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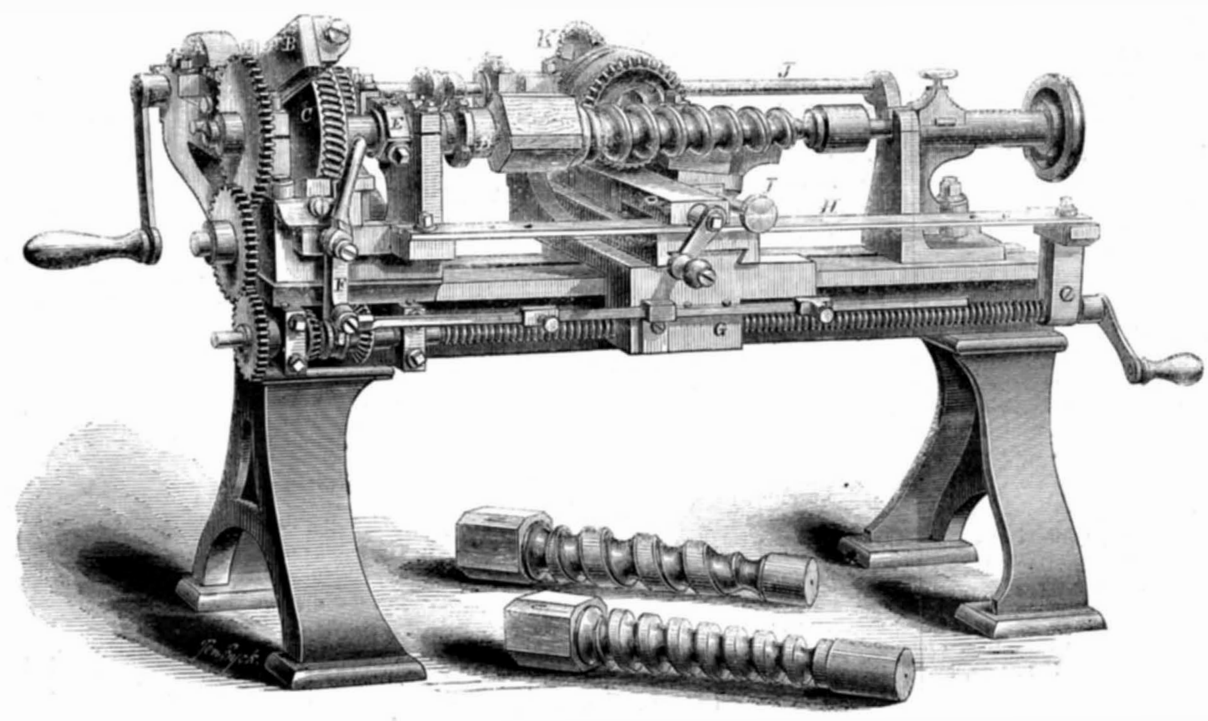
Improved Lathe for Wood Turning.

Much ingenuity has been displayed in devices for working wood into fanciful forms by machinery, and in none more successfully than in lathes for turning. The one herewith represented employs rotary instead of fixed cutters, the required speed for work being given the cutter head rather than the material to be turned.

The power is applied to the pulley, A, and by means of an intermediate shaft and bevel gears, gives motion to a screw turning in the support, B. This screw rotates the worm gear, C, attached to the spindle of the head stock. The center which holds the piece to be turned can move independently of the arbor. If it is desired to secure it while the arbor turns so that the cutters may operate on one side only of the wood it can be done by means of a catch engaging with slots on the collar, D, of the center; or by the screw through the head, E, on the arbor, it may be fastened to the arbor to rotate with it. A train of gears connect the arbor and the feeding screw which by means of the triple beveled gears and a clutch, F, can be rotated in either direction as may be desired. This screw gives the lateral movement to the carriage, G. A transverse carriage slides on G, which by means of the screw as in ordinary lathes can be advanced to or receded from the work. This carriage has also an automatic movement governed in one direction by a guide, H, and in the other by a spiral spring not shown. The line of motion is regulated by a stop screw, I.



BASSE'S LATHE FOR WOOD TURNING.

The guide, H, can be of any form desired so that its edge will present a sectional line corresponding with the form to be produced. The shaft, J, which bears the pulley, A, is slotted and carries the bevel gear, K, that has on the inside of its hub a spline corresponding to the slot on the shaft. It traverses with the carriage, G, and drives the cutter head inside the dished gear by the intervention of another gear and pinions, not seen perfectly in the engraving.

The clutch, F, can be operated automatically by the carriage acting on stops on the rod parallel with the main screw as seen in the illustration. Three varieties of spiral work done by this machine are seen in the lathe and on the floor. Specimens in our possession just as taken from the lathe, without sandpapering or polishing, are very smooth and speak well for the effectiveness of the device.

This lathe is capable of doing an almost infinite variety of ornamental work, round or polygonal, with curved, waved, spiral or irregular surfaces. It was patented Oct. 16th, 1866, by August Basse, of Quincy, Ill., whom address for additional particulars. Box 593.

A New Medium of Power.

We have seen in the Bridgeport *Farmer* a notice of a new motor invented by Mr. Henry B. Stiles of the former place. The notice not being really a description we are unable to give the details of the machine, but from what we can learn it is a wheel working by water pressure, capable of exerting great power, and occupying but a small space. One of them twelve inches diameter, under a pressure of forty pounds to the inch, is said to be capable of driving a double medium power printing press. One has just been placed in Trinity Church, New Haven, to drive the bellows of the new organ; the third in size in this country, being exceeded only by that of Trinity, New York, and H. W. Beecher's Church, Brooklyn.

Whenever there is a sufficient head of water it is said this is the best medium for utilizing power now known. It will not get out of order and can be governed and regulated with the utmost exactness. It was patented by Mr. Stiles in Feb., 1866.

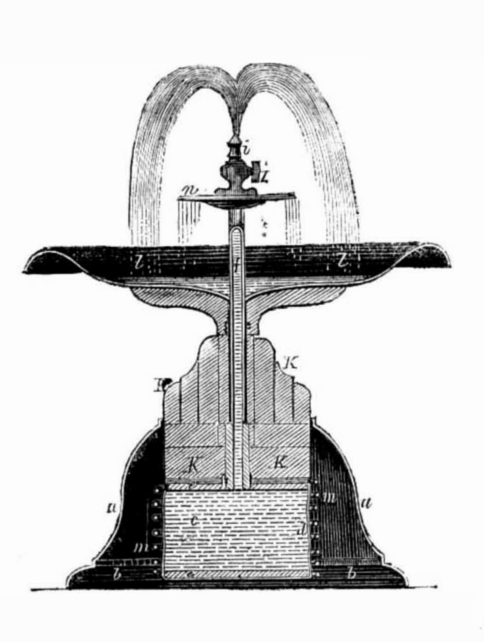
New Process of Pickling.

