed within the limits of breaker action, they are continually being partially broken up, and the resulting *débris* is dispersed by marine currents over the bed of the surrounding sea, under the same rule that controls the dispersion of the sediments derived directly from the land. The heaviest pieces of shell sink nearest the original source; the finer particles are carried further away. The largest fragments of coral are cast down to the foot of the reef, while almost impalpable lime mud is swept far away out to sea. This regularly graduated dispersion of materials will not obtain, however, in the disposition of the calcareous deposits accumulating in the quiet depths of the ocean. There we shall expect to find widespread deposits of uniform character, consisting chiefly of the minute shells of creatures which have lived and died on the spot.

Painting on Leather.

This is an important part of carriage finishing, and it often gives much trouble. The following directions are given in Arlot's "Guide for Coach Painters," a new publication recently noticed in this journal:

When a swelling appears upon a panel, it is evident that the leather has become separated from the wood, and this defect appears only when the paint has been varnished. This accident, therefore, arises from the infiltrated water used in pumicing and polishing, the leather becoming damp and the glue soft; hence the swelling.

Crimples are due to the same cause; water has penetrated the leather without reaching the glueing paste, and we must notice that these crimples are to be found almost always at the base of the panels, and above the lunette (dormer window), which is a proof that the water has penetrated the edges of the leather.

Cracks will also take place on the roof, and on the barrelled seats of ceremonial carriages. The reason, in the first case, is, that the boards or the roof become disjoined by heat after the laying on of the leather, which causes it to bend. When dampness occurs, the boards become tight, the leather swells, and the paint, which has become hard, scales off.

The cracks on the barrelled seats are not due to the same cause; I have often seen an empty space between the wood and the leather. Add to this the rolling and the shocks of the carriage in motion, and we can understand why the leather becomes stretched and breaks.

There are also small cavities which appear, at regular distances, after the spreading of the last coats of paint. These small holes are occasioned by the stretching action of the small tacks employed on the wooden panels, when they have been too much punched in.

But if, instead of these cavities, there appear small swellings, the cause is due to the tacks, which have not been sufficiently driven in, and which, by the motion of the carriage, have a tendency to come out, and push the leather back.

It is customary to give a priming coat to wooden panels which are to be covered with leather, and I have myself followed this old custom, although I have often protested against it. It is evident that the watery paste employed for glueing leather is incompatible with fatty substances; and this is so true that, if we glue leather upon two boards, one of which has been painted, and the other not, the leather will be found more adhesive and firmer on the unpainted board.

The small swellings, cavities, etc., must be avoided by driving the tacks into the wood not deeper than one millimeter (about one twenty seventh of one inch), and afterwards passing a wet sponge over them. The wood swells and covers the heads of the tacks. When the wood has become dry again, lay on the leather, previously stretched.

When the leather is sufficiently dry, it is nailed very carefully, taking especial care that no air penetrates between the leather and the panels, because the air will, by dilatation, cause swellings. Unless very dry, the leather does not receive a priming coat; and, to be doubly sure, we should pass a hot sadiron over its surface, with the interposition of a sheet of paper between the iron and the leather, so as not to burn the latter. When no trace of dampness is left, we may lay on the priming coat. This process has also the advantage of stretching the leather, and rendering it tougher.

I especially recommend a careful puttying, with the oil putty, of the moldings of the lunettes (dormer windows) and those of the lower parts of the Custolde panels, before pumicing.

Leathers thus prepared can scarcely become loose.

The small roughnesses which may appear after the pumicing of the body must be leveled with a sadiron, and then rendered smooth by another pumicing with turpentine. Should the preparing coats be too thin, we must give two coats of gray lead before the last pumicing. But, when defects appear after varnishing, we must pumice with water, and then give a glazing coat with Japan varnish.

The molding strips, when they are to be painted black, are put in their place only after the dressing of the body; and by all means the infiltration of water into the tack holes must be avoided. The workmen should use slender awls for marking the places for the tacks, and must not make deep holes, because it would become necessary to remove the tool violently, the leather would be raised, and water could penetrate underneath.

For the barrelled seats, when the leathers are fractured, I do not know any other process but removing the old paint, and painting afresh. I think that a good preservative would be the stretching of a piece of canvas before the leather is laid on, and making a flexible paint by a good supply of fatty oil.

The cracks on the roofs should be filled with rough stuff kept fat.

It remains for us to consider the painting afresh of old leathers. When the paint is thoroughly cracked, there is other way but burning it. A great amount of care is needed not to burn or raise the leather; a burning cannot be repaired, but raised leather may be levelled down. As soon as the leather rises, the raised parts must be immediately wetted, so as to soften the leather, which is afterwards pressed in place with a hot iron.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections in February, 1871:

During the month, there were 529 visits of inspection made, and 896 boilers examined—833 externally and 252 internally, while there were 119 tested by hydraulic pressure. The number of defects in all discovered were 413, of which 52 were regarded as dangerous. These defects in detail are as follows:

Furnaces out of shape, 17. These cases are generally the result of ignorance in firing, or because of too limited boiler power. Coal is heaped upon the grate, making it impossible for air to circulate, and it becomes a heated mass, doing great injury to grate bars and those portions of the furnace with which it comes in direct contact. The gases under such management escape unconsumed, and the result generally is far from economical. We speak now more particularly of anthracite coal. Ashes are often allowed to accumulate in the ash pit to the injury of furnace and grate bars. In managing fires, spread the coal evenly over the grate so that the air can mingle freely with the gases. See that there is a sufficient supply of air, and very perfect combustion will be secured. Keep the ash pit clean, and have abundant boiler power for the work to be done, and "furnaces out of shape" would be comparatively rare. Fractures, in all, 16—3 dangerous; burned plates, 21—2 dangerous; blistered plates, 48—5 dangerous; cases of sediment and deposit, 79—8 dangerous; cases of incrustation and scale, 74—8 dangerous; cases of external corrosion, 19—3 dangerous; cases of internal corrosion, 9—1 dangerous; water gages out of order, 46—3 dangerous; blow-out apparatus out of order, 4—2 dangerous; feed apparatus out of order, 1—1 dangerous; safety valves out of order, 19—4 dangerous; pressure gages out of order, 94—4 dangerous, cases of deficiency of water, 7—3 dangerous; broken braces and stays, 21—1 dangerous; boilers condemned, 5—5 dangerous.

During the month there were nine serious explosions, killing 15 and wounding 7.

DEEP SEA CURRENTS.—It is known that, not long since, the cable between Lisbon and Gibraltar was disabled. After considerable labor, it was grappled, on February 11th, in 500 fathoms water. It is supposed that, at that depth, the ocean is generally at rest, and that there are no currents below 200 or 300 feet from the surface. When brought to the deck of the repair ship, however, there appeared on the cable most evident indications of chafing of very heavy character. We believe that this is the only case of abrasion at such a depth known, and it is important to those who study the geography of the seas, inasmuch as the chafe of the cable indicates the existence of a powerful ocean current, at a depth of 3,000 feet, along the Spanish or Portuguese coast.—*Journal of the Telegraph*.

LOCOMOTIVE WATER TROUGHS.—Troughs for supplying locomotives with water, while in motion, have been laid on the Pennsylvania Central Railway, one at Derry and another near Johnstown. The troughs are 18 inches wide, 6 inches deep, and 1,500 feet long. The scoop let down from the locomotive will take up a quantity of 2,200 gallons of water from each trough.

A WESTERN writer gives it as his belief that if as much attention were paid to improving corn as is given to grapes, a hundred million bushels might be added to the annual crop.

WICKERSHAM'S SYSTEM OF LUBRICATING DEVICES FOR RAILWAY CAR JOURNALS, MACHINERY, ETC.

The waste of oil attendant upon the old system of lubricating journals, though utterly inconsistent with the advances made in mechanical appliances, is only one of its numerous evils. The slovenliness of dripping oil only partially removed by the use of drip cups, and the unequal application of the oil, which is deluged upon bearings at intervals, to drain off and leave the journals to dry and heat, if neglected by inadvertence or carelessness, are other evils which do

FIG. 1.

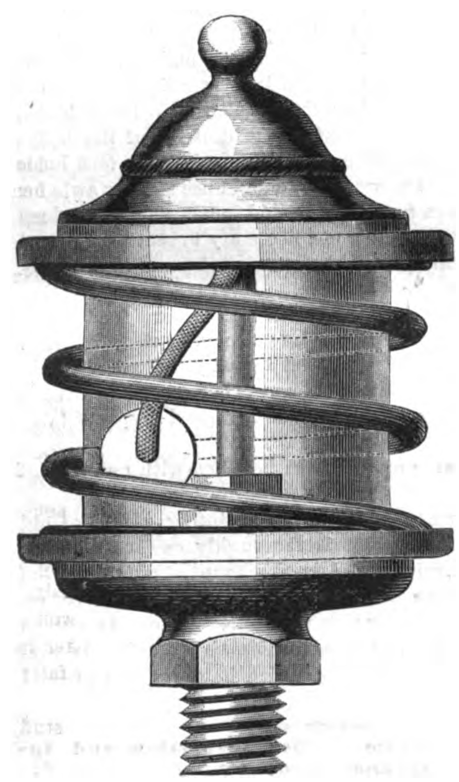


FIG. 4.

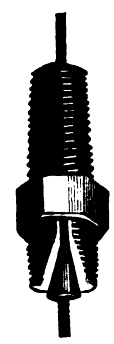
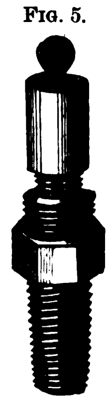


FIG. 5.



not exhaust the category. These facts are, however, so familiar to all users of machinery that it is superfluous even to allude to them. What excuse is there, then, for the continuance, even in small establishments, of such a rude, slovenly, and wasteful system?

Among those who have successfully labored to introduce a more refined and economical system of lubrication, is Mr. J. B. Wickersham, manufacturer of the "American Oil Feeder," No. 152 South Fourth street, Philadelphia, Pa., and we this week present to our readers, as matter of general mechanical interest, the series of devices by which so much oil is saved, that only a fraction of what is used in the old method is needed to produce better and more uniform results, with less attention in keeping the boxes supplied with oil, and with much greater cleanliness.

Fig. 1 is an illustration of a glass oil cup, with a spiral metal guard and metal mountings. The cup contains an adjustable bonnet or sleeve stem, Fig. 2, with the American oil feeder. This bonnet stem is intended for oil cups in motion, such as on cranks, crossheads, slides, loose pulleys, etc. The bonnet may be screwed either up or down, opening or shutting the slot through which the feeder

FIG. 3.

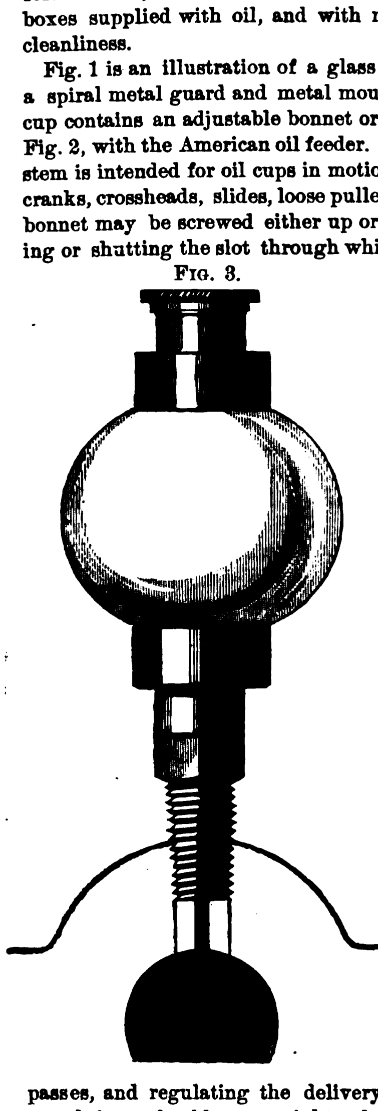
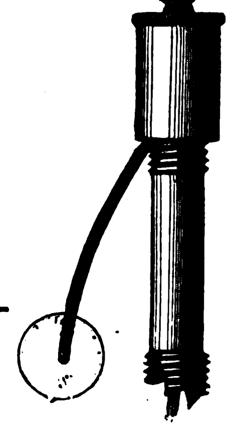


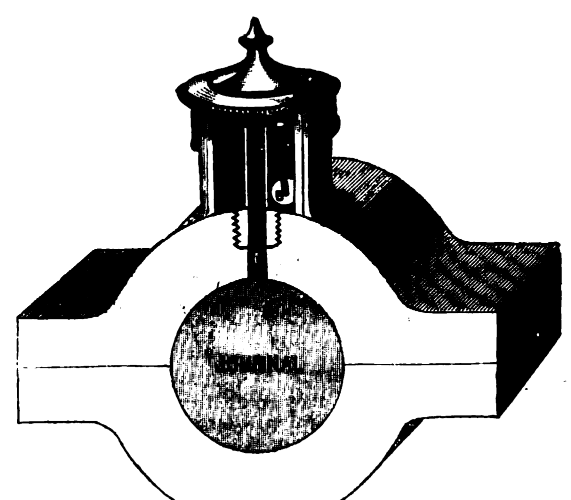
FIG. 2.



passes, and regulating the delivery of the oil. The spiral guard is preferable to upright rods, as it protects the glass all round the cup.

In the oil cup, Fig. 3, the valves, Figs. 4, and 5, are used. This style of oil cup comes under the category of air-tight cups, and has the advantage that it can be filled at the top without taking it off from its place. When the valve, Fig. 4, is used, it is called the "Pendulum Valve Oil Cup," as it is operated by the vibrating motion of the journal; the valve shuts off the flow of oil when the machinery stops, making it a desirable oiler where machinery is not in constant use. When the valve, Fig. 1, is used, it is called the "Atmospheric or Barometric Oil Cup," This valve is adjusted in the same way as the bonnet stem, with the difference that there is no feeder used, except the opening made by the slot, which aperture can be opened, more or less, to allow the oil to escape to the parts to be lubricated.

FIG. 6.