The Grocer notes the application of a well known scientific principle in a new process for preparing pickles for the table, in large quantities; an invention lately patented by Mr. Manfield. The machinery employed in this process consists of a large air-tight receiver, capable of containing one hundred gallons of the vegetables to be pickled, connected with an air-tight tank for holding vinegar. The receiver is also fitted with two sets of air pumps, for exhausting and condensing the air, worked by a Lenoir gas engine. All the metal parts of the machinery with which the vinegar comes in contact are made of platinum, rendering the contents entirely free from the dangerous presence of copper.

The pickling process is attained by exhausting the air from the receiver by the vacuum pump, thereby also expressing all superfluous moisture, without injuring the shape of the contained vegetables. Connection being now made with the tank, the spiced vinegar rushes in, and is forced with a pressure of forty-five pounds to the square inch into the very fibers of the vegetables. When this operation is completed, the pickles are ready for the table, having a good wholesome appearance, and retaining to a great extent their natural color. An important feature in pickles prepared in this way, is that being so completely saturated, they will keep sound for an indefinite period without being immersed in vinegar or brine.

SELF-ACTING FOUNTAINS.

We copy from the London *Mechanics' Magazine* the design of a fountain for propelling common or scented water, which



can be used in any drawing room without the necessity of elaborate "pipe laying." It is a simple mechanical device operated by the compression of air by mechanical contrivances. It is the invention of Eugene Rimmel, the celebrated London perfumer, and is intended for perfuming the air of apartments by the injection of a jet of scented water.

The engraving shows a section of the fountain, *a* being the case or pediment, having a metal bottom, *b*, on which a reservoir, *c*, rests, and with which it is connected. This reservoir is made of a flexible material, *d*, as india-rubber, and at top and bottom is connected to disks or plates, *e*. From the center of the top disk a pipe, *f*, is carried, having a jet, *i*, furnished with a tap, *j*. In and above the case, *a*, are weights, *k*, which force down the top disk, *e*, and compress the liquid contained therein. This pressure compels the liquid to ascend through the tube, *f*, into the basin, *l*. A smaller basin, *n*, may be used to receive the liquid under a lighter pressure.

The action of the fountain is as follows: The tap, *j*, is unscrewed and the liquid is poured into the basin, *n*, the fountain being lifted up, which creates a partial vacuum, allowing the liquid to descend freely. The basin being filled, the tap is screwed on, and on turning it the liquid is thrown out in a jet which is continuous so long as the weights, *k*, and the springs, *m*, continue to act and until the liquid is exhausted. It seems as though this simple device might be adapted to use in gardens and dwellings wherever the force of a natural head of water is wanting. Fanciful devices in iron or bronze might be made cheaply with the working apparatus attached.

Safeguard against Fire.

Among the recent improvements having in view the safety of life and property from fires, now so alarmingly prevalent, is an ingenious device patented by Mr. Chas. Dion, of Montreal, Canada. It consists of a small dial, something like a clock face, which is to be hung up in the apartment, and from the dial wires extend through the various rooms of the building, all connecting with one or more large alarm bells.

The construction is such that the instant any undue heat is occasioned in any of the apartments of the building where the wire passes, the alarm bell will be violently sounded, and a pointer will be thrown up indicating the number of the room where the heat or fire has begun. We believe the fire records conclusively show that the great majority of all fires could be easily extinguished, in many cases without water, if a prompt alarm could be given. Mr. Dion's invention seems admirably adapted for this purpose, while its cheapness and simplicity commend it for general adoption. The invention has been put into use throughout all the apartments of the Bishop's Palace and also the Chapel, at Montreal, where it gives the highest satisfaction. Over sixty of the dials are there used, and the Vicar General testifies to their remarkable importance and value. The Board of Fire Underwriters of this city have also officially certified to the striking merit of the invention and strongly urge its general employment.

The Center Rail.

A correspondent reminds us that the center rail, successfully used for heavy grades on the Mont Cenis railway (see SCIENTIFIC AMERICAN, Vol. XV., No. 24) is an American invention, patented some fifteen years since by Mr. George E. Sellers, of Cincinnati, and practically applied by the Coal River Improvement and Coal Company, for overcoming a grade of 150 feet to the mile in crossing the eastern barrier of the Shamokin Coal Basin. Two heavy freight engines were built for that company on Mr. Sellers's plan; but they failed to complete their road, and the engines were eventually sold among other things to the Beaver Meadow Railroad Company, and are now in use as ordinary locomotives. The following extract from the report of John C. Trautwine, Chief Engineer to the former company, shows where the credit of first inventing and introducing this device belongs:—

> In this engine adhesion is obtained, not by the weight of the engine alone, but by pressure produced by the load itself. The pressure is made to operate by means of two horizontal adhesion wheels or rollers, which act upon the opposite sides of a center rail. The force with which they press the rollers is, by means of a most ingenious device, made to adjust itself instantaneously to the varying resistance to be overcome, whether that resistance be modified by an increase or diminution of the load, or by change of grade. I have seen a small working engine, on Mr. Sellers' principle, ascend and descend a grade of 276 feet per mile, with the same loads that it could barely start on a level. On this grade the engine was under the most perfect control of the engine man. We shall have no difficulty in ascending our 150 feet grade with trains of the same weight as the ordinary engines will transport over the 35 feet grades of the roads with which we connect.

PRESERVING POLISHED STEEL FROM RUST.—A correspondent says that nothing is equal to pure paraffine for preserving the polished surface of iron and steel from oxidation. The paraffine should be warmed, rubbed on, and then wiped off with a woolen rag. It will not change the color, whether bright or blue, and will protect the surface better than any varnish,

ARTESIAN WELLS--NOT EVERYWHERE ATTAINABLE.

[For the Scientific American.]

The popular theory prevailing a few years since, that artesian wells might be obtained anywhere by penetrating the earth's crust to a sufficient depth, received its refutation in the grand experiment made in 1858 by the legislature of Ohio, at the capitol of that State.

Artesian wells are obtained by boring into the earth's crust until subterranean reservoirs or streams of water are reached; but unless these supplies have their sources at an elevation higher than the mouth of the wells, the water cannot rise to the surface. These subterranean reservoirs are not lakes, or large bodies of imprisoned waters, but beds of sand, or porous rocks, saturated with water capable of motion. Such borings have produced an abundance of water at Paris and other places in France; and also in portions of Mississippi, Alabama, South Carolina, and other States in our own country. Now, to understand why one district will yield water in every boring made to the proper depth while another will yield none, we must examine the difference in their geological characteristics. Geological science only can solve the mystery.