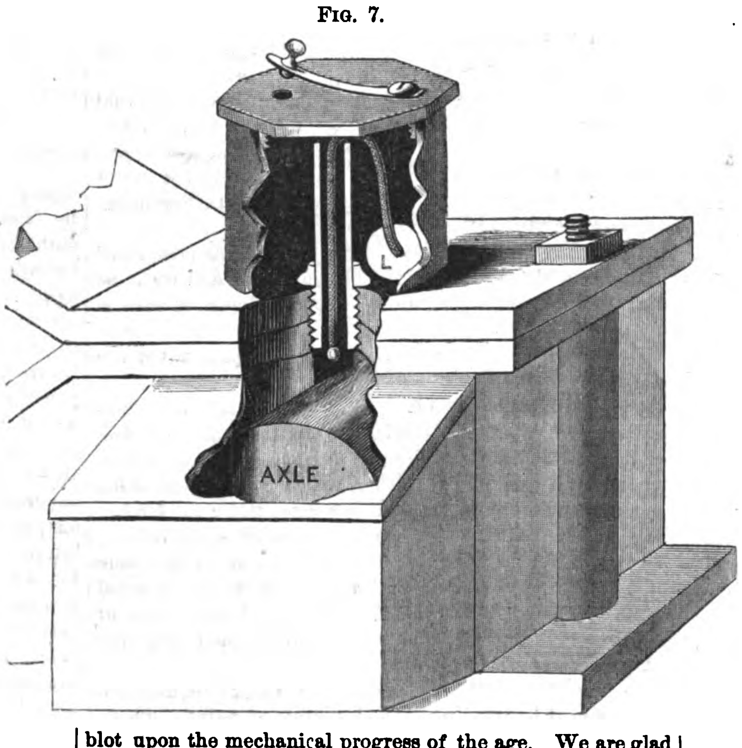
This latter oil cup is operated by the surrounding atmosphere and the jarring of the journal.

Fig. 6 shows how the oil cup may be cast with, and on the top of, the journal cover, in building new machinery where small journals are used. In this cup a metal stem, containing the American oil feeder, is placed. It is believed that, by the application of this simple device to many kinds of machinery, the saving in oil and in the wear of the journals, will pay the interest on the cost of the machine.

Fig. 7 shows the adaptation of the American oil feeder to railroad car journals—dispensing entirely with cotton waste, and, at the same time, saving 50 per cent of the oil. By dropping the oil directly on the bearing surface of the journal, every drop is used to advantage, and deposited clean, without grit, on the center of the journal.

With such devices available, the slovenly and inefficient methods of lubrication existing in many establishments is a

FIG. 7.



blot upon the mechanical progress of the age. We are glad to say, however, that mechanics are gradually waking up to the fact, and that there has been great improvement in practice, as regards lubrication, during the last few years.

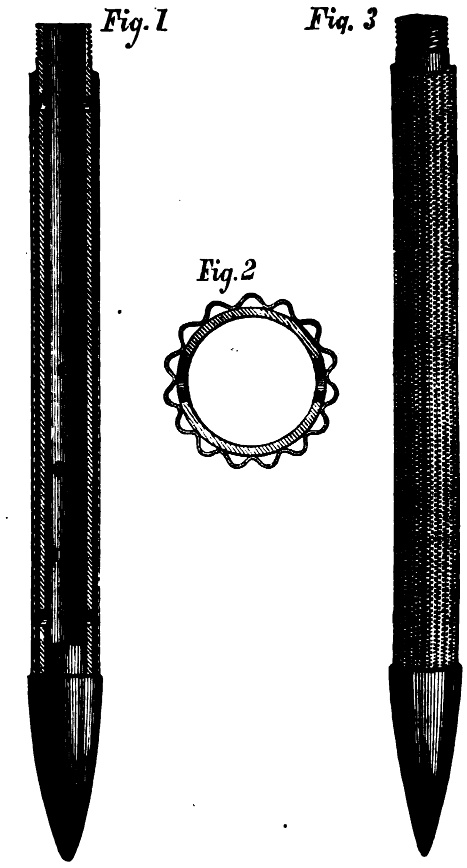
TESTING GAS IN LONDON.—The argand burner of Sugg is the official standard for the measurement of gas in London. The burner for testing the ordinary gas of the Gas Light and Coke Company, which ought to have 16 candle power, must be the London argand No. 1, of Sugg, with a glass cylinder 2 inches in diameter and 6 inches high. For the gas of the Imperial Gas Company and the South Metropolitan Gas Company, which must possess an illuminating power of 14 candles, the glass chimney may have $1\frac{3}{4}$ inches diameter and 6 inches hight. The chimney may be made 7 inches tall if the flame leaps over the top. The London gas is regularly inspected, and the companies are required to keep up to a fixed standard.

THE successful sinking of the great caisson for the east pier of the St. Louis bridge, to its final position, is announced. The event was celebrated by the ringing of bells, firing of cannon, etc. A full description of this caisson, with engraving, will probably appear in our next issue.

THE measurements, in our article, published March 18th giving a comparison of the area of the territory acquired by Germany, in the late war, with the areas of other countries in Europe, were expressed in *German square miles.*

EDSON'S IMPROVED DRIVE-WELL POINT AND STRAINER

Persons who have had experience in driving wells, feel the need of a strainer of sufficient capacity, and, at the same time, so compact and strong as to drive easily, and not bend or break in the operation. But it must be so constructed that it will supply an abundance of water without clogging, and will not allow sand to pass up, to injure the boxes and render the pump useless. In ordinary strainers it has been difficult get a sufficient number of holes to admit the water, with-



out making the strainer too weak or too large, or else so long that one or the other end would come above or below the stratum that supplies the water.

The improvement shown in our engravings is designed to obviate these difficulties. Fig. 1 is a longitudinal section of the device, Fig. 2 is a cross section, and Fig. 3 a perspective view of the same.

The point is thoroughly welded within the lower end of the pipe, and is of a proper form to be driven easily, and sufficiently large to make a good passage for the strainer.

There are two spiral rows of induction holes twisting around the pipe; these holes are bored and countersunk in such a manner as to give a free passage for the water, without unnecessarily reducing the strength of the iron. Over these holes, a corrugated cylinder made of perforated brass is sprung on, so as to stiffen the corrugations and reinforce the point. These corrugations form channels in which the water flows freely up or down to the holes of the spiral induction course which supplies the pump.

The corrugated form of this strainer presents a large and reliable filtering surface. In one of these strainers, with pipe $1\frac{1}{4}$ inches in diameter, and 18 inches long, there are upwards of thirty-eight thousand holes, coarse enough to allow mud to pass through, and yet fine enough to hold such particles of sand as should be retained for a proper filtering medium.

Further information may be obtained of the manufacturer, Henry N. Stone, 132 Commercial street, Boston, Mass.

LADLE FOR POURING METAL.

A most convenient implement is shown in the accompanying engraving. It is a ladle for pouring metal, furnished

with an automatic skimming device, so that it may be manipulated with one hand, while the mold may be held with the other. It is one of those simple inventions which are really, of much value, though requiring little inventive skill for their contrivance. It was invented and patented in July 1867, by H. W. Benton, of Lebanon, N. H.

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NEW YORK, SATURDAY, APRIL 8, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

MORE ABOUT RATING BOILERS.

The correspondent who wrote us regarding a certain proposition, under consideration by a committee of the Franklin Institute, relative to rating boilers, now berates us, because we made use of the information sent us. His letter asked the very pertinent question, "how do you think this plan will suit engineers throughout the country?" or words to that effect. It did not request a reply by mail, and we simply conformed to our usual custom of answering such queries in our paper.

He also complained that we "*applied to the committee*" such terms as "too absurd to be adopted," and "not tolerable for one moment to common sense." Well, really, we thought we were discussing a proposition said to be under consideration by the committee, and not the committee itself.

At the time of our former writing, we did not know a single name of the gentlemen who constitute the committee. Our correspondent's second letter has put us in possession of *one* name, which is all we know of the committee now, except that one of its members is a "proprietor of an engine shop, and two others superintendents of the largest works," and also that the proposition under discussion originated with one of the members, which accounts for the tenderness evinced under our criticism of it.

The first letter seemed a candid inquiry for our opinion upon an important subject. We gave it accordingly.

A paper, read by Edward Brown before the Franklin Institute, at its stated meeting in January, "On the Horse Power of Steam Engines and Boilers," etc., accompanies the second communication, which paper, having been read and published, we suppose it is lawful to discuss, leaving out of the argument the committee, whose callings imply that they are possessed of too well-disciplined judgment to agree upon the plan proposed.

Passing all that is said of rating engines without reference to boiler power, we shall only review what is said upon the subject of rating boilers.

On page 4, of the printed copy, we find these words: "Whilst the horse power of a boiler depends somewhat upon the engine it supplies, still it is only to a limited extent. A three-port D-valve engine is realizing within 12 per cent of the power *which that engine would produce with a shorter cut-off.*" The looseness of expression which characterizes the first part of this quotation is little remedied by the words we have italicized, which we find in pencil writing on the margin of the page, to be inserted at the end of the sentence which ends with the word "power."

We infer that Mr. Brown means effective horse power, when he speaks of horse power of boilers, as influenced by engines. But we fail to see what need there is of considering boilers in connection with engines, so far as their power to develop steam is concerned, further than to determine whether particular boilers are capable of supplying sufficient steam to run particular engines to their full capacity. In our former article we dwelt upon this point to sufficient length. Rating boilers with reference to engines is one thing, and a fixed standard rating of boilers is another. Any such rating to be anything more than a farce, must proceed upon the supposition that all things outside of the boiler are equal. Irregularities in the performance of engines cannot be charged to boilers, any more than deficiencies in boilers can be charged to engines.

The power of a boiler lies wholly in its capacity for producing steam, and its maximum power is its capacity when fired and fed under the best circumstances, and in the best manner. It will not do to charge defective firing to the boiler. The rating should, therefore, proceed upon the supposition that the boiler will be properly attended in practice.

Neither should defective setting, and bad engineering in placing the boiler, be charged to it. In the case of boilers combined with furnaces, as is the case with a great many boilers now made, the manufacturer should be held responsible for proper proportions of grate and heating surface. With plain cylinder boilers where the grate is set in masonry, and the proper proportions of grate surface, correct position of bridge walls, etc., are not supplied, the maker is not responsible.

"It is quite safe," says Mr. Brown, "to assume that the evaporation of 1 foot of water is abundance for a horse power, provided the consumption of coal be taken into account; for a small boiler with good draft, burning much coal, will give out as much power as a larger boiler burning less coal. Therefore, the commercial value of a steam boiler, estimated by the horse power, depends upon its ability to evaporate a given amount of water into dry steam, on a basis of a certain amount of coal, say, about 8 pounds. The conclusion arrived at in reference to this subject would be, that neither the test by the engine nor by evaporation is a positive test. By the engine test, the efficiency of the engine is always liable to be called in question. The steam pipe may be long and contracted, and the pipe and cylinder uncovered, and a large back pressure, for which allowance must be made. The boiler may also be forced for a trial of ten hours, and more coal burnt than usual.

"And by the evaporation test it will be found that some boilers are notorious for lifting water; that is, carrying it over bodily. Exceptional cases will always occur in which either test is unsatisfactory; then the only way is to combine the two methods."

The first sentence in our last quotation from the paper referred to is, in substance, the basis of a plan which the Franklin Institute Committee have under consideration. Now, we ask whether a cubic foot of steam, produced by the combustion of 6 pounds of coal, has not the same amount of heat motion, capable of being converted into work, as a cubic foot of steam made by the combustion of 8 pounds? To use the words of the immortal and sapient Bunsby: "If so, why so, and if not so, why so also?" How are we going to rate boilers by draft and power to burn coal, except in cases where the grate surface, furnace, and smoke stack being made with, and combined with, the boiler, are properly to be considered as part of it? When a manufacturer finishes a boiler and rates it, how is he to take into account the defective chimney of a purchaser, whom he may not see till months after the boiler is made, and how can he make allowance for all the bad practice which still disgraces this department of engineering?

The rating of evaporative capacity should be made when the boiler is fired with skill and with the economy of fuel the manufacturer finds he can attain to advantageously, whether it be 6 pounds of coal per cubic foot of water evaporated, or 8 pounds, or 10 pounds. It is not profitable to reduce the consumption so low, as to require a huge boiler for a small amount of power, nor to urge it so far as to develop an excessive power from a small boiler. This is bad practice. Good rating should be based on good practice.

We showed in our last article that two boilers, rated by combining coal consumption and evaporation on the plan before the committee, might show the same evaporative power, though one was rated at twice the horse power of the other.

If the committee wish to make a standard rule for rating boilers, they should define the conditions of testing, and then rate for power, that is, evaporative capacity, and for economy of fuel separately. We maintain that any attempt to combine the two ratings is as absurd, as it would be to rate a boiler and engine together, and call that the horse power of the engine.

When an engine is said to have a capacity of performing a work of 100-horse power, it is meant that, with a proper supply of steam, it will develop that amount of work. When a boiler is rated at 100-horse power, the rating should imply that, properly set, supplied with sufficient grate surface and draft, and all the other conditions essential to efficient working complied with, it will evaporate a given amount of water per hour. "*Only this and nothing more.*"

We omit to mention the name of the gifted author of the line of poetry which rounds off the preceding paragraph, lest our too sensitive correspondent, overlooking orthography, should suppose it a sneer at the committee.

As economy is a primary consideration with most purchasers of boilers, no manufacturer will, even in a test, push his coal consumption so far as to reduce his rating for economy, in order to secure a greater horse power rating than can be profitably attained. And as for the "lifting of water by boilers," and consequent difficulty in determining the amount of dry steam produced, we fail to see how that can be any better determined by complicating the evaporation with coal consumption. But we do not admit the difficulty. If Mr. Brown wishes to learn how to determine the evaporation of boilers, expressed in units of *dry steam*, we assure him there are those from whom the art can be learned.

WATER-TIGHT CLOTHING.—Balard recommends the application of acetate of alumina for the purpose of rendering clothing impervious to water. The cloth is to be immersed in a mixture of solutions of acetate of lead and sulphate of alumina; by mutual decomposition of the salts, acetate of alumina is produced on the cloth, and when the goods are dried, basic acetate of alumina adheres to the fiber, and thus protects it from the action of moisture. The process is particularly recommended for military goods

IMPORTANT EXPERIMENTS ON THE PRODUCTION OF BEET SUGAR IN MASSACHUSETTS.

Important experiments have been tried, at the Massachusetts Agricultural College, by Professor Charles A. Goessmann, to test the question whether, with intelligent management, the production of beet sugar, as an industrial enterprise, can be profitably undertaken in the Northern States, as it has been in many countries of Europe. These experiments were not conducted on a sufficiently extensive scale to decide all the questions of soil, manure, variety of beet, etc., but were enough to show that it is by no means improbable that the farmers, on the exhausted lands of New England, will be assisted by capitalists to enter upon the cultivation of the sugar beet, as a profitable crop.

We have been favored with an advanced copy of Professor Goessmann's report, to the Legislature of Massachusetts, from which we gather many interesting and valuable facts. It appears that European agriculturists have devoted themselves to the task of producing a sugar beet which contains the largest possible amount of sugar, in the most favorable condition for extraction. It is not enough that the sugar is there, but it must be free from certain nitrogenous matters and minerals, that prevent the extraction of sugar, and have a tendency to produce molasses. To determine what variety of beet was best adapted to our climate and soil, Professor Goessmann procured samples of seeds from successful sugar beet cultivators in Germany; and, on the first year's crop, he has determined the percentage of sugar of each of the varieties employed. These results will be used as the basis of future experiments.

The sugar beet is a variety of an unsightly biennial plant, *beta maritima*, which grows wild along the coast of the Mediterranean, in Southwestern Europe; and in its present useful form, is entirely the product of cultivation. In its original condition, it is a soda plant, while the cultivated sugar beet is decidedly a potash plant. This is shown by a comparison of the analyses of the ash constituents of the cultivated and wild plant:

WILD BEET ROOT (WAY).

Potassa	30·1
Soda	34·2
Lime	3·1
Magnesia	3·2
Chlorine	18·5
Sulphuric acid	3·8
Phosphoric acid	3·5
Silicic acid	3·6
	100·0

CULTIVATED SUGAR BEET (BOUSSINGAULT).

Potassa	48·9
Soda	7·6
Lime	8·8
Magnesia	5·5
Chlorine	6·5
Sulphuric acid	2·0
Phosphoric acid	7·6
Silicic acid	13·1
	100·0

The above analyses afford one of the most striking illustrations of what cultivation can do for a plant; from a weed, abounding in soda and chlorine, is raised up one of the most valuable agricultural products known to the industry of Europe.

The report gives advice in reference to the selection of varieties of beets, and goes very thoroughly into the preparation of the soil, the proper system of manuring, mechanical appliances, time for planting, and proper treatment of the sugar beet; all of which will prove of great value to the farmers of the country. For purposes of sugar, quality, and not quantity, is what is wanted. This is shown in a comparison of the Metz fodder beet and the Silesian sugar beet. The Metz beet yields 86,457 pounds of roots to the acre, containing 3,890 pounds of sugar; whereas the Silesian beet, producing 52,787 pounds of roots to the acre, yields 7,200 pounds of sugar. The beet juice ought to contain from 11 to 13 per cent of sugar; and those who sell at the factories in Europe receive from 25 to 27 cents per hundred pounds of beets, together with one half of the vegetable refuse and press cake. Eight per cent of sugar from the beet is at present assumed to be the actual result of most factories with improved modes of operation and superior sets of apparatus; this allows from 1,520 to 2,270 pounds of sugar to the acre. In France, the yield is said to be from 1,706 to 2,650 pounds per acre. The average expenses in Germany, for the production of sugar, per acre, amount to from $132 to $133, of which the Government takes, in the form of taxes, from $45 to $46. In France, the average is $161 to $162 per acre, and the tax is $50·75. These data will enable American farmers to judge whether it will be possible for them to enter with profit upon this new industry.

After considering all the questions at issue, the report sums up the probable value of the various products of one acre of sugar beets, in New England, as follows:

Sugar, 1,500 pounds, at 7 cents	$105·00
Molasses	2·90
Press cakes	13·60
Preserved leaf mass	6·30
Manure	3·50
Total	$131·30

Every cent of increase in the price of sugar would be equal to fifteen dollars additional profit per acre.

How much the expenses of the production of the above articles, per acre, would be, must be left to experience; the author of the report does not attempt to decide the question. Taking into consideration the cheapness of our lands, the superiority of our agricultural machinery, and the freedom from Government taxation, the conclusions of the report would appear to be well founded; "That money can be made if the business be intelligently managed."

The report, comprising thirty-six large octavo pages, is one of the most valuable contributions to agricultural science that has been made in our country, and reflects great credit upon its author, Professor Goessmann, and the management of the Agricultural College of Massachusetts.

EFFECTS OF MODERN TRAVELING ON HEALTH AND LONGEVITY.

An impression has prevailed that persons traveling by the modern methods of railways and steamers assume risks not pertaining to the more common and ancient means of conveyance, and hazards exceeding those to which they are liable when remaining at home, engaged in their ordinary avocations. The accounts of railway and steamboat disasters, which appear so often in the papers, give some ground for the impression, yet the general estimate of risks involved in railway and steamer transit is undoubtedly exaggerated.

In England some investigations have been made calculated to throw some light upon this subject. In America, very little is accurately known as to the general effect of traveling upon health and longevity. At least one American life insurance company has taken the ground that traveling does not shorten the average duration of life, and therefore makes no restrictions in this particular upon those it insures.

It is obvious that where so many causes and changes are combining to affect the health of the general public, those who travel occasionally cannot be made the subjects of carefully compiled statistics; but those who are habitual travelers, employés on railroads, traveling salesmen, expressmen, etc., may be, and from the examination of the death records of such persons, a fair estimate may be made as to general effect of continued travel upon human life.

Among those who have paid particular attention to this subject in England is Dr. James O. Fletcher, of Manchester; and in France, Drs. Duchesne and Santa. From the statements of Dr. Fletcher, we learn that he has never been able to trace any disease to which habitual travelers are more liable than others. The testimony of such persons seems to establish the fact that traveling by railway is better for the health than any other means employed. An examination of railway conductors (guards) who stand for ten hours, or sit on hard seats, destitute of either cushions or springs, developed the fact that, of seventy-four, some of whom had followed the avocation for twenty years, none had suffered any permanent injury from accidents, none had rheumatism, loss of muscular power, or other diseases, supposed by many peculiarly to attend the exposure to weather and vibration, pertaining to the occupations named.

Dr. Duchesne thought he discovered among locomotive engineers a disease which he styles the mechanic's disease (*maladie des méchaniciens*), of which the symptoms are enumerated by him as "rheumatic pains, weariness, numbness, difficulty of locomotion, neuralgia, sciatica in the right side, and cramps." It would appear that this comprehensive disease of Dr. Duchesne's naming includes what are generally considered as separate and distinct ailments.

On the contrary, he states that engineers on locomotives generally get stout after two or three years of service, about eighty per cent of them showing this peculiarity, and that a general increase of vigor is noticeable. Examples of persons in delicate health recovering from their ailments upon entering this occupation, are adduced by him, and he adds that out of seventy-three engineers employed on the *Chemin de fer du Nord*, there have been scarcely ever more than two sick at once. For five months in one year there was not one sick, and one is mentioned who enjoyed perfect health for ten years in succession. It would seem that the usual health of engineers and firemen is even better than that of people in general.

As to risks to passengers, the statistics show that in Europe railway traveling is the safest of all means of conveyance. We wish we could say this of America; but, though railway way-accidents are far more frequent here than in Europe, it is probable that, in proportion to the number of people traveling by rail, there are as few killed or injured as in any other mode of traveling. The following quotation from an exchange, places in a striking light the small risks assumed by travelers on European railways:

"An Englishman's risk of dying by strangulation is 6 times as great as of being killed on a railroad, whether by his own carelessness or by an accident. If his own carelessness be excluded from the estimate, his risk of death by hanging is 130 times as great. Ninety-nine times as many people die of cancer in England as are killed on railways. Excluding, as before, the element of carelessness, 2,165 persons will die of cancer to one killed on a railroad. In England, during 5 years, 333 accidents occurred, 200 from collision, 77 from getting off the track, 36 from damage to machinery, and 20 from other causes. For 14 years, from 1855 to 1869, 1 person was killed in every 7,161,301 transported. In Prussia, 1 is killed in 24,411,488, and 1 is injured in 3,892,998. The statistics of stage coaches in France, covering a period of 10 years, show that 1 passenger in 355,463 is killed, and 1 in 29,871 is injured."

It would seem from these facts (even admitting that a large allowance must be made before they can apply to traveling in America) that the restrictions upon traveling made by some life insurance companies, are absurd; and also that the rates charged by accident insurance companies are extravagant.

A CORRESPONDENT of Forney's (Phila.) *Press* has received a circular from Hamburg, Germany, offering sand, of a peculiar color, for sale for the adulteration of clover seed.

NEW METHOD OF MAKING PAPER PULP FROM WOOD STRAW, ETC.--THE DEININGER PROCESS.

Referring to an article published in No. III., current volume, of the SCIENTIFIC AMERICAN, entitled "Waste Liquors of Paper Mills," a correspondent from Baltimore has put us in possession of the details of a new process invented by Mr A. Deininger, of Berlin, Prussia, who, we are informed, has already successfully introduced his invention in several paper mills in Prussia. The method is applicable to all kinds of vegetable fibrous material.

In the previous article referred to, is pointed out the advantage of recovering the alkali from the waste alkaline solutions, in which the raw material has been converted into pulp by boiling. The expense of chemicals in the manufacture of paper pulp from wood, straw, etc., requires the greatest economy, in order to render the business profitable. A method of recovering the alkali was mentioned as employed in a manufactory at Manayunk, Pa. Without this recovery of the alkali, the process employed would be commercially a failure, as, otherwise, the consumption of alkali would be more than could be profitably sustained. This recovery of the alkali consists essentially in the concentration of the waste liquors by evaporation and subsequent calcination. This process of recovery, however, requires expensive apparatus, and is in itself expensive.

The Deininger process, it is said, greatly lessens the amount of chemicals required to reduce the vegetable fiber to pulp, and also the amount of chemicals used in bleaching; and if its claims are really sustained in practice, it must prove of great importance in this branch of industry. Besides economy of chemicals, secured by the process, it is claimed that it yields a larger quantity, and a better quality of pulp, than processes hitherto employed.

The alkaline solution used is weak, and the material to be reduced is submitted to its action under a pressure of 60 lbs., while the solution of the material immersed in it is kept at a temperature of 210° F., so that, under the combined influence of heat and pressure, without actual boiling, the material is disintegrated, as in other methods, but without the use of strong solutions and high temperatures.

The apparatus employed is a vat capable of being hermetically sealed, and of sustaining the required pressure of 60 lbs. of steam, received from a boiler with which it is connected. At first we thought it seemed paradoxical that the contents of a vat receiving steam under a pressure of sixty pounds could be kept down to 210° F., but we are assured that the manner of admitting the steam, and the prevention of its accumulation in the top of the vat, by means of try-cocks, does keep the temperature down, while the pressure is maintained. We confess that we cannot, from the information at hand, understand how this is accomplished, but are willing to accept the statement, as this peculiarity is claimed to be a marked feature of the Deininger process, and probably the matter would prove simple enough if the details of the apparatus were fully explained.

The raw material is cut up into pieces, from one fourth to one half inch long, and then introduced in the above described vat, and steeped with a solution of soda in water, of about 1° B., heated to about 175° F. When the vat is filled with raw material, the steam is turned on, and the temperature of the contents of the vat is thereby raised from 175° to about 212° F., the vat being kept at this temperature, and under the above named pressure of sixty pounds to the square inch, for from four to six hours, and care taken that no steam shall form in the interior of the vat. A thermometer serves to regulate the temperature, and a pressure gage indicates the pressure in the vat.

By the combined action of the heat and pressure, the silicic acid, the chlorophyl, and a portion of the gelatin, are dissolved, and the horny scale, the marrow rays, and the knots of the raw material, are softened and split by the lye, while the cellular texture remains intact, thus obviating the use of the strong leys and high temperatures essential to other processes, by which the texture of the fiber is more or less injured. When treated in this manner, the fiber obtained is said to be nearly white, and can be readily bleached and used for the manufacture of paper.

The material is exposed to the above described action, for from four to six hours, when it is removed from the vat, washed in a suitable drum, and reduced to pulp, in ordinary pulp engines, with, it is claimed, but little expenditure of power.

In bleaching, the pulp is spread upon a floor, to a depth of from two to three feet, and moistened with diluted sulphuric acid of about ½° B. In this state it is left for two or three days, and during this time the acid combines with the coloring matter and gelatin still present, and the acid reaction ceases. The bleaching liquid is prepared by making a solution of chloride of lime in water, of 4° B.; and, after the clear liquid has been drawn off, it is treated with soda (using about one fourth, by weight, as much soda as chloride of lime), until all the lime is precipitated, it being essential to prevent any free lime from coming in contact with the gelatin and silicic acid, as it would adhere to the fibers, and render the bleaching process exceedingly difficult. By the addition of soda, as above stated, a solution of hypochlorite of soda is obtained, which is brought into contact with the pulp, the action of the liquid being facilitated by imparting to the mass a revolving motion, in a suitable drum, and by admitting a sufficient quantity of steam to raise the temperature to about 96° F. Under this heat, the pulp remains soft, and bleaching action becomes uniform, and the bleaching liquid is completely spent. The yield of bleached pulp is from sixty to seventy-five per cent of the raw material, according to the nature of the latter.

SUPPLY OF AIR TO COMBUSTIBLES IN FURNACES.

We lately visited the engine room of an establishment in a neighboring city, and while there, were appealed to on the part of the proprietor, as to what was the probable cause of the enormous consumption of coal in the establishment, in proportion to the power obtained. Looking out of the window, at the moment the question was put, our eye took in the outline of a gigantic shadow, dancing and flickering over the pile of old iron and rubbish which decorated the courtyard of the building. "What causes that shadow?" said we. "Oh, that is caused by the smoke from our chimney," was the reply. "Ah!" we replied, "judging from your statement of coal consumption, it is quite probable that for every hundred pounds of coal your boiler tender puts into your furnace, he puts in about sixty per cent of fuel, of which you can, at best, get only about one tenth the full value of the heat in the form of useful work, twenty per cent, or thereabouts, of cinder, ashes, and slate, and twenty per cent of shadow. That shadow costs a good deal of money, my friend, and perhaps there is even less fuel and more shadow than the proportions made in our rude guess."

In the subsequent conversation we found this gentleman entirely ignorant of the amount of air necessary to support combustion of various fuels, and when we told him it would take about 150 cubic feet of air to completely burn every pound of carbon he put in his furnace, he exclaimed, "Well, really, I don't believe my furnace has draft enough." Yet it had draft enough and to spare, only the air was not admitted so as to reach the combustible in right quantity, and at the time and place when and where the fuel was at the right temperature to unite with the oxygen. It was all admitted from the front, and the products of distillation, one of the first effects of heating coal, passed off without their share of oxygen, as smoke, or carbon suspended in a gaseous medium.