Surrounding Paris, at a considerable distance from the city, there appears at the surface an immense bed of porous silicious rocks, through which water easily percolates, and which rests on strata impervious to water. The strata of this porous bed of rock dip from all directions toward the city, indicating that they pass beneath it, thus forming a vast basin, having a depth of about fifteen hundred to two thousand feet at its center. This basin is filled by the rocks of the chalk and tertiary formations, so as to bring the surface of the country to nearly a common level—the outer rim of the basin, however, having a higher elevation than its center. The chalk formation rests upon the porous silicious rocks, and is impervious to water. The tertiary formation overlies the chalk, and the two together have a thickness of many hundred feet. The rains, falling upon the outer margin of the basin, sink freely into the porous materials there exposed at the surface; and, keeping the strata constantly saturated with water, create a pressure of that fluid toward the center, where they are overlaid by the newer formations. These porous rocks, may therefore be called water bearing, as an abundant supply of water everywhere pervades their strata, where its evaporation is prevented by the overlying chalk and tertiary. By boring down through these two beds into the porous strata, at suitable distances within the margin of the basin, the water is forced up to a hight corresponding to that of the source of its supply, and in some cases reaches an elevation of thirty feet above the surface. The artesian well in the city of Paris is bored to a depth of eighteen hundred feet, and the water rises through a tube to an elevation of sixty feet above the surface, and has a temperature of ninety-four degrees, Fah. The first well of this kind was bored at Artois, in France: hence the name, artesian wells.

In Mississippi and Alabama, the region furnishing artesian wells is not in the form of a basin as at Paris, but is an inclined plane, commencing near the base of the Alleghanies and descending toward the Gulf of Mexico. The water-bearing formation of this section of country is a loose, sandy deposit, occupying a large extent of surface. It is overlaid, further south, by the chalk and tertiary formations, which are known, locally, by the name of rotten limestone. This is an immense deposit of carbonate of lime, existing almost as pure marl, but occasionally including some beds of limestone, and in many places abounding in fossils. It has often a thickness of only a few feet at its northern margin—as at Purdy, Tenn. —but increases rapidly in depth southwardly, until it attains a thickness of nearly two thousand feet; the increase in some localities being at the rate of thirty feet to the mile. The marl is impervious to water, and none can penetrate down through it, however heavy the rains at the surface, or rise up through it by capillary attraction, whatever may be the extent of the evaporation from the soil above. Planters dig cisterns in it, in the form of immense demijohns, and fill them with water from the roofs of their buildings. These cisterns require no wallings of cement to make them water-tight, and retain the water during summer in all its original sweetness.

The bed of sand which underlies the marl must be of considerable thickness, as it has been penetrated to a depth of three hundred feet in some of the artesian wells. It rests upon the older secondary rocks, which, being impervious to water, serve as a flooring to the sand, and prevent the water from sinking lower in the earth. This sand bed, as before stated, occupies the surface all around the northern margin of the marl, and the rains descending upon it are readily absorbed. The water thus supplied is arrested in its descent by the flooring before described, and it flows along the inclined plane, among the sand, until it passes beneath the great marl bed, from whence there is no retreat or escape except by a forward movement. Far down toward the coast, where it has gained power by accumulation, the water is found bursting up through the marl in large springs. Wherever artesian wells have been bored at proper distances within the marl formation, water has been secured; but when attempts have been made at points too near its northern margin, they have either failed or the water does not rise to the surface. The more northern wells in Alabama have a depth of two hundred and seventy to three hundred feet—the water rising in them to within eighty or ninety feet of the top, from whence it is drawn up by the bucket and windlass. There are other wells in the river valley near by which is eighty or ninety feet lower, in which the water overflows at the surface. Further south, where the common level of the country is a hundred feet lower, the artesian wells have the water flowing from their mouths in a constant stream; but, owing to the increase in the thickness of the marl in that direction, they have to be sunk to the depth of five hundred to eight hundred feet, to reach the water.

In all these wells the water rises to a common level, whether it stops at ninety feet below the surface, barely overflows at the tops of the wells, or ascends in tubes prepared to allow it to reach its maximum elevation. This shows clearly enough that the water has a common origin in a single broad bed of water-bearing sand, everywhere underlying the whole region covered by the rotten limestone. Some exceptions have to be made to this general statement. It has been said that the sand bed includes some strata of hard sandstone. These strata are at different depths, and some of them serve as floorings for the water, or secondary lids to the basin, or rather to the inclined plane upon which the water runs. Consequently, after reaching the water immediately below the marl, if the boring is continued two hundred or three hundred feet through these occasional strata of sand rock, it will rise to a higher elevation than when first reached. This is only true, however, of points distant from the margin.

The artesian well at Columbus, Ohio, may now be considered, and the reasons of its failure stated. The geological strata of this region vary but little from the horizontal, and at many places not very distant, the same rock which is found a thousand feet below Columbus can be seen exposed along the hills of the Ohio River, from Cincinnati, up and down that stream, for a hundred miles. The order is as follows, using western names to designate the formations:—

Beginning at Columbus, the cliff limestone, which is the surface rock, has a thickness of four hundred feet. It is composed of alternating layers of gray limestone and soft marlite. The marlite is as impervious to water as the marl of Alabama or the chalk of Paris. The limestone strata are not what can be considered as water-bearing, though often cellular and containing many seams and small fissures. The dip of this formation is toward Columbus, from the westward, at the rate of a foot or two to the mile, for a distance of sixty or seventy miles. Water penetrating the strata at that distant point, if it could pass on to Columbus, should have been found at the depth of two hundred and fifty feet. But the boring shows that no such supplies are coming in from the westward, thus proving that the cliff limestone has no water-bearing strata. The dip of the strata increases eastward of Columbus, so that at Zanesville, Ohio, it has attained a dip of about twenty-five feet to the mile, and this continues as far as Wheeling, Virginia. No water, therefore, can come to Columbus from that direction, so long as fluids refuse to flow up hill.

Immediately beneath the cliff limestone, but occupying the surface in a large area surrounding Cincinnati, the blue limestone prevails. This formation is composed of alternate beds of blue limestone and marlite, and is not water bearing. It conforms in its dip, of course, to that of the overlying cliff limestone. Its exact thickness is unknown in Ohio, Indiana, and Kentucky, as the whole formation is not exposed at one place within these states. In Pennsylvania it is estimated as having a thickness of six thousand feet; while in the vicinity of Cincinnati only six hundred feet of it are presented, and at Frankfort, Ky., an additional six hundred feet, of still lower strata, are brought up to view. This gives an exposure of about twelve hundred feet of the blue limestone for examination; leaving, it is supposed, about two or three hundred feet beneath, which cannot be seen. It is estimated that its thickness must be greater at Columbus than at Cincinnati, as the former place is over a hundred miles nearer than the latter to its greater development in Pennsylvania.