We have said enough about the importance of bringing air into contact with the heated gases in furnaces, and do not intend to repeat the lesson at this time. The conversation, however, led us to think of the probable general want of information among steam users, as to the proportions of air required to completely consume various kinds of fuel, and the temperatures at which, as above, combustion takes place, and below which there must necessarily be imperfect combustion, and more or less distillation, and consequent waste of fuel.

The fuels in general use are mineral coal, coke, wood, peat, and charcoal, mentioned in the order of their importance as steam producing fuels. To burn a pound of mineral coal, of average quality, requires all the oxygen contained in 147·6 cubic feet of common air at 60°. Coke requires a supply of 134·3 cubic feet of air, at 60°, to consume one pound. Wood of average dryness and quality requires 64·5 cubic feet of air for the combustion of one pound. Peat requires 81·3 cubic feet of air per pound of the fuel. Charcoal requires 147 cubic feet of air for each pound consumed. These figures make no allowance for waste, but suppose the chemical combination of the oxygen with the carbon and hydrogen of the fuel, to be absolutely perfect and complete, before a particle of either passes through the uptake. This is hardly ever the case. In the instance alluded to at the commencement of this article we have no doubt the amount of air admitted was 250 cubic feet per pound of fuel; but the contact with the heated fuel was not sufficiently intimate to effect perfect combustion before the gases and vapors had cooled to a point below which combustion cannot take place. In fact, the practical rule has been adopted—so great is the waste in most cases—to make the supply of air twice what is needed to theoretically consume the fuel. The gases and vapors distilled from coal will not burn below a temperature of from 900° to 1000° Fah., a temperature much higher than usually exists in the uptakes of the furnaces of steam boilers. Besides, the combustion, to be of full utility, ought to be rendered as complete as possible in the furnace under the boiler, and should not extend into the uptake at all.

As general principles, it may be stated that the greater the amount of air admitted, beyond the theoretical quantity required for perfect combustion, the greater will be the loss of heat through the uptake; that the greater the amount below the theoretical quantity, the more partial, slow, and incomplete will be the combustion on the grate, and the greater will be the loss of fuel through the uptake, provided air enough be admitted to maintain a combustion of sufficient intensity to distil over the fuel; and, lastly, that the less perfectly the air is brought into contact with the gaseous and vaporized combustibles beyond the grate, while they are hot enough to burn, the greater will be the loss of fuel through the chimney.

We shall not extend this article by a discussion of the proper methods of introducing air behind the bridge walls of furnaces, for the consumption of smoke. These topics have already been discussed, theoretically and practically, in this journal. We would, however, close by urging upon all men who use steam, to provide themselves with some convenient and handy book of reference on the subject of heat, and to inform themselves thoroughly in regard to all the practical details concerning its application to the production of mechanical power. For this purpose, we have no hesitation in recommending Box's "Practical Treatise on Heat," published by Henry Carey Baird, of Philadelphia, as the best work on the subject extant.

BRICK MACHINE CHALLENGE.—In our advertising columns, last week, Messrs. Wright & Winn, of Lock Haven, Pa., threw down the gauntlet to brick machine manufacturers in the United States. Here is a chance for a sharp and decisive competition.

PAPER HANGING.

Again the season has arrived for the renovation of dwellings, in which process the operation of paper hanging is one of the most prominent. In cities, this is either a trade by itself, or is carried on as an adjunct to the painter's trade. In rural districts, however, there are many housekeepers who are obliged to do this work for themselves. We shall, therefore, not attempt to adapt the present article to the wants of the professional paper hanger, but to those of the general reader.

The first thing to be thought of is the selection of paper hangings. In purchasing, every one, of course, tries to secure that which is most in accordance with good taste and with the means of the buyer. No specific directions can be given on this head, but it is a doubtful economy to let a difference in price, of a few cents a roll, lead to the purchase of a very inferior article, that will not only give great trouble in hanging, but will be an eyesore so long as it disfigures the walls upon which it is hung.

The paper being purchased, the walls should next be looked to, in order to be sure that they are in proper condition to hold the paper. A new unwhitewashed wall will absorb the paste so rapidly that, before drying, there will be left too little body of paste on the surface to hold the paper. A coating of good glue size, made by dissolving a half a pound of glue in a gallon of water, or a coating of good paste, put on and allowed to dry before the paper is hung, will provide for this difficulty.

If the wall be whitewashed, it should be scratched with a stiff brush, to remove every particle of loose lime from the surface; after which it should be thoroughly swept down with a broom, and coated with the glue size or thin paste.

A long table of thin boards cleated together and placed on wooden horses, such as are used by carpenters, a pair of sharp shears—with long blades if possible—a whitewash brush, a pail for paste, and a yard of cotton cloth, are the implements required. The table or board platform should be level on its upper surface to facilitate the distribution of the paste. The latter should be free from lumps, and should be laid on as evenly as possible. It should be made of good sweet rye or wheat flour, beaten smooth in cold water before boiling, and should not be allowed to boil more than a minute or two, but should be raised to the boiling point slowly, being continually stirred till it is taken from the fire.

Inexpert hands often find difficulty in making the patterns match in the juxtaposed pieces. No general directions can be given for this, but a little study at the outset will often save cutting to waste, and other difficulties. In this matter, as in others, it is wise to "first be sure you are right, then go ahead." As soon as the proper way to cut the paper is decided upon, a whole roll, or more, may be cut at once, and the pieces laid, printed side downwards, upon the table, weights being placed upon the ends to prevent curling. The paste should then be applied to the back of the uppermost piece, as expeditiously as possible, as the longer the time employed in this part of the operation, the more tender will the paper get, and the more difficult it will be to lay it properly.

The upper end of the piece should then be taken by the corners, and the operator, stepping upon a bench or step-ladder, should barely stick the piece at the top, and in such a manner that the edge shall coincide with the piece previously hung; this can be done by sighting down the trimmed edge of the piece, while it is held in the hands. The cloth should now be held in a loose bunch, and the paper smoothed with it from top to bottom, care being taken to work out all air from under the paper, which, if not thoroughly done, will give it a very unsightly blistered appearance.

If the wall be uneven or crooked, as is often the case in old houses, it will be difficult to avoid wrinkles, but they can be mostly got rid of, by cutting the paper and allowing the cut edges to lap over each other, in places where there would otherwise be a wrinkle.

By following these directions the most inexperienced will be able to do a reasonably tidy piece of work, but of course much skill is only secured by practice.

AN "ANCIENT AND FISH-LIKE" STRANGER—THE "ICHTHYOSAURUS," OR FISH LIZARD.

The scientific man is often at a loss to tell whether he is most astonished at the remarkable credulity, or at the no less extraordinary incredulity, that characterizes ignorance. Let the showman set up a palpable hoax, like the fish with legs, or the Cardiff giant, and people will freely pour their fifty-cent stamps by the thousand into the cash box of the exhibitor; but let a geologist exhibit and undertake to say a few words concerning the veritable bones of a genuine extinct animal, and of the habits of the ancient monster, and folks will scarcely deign to listen to him, or, listening, will not be induced to believe. They very generally succeed in placing their faith upon the wrong object.

There has been on exhibition, during the past week, at the College of the City of New York, a remarkably interesting specimen of the skeleton of the ichthyosaurus, or fish lizard; a creature which abounded in the seas that covered Europe during the middle ages of the earth's geological history, but which has altogether disappeared since that time. The first question that naturally suggests itself to the popular mind regarding this specimen, is: Is it a genuine fossil, or is it made up by human ingenuity? and the next that will occur to persons ignorant of geology, will be: Were these bones ever the framework of an actually live animal? To the first question, we reply, even setting aside the endorsement of authenticity which the specimen has, we believe, received from an eminent German geologist (it being from Germany): that it presents to the cursory examination of one who has had considerable experience in such specimens, every appearance of being a perfectly genuine fossil. Of course, there is no doubt that the bones are all actual bone; they are not plaster casts; the only question would be whether any bones not belonging to this individual, have been added to make the skeleton appear more complete. Such tricks are well known to the trade, and more than one great authority has been before now grievously misled by such injurious reconstructions. We have every reason to think that, in this case, all the parts undoubtedly belong to one individual ichthyosaur; why we lay stress on this, we will presently explain.

Next: Is this the skeleton of an animal that ever actually lived? Of this really few in these days would be so foolish as to doubt; but we may say that Nature must have carried out her scheme of hoaxing mankind in a remarkably complete manner, if these bones are but her sports, since she leaves between the ribs traces of food, and of food precisely such as we should credit an animal of this particular structure with devouring. Nay, even in the hard fæces (coprolites) of these creatures which occur, associated with their remains, in abundance in some parts of England, we find the evidences of the form of the intestines and impressions of the "minute vessels and folds of the mucous membranes by which they were lined!"

Here, then, we have an authentic specimen of the skeleton of a creature of strange structure, embodying characters the analogues of which are now to be found separately in the fish, the saurian, the ornithorynchus (or duck bill) of Australia, and the whale, laid out before us in the ooze of a sea, in the waters of which this creature lived, long before the Andes, the Rocky Mountains, or the mighty Himalayas had been raised out of the ocean's depths. This age of the specimen before us alone overwhelms the mind with astonishment; but how much more suggestive is it that, after the lapse of these unnumbered ages, man should be able to indicate the affinities of this creature to forms still existing, in such manner as to fix exactly the place it occupied in the system of animal life! Who could desire a more striking illustration than is afforded by the ichthyosaur, of the uniformity of design, combined with an endless diversity of execution, that pervades the entire scheme of creation?

We sincerely trust that this fine specimen (for it is not only far above the average degree of perfection amongst such fossils, but also above the general average of size of anything like well-preserved individuals) will be secured by the public for educational purposes, and that it will be placed where it will be accessible to all—to the young and the old, the poor as well as the rich. Such a specimen is especially invaluable in the education of the youthful mind. In the first place it is truthful; the teacher can say "these are genuine bones, and the bones lie there much as when the flesh perished from them." There is no need, with such an object, of roundabout explanation or of mental reservations. The child will not be misled by any false representation or actual deception; and our strong impression is, that with children, a single good downright truism, even in stone, is morally worth a whole host of the most ingeniously devised substitutes. Let children be told that the shale in which the bones are imbedded is the actual mud of an ancient sea bed; let them learn where this sea was, interest them with an account of the habits of these creatures, and of the creatures with which they were associated, and their minds will conceive vividly that the earth has had a history—a history as interesting as it is vast, opening up new views of the completeness and perfection of nature. By this means, these dry and ancient bones may be made to do efficient service to the community, for they will promote the cause of truth, and aid in freeing us from the multitudinous humbugs that thrive upon general ignorance.

The New Steamship "Oceanic."

This new steamship arrived from Liverpool, at this port, on Tuesday, March 28th. Since the *Great Eastern* left these waters, nothing has been seen to rival the *Oceanic* in size. Her length is 432 feet, breadth of beam 41 feet, depth of hold 33 feet, entire burden 6,000 tuns, engines 3,000 horse power, and she draws, at the load line, 25 feet of water. Her four masts tower above all the shipping on the Jersey side, and the flags at their heads can be seen from the corner of Chambers street and Broadway. The *Oceanic* was built by Harland & Wolff, of Belfast, and five other vessels of equal tunnage, power, and equipment, named the *Atlantic, Baltic, Pacific, Arctic*, and *Adriatic*, will follow during the year from the same yard. The decks are entirely of iron, cased above and below with wood, and she is furnished with that "great Yankee improvement"—a straight stem. The saloon is elegantly finished and upholstered. Four large tables run the entire length, with seats cushioned in magenta-colored silk velvet, and the whole saloon is resplendent with silver plating and mirrors. Two coal grates with marble mantles, surmounted by delicately-fashioned bronzes, are in the aft end near the entrance doors. Between these stand the library and secretary. The ladies' cabin, 10 by 18 feet, situated on the starboard side, directly aft of the saloon, is upholstered in green velvet. The smoking room—finished in buff—on the spar deck, affords from the windows a complete view of the decks. The state rooms have perfect ventilation, which those lying in the upper berths have it in their power to control. Each state room is furnished with eight life preservers. An electric bell, leading to the steward's room, is fitted to every sleeping berth.

These vessels are undoubtedly the largest, handsomest, and best furnished of any now plying in the trans-Atlantic service.

NEW BOOKS AND PUBLICATIONS.

ANNUAL OF SCIENTIFIC DISCOVERY; or, Year-Book of Facts in Science and Art, for 1871. Exhibiting the most Important Discoveries in Mechanics, Useful Arts, Natural Philosophy, Chemistry, Astronomy, Geology, Biology, Botany, Mineralogy, Meteorology, Geography, Antiquities, etc. Edited by John Trowbridge, S.B., Assistant Professor of Physics in Harvard College, aided by W. R. Nichols, Assistant Professor of Chemistry in Massachusetts Institute of Technology, and C. R. Cross, Graduate of the Institute. Boston: Gould & Lincoln, 59 Washington street. New York: Sheldon & Co. London: Trubner & Co.

This volume contains the usual summary of advances made in the respective departments named in its title. The character of this annual is too generally known to render it necessary for us to dwell upon it. The present volume records no very startling discoveries or very remarkable inventions. In this respect the past year has been uneventful. But a good deal of steady progress in science, and many improvements in the arts of that kind, which, though they do not revolutionize processes, still greatly aid in industrial progress, have been made. The volume for 1871 fully sustains the character which in previous issues has won for this annual, great popularity and a wide circulation.

WHAT I KNOW ABOUT FARMING. By Horace Greeley. Published by the Tribune Association. New York.

We are indebted to the distinguished author for a copy of the above volume. It is dedicated "To the man of our age who shall make the first plow, propelled by steam or other mechanical power, whereby no less than ten acres per day shall be thoroughly pulverized to a depth of two feet, at a cost of not more than two dollars per acre." The work itself contains 321 pages of very instructive matter upon almost every aspect of farming as viewed by the author, who is a veteran thinker and observer; and we are quite sure that whoever procures this work will peruse it with interest, and gain thereby, not only much information, but will get a new idea also of the versatile character of Mr. Greeley as a writer and thinker. The force of Mr. Greeley's dedication to the coming steam plow man is rendered obvious by the fact that there are three thousand such plows in England and less than a dozen in this country.

THE HUMAN FEET; their Dress and Care, showing their Natural, Perfect Shape and Construction; their Present Deformed Condition; and how Flat Feet, Distorted Toes, and other Defects are to be Prevented or Corrected, with Directions for Dressing them elegantly, yet comfortably, and Hints upon various matters relating to the whole subject, with Illustrations. 12mo, 202 pp. Price, $1·25. New York: S. R. Wells, 389 Broadway.