The strata of this formation are composed of alternate layers of crystalline limestone and soft marlite, both of which are impervious to water. The marlite predominates in the upper half of the formation, and the limestone in the other. It includes no water-bearing strata; but at Frankfort, Ky., there is a portion of the limestone, a little above the river bed, which is cavernous. The same character is presented in it at Tazewell, Tenn., indicating that the lower members of this formation may possess this character throughout great distances.

Now, although these strata, as well as those of the cliff limestone, include none that are water bearing, in the sense in which the term is employed when applied to artesian wells, yet they retain sufficient water for the supply of springs and common wells: but in these cases the water is only found pervading the loose surface deposits or running in veins in the open joints of the rocks, and not, as every one knows, in the body of the rocks themselves.

The marlite, at depths where the frost cannot act upon it, is usually unbroken in its strata, and serves to conduct water along its upper surface, where porous materials allowing its passage exist. But water can never flow along in the midst of compact marl or clay as in deposits of sand. The whole of the cliff limestone, and the blue limestone also, are therefore unsuitable formations in which to attempt the production of artesian wells.

But there is another point which should be noted. Cavernous limestone, as well as that which has openings along the joints, often affords subterranean passages for streams of water. If the quantity in any instance be greater than can pass along the narrower parts of the channel, and the water be thus dammed back, and the source of supply be at a higher elevation than the surface above, a flowing well may be supplied from it, and will secure the surplus which is held back for want of sufficient width in the passage below. The only difficulty will be in striking the vein of water, and to succeed in this, must be the result of accident and not of foresight in the operators.

Beneath the blue limestone, there exists a heavy formation of sandstone, very compact in its structure, and not likely to have any reliable water-bearing strata. It is known in the New York survey as the Potsdam sandstone. This formation rests upon the primary rocks, and artesian wells canno be expected in rocks of that age and depth.

The facts stated conducted me to the conclusion, that the geological formations existing beneath the capital of Ohio, were not of a character to justify the expenditure of the money necessary to bore through them. That city is located near the margin of a great basin, having its center in Virginia, and the dip of the rocks was all from it and not to it as a center. In short, the water basin was turned upside down, and Columbus was upon the bottom, with the water all running away from it, instead of converging toward it as is the case at Paris.

But the Legislature made a new appropriation, and the boring progressed until a depth of twenty-seven hundred and seventy-five feet and four inches (2,775 $\frac{4}{12}$ feet) was obtained. The temperature at 2,575 feet was 82° Fah. and at 2,750 feet it was 91°.

The last 190 feet gave no sedimentary borings to the sand pump, the whole seeming to be carried away by currents of water moving at that depth. But where did this water go? This is a question of a curious nature. These currents were moving at a depth of nearly two thousand feet below the sea level. They could only have an outlet into the bed of the ocean, and the fresh water, rising to the surface through the salt water, on account of its less specific gravity, established a current that allowed the continual movement forward of the water filling fissures, or connected cavities, existing at great depths in the earth.

The existence of artesian wells, in minor localities, may be explained on the principles here stated. D. C.

[Our Foreign Correspondence.]

THE LONDON FIRE DEPARTMENT.

LONDON, Dec. 25th, 1866.

I have recently, through the politeness of Captain E. M. Shaw, Chief Executive Officer of the Metropolitan Fire Brigade, had an opportunity of acquainting myself with the organization and working of the London Fire Department, and I think some of the particulars will be of interest to your readers.

INSURANCE FIRE SYSTEM.

In most of the cities of England the work of extinguishing fires is intrusted to the insurance companies. These each own their separate engine and hire a certain number of men to manage it, but depend on volunteers picked up on the emergency, for the complement necessary to work the engine properly. They subdue all fires that occur, but if the property is not insured, the expense of extinguishing is charged to the owner. If it is insured by another company, the expense is charged to them. Somewhat similar, until the present year, was the system in London also. Now, however, the Board of Works have assumed control of the brigade and considerably extended the district to be protected, increasing at the same time the number of stations and the force employed. Just at present, therefore, the organization is in a transition state; but a tolerably correct idea may be formed of the system as it is intended to be.

ORGANIZATION—TELEGRAPH SYSTEM.

The extent of the metropolis is not far from 120 square miles. This is divided into four districts—three on the north side of the Thames, and one comprising all on the south side. In these there will be altogether sixty stations, although at present there are but forty. Each district is under the superintendence of a foreman, who is stationed at a central point and in telegraphic communication with each station in his district and also the head office in Watling street. He attends to the dispatching of engines and all the working of his district, and is responsible for its proper management to Captain Shaw. The telegrams from these four foremen are the only ones that go to the central office. No bells are rung, the whole signaling being done by telegraph. The instruments are very simple and can be worked by all the employees in the station. They are operated by merely turning a handle around over a dial on which are marked the letters of the alphabet; so that any one can receive or send a message. The endeavor of the officers is to keep the existence of a fire as quiet as possible, so that they may get there before the crowd.

LOCATING FIRES MATHEMATICALLY.

As some of the stations on the outskirts of the district are necessarily very far apart, a very effectual means is adopted for locating the precise position of a fire seen at a distance. On the roof of each of the stations is placed a compass, so that the bearing of any light may be readily observed. The officer at the central station telegraphs to two stations at a considerable distance on either side of the direction of the light, to know its bearing from that point. He has a map on which the position of each station is marked by a raised point, so that they can be readily found by the touch, and on which the points of the compass are plainly indicated. It is then but the work of a moment to find where the bearings telegraphed from the outlying stations will intersect, and then the orders can be sent to the various stations with certainty. As everybody knows, nothing is more deceptive than following a light seen at a distance.

FORCE AND APPARATUS.