The object of this book is to teach the reader how to treat and dress the feet that there may be no more corns, bunions, aches, or pains. It is possible to have sound feet on sound bodies, and this work sho s how. Written in a plain, practical manner, with physiological and me hanical illustrations, it is at once scientific, philosophical, and instructive.

THE QUARTZ OPERATOR'S HAND-BOOK. By P. M. Randall. Revised and Enlarged Edition. New York: D. Van Nostrand, Publisher, 23 Murray street and 27 Warren street.

This is a plainly-worded, practical treatise upon the machinery necessary in quartz mining, assaying, and testing metals and ore, analysis of ores containing special substances, the use of the blowpipe, examination of minerals, treatment of gold ores in the different ways employed for reducing such ores, species, formation, exploration, and exploitation of mineral veins ventilation of mines, silver, its ores, their analysis, assay treatment in reduction, etc., etc. The directions given are of the kind suited to the practical miner in the system of mining most prevalent in the rich mineral districts of the United States. A good work, and one largely needed by practical miners.

WORCESTER CO. FREE INSTITUTE OF INDUSTRIAL SCIENCE. Addresses of Inauguration and Dedication, Worcester, November 11, 1868; Memorial Notice of John Boynton, Founder of the Institute; Memorial Notice of Hon. Ichabod Washburn, Founder of the Practical and Mechanical Department, Worcester. Printed by Charles Hamilton, *Palladium* office.

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, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—CLEANING VIOLIN.—How can I best remove, from the belly of a violin, the coat of rosin which has accumulated on it, without injury to the varnish or the instrument?—G. D.

2.—CLEANING GUNS.—What is the most convenient and practical method of cleaning a gun, either at home or in the field? I find the old way, with rod and water, and the use of tow or cotton for drying, rather a tedious and disagreeable process; especially inconvenient, too, when one is hunting where no water is to be had.—G. D.

3.—MAGNET AND BATTERY.—Can a magnet be made, that will draw its keeper to the poles, from a distance of five or ten inches? How can I make a cheap but very powerful battery?—W. B. F.

4.—SCREW PROPELLER.—Will a screw 3 feet in diameter, made of ¼ inch boiler iron, propel a canal boat three or four miles per hour? and will two or three such screws work well side by side?—S. C.

5.—VARNISH FOR GUN BARRELS.—Will some one tell me how and what to use in making the stain or varnish used on gun barrels, and how to apply it properly when made?—D. M. S.

6.—FURNITURE VARNISH.—The recipe given, in answer to my query, on page 9, current volume, for a cheap furniture varnish makes, I find upon trial, a varnish that will not dry. Will some one correct it, or give me a recipe that will work?—B. H.

7.—MATCHES.—Will some one give me a recipe for composition for lucifer matches, and directions how to make them?—B. H.

8.—VERMILION VARNISH.—We wish a recipe for a nice vermilion varnish to varnish edge tools, one that will dry quickly.—B. & Co.

9.—LEAKY SHINGLED ROOF.—How can I remedy the leaking of a shingled roof, that is a little too flat? Is there any composition that can be applied for this purpose? I want something cheap, simple, and durable.—S. R.

10.—MILL SPINDLE JOURNAL.—The mill spindle journal, suggested by B. and W. in answer to my query, is without objection; but it is hardly applicable to my case, as my mill is a cast iron one, with the grinding surface and journal in one piece, and the latter made large and filled with soft solder.—H. A. S.

11.—TELESCOPE.—I want to construct a telescope of sufficient power, for instance, to observe the planet Saturn and its satellites; what lenses do I require, and what are their focal lengths? Should they be fixed in tin or wooden tubes, and what should be the construction of the eye piece?—W. B.

12.—PICKLE FOR CASTINGS.—What is the best pickle for cleaning castings, preparatory to galvanizing them with zinc, tin, and lead What work gives the best information on this subject?—J. R. P.

Recent American and Foreign Patents.

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

CULTIVATOR.—Jacob S. Thomas, Mifflintown, Pa.—This invention consists in the combination of shanks, having shovels attached at their lower rear ends, and pivoted themselves at their upper front ends to the sides of the cultivator beam, with a bar, having in its under side as many grooves as there are shanks, and placed upon the latter crosswise of them, and of the beam, on which it is adjustable lengthwise, for the purpose of producing a contraction or expansion of the shanks with reference to each other.

FRUIT-GROWERS' CHECK AND HOLDER.—Andrew A. Baker, Camden, Del.—This invention consists of a box, provided with a number of vertical fingers, for holding metallic checks, which are stamped with the abbreviation "qts.," or other denomination in dry measure, and with numerals, which signify number of quarts, and are intended for fruit-growers' use, to be delivered by them to their fruit pickers and canners in lieu of money.

PLASTIC COMPOUND FOR SADDLETREES, STIRRUPS, GUNSTOCK, ETC.—Ernst B. Newman, St. Louis, Mo.—This invention consists in a saddletree, molded from a certain plastic composition, and hardened by drying or exposure to the air.

HAY RAKE.—John F. Henkle, Fredericktown, Mo.—This invention has for its object to furnish an improvement in that class of horse hay rakes, in which the rake-head is jointed to adapt it to the inequalities or undulations of the surface of the ground; and the invention consists in the peculiar arrangement of caster wheels with the jointed rake head.

BURNER FOR LAMPS.—Charles B. Mann, Baltimore, Md.—This invention relates to an improved safety-filling tube, and a wick tube, for kerosene lamps, designed to prevent the frequently recurring explosions of the same, and the loss of life and property occasioned thereby.

EXCAVATOR.—Barna T. Stowell, Quincy, Ill.—This invention relates to an improvement upon the machine for which letters patent of the United States were granted to same party November 17, 1868. It aims at combining simpler means of cutting or digging in the earth, and elevating the portion thus loosened, and consist of a toothed digger, and an endless chain which rotates said digger, and carries the loosened earth up an inclined plane to the horizontal apron or conveyer, by means of scrapers attached to it (the chain) in a suitable manner.

SUBSOIL PLOW.—Joseph R. Morris, Houston, Texas.—This invention consists in a shaft bearing spades, and combined with plows located in front thereof, and arranged so as to cut furrows, so that the shaft and spades, at the rear end of the same frame which carries the plows, may penetrate beneath the surface of the earth and pulverize the subsoil, said shaft being connected with the interposed gearing in such manner as to revolve against the line of motion of the frame and master wheels.

SADDLE BAG.—A. M. Leslie, St. Louis, Mo.—This invention consists in so cutting or forming, and so applying a plate of leather to the metallic cases of saddle bags employed for containing medicines and other articles, that while it encloses and protects said cases, it forms also the hinge between them, so that convenient and ready access may be had to the interior of the cases, and certain other advantages may be secured.

OXY-HYDROGEN CUPOLA OR FURNACE.—J. R. Morris, Houston, Texas.—This invention relates to a cupola or furnace, in which a water chamber more or less completely encloses the fire chamber, and absorbs therefrom all the heat that would otherwise be wasted, by which absorption of heat steam is generated in the water chamber, whence it rises into a steam chamber, inclosing the fire chamber above the water chamber, in which upper chamber the steam is superheated, and from which its own pressure forces it (by the only outlet afforded) through vessels loosely filled with iron scraps, or filings, said vessels being placed either within or next to the fire chamber, and their iron contents being consequently heated to redness, so that the contact of superheated steam therewith results in decomposition of the latter into oxygen and hydrogen, the former of which, uniting with the iron, forms oxide of iron—a merchantable article—while the hydrogen rushes into the fire chamber, mingles with the ignited fuel therein, and not only burns itself, thereby increasing the amount of heat, but also attacks and drives off the impurities in the iron and coal.

STEAMING APPARATUS.—Otto Lehmann, Columbus city, Iowa.—The object of this invention is to provide efficient and convenient means for generating steam for domestic purposes, for instance, for cooking feed for animals, steaming grain, heating water for washing, and other purposes.

GRATE BARS.—Capt. William H. Farris, Cairo, Ill.—This invention has for its object to furnish an improved grate bar, for the furnaces of steam boilers, which shall be so constructed as to allow water to circulate through it and the boiler, to protect the bars from the intense heat of the fire, and to assist in heating the water and generating steam.

HAND TURNING AND BORING MACHINE.—J. F. Finger, Wilmington, N. C.—The object of this invention is to provide suitable and convenient means or turning and repairing wrist pins in steam engine and other cranks, and also for boring out cranks, or "trueing" the wrist pin holes.

WASHING MACHINE.—Edwin Knock, Vermont, Ill.—This invention has for its object to furnish an improved washing machine, simple in construction, effective in operation, and convenient in use.

APPARATUS FOR DRAWING BEER, ETC.—Jacob Van Norman, Easton, Pa.—This invention has for its object to furnish an improved apparatus, simple in construction, convenient in use, and effective in operation, by means of which hydraulic pressure may be employed to force air automatically into the cask to take the place of the beer, as it is withdrawn from said cask, so that the last beer drawn from the cask may be as good as the first.

LIQUID INHALER.—Richard M. Moyle, M. D., New York city.—This invention has for its object to furnish a simple and convenient apparatus for inhaling liquid preparations for the treatment of catarrh, colds in the head, and other diseases, and which shall be so constructed as to cause, when in use, no undue pressure in the passages.

NAIL PLATE ROLLING.—Orville C. Dewey, Joseph Dudley, and Frederick Linderman, Wheeling, Va.—This invention has for its object to furnish an improved attachment for the finishing rolls for finishing nail plates, which shall be so constructed as to remove the necessity of turning the end of the plate between the rolls by hand, and which shall be simple in construction and easily applied and operated.

SHEET-METAL FRUIT CANS.—C. F. Sturgis, Buena Vista, Ala.—This invention has for its object to furnish an improved fruit can, made in parts, so that it may be conveniently nested for transportation, and that the parts may be easily put together by the user of the can, and which shall, at the same time, be readily and cheaply made, and without waste of the material.

TENSION GUIDE FOR SEWING MACHINES.—Edwin L. Crumb, Southwest, Pa.—This invention relates to an improvement in the construction of the guide pin which is attached to the needle bar of a sewing machine, for guiding the thread to the needle.

MORTISING CHISELS.—E. McConnell, Sharon, Pa.—This invention has for its object to furnish improved mortising chisels, which shall be so constructed that they may be used for mortising rectangular or dovetailed mortises without reversing, and which will draw its own core while cutting the mortise, thus saving time and labor.

COMBINED SAWING MACHINE.—Pierson Jacobus, Romulus, N. Y.—The object of this invention is to combine in one compact and portable machine two valuable and indispensable machines, whereby much expense in construction is saved, while each machine is perfect in itself; the two being so constructed that they may be used separately, or both at the same time.

CLOTHES DRYER.—August Stechschutt, Glandorf, Ohio.—This invention relates to a new and useful improvement in clothes drying apparatus, and consists in a series of arms, jointed to centers around an upright revolving post, or stand, connected together by lines, and arranged to be raised and wered by means of other lines and cords.

GRAIN DRILL.—Jesse W. Craven and Albert Clarke, Center Valley, Ind.—This invention relates to improvements in grain drills, and it consists in a triangular, adjustable frame, similar to harrow or cultivator frames, mounted on a guide wheel and slide operating wheel, with drills arranged in the order of cultivator teeth, on which frame is a hopper and dropping apparatus, of novel construction, with spouts leading to the drills. It also consists in an improved arrangement of adjusting apparatus, for spreading or contracting the machine, and an arrangement of the drill opening devices, for holding them above the ground when moving the apparatus along on the wheels, where the sowing is not to be done.

MANUFACTURE OF WHITE LEAD.—Ludwig Brumlen, Hoboken, N.J.—This invention has for its object to effect an uniform and thorough distribution of the carbonic acid through the entire quantity of the solution being operated upon.

WASHING MACHINE.—Elias Crick, Phillipsburg, N. J.—This invention has for its object to furnish an improved washing machine, simple in construction, effective in operation, and easily operated.

COMBINED HAY RAKE AND TEDDER.—Charles La Dow, South Galway, N. Y.—This invention has for its object to furnish an improved combined hay rake and tedder, which shall be simple in construction, easily operated, and effective in operation, doing its work equally well in either capacity.

CANDLE MOLDING MACHINE.—Joseph Wales, New York city.—This invention relates to improvements in machines for molding candles, and it consists in improvements in the lifting rods used for closing the molds when the melted substance is poured in, and for lifting them out, whereby the inventor is enabled to make candles of different lengths in one machine; also in packing the pistons around the holes for the wick. It also consists in a novel construction of the clamping apparatus used for receiving the candles when lifted on it to the molds, holding them till the next batch is molded, and then removing them. It also consists in certain details of construction, in relation to the application of the molding tubes to the supporting plates, and to the introducing and drawing off of the water employed for cooling the molds.

HOISTING APPARATUS.—Elias Ziegler, Harmony, Pa.—This invention relates to improvements in hoisting apparatus, for lifting heavy stones and other heavy weights, and it consists in an improved grappling tongs.

FLOWER STAND.—Garrett Erkson, Brooklyn, N. Y.—This invention relates to a new and useful improvement in stands for supporting flower pots, whereby the stand is made both convenient and ornamental.

ROCK DRILL.—J. M. Stevenson, Pendleton, Ind.—This invention relates to a new and useful improvement in drills for boring rock, and consists in the mode of raising, releasing, and revolving the drill.

SHOVEL.—I. W. Denning, Alleghany, Pa.—This invention relates to a new and useful improvement in shovels, of the kind used for feeding stoves with coal, and for taking up ashes, but applicable to other kinds of shovels, whereby they are made with less expense, and are more durable than when made in the ordinary manner, and it consists in the mode of attaching the shank to the blade.

CHURN.—G. S. Perfater, Camp Point, Ill.—This invention relates to improvements in churns of that kind in which a twisted dasher rod is employed, the vertical movement of which, in a narrow slotted guide, will produce rotation of the dasher.

CULINARY VESSEL.—Peter Boesen and Michael Bedessem, Kenosha, Wis.—This invention relates to a new culinary vessel, which has for its object to enable the treatment of food by a suitable process, and of several articles of food in one vessel.

ANTI-FRICTION BALANCED VALVE.—William Seifert, New York city.—This invention relates to a new construction of valve for regulating the admission of steam to the ports of a cylinder, and consists in the use of a tubular rock valve, which, containing the steam within its bore, will thereby be fully balanced throughout, and operate without friction.

FIRE-ARMS.—S. S. Hopkins, Norwich, Conn.—The object of this invention is to improve revolving fire-arms in such manner that the cylinder can be readily cleaned and charged, without requiring its detachment, or that of the base pin, from the stock or barrel. The invention consists in providing a pivoted link at the end of the stock or frame for holding the base pin, while the same is withdrawn from the cylinder, allowing it to be moved laterally and brought in line with the chamber of the cylinder to be cleaned. This link contains a stop, whereby the pin is prevented from being entirely withdrawn.

LIQUID METER.—Anna Buettner, New York city.—This invention relates to a new apparatus for measuring the quantity of water or other liquid flowing through the same. The invention consists in the combination of a pair of floats, with a swinging box containing mercury, and with a swinging trough or distributing vessel. The floats serve to oscillate the mercury vessel, which, by the motion of the quicksilver, will rapidly change the positionn of the trough, and the consequent distribution of water.

DEVICE FOR PIERCING AND LINING EAR LOBES.—W. C. Edge, Newark, N. J.—The object of this invention is to provide a device whereby ladies' ear lobes can be readily perforated, and the apertures lined, so that the same cannot grow up or be torn out.

CUT-OFF ATTACHMENT TO SLIDE VALVES.—Thomas Sault, New Haven, Conn.—This invention relates to a new automatic valve, which is applied to the aperture or port of an ordinary slide valve, to close the same at the required time, and thereby regulate the admission of steam to the cylinder. The invention consists chiefly in the application to the ordinary slide valve of a secondary hinged valve, which closes the steam port in the former, and holds it closed for a greater or less part of the stroke, according to the velocity of the governor.

SKATE.—Moses Kinsey, Newark, N. J.—This invention relates to a new means of securing skates to the heels and soles of boots or shoes, and consists in the use of perforated ears or jaws, which project from the foot support of the skate.

PLANING MACHINE.—Charles Levey, Toronto, Canada.—This invention has for its object to improve the construction of planing, matching, molding, and other wood-working machines, so as to enable them to be more readily adjusted, and so as to make them more effective in operation than machines constructed in the ordinary manner.

DRAWER PULL.—Joseph Kintz, West Meriden, Conn.—This invention relates to improvements in that class of drawer pulls, in which the handles are jointed to a shank, so as to hang downwards therefrom, the shank being attached to the drawer, and it consists in the employment of a ball and socket joint for connecting the handle, the socketed part, which is on the shank in this example, having a notch at the lower side, into which the stem which connects the ball with the handle swings when suspended. The invention also consists in the construction of the escutcheon plate of the shank, to which the handle is connected, of an iron or other cheap metal base, and a covering of thin soft metal spun upon or otherwise attached to the base, and having the socket for the ball formed on or attached to it.

BEE HIVE.—Philip Nicolls, Lindsay, Canada.—This invention relates to a new bee-hive, which is so constructed as to be useful during the hot and cold seasons, and readily inspected whenever desired.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

APPLICATIONS FOR LETTERS PATENT.

608.—BOXES, CARTRIDGE CASES, ETC.—Chas. S. Wells, Springfield, Mass. March 7, 1871.

610.—APPARATUS FOR ARRESTING THE MOTION OF RAILROAD TRAINS.—F. R. Schettler, New York city. March 7, 1871.

633.—APPARATUS FOR RETAINING, ADJUSTING, AND SEWING UMBRELLAS AND PARASOLS.—W. A. Drown, Jr., Philadelphia, Pa. March 9, 1871.

635.—REDUCTION OF IRON ORES.—T. S. Blair, Pittsburgh, Pa. March 10, 1871.

640.—RUBBER COMPOUND FOR STEAM PACKING.—M. A. Sutherland, Passaic, N. J. March 10, 1871.

APPLICATIONS FOR EXTENSION OF PATENTS.

MANUFACTURE OF IRON.—William Kelly, Louisville, Ky., has petitioned for an extension of the above patent. Day of hearing, June 7, 1871.

MACHINE FOR MAKING HORSESHOES.—James A. Burden and I. Townsend Burden, of Troy, N. Y., have petitioned for an extension of the above patent. Day of hearing, June 14, 1871.

ELASTIC GORE CLOTH.—Charles Winslow, of Lynn, Mass., has petitioned for an extension of the above patent. Day of hearing, July 19, 1871.

TRUCKS FOR LOCOMOTIVES.—Levi Bissell, New York city, has petitioned for an extension of the above patent. Day of hearing, July 19, 1871.

TYPE SETTING AND DISTRIBUTING MACHINE.—Henry W. Alden, New York city, has petitioned for an extension of the above patent. Day of hearing, August 30, 1871.

EXTENSION GAS TUBES.—Charles Monson, New Haven, Conn., has petitioned for an extension of the above patent. Day of hearing, August 23, 1871.

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.

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Carpet Rag Cutters.—Persons having a Machine for sale address L. Mooney, Allegheny City, Pa.

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Superintendent Wanted.—An energetic man, capable of superintending a factory. Must have a general knowledge of mechanics. One familiar with the manufacture of horn, shell, or vulcanite preferred. The very best reference required. Address "Horn," P. O. Box 2874,New York.

Machinery for the manufacturing of all of kinds of Rubber Goods, made by W. E. Kelly, New Brunswick, N. J.

Peteler Portable R. R. Co. contractors, graders. See adv'ment.

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

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Wanted.—Descriptive Catalogue and Price List of any machinery that can be applied to the manufacture of church organs. Address H. L. Roosevelt, No. 5 Bedford st., New York.

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.

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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.

Self-testing Steam Gage. There's a difference between a chronometer watch and a "bull's eye." Same difference between a self-tester and common steam gage. Send for Circular. E. H. Ashcroft, Boston, Mass.

American Boiler Powder Co., Box 315, Pittsburgh, Pa., make the only safe, sure, and cheap remedy for "Scaly Boilers." Orders solicited.

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E. Howard & Co., Boston, make the best Stem-winding Watch in the country. Ask for it at all the dealers. Office 15 Maiden Lane, N. Y.

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

Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau st., New York.

Peck's Patent Drop Press. For circulars address the sole manufacturers, 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.

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.

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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., Fair Haven, Conn.

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

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.

2d-hand Worthington, Woodward and Novelty Pumps,Engines 25 to 100 H. P., 60 Horse Loc. Boiler. W. D. Andrews & Bro., 414 Water st.,N.Y.

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

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Facts for the Ladies.

W. Kelly, of Amsterdam, N. Y., earned with a Wheeler & Wilson, in fourteen years, $14,564, making coats. An average of more than $20 a week.

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.

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Answers to Correspondents.

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

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

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

SUPERHEATING STEAM.—For P. W. G.'s benefit, I will say that I have put up many superheaters (on Carvalho's plan), for various operations of boiling, heating, drying, etc., as well as for power. I place the superheaters under the boiler, a few feet behind the bridge wall, and support them so that they will be moderately and uniformly heated. The steam superheated to 400°, as shown by the pyrometer, may then be carried long distances without very much condensation (none at all if the pipes are covered), and then used in the cylinder with very great advantage. No water settles in the latter, and the action of the piston is quick and unembarrassed. The saving in fuel is considerable (where boilers work water), amounting to 20 to 25 per cent or more, and more power is obtained with a less pressure of steam than where ordinary steam is employed. The superheating is uniform, and easily regulated.—H. W. B., of N. Y.

SILVERED ARCS.—Let B. G. substitute nickel-plated arcs for silvered ones on his mathematical instruments, and he will never be troubled with tarnishing. He can have the arcs replated if he wishes, without injuring them in the least.—G. L. S., of N. Y.

A. H. A., of Mich., writes us that "a gallon or two of black oil, put into a boiler, before filling, will loosen and prevent incrustation. If a small quantity be occasionally pumped in with the feed water, the boiler is easily kept clean. Is there danger attending the use of oil in that way? A great many are using it, and would like to, if there be no attending danger." We see no cause for apprehension in the use of "black oil" for this purpose.

TEMPERING OLD FILES.—If your querist will grind out the cuttings on one side, he will then have a bright surface; then damp the said surface with a little oil: then lay the file on a piece of red-hot iron, bright side upwards. In about a minute he will see the bright surface turning yellow; and when the yellow has deepened to about the color of straw, plunge in cold water. He must not put any more files in the fire.—E., of Ohio.

PULVERIZED SOAP.—Hard bar soap should be scraped or planed into fine shavings, dried in the sun, or by heat, thoroughly, and then pounded or crushed. After this, it should be placed in a bowl or kettle, and a small cannon ball should be used to pulverize it; and it may then be sifted through a very fine sieve. This is the way that my father made shaving powder, in 1842; and he received a medal for the preparation, from the King of Prussia, in 1845.—L. D., of La.

CEMENT FOR GLASS SYRINGES.—I have, at present, a glass ear syringe, that has been in use over six years. The cap came loose from the plaster of Paris, and I fastened it with gum shellac. I have never had any trouble with it since.—L. D., of La.

EMERY WHEELS.—Let F. W. take a solid wheel, made of pine, or any other soft wood, and of the size required for his purpose. Turn the wheel true, and then turn rounds or hollows in its face, to suit the tools he wishes to grind, gouges, rounds, etc.,[mentioned by him. Then let him prepare some best glue, and, using it hot and thin, put it on the face of the wheel with a brush. The first coat of glue should be a light one, and when it is dry a second one should be applied, and as quickly as possible, as much emery should be sifted upon the wet surface as the glue will hold. When this is dry another coat of glue and emery should be applied in the same way. This will make a wheel that will last for months, and grind faster than anything else. I use No. 0 emery.—A. D. S., of Mo.

BRASS TOPS OF LAMPS.—Let your correspondent mix about two tablespoonfuls of plaster of Paris in a little clean water, as thick as possible; then fix the parts on, and hold them down for about five minutes; the top must then not be removed till the next morning. Or, he may dissolve a little glue in hot water; when cold, add a sufficient quantity to some plaster of Paris, and make a paste of it; then fill the neck of the burner and place it on the glass cistern; it must be done very quickly. The glue prevents the composition from hardening too quickly, and makes it firmer. Putty will also answer very well for this purpose.—A. L., of Wis.

FROSTED SILVER.—To produce a frosted surface on polished silver, use cyanide of potassium with a brush, but do not handle it more than you can help. Get a piece of lance wood or box, and make a pair of wood pliers. The proportion should be an ounce dissolved in a half pint of water. It is very poisonous.—W. B., of N. J.

GRAFTING WAX.—For the benefit of J. H. A., I will state that, for early use, I melt together rosin four parts, tallow two parts, and beeswax one part; and in this I dip pieces of partly worn cotton cloth. Cloth thus prepared is better than that done with clear wax, as it does not crack. As the weather gets warmer, a larger proportion of beeswax should be used. For an application where limbs are removed in pruning, I have found nothing to equal coal tar.

E. W. B., of Ill.—Your plan of spiked iron plates, for pavements is substantially like others which have been tried and failed. Iron wears too smooth for road surfaces. Your plan for railways to transport ships over necks of land, namely, multiple tracks with trucks running on each, seems practical; but we hardly think such railways would be preferred to canals.

SETTING BOILERS.—If N. H. is about to re-set his boilers, I would advise him to have them set on the Nelson plan, which will carry the fire around and over the top, and into the smoke stack at the back end of his boiler. I would advise him to have built, from the end of the grate bar, an arch of brick work, three feet in diameter, and fifteen inches below his boiler. The distance I usually observe, from the back wall to the end of the boiler, is two feet, with a brick arch overhead, to return the fire through the flues or tubes.—C. T., of Mass.

D. F. F., of Vt.—The sugar contained in living vegetable and woody structures, is formed in them from substances absorbed in their growth, and assimilated by them. It is not formed in the soil, nor absorbed, as sugar, by the roots.

A. K., of Ill.—The mineral you send us is iron pyrites, which has no commercial value.

SILVER CIRCLES.—After cleaning with solution of carbonate of ammonia and cotton wool (which is better than chalk or any powder as it does not scratch), let your correspondent, using a little cotton wool, smear the circles with a thin layer of "zinc ointment;" this makes the bright silver "matt," or a dead white, without in the least obscuring the clearness of the fine divisions. Indeed, the microscope acts much better on them, from the total absence of glitter. The circles so treated will never become discolored, but the excessively thin unctuous layer requires to be renewed every few months on account of dust particles.—J. A., of N. Y.

J. H. S., of Ohio.—Your method of setting fence posts, making the part which enters the ground of concrete, with iron spindle rising from the center, upon which the wood post is set, would, we think, prove cheap and durable.

A. B. F., of La.—The loss of muscular power, in the case you mention, was undoubtedly an instance of paralysis, caused by injury to a nerve, either directly or indirectly, by the passage of the shot near it, in its course through the limb. Such cases are not rare, as you will find upon consulting any good work on surgery.

R. H., of Mass.—Your arrangement of segmental gearing is all wrong. It will not work as you anticipate. No matter how many teeth there may be in one segment, it will only impart that amount of motion, to the driven segment, due to the number of teeth in the latter.

MEDAL CASTS.—If J. E. M., has the opportunity to look into the "Brass and Iron Founder's Guide," by James Larkin, he will find information on medal casts. It is one of the books in Baird's catalogue.—W. B., of La.

W. B., of R. I.—The parties, to whom you refer, at Augusta, Me., are the publishers of a literary journal, and we do not for a moment suppose they have any connection with Wade & Co., the counterfeit money swindlers. We don't advertise such business, if we know it.

W. D., of N. Y.—We do not care to open our columns to a discussion of Swedenborg's views of natural philosophy. He was a subtle thinker, no doubt. Some people think he was crazy, others regard him as the only true expounder of philosophy and theology, but we do not propose to invite a controversy respecting his views.

G. S., of Md.—We cannot give up space in our paper to the publication of articles from correspondents, intended especially to advance their own private interests. Should we yield this position to one, we could not deny it to others, and our paper would thus become the vehicle of individual interests. A little reflection will convince you of the soundness of our position.

W. B., of N. Y.—We cannot now turn to the article to which you refer; but it is well settled that an employer cannot claim the ownership of an invention made by an employé, unless the latter was especially engaged to bring out the invention for the former. Any other theory than this would be absurd and unjust.

J. S. R., of Quebec.—The subject of your letter is one that we have not studied. It does not belong to the category of the practical arts. We think S. R. Wells, editor of the *Phrenological Journal*, can give you the information.