The number of men composing the brigade is 230, but is constantly being increased. The number of engines is 70, of which 19 are steamers, 27 old manuals, and the others new manuals. A special and most important feature of their force is the use of " curricles," or very small engines, which can be started off at the instant of alarm, and managed by one man. These consist of a box mounted on a pair of wheels, and containing three or four lengths of hose—say 200 feet—coupled to the pump and "snaked" into the box so as to come out without kinks, half-inch and three-eighths-inch nozzles, an ax, saw, several canvas buckets which fold up so as to be compactly stowed, a canvas cistern, and a small syringe-like hand pump with small hose attached. On the outside are a couple of small ladders, and the pumps and brakes. In using these the three-eighths-inch nozzles are generally employed, since when it is possible to get near the fire, the smaller the jet the better, as less damage is done by water. The use of these little engines very frequently nips in the bud what must otherwise become a serious conflagration; and I think that as in New York we have gone to the extreme of adopting steam engines exclusively, it would be well worth the while of our Commissioners to turn their attention to the advantages of these curricles. The hand engines would appear to the members of our old volunteer department as very ungainly affairs. They consist of a large box containing the pumps and all the necessary hose and equipment, much the same as the curricles, but on a larger scale. They are painted red, with little if any attempt at ornament, and are drawn by horses or by hand, according to the size. The larger ones weigh 2½ tuns in working trim, and require a complement of 40 men to work them.

THE LONDON "STEAMERS."

The steam engines are mostly built by Messrs. Shand & Mason and Merryweather & Co. The engines by the former firm are preferred on many accounts, and range in weight from 26 to 52 cwt. Messrs. Merryweather's engines have the working parts placed under the horizontal body, and are exposed to all the flying mud from the wheels when running to the fire, so that it is necessary to give them a bucket of water before getting to work: they work at a disadvantage on this account. Their weight varies from 30 to 60 cwt. The suction pipe of Messrs. Shand & Mason's engines is kept coupled on while in the station, so that the time of performing this operation is saved, besides insuring that the joint shall be tight. The water is kept always at about 212° by a gas jet which is placed in the firebox, so that but little time is required for raising steam. It takes fourteen minutes to get up steam from cold water. The hose is in forty-feet lengths, two and a half inches in diameter, made of leather, only the best portion of the skin being used, and the rivets are placed half an inch apart. The cross joints are cut at an angle, so as to fold more readily. The hose is all tested to 100 lbs. pressure. The water pressure is from 100 to 150 lbs. The nozzles used range from one and a half inches to three eighths of an inch, increasing by sixteenths from the one and a quarter inch size.

DEFICIENCY OF WATER—PRIMITIVE HYDRANTS.

The great difficulty against which the brigade have to contend is the miserable water supply. As a rule, the water is neither at constant service or high pressure. The fire plugs are surprisingly rude, consisting mainly of a rough cast branch in the water pipe, pointing upwards in a hole in the pavement, and *closed with a wooden plug* which has to be knocked and pryed out. The water then fills the hole and flows up into a canvas cistern about four feet long by two feet wide and two feet deep, having a hole in its bottom to admit the water, the pressure of which, when in, keeps it tight against the pavement. The suction pipes are dropped into this cistern. In some cases a stand pipe having a taper end is driven into the cast-iron nozzle, and is furnished with the necessary couplings at the top. It is unnecessary to say that the leakage with such an arrangement is considerable

LOW AVERAGE OF FIRES.

The daily average number of fires is five; some few days having been entirely exempt, and some having had as many as twelve: but the average is pretty uniform, and I think very small for such a large city. The uniform of the men is plain and suitable. Each man is provided with a hatchet which he carries in his belt, and wears a brass helmet.

Captain Shaw is a gentleman of great experience and ability, and is laboring as rapidly as allowed by the Board of Works to bring the brigade to the highest degree of perfection in efficiency, force and distribution. SLADE.

ICE BOATING.—This unequaled sport is fast becoming an institution on the Hudson River. The Ice Boat Association of Poughkeepsie, where the interest centers, contains ten handsome boats, and as many well-to-do and spirited proprietors; and there are eight or ten boats more on the river. A grand prize regatta has been resolved on for this season; the winner pledged to run twice afterward for the retention of the prize. Three of the vessels of the association made an exploring trip a few days since: the best time made was a run of two miles in one and a half minutes—only 80 miles per hour. Last winter a run of nine miles was made in eight minutes, or 67½ miles per hour. Of course clothing like that of arctic explorers is needed on an open deck rushing through a winter atmosphere at such breathless speed as this. The construction of the ice boat is peculiar but simple. It is V shaped, the point astern and resting on a single pivoted runner by which the craft is steered. The broad front rests on a pair of runners. The deck is but a few inches from the ice: mast, rigging and sails are similar to those of water boats. Steam has not yet been regularly employed, but is cetain to be before long, we judge. These yachts can sail two points nearer to the wind than water craft. Sport in this case will prove the pioneer of business. Practical attempts have been made on the Hudson already, in years past; and the art which is advancing so bravely will doubtless soon be applied to business purposes, as it has begun to be on the upper Mississippi, and will become at its maturity no contemptible competitor with the railroads for winter freight and passengers.

Editorial Summary.

NATIONAL GEOGRAPHICAL PARK.—We have received a circular suggesting inquiry by Congress into the practicability of establishing at Washington a Geographical Park, in which the relative positions and proportions of the several states and territories, with the topography and main features of the continent, shall be represented in miniature. On the representative territory of each state, etc., it is proposed to establish a museum of its productions and history. This is a very pretty plan. In a square mile of ground, the continent might be laid out on a scale of something like one foot to the mile; and such features as the Mississippi River, the great lakes, Niagara Falls, or the Rocky Mountains, might be represented with their outlines clearly visible to the naked eye, though by no means safe from the incautious foot. Gulliver among the Liliputians was nothing, to the American public stumbling or dragging their hoop-skirts over "the great national features of our country" in the Geographical Park. As a facility for the study of geography, we could wish that just such a park were within easy walk of every school house. But we doubt whether its proposed proximity to the halls of Congress and the Executive departments, would enlighten and expand the patriotism of our rulers to the extent anticipated in the circular. Perhaps we have not looked deeply enough into all the bearings of the scheme; but we apprehend that the many millions required to construct and preserve this stupendous toy will not be forthcoming until after the national debt is paid.

THE TAXES.—We are somewhat surprised that Mr. Wells, among his forcible recommendations for the reduction and less oppressive distribution of our taxes (quoted on page 34 of this paper), has made no reference to the burdensome income tax. Perhaps he considered justly that the direct taxes on industry and its products—which are indirect additions to the income tax, compared with which the income tax itself is not worth mentioning; and not only that, but are also levied mercilessly on the poor man's necessaries of life—ought to be the first objects of retrenchment on the list, to which the practical consideration of other reductions might well be postponed. If any thing was ever demonstrated, the American people, who were supposed by European statesmen to be capable of any anomaly in the universe rather than submission to taxation, have demonstrated that they can tax themselves beyond the endurance of any other people—when they have debts to pay. We think it unquestionable that a revision of our tariff and taxes is within the present resources of fiscal science, such as would equalize and diminish all our principal burdens, and at the same time yield unabated revenue, and encourage instead of depressing industry. The income tax cuts deep when it takes five and ten per cent from large incomes: it cuts to the bone when it cuts through to the last $600 per annum.