J. Y. S., of Conn.—There is escape of coal gas into your well from some source, but as you say the nearest gas pipe is sixty feet from its there must be some fissure by which the leaking gas finds its way to the water. The only remedy is to either stop the fissure or the leak.

Official List of Patents.

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FOR THE WEEK ENDING MARCH 28, 1871.

Reported Officially for the Scientific American.

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113,001.—FLOOD GATE.—August H. Adams, Piqua, Ohio.

113,002.—APPARATUS FOR OPERATING RAILWAY SWITCHES.—James Alcorn (assignor to George R. Kelso), Charlestown, Mass.

113,003.—PLANE STOCK.—Leonard Bailey, New Britain,Conn.

113,004.—PATCH FOR RAILROAD RAILS.—John T. Barnett, Decatur, Ill.

113,005.—ROTARY STEAM ENGINE.—William Barry,Carthage, N. Y.

113,006.—WOOD SCREWS.—Jason A. Bidwell, East Boston, Mass.

113,007.—COMBINED BORDERING AND DRAIN TILE.—Charles Biehl, Albany, N. Y.

113,008.—AWL FOR HEEL MACHINES.—Horace H. Bigelow, Worcester, Mass.

113,009.—MACHINE FOR TURNING RANDS FOR SHOES.—Horace H. Bigelow, Worcester, Mass.

113,010.—NEEDLE FOR SEWING MACHINES.—Joseph B. Blanchard, Boston, Mass.

113,011.—CULINARY BOILER.—Peter Boesen and Michael Bedessem, Kenosha, Wis.

113,012.—LOUNGE BED.—John Brada, New York city.

113,013.—DUMPING CAR.—Daniel J. Brimmer, North Petersburg, assignor to Martin E. Brimmer, Rensselaer county, N. Y.

113,014.—MANUFACTURE OF WHITE LEAD.—Ludwig Brumlen, Hoboken, N. J.

113,015.—INDEX.—O. Flagg Bullard, Media, Pa.

113,016.—REGULATING CLASP FOR ELASTIC TUBES.—William Bunce, Oberlin, Ohio.

113,017.—LIQUID METER.—Anna Buttner, administratrix of the estate of Friedrich Buttner, New York city.

113,018.—CORN PLANTER.—James B. Conaty and Milton Catt, Indianapolis, Ind.

113,019.—CULTIVATOR.—Lee W. Conner and Richard G. Conner, Troy, Iowa.

113,020.—GATE.—James B. Cotton, Dayton, Ohio.

113,021.—CONDENSER FOR STEAM ENGINES.—William Craig, Newark, N. J., and Henry L. Brevoort, Brooklyn, N. Y.

113,022.—GRAIN DRILL.—Jesse W. Craven and Albert Clark, Center Valley, Ind.

113,023.—APPARATUS FOR PURIFYING COAL OIL.—Benjamin Crawford, Allegheny, Pa.

113,024.—WASHING MACHINE.—Elias Crick, Phillipsburg, N. J.

113,025.—STEERING APPARATUS.—Alonzo G. Crossman, Huntington, N. Y.

113,026.—PAPER CLIP.—Jacob M. Crull (assignor of one half his right to George S. Crull), Harrisburg, Pa.

113,027.—Needle Holder and Tension Device for Sewing Machines.—Edwin L. Crumb, South West, Pa.
113,028.—Stop Motion for Warping Machines.—Edwin H. Cummings, Lewiston, Me., and Grimshaw Heyes and Thomas Entwistle, Accrington, England.
113,029.—Nail Plate Rolling.—Orville C. Dewey, Joseph Dudley, and Friedrich Lindemann, Wheeling, W. Va.
113,030.—Bridge.—Ferdinand Dieckmann, Cincinnati, Ohio.
113,031.—Device for Piercing and Lining Ears for the Reception of Ear Rings.—William Charles Edge, Newark, N. J.
113,032.—Purchase for Capstans.—Joseph Edgecomb, Gardiner, Me.
113,033.—Printing Telegraph Apparatus.—Thomas A. Edison, Newark, N. J.
113,034.—Printing Telegraph Apparatus.—Thomas A. Edison, Newark, N. J., assignor to the Gold and Stock Telegraph Company, New York city.
113,035.—Flower Stand.—Garrett Erkson, Brooklyn, N. Y.
113,036.—Electro-magnetic Burglar Alarm.—Wilson E. Facer, Philadelphia, Pa.
113,037.—Water Grate Bar.—William H. Farris, Cairo, Ill.
113,038.—Hand Turning and Boring Machine.—John Franklin Finger, Wilmington, N. C.
113,039.—Pitman Rod Connection.—Edward G. Fish, Colfax, Iowa.
113,040.—Coating Iron and Steel with Molten Iron.—Rufus B. Fowler and Daniel F. Brandon, Chicago, Ill.
113,041.—Mechanical Telegraph Instrument.—James Gamble, San Francisco.
113,042.—Scroll Saw.—William Gardner, Glen Gardner Station (Clarksville Post Office), N. J.
113,043.—Stave Sawing Machine.—Robert W. George, Boston, Mass. Antedated March 28, 1871.
113,044.—Method of Banding Compressed Wood.—Charles B. Gilman, Brooklyn, N. Y.
113,045.—Manufacture of Salt from Brines.—Samuel D. Gilson, Syracuse, N. Y.
113,046.—Construction of Pier Glass Frames and Cornices.—Daniel A. Hall and David Garrison, Philadelphia, Pa.
113,047.—Confectionery or Cocoanut Candy.—Horatio N. Harbach and Theodore J. Harbach, Philadelphia, Pa.
113,048.—Turning Lathe.—Pierre J. Hardy, New York city. Antedated March 24, 1871.
113,049.—Coach Painter's Easel.—D. R. Harris, South New Berlin, N. Y. Antedated March 16, 1871.
113,050.—Wheel for Vehicles.—James Harris, San Francisco, Cal.
113,051.—Mouse Trap.—Hubert C. Hart, Unionville, Conn.
113,052.—Tubular Steam Generator.—James M. Hicks, New York city. Antedated March 11, 1871.
113,053.—Revolving Firearm.—Samuel S. Hopkins (assignor to "The Hopkins & Allen Manufacturing Company"), Norwich, Conn.
113,054.—Ventilator for Hats.—Henry A. House, Bridgeport, Conn.
113,055.—Dental Plate from Pyroxyline.—Isaiah Smith Hyatt, John Wesley Hyatt, Jr., and Jesse A. Perkins (assignors to "Albany Dental Plate Company"), Albany, N. Y.
113,056.—Refrigerator and Water Cooler.—Anthony Iske (assignor to Daniel H. Lintner), Lancaster, Pa.
113,057.—Sawing Machine.—Pierson Jacobus, Romulus, N. Y.
113,058.—Former for Baskets.—Horace C. Jones, Dowagiac, Mich.
113,059.—Stave Basket.—Horace C. Jones, Dowagiac, Mich.
113,060.—Adjustable Seat for Vehicles.—Richard E. Jones, Goldsborough, N. C.
113,061.—Police Baton.—Charles Kast, Williamsport, Pa.
113,062.—Skate.—David Kerr and Asa Ebenezer Hovey, San Francisco, Cal.
113,063.—Meat Biscuit.—Alexander Kirkwood, Toronto, Canada.
113,064.—Washing Machine.—Edwin Knock, Vermont, Ill.
113,065.—Check Rein Hook.—Alexander Ladd, St. Lawrence, N. Y.
113,066.—Combined Hay Rake and Tedder.—Charles La Dow, South Galway, N. Y.
113,067.—Photographic Camera.—William A. Leggo, Montreal, Canada.
113,068.—Steaming Apparatus.—Otto Lehmann, Columbus City, Iowa.
113,069.—Steam and Water-pressure Regulator.—N. C. Locke, Salem, Mass.
113,070.—Sash Holder for Railroad Cars.—Adam Loeffelholz and Anton Prier, Milwaukee, Wis.
113,071.—Machine for Cutting Veneering into Strips.—G. W. Manton, Fredonia, N. Y.
113,072.—Machine for Threading Bolts.—Henry Martin, Louisville, Ky.
113,073.—Piano.—Frederick Mathushek, New York city.
113,074.—Pianoforte Action.—Frederick Mathushek, New York city.
113,075.—Chisel for Mortising Machines.—Edgar McConnell, Sharon, Pa.
113,076.—Separator for Thrashing Machines.—Curtis Miller, Clay township (Lincoln Post Office), Pa., assignor to himself and J. R. Rogers.
113,077.—Folding Chair.—George Miller and Phillip Hannah (assignors to themselves and John Gorton, Jr.), Rochester, N. Y.
113,078.—Machine for Turning Axles.—Arthur F. Moore, Florence, Ind.
113,079.—Making Flour.—George Motley (assignor to himself and Jirah B. Mosley), Rochester, N. Y.
113,080.—Catarrhal Douche.—Richard M. Moylt, New York city.
113,081.—Gang Plow.—John Murray, Silveyville, Cal.
113,082.—Burglar Alarm.—J. T. Mygatt and John Downing, Binghampton, N. Y. Antedated March 15, 1871.
113,083.—Composition Fuel.—Jotham Newton, Providence, R. I.
113,084.—Beehive.—Philip Nicolle, Lindsay, Canada.
113,085.—Grinding Mill for Ores.—Jacob S. Niswander, Oakland, Cal.
113,086.—Cooking Stove.—Daniel Eldon Paris, Troy, N. Y.
113,087.—Reversible Settee.—Robert H. Paton, New York city.
113,088.—Horse Power.—Thos. D. Pennington (assignor to himself and R. G. Anderson), Forsyth, Ga.
113,089.—Churn.—G. S. Perfater, Camp Point, Ill.
113,090.—Electro-plating Letters and Numbers on Metallic Plates for Signs, etc.—John J. Pratt, New York city.
113,091.—Shoe Brake for Wagons.—Abraham Quinn, Brooklyn, N. Y.
113,092.—Running Gear for Carriages.—John Rancevan, Carthage, Ohio.
113,093.—Button-hole Clamp and Guide.—Loyal Reding (assignor to N. S. C. Perkins and M. P. Smith), Norwalk, Ohio.
113,094.—Machine for Pulling Flax.—Benj. M. Reeves, Franklin, Pa. Antedated March 16, 1871.
113,095.—Chuck for Lathes.—John Rich, Painesville, Ohio Antedated March 27, 1871.
113,096.—Reversible Knob Latch.—H. M. Ritter, Cincinnati, Ohio.
113,097.—Reversible Knob Latch.—H. M. Ritter, Cincinnati, Ohio.
113,098.—Plow.—Hamilton Roney, Dayton, Ohio.
113,099.—Soldering Spiral Bands.—Elijah H. Russell, Providence, R. I.
113,100.—Suspension Toilet Mirror.—R. T. Sargent, Norwich, Vt.
113,101.—Cut-off Attachment to Slide Valves.—Thos. Sault, New Haven, Conn.
113,102.—Anti-friction Balanced Valve.—Wm. Siefert, (assignor to himself and M. T. Kane), New York city.
113,103.—Baby Tender.—S. M. Simonds, Lynn, Mass.
113,104.—Lamp Burner.—Geo. L. Smith, Bridgeport, Conn., assignor to the Bridgeport Brass Co.
113,105.—Portable Fence.—Frank Sproul, Doniphan, Kansas.
113,106.—Clothes Dryer.—August Stechschult, Glendorf, Ohio.
113,107.—Rock Drill.—James M. Stephenson, Pendleton, Ind.
113,108.—Automatic Water Spout Cut-off.—Edward Stewart, Fort Madison, Iowa.
113,109.—Cultivator.—Michael Stoll (assignor to himself and J. Peters), Conestoga township, Pa.
113,110.—Boiler Furnace.—Uriah B. Stribling, Madison, Ind.
113,111.—Sheet-metal Fruit Can.—C. F. Sturgis, Buena Vista, Ala.
113,112.—Railway Switch Lock.—Archibald Thomson, St. Louis, Mo.
113,113.—Apparatus for Transmitting Power to Machinery.—W. H. Thorne, Philadelphia, Pa.
113,114.—Manufacture of Composition Roller Bushings.—F. B. Torrey, Bath, Me.
113,115.—Forcing Liquids.—Jacob Van Norman, Easton, Pa.
113,116.—Axle and Axle Box for Vehicles.—Ernest Von Jeinsen and J. M. McDonald, San Francisco, Cal.
113,117.—Candle-molding Machine.—Joseph Wales, New York city.
113,118.—Washing Machine.—G. S. Walker, (assignor to himself and F. F. Adams), Erie, Pa.
113,119.—Men's Gaiter.—E. R. Ware (assignor to W. A. S. Smyth and R. L. Smyth), Worcester, Mass.
113,120.—Means for Detecting and Signaling Fires.—W. B. Watkins, Jersey City, N. J.
113,121.—Horse Rake.—Benjamin Webb, Unadilla Forks, N. Y.
113,122.—Butter Tub.—Chas. H. White, Emmett township, Mich.
113,123.—Sash Holder.—Barnet M. Whiting, San Francisco, Cal.
113,124.—Tinted Glass for Spectacles, etc.—Thomas A Willson, Reading, Pa.
113,125.—Bean Harvester.—J. A. Wood and Thos. Wood, Chemung, Ill.
113,126.—Grappling Hook.—Elias Ziegler and Chas. Cable, Harmony, Pa.
113,127.—Coloring and Staining Marble.—John Zengeler, Chicago, Ill. Antedated March 25 1871.
113,128.—Skin Under-garment.—J. H. Andrus, New York city.
113,129.—Clothes Rack.—H. M. Andrus and J. H. Cleveland, North Bay, N. Y.
113,130.—Washing Machine.—A. M. Bailey, Middlefield, Conn., assignor to the Metropolitan Washing Machine Co.
113,131.—Check Holder.—A. A. Baker, Camden, N. J.
113,132.—Double-acting Force Pump.—Jeremiah Barney, Perry's Mills, N. Y.
113,133.—Grain Weighing Register.—W. H. Baxter, Brixton Hill, England.
113,134.—Harvester.—J. H. Beam, Springfield, Ill.
113,135.—Sewing Machine Caster.—T. J. Bishop and H. J. Merret, Evansville, Ind.
113,136.—Harness Saddle.—Valentin Borst, New York city.
113,137.—Nozzle for Oil Cans.—J. A. Bostwick, New York city.
113,138.—Composition Burial Case.—F. W. Brown, Albany, N. Y.
113,139.—Shot Charger.—G. D. Capewell, G. A. Capewell, and J. T. Capewell, Woodbury, Conn., assignors to G. D. Capewell and G. A. Capewell.
113,140.—Top-roll for Spinning, etc.—W. A. Caswell (assignor to himself, A. F. Allen, and W. D. Hilton), Providence, R. I.
113,141.—Rotary Harrow.—J. R. Chase, Westbrook, Me.
113,142.—Stove Leg.—T. J. Close, Philadelphia, Pa.
113,143.—Marine Propeller.—G. B. Cocks, Cincinnati, Ohio. Antedated March 24, 1871.
113,144.—Pump.—N. T. Coffin, Knightstown, Ind.
113,145.—Garden Bed Border.—J. E. Dickson and Seelye Richmond, Annapolis, Md.
113,146.—Sash Holder.—J. J. Diehl, Harrisburg, Pa.
113,147.—Carbureting Machine.—A. E. Dupas and Arthur Barbarin, New Orleans, La.
113,148.—Cultivator.—David Edwards, Marong, near Sandhurst, Australia.
113,149.—Shoe and Over Gaiter.—T. R. Evans, Philadelphia, Pa.
113,150.—Chimney.—A. B. Ewing, Lewisburg, Tenn.
113,151.—Medical Compound for Cure of Scrofula, Liver Complaint, etc.—Philip Fay, Sr., Lacon, Ill.
113,152.—Spur.—Henry Fellows, Bloomington, Ill.
113,153.—Valve for Oil Tanks.—Daniel Fisher and William Cumming, Oil City, Pa.
113,154.—Lightning Rod.—D. A. Foot and G. S. Knapp, Winona, Minn.
113,155.—Spark Arrester for Locomotives.—B. P. Freeman and Pat. Payton, Macon, Ga.
113,156.—Coffee Pot.—D. S. French, Montgomery, Ala.
113,157.—Feather Renovator.—Jonathan Garrett and J. Rauch, Selin's Grove, Pa.
113,158.—Treating the Timber of Old Field Pines.—J. H. Gatling, Murfreesborough, N. C.
113,159.—Cotton Picker.—Williamson Goodwin and S. D. G. Niles, Helena, Ark.
113,160.—Car Coupling.—Stephen Gregory, Jonesville, Mich.
113,161.—Horse Collar.—Lyman Guinnip, Danville, Ill.
113,162.—Water Meter.—T. C. Hargrave, Boston, Mass.
113,163.—Propeller for Vessels.—C. A. S. Harris, St. Louis, Mo. Antedated March 21, 1871.
113,164.—Machine for Forming Carriage Springs.—William Harty, Bridgeport, Conn. Antedated March 20, 1871.
113,165.—Horse Hay Rake.—J. F. Henkle, St. Louis, Mo.
113,166.—Torsion Spring for Cars.—Benjamin Hershey, Erie, Pa.
113,167.—Machine for forming Pipe Elbows.—Charles Hoeller (assignor to himself and H. S. Hoeller), Cincinnati, Ohio.
113,168.—Animal Trap.—J. W. F. How, Douglas county, Oregon.
113,169.—Land Roller.—J. T. Hudnet, Reaville, and H. W. Mathews, Brenchtown, N. J., assignors to J. W. Priestly & Co.
113,170.—Cotton Picker.—John Hughes, New Berne, N. C.
113,171.—Hub for Wheels.—W. C. Johnson, Philadelphia, Pa.
113,172.—Churn Dasher.—Columbus Johnston, Clarksville, Mo.
113,173.—Horse-shoe Machine.—W. R. Justus (assignor to Shoenberger & Co.), Pittsburgh, Pa.
113,174.—Corn Picking and Husking Machine.—S. R. Kenyon, Greenville, R. I., assignor to himself and W. D. Vernam, Elizabeth, N. J.
113,175.—Harvester Cutter.—W. G. Kenyon, Wakefield, R. I.
113,176.—Composition for Lubricating Journals.—R. C. Klein, St. Louis, Mo.
113,177.—Fastening for Neck-ties.—A. Komp, New York city.
113,178.—Vapor Burner.—W. H. Lawrence, Baltimore, Md.
113,179.—Grinding Mill.—E. D. Little and E. C. Little, Shabbonas Grove, Ill.
113,180.—Peat Machine.—Zalmon Ludington, Fayette county, Pa.
113,181.—Shade Holder for Lamps.—J. W. Lyon, Brooklyn, N. Y. Antedated March 18, 1871.
113,182.—Machine for Scouring Needles.—F. W. Mallett, New Haven, Conn.
113,183.—Lamp Burner.—C. B. Mann (assignor to himself and S. S. Mann), Baltimore, Md.
113,184.—Sieve.—R. J. Mann, Dallas City, Ill.
113,185.—Brick Kiln.—J. M. McCarthy, Canal Dover, Ohio.
113,186.—Earth Closet.—James Megratten, Wilmington, Del.
113,187.—Bee Hive.—J. F. Metherd and Solomon Young, Union City, Ind.
113,188.—Vegetable Cutter.—Francisque Monnet, New York city.
113,189.—Machine for Striping and Cutting Leather.—J. E. Coffin, Portland, and C. E. Morrill, and G. F. Hall, Westbrook, Me.: Coffin and Hall assignors to C. E. Morrill.
113,190.—Rotary Plow.—J. R. Morris, Houston, Texas.
113,191.—Furnace for Producing Hydrogen and Treating Ores.—J. R. Morris, Houston, Texas.
113,192.—Producing Gas from Hydrocarbons.—Xavier Moussard, Paris, France.
113,193.—Buggy Brake.—I. L. Myers, Ferguson Township, Pa.
113,194.—Breech-loading Fire-arm.—Robert Nenninger, Newark, N. J.
113,195.—Skirt Board.—J. F. Nettleton, New Haven, Conn.
113,196.—Molded Saddle-tree and Composition for the same.—E. B. Newman (assignor to Newman Erb), St. Louis, Mo.
113,197.—Hot-air Furnace.—J. R. Nichols, Boston, Mass.
113,198.—Medicine or Powder for Horses, etc.—John Norcross, West Newton, Pa.
113,199.—Oiler for Loose Pulleys.—S. R. Norris, New York city.
113,200.—Lubricator.—T. J. Nottingham, Cincinnati, Ohio.
113,201.—Sewing Machine.—C. O. Parmenter, Amherst, Mass.
113,202.—Method of Scene Shifting for Theatrical and Analogous Purposes.—John L. Peake, New York city.
113,203.—Rock Drill.—George B. Phillips (assignor to himself, A. M. Cornell, and J. B Harbottle), Poughkeepsie, N. Y.
112,204.—Clothes Dryer.—Edward N. Porter, Morrisville, and Israel J. Currier, Wolcott, Vt.
113,205.—Corn Drill.—B. W. Remy and N. T. Remy, Brookville, Ind.
113,206.—Corn Plow.—B. W. Remy and N. T. Remy, Brookville, Ind.
113,207.—Bee Hive.—Wm. Reynolds and J. V. Brooks, Lexington, Ill.
113,208.—Chloralized Silver Ore.—Eugene N. Riotte, (assignor of five fourteenths interest to Charles A. Stetefeldt), San Francisco, Cal., and five fourteenths to John H. Boalt, Sandusky, Ohio.
113,209.—Wardrobe or Hat Hook.—Charles Roe Scott, New York city.
113,210.—Treadle.—Ai B. Shaw, Medford, Mass.
113,211.—Punch and Eyeletting Machine.—Elijah Shaw, Milwaukee, Wis.
113,212.—Fork, Hoe, etc.—Samuel Sheble, Philadelphia, Pa.
113,213.—Machine for Repairing Hose, etc.—Alfred Shedlock, New York city. Antedated March 22, 1871.
113,214.—Stave Jointer.—John Sherman and Wm. Marriott, Cleveland, Ohio.
113,215.—Fastener for Carriage Curtains, etc.—Samuel Shute, Jr., Richmond, Va.
113,216.—Locomotive.—Albert S. Smith, Boston, Mass.
113,217.—Saw Mill.—W. Dean Smith and Andrew J. Chase Union, N. Y.
113,218.—Windmill.—Bradley W. Stanton, Almena, Mich.
113,219.—Grain Dryer.—William Stark and J. G. Fisher, Toledo, Ohio.
113,220.—Heating Stove.—William Stark and J. G. Fisher, Toledo, Ohio.
113,221.—Excavator.—Barna T. Stowell, Quincy, Ill.
113,222.—Farmer's Boiler.—R. W. Thickins and David R. Sperry, Batavia, Ill.
113,223.—Excavator.—Jacob S. Thomas, Mifflintown, Pa.
113,224.—Composition for Printers' Inking Rollers.—Andrew Van Bibber, Cincinnati, Ohio.
113,225.—Harvester.—Joseph Van de Water (assignor to himself, George Esterly, and George W. Esterly), Whitewater, Wis.
113,226.—Flour Bolt.—Thomas M. Walker, Bellefontaine, Ohio.
113,227.—Washer and Wringer.—Paul Weatherbee, Port Washington, Ohio.
113,228.—Composition for Treating Iron.—Samuel Weaver, Pottstown, Pa.
113,229.—Blower.—Wm. W Webb, Indianapolis, Ind.
113,230.—Glove.—William W. Whitaker, Gloversville N. Y.
113,231.—Folding Bed.—Lewis Whitehead, Sr., Brooklyn, N. Y.
113,232.—Cut-off Valve Gear.—S. H. Whitmore, Decatur, Ill.
113,223.—Corn Planter.—Uriah T. Wilson, De Soto City, Miss.
113,234.—Sulky Attachment for Plows.—John Worrell and James H. Rynerson, Clayton, Ind.
113,235.—Sulky Attachment for Plows.—John Worrell and James H. Rynerson, Clayton, Ind.
113,236.—Lighting Attachment for Alarm Clocks.—H X. Wright, Memphis, Tenn.
113,237.—Liquid Measure.—William M. Wright, Chambersburg, Pa., assignor to himself and Harrison Phoebus, Fortress Monroe, Va.