NEW YORK POST-OFFICE.—The prospect brightens for a post-office worthy of this city and the Union, in place of the old meeting-house and circumambient horse sheds now used for the purpose in Nassau street. The Secretary of the Interior and acting Postmaster-General have united in a strong recommendation to Congress of prompt action in accordance with the report of the Commissioners who investigated the subject during the recess. The House Post-office Committee have agreed to report the bill, and there should be every reason to hope that the necessary appropriation will now be made. The site proposed is the triangular southern end of the City Hall Park, opposite the front or Park Row corner of the SCIENTIFIC AMERICAN office. Its area is 65,259 square feet—equal to about 25 city lots. The ground will cost $500,000, and a building is proposed at a cost of $1,000,000, for the accommodation of the post-office and United States courts. The average of outgoing and incoming mails at this office has increased in the last ten years from 10 tons to 90 or 100 tons per day. Fronting all sides on broad streets, the proposed new post-office will have every facility of access and departure for this heavy business.

TERRA ALBA.—The extent to which this fine white earth is employed in adulterating pulverized sugar, confectionary, flour, prepared cocoa, spices, milk, etc., is incalculable. Dishonesty gives the law to many a traffic and manufacture in these days, and compels those who would rather be honest (so they imagine) to "do as others do." A chalky taste in the delicate white cracker, a tastelessness in bread, a whity scum in the tea cup from a spoonful of snowy sugar, with many another uncomprehended indication, betray the presence of the ever-present adulterator. Two thirds their weight of terra alba has been obtained from lozenges. This comparatively new ingredient is imported from Ireland, and that largely, costing only about one dollar and a quarter per cwt.

RAZING GRINDSTONES.—A subscriber suggests that a simple machine might be made to "raze" grindstones when first hung or out of truth, without the care and labor now employed in that disagreeable job. He says a cylinder armed with proper teeth could be attached to the grindstone frame and be driven in a direction contrary to that of the stone's revolution. We see no reason why a simple device of this character could not be contrived, and made so as to feed up automatically as the work proceeds. This is a hint for our inventors.

AT a recent meeting of the Polytechnic Society, Dr. Rowell stated that a cubic mile of water, at a temperature of 40° Fahrenheit, was 900,000 tuns heavier than the same amount at 50° Fahrenheit, and weighed 3,000,000 tuns more than a cubic mile at 60° Fahrenheit.

COST OF MINING.—The Spanish proverb says: "It takes a mine to work a mine." This is emphatically true in our wild territories remote from markets and manufactures, whither almost every article of subsistence, machinery and implements, must be transported hundreds or thousands of miles on rude wagon roads. A comparison of the bullion produced from the most successful mines in Nevada, with the profits that reach the owners, forcibly illustrates the rude conditions under which mining is now carried on. The proprietors of the famous Gould and Curry mines divided last year a quarter of a million net ($252,000), out of a gross product of a million and a half ($1,600,000.) Thus only about 16 per cent of the bullion marketed went to the supposed owners. Other mines have done better, and some have done worse. The Savage mine yielded $1,100,000 in the last six months; net profit $360,000, or 32½ per cent. The Hall and Norcross and Yellow Jacket mines made each very nearly the same operation in twelve months. The Ophir mine yielded $450,000, and no dividend at all. On the other hand, the Eureka of Grass Valley produced $600,000, of which $420,000, just 70 per cent, was profit; and the Eureka of Amador County produced $485,000, of which $310,000, or 64 per cent, was profit. When they get the Pacific Railroad, agriculture and manufactures among themselves, and matured processes of extracting the metal from the ore, our miners may all be able to cry "Eureka."

POPULATION OF THE METROPOLIS.—The census returns for the metropolis proper, so far as it lies within the State of New York—*i. e.*, the "Metropolitan District," or city of New York and its suburban dependencies—have just been published. The population does not appear to be as large as commonly estimated, this city showing but 726,386, Brooklyn, 296,378, and the whole district, 1,224,879. Either these figures are below the truth, or former censuses have been exaggerations. The latter supposition is unlikely; for probably hundreds of families can testify to having received no call from the census taker where one has experienced that attention twice over. There are many temptations to avoid the census taker, and none to seek him out: likewise many temptations to that official to under-do rather than over-do the duty for which he is employed. Certainly, New York and Brooklyn were never so crowded before, notwithstanding the constant increase in the number of dwellings. Landlords can not have it all their own way, as they do here, by proving with figures that houses must be scarce: the fact that houses *are* scarce is what does the business for the unfortunate tenant. As in many large centers of business and employment, the female population are a majority—in New York, of 28,924, and in Brooklyn, of 13,357. Out of these cities, in the suburbs, curiously enough, the males preponderate by 14,464.

BRITISH EXPERIENCE OF STEAM ON CANALS.—Steam tugs are employed on the Gloucester and Berkeley Canal, at an expense only one fourth that of horse power, which costs one farthing per ton per mile against one sixteenth of a penny for steam. The speed has been increased at the same time from one, two and three miles per hour, to three and four miles per hour. The wear of the banks by the "run" of the water has been completely remedied by a band of weather-stone pitching, two feet wide. On the Ashby-de-la-Zouch canal, experiments indicate that no injury is done to the banks, with a speed limited to 3½ miles per hour. In other respects, as the wear of the sides by the boats, and the accumulation of deposits, the canals prove much the better for the employment of steam. On the Grand Canal, Ireland, a system of navigation 160 miles long, screw steamers are successfully employed on a long level of 25½ miles, with a depth of only five feet two inches. On the Forth and Clyde navigation seventy steamers are now employed for carrying cargo, some as large as 120 tons. The tug plan, however, appears to be more generally approved, though on some canals they prefer to use steamers carrying freight and acting as tugs at the same time.

A VERY curious example of photography is seen in the prints of the Exhibition card, prepared by the New Haven Malleable Iron Works, for the French Exposition. The board measuring 6 by 7 feet, contains samples of the various stock articles and tools made by the company, to the number of 746 pieces, none of which are exactly alike. Their arrangement is quite artistic. The photographic copy is only 7 by 9 inches, but the exact form and comparative size of every one of the 746 articles is clearly shown. It would be possible, by means of photography, to present in a few volumes reduced views of the various tools of the world.

THE PRESS.—There are two items of press statistics going the rounds which illustrate our national growth in two striking aspects. The German press of a single State (Pennsylvania) numbers no less than sixty papers, of which seven are dailies, and eleven are religious. The newspapers already flourishing in the Pacific States and Territories number *two hundred and four*. Sixteen of these, however, are outside of the land of Unculpsalm. San Francisco boasts twelve dailies—which is quite up to New York.

UNITED STATES AND CUBA TELEGRAPH.—The conditions under which it is proposed to connect Cuba with Florida, by telegraph, have been approved by the Spanish Government, and the contract has been signed.

COLORADO has apppointed Geo. W. Maynard, an experienced miner and geologist, as Commissioner to the Paris Exposition, and has forwarded a full and rich collection of specimens of her mineral products.

Reported for the Scientific American.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Friday evening, January 4th, Prof. Tillman presiding.

In continuing the subject laid over from the last meeting Mr Walling read a paper on the

THE NEBULAR THEORY.

All inquiries into the origin of the earth must be more or less speculative in character. Theories can only be formed when facts are sufficiently numerous to fully establish them. In the meantime those hypotheses which best explain all known facts, and include the greatest number under simple laws, seem most likely to be finally accepted; for this reason the nebular hypothesis has been so generally received by scientific men. A paper was read at the last meeting, opposing that portion of the theory which supposes the earth once a molten mass; and to point out the fallacy of the arguments then employed, is the object of this article.

Mr. Wood stated in that paper, first, that since force cannot exist independently of matter, no condensation of nebulæ could have taken place, because the consequent radiation of heat into space where there was nothing to receive it, would be impossible. We know that the sun and fixed stars are continually radiating heat into space, and if force cannot exist independently of matter, we have the ether, a material medium, which can receive the radiations and transmit them indefinitely. His statement that solidification in a melted mass will commence at the center, is refuted by the fact that the maximum density of liquids is reached at a higher temperature than that at which they solidify.

LIQUIDITY OF THE EARTH'S INTERIOR.

Among the geological evidences that the earth once existed in a molten state and is now liquid at its center, are included, the regular increase of temperature from the surface downward, volcanoes and the connection between their eruptions and earthquakes, the gradual elevation and depression of continents and ocean beds, and the direction of mountain chains, as if formed by the contraction of a molten mass.

Mr. Wood attributes these phenomena to the influence of some central orb, which acted in some manner analogous to the influence of the moon in causing the tides. We know that the tides are due to gravity between the moon, sun and earth, but the force capable of producing such various changes without manifesting itself correspondingly upon the ocean, is widely different from any force now known to us.

The laws by which solidification takes place under great pressure are not well enough understood to show the truth or fallacy of the argument that fluidity of the earth's interior is counteracted by the pressure it sustains. Such experimental knowledge as we do possess points in the opposite direction, proving that pressure lowers instead of raising the freezing point.

By the nebular hypothesis, innumerable facts are explained which cannot be accounted for in any other way, and not a solitary fact in conflict with it can be brought forward.

COSMOGONY.

Dr. Bradley also read a paper on this subject, assuming as the fundamental principles of the nebular theory, the indestructibility of matter, the existence of ether filling all space, by or from which are developed all forces, and these like matter, are eternal, and all their modifications consist in varying the forms of undulations of ether. The inconceivable attenuation of the molecules of nebulæ, find a counterpart in air, which though so distended, defies the philosophers to create a vacuum.

HOW THE NEBULÆ WERE FORMED.

Astronomers tell us that the solar system is rapidly moving in space, making a great revolution occupying billions of years for its completion, around the star Alcyon in the Pleiades. Is it not reasonable to suppose that, at some time, there should be a great astral winter, and again after the lapse of billions of years, an astral summer with a temperature many degrees higher than that required to gasify all matter or resolve it into nebulæ? When in this state, the opposing forces, gravity and heat, would balance each other, and matter would be in a state of quiescence. But the mass is moving to a colder region, and gravity begins to act, contracting and drawing the molecules to a common center.

SOLAR SEGREGATION.

When a fluid is poured through a funnel rotation takes place: so it will be whenever a fluid, elastic or non-elastic, is gathered toward a center. In this case rotation begins, and continues with an accelerating velocity, an equatorial belt swells out, and thus an oblate sphere is formed. Condensation from cooling renders the exterior matter less mobile, the specific gravity is increased, the centripetal equals the centrifugal force, or force of gravity, and a ring is formed, which finally detaches itself, leaving the interior part to repeat the process: thus ring after ring is thrown off, till the sun has reached its present dimensions. Each of these rings still revolving, gradually contracts in volume, its diameter remaining the same, till another separation takes place, the inner portion collected revolving within an orbit. We note the rings of Saturn as proof of this hypothesis.

METEORS.

Satellites and the asteroids, were in like manner formed, but comets are due to the agency of the tangential force aided by heat, being thrown off from primaries, secondaries, or comets themselves, and may we not suppose some small comet performing its round every thirty-three years, which gives off a little spray at each perihelion passage, causing the tricennial meteoric displays?

THE SUN'S SPOTS.

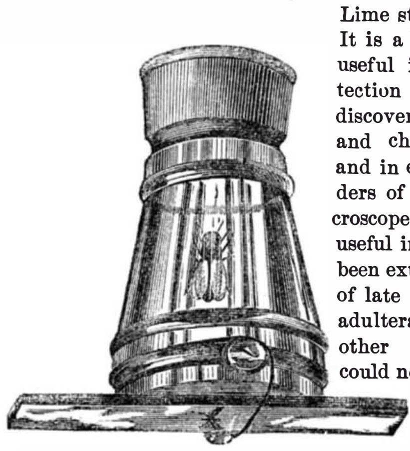
As seen through the telescope, the spots are continually changing, and show all the signs of mobility characteristic of masses floating in a molten liquid, and melting and sinking away. To credit the fanciful notions often received to account for these spots would prostrate the doctrine of the conservation of force and undulations of ether. The hypothesis I would advance in regard to these spots, is based upon the assumption that they are the manifestation of an effort on the part of nature at incrustation. When molten matter crystallizes, it is lighter than the molten mass and floats upon it, but when the crystalline mass is cooled, it contracts and tends to sink.

Suppose a crystalline mass of the sun's surface, cooling on its upper surface, and enlarging on its lower, till the increasing specific gravity causes it to plunge beneath the surface of the molten mass.

Following Dr. Bradley, Professor Stevens made some interesting remarks upon the gold fields of North Carolina, explaining also the geological formation where the precious metal is found, and naming the widely-extended districts over which it is scattered. Space this week will not allow any further presentation of the facts brought forward by the erudite Professor.

A CONVENIENT AND CHEAP MICROSCOPE.