REISSUES.

4,308.—Breech-loading Firearm.—Kiel V. Barnekov, Cornwall, assignor to himself and George W. Greene, New York city.—Patent No. 104,100, dated June 14, 1870.
4,309.—Cultivator.—Theopolis Bertrand and Peter Sames Rockford, Ill.—Patent No. 60,916, dated January 1, 1867.
4,310.—Grindstone Journal Box.—Thomas W. Brown, Boston, Mass., assignor, by mesne assignments, to Harbster Brothers & Co., Reading, Pa.—Patent No. 58,678, dated October 16, 1866.
4,311.—Steam Road Wagon.—C. W. Hermance, Schuylersville, N. Y.—Patent No. 111,644, dated February 7, 1871.
4,312.—Machine for Opening Cotton.—Wm. C. Jillson and Amos B. Palmer., Willimantic, Conn.—Patent 110,366, dated Dec. 20, 1870.
4,313.—Muff and Collar Box.—James P. Jones (assignor to Jason Crane) Bloomfield, N. J.—Patent No. 96,118, dated October 26, 1869.
4,314.—Manufacture of Steel.—S. W. Kirk (assignor of part interest to Henry Thomas), Philadelphia, Pa.—Patent No. 53,307, dated March 20, 1866.
4,315.—Machine for Making Horseshoes.—The Howe Horseshoe and Machine Company, New York city, assignee of Ozias A. Howe.—Patent No. 82,409, dated September 22, 1868.
4,316.—Hoop Skirt.—William H. Towers (assignor to the Vertical Hoop Skirt Company), Boston, Mass.—Patent No. 84,149, dated November 17, 1868.

DESIGNS.

4,732.—Stone Drag.—Joseph P. Adams and George Hyde, Whitney's Point, N. Y.
4,733.—Toy Steam Engine.—Alexander Buckman and John W. Huffington, Brooklyn, N. Y.
4,734.—Carpet Pattern.—George Holdsworth, Halifax, England, assignor to W. & I. Sloane. New York city.
4,735.—Bed Quilt.—Louis Kreuzberger (assignor to Braner & Co.), Philadelphia, Pa.
4,736.—Salt Cellar.—John B. Larner, Washington, D. C.
4,737.—Carpet Pattern.—Wm. Mallinson, Halifax, England, assignor to W. & I. Sloane, New York city.
4,738 to 4,740.—Carpet Pattern.—Archibald McCallum, Halifax, England, assignor to W. & I. Sloane, New York city. Three patents.
4,741 and 4,742.—Chair.—Henry Ocorr, Sheboygan, Wis. Two patents.
4,743.—Type.—Richard Smith (assignor to Mackellar, Smiths & Jordan), Philadelphia, Pa.
4,744.—Statuary.—Ames Van Wart, New York city.
4,745.—Glass Bottle.—Wm. R. Warner (assignor to Wm R. Warner & Co.), Philadelphia, Pa.

TRADE MARKS.

207.—Whisky.—John L. Betnecker, St. Louis, Mo.
208.—Medicine.—Henry H. Hay, Portland, Me.
209.—Whisky.—Daniel V. B. Henarie, San Francisco, Cal.
210.—Whisky.—E. Martin & Co., San Francisco, Cal.
211.—Bitters.—Adam Orth, Milwaukee, Wis.
212.—Salve.—O. M. Palmer, New York city.
213.—Mineral Water.—Saratoga Seltzer-Spring Company, Saratoga Springs, N. Y.
214.—Tea.—Williams, Blanchard & Co., San Francisco, Cal.

EXTENSIONS.

Machine for Paring Apples.—David H. Whittemore, of Worcester, Mass.—Letters Patent No. 16,666, dated February 17, 1857.
Enema Syringe.—Herman E. Davidson, of Gloucester, Mass., for himself and Charles H. Davidson, deceased.—Letters Patent No. 16,956, dated March 31, 1857: reissue No. 1,940, dated April 25, 1865.
Gas Generator.—Alonzo M. Giles, Boston, Mass.—Letters Patent No. 16,830, dated March 17, 1857.

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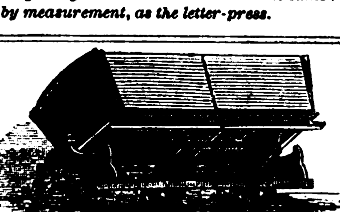

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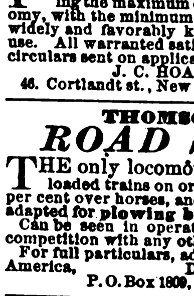

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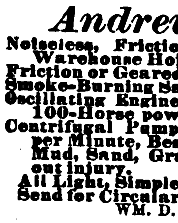

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