The engraving shows a complete microscope, full size and exact form, constructed and patented by O. N. Chase No. 3, Lime street, Boston, Mass. It is a handy instrument, useful in aiding the detection of counterfeits, in discovering the texture and character of fabrics, and in exploring the wonders of nature. The microscope is one of the most useful instruments. It has been extensively employed of late years in detecting adulterations in food and other substances which could not be easily discovered by chemical analysis. To the farmer it is useful in ascertaining the quality of seed bought, and in studying the structure and habits of insects injurious to vegetation. To the merchant and business man it is an aid in testing the genuineness of bank notes, the quality of cloths, etc., and to all it is a source of elevating and instructive amusement.



This little instrument, although perfect in every part, is retailed at the low price of one dollar. [See advertisement on another page.]

THE MANUFACTURE OF COTTON--THE MAKING OF ROVING.

In previous articles we have followed the cotton through the first cleansing and straightening processes. In all these it has remained only a soft, woolly filament, known as "cotton," or "cotton wool," an expressive although contradictory term. As it left the drawing frames it was merely "cotton wool," differing from its raw state in that it was cleansed and its matted fibers straightened and brought longitudinally side by side, and cohering somewhat by the pressure to which it had been subjected. It has in this state very little tenancity, having received no twist, except that in some factories the cans that receive it from the last drawing frames have a slow, rotary motion, giving it a very slight curve on its exterior surface. As it comes from the last drawing it is a cylindrical ribbon, about an inch or an inch and a quarter in diameter. Its weight, in comparison with its length, is noted and regulated at almost every step in its progress, so as to insure a certain grade of yarn.

After being put into this form the cotton is to be made into "roving" or "roping," as a preliminary to being spun into yarn. For this purpose some of the most ingenious machines ever invented are employed. The "fly frame" is one of the most remarkable machines used in this or any other manufacture. The drawing is fed in between rollers precisely as in the drawing frames, which have varying speeds, so that while the first course merely takes and delivers the cotton to the next, these, revolving faster, attenuate the cotton ribbon and deliver it to the third or front set, which receive it at a further increasing speed. By this means the fibers are more and more straightened. On the front of the machine are spindles, each one directly under the delivery of the cotton. The top of each spindle is furnished with a fly, having two dependent legs, extending down on each side of a bobbin. One of these is hollow and the other solid, the use of the last being merely that of a counterbalance. The cotton is introduced at the top axis of the fly, which is hollow, and traverses the pipe arm, from which, at the center, it winds on the bobbin. Of course, the supply delivered by the rollers is exactly proportioned to the speed of the fly spindles. The bobbins rotate with the spindles, while the flies rotate outside of them, and they have also a gradual reciprocating motion inside the flies, being carried up and down to wind the product evenly in concentric spirals on the bobbin. Beside these two distinct motions, the bobbins have a gradually retarding velocity as they are filled, as it may be supposed that if, when three inches in diameter, they revolved as fast as when only one, they would strain and break the slightly twisted cotton. In this provision for a gradually decreasing speed is seen the ingenuity of the inventor. We cannot, without numerous diagrams and a lengthy description, explain the operation of this very remarkable device. The fly frame is, all things considered, one of the greatest triumphs of mechanical skill.

There is another machine, much simpler, and which has, to a great extent, superseded the fly frame. It is known in this country and in Europe as the "Taunton Speeder," from the residence of the inventor, Mr. William Mason, of Taunton, Mass., a mechanic to whom the cotton manufacture is more indebted, probably, than to any other since the days of Arkwright. This machine is very simple, and altogether different from the complicated fly frame. It takes the drawing between sets of rollers precisely as does the fly frame, but the bobbins are run horizontally and rotated by rollers, on which they revolve. Being moved by their circumferences, their peripheries, of whatever size, run at a uniform speed. Therefore, the complicated mechanism of the fly frame for graduating the speed of the bobbins' revolution, is unnecessary on the "Taunton Speeder." The twist, which on the fly frame is insured by the rotation of the flies outside the bobbin, is effected on this machine by an endless belt that rotates rapidly the guiding tubes of the cotton as it comes from the drawing rollers of the machine. But while on the fly frame, using bobbins with heads like flanges, which give the same length to each successive layer of the "roving," the reciprocating movement—up and down—is equal throughout, by the process on this machine each successive layer is shortened, until the top layer is as much shorter as the circumference of the filled bobbin is greater than that of the empty core; so that the filled bobbin is a central cylinder, and the cotton forms on it a larger cylinder, the ends of which are frustrums of cones.

The product, as thus wound upon bobbins or cores, is in the condition called "roving," ready now for being spun into yarn. In this state it is a filament of cotton, cylindrical in form, and, perhaps, about the size of a common straw. The cotton has been almost entirely changed in texture and, to the superficial observer, in nature. The matted and snarled fibers, as they came from the cotton field and the press, are straightened, arranged in parallel form, and stretched. All these operations of cleaning and arranging by the "willower," "picker," "cards," "drawing frames," and "speeders," may be regarded as preparatory to the ultimate use and value of cotton as a material for textile fabrics. The operation of converting the soft cotton into obdurate yarn, possessing tensile strength and rigidity, by spinning, must be considered in another article.

Micro-Photo-Sculptures.

Some very curious applications of this photo-medallion process are described in the *Photographic News*. They consist in what are termed "Micro-Photo-Sculptures," or enlarged images in bas relief of microscopic objects, the material being plaster of Paris. Nothing can exceed the delicacy, sharpness and perfect rendering of these reliefs, which give practically an enlarged model of the original object. The tongue of a cricket is the most perfect of those before us; the tongue of a fly is also exceedingly good; a flea is from a somewhat imperfect negative, and lacks crispness; but this is in nowise due to the process. The perfection of the modelling depends, of course, on the perfection of the definition in the negative; and the amount of relief, other things being equal, on the intensity of the negative, although this may be considerably modified by management in the manipulation. Those before us are on round tablets about three inches in diameter, the amount of relief resembling the thickness of a skeleton leaf.

The result is exceedingly beautiful, and it is probable that the principle upon which they are produced will find other applications. It is only necessary to remark that it is imperative that the subject to be produced should be semi-transparent, and admit of being photographed by transmitted light, so as to secure the relations of form in a relief so produced.

Time and Longitude.

The determination of exact data on this subject can now be effected by careful experiment through the Atlantic cable and connecting telegraphic lines. Mr. Dean, of the U. S. Coast Survey, is engaged in this duty. The telegraph offices from Valentia, Ireland, to Chicago and New Orleans have been put in connection for time, but San Francisco had not been reached at the present writing, the California wires having been down. The results blunderingly reported through the daily papers (after turning some of their P. M.'s into A. M.'s and *vice versa*) approximate closely to the results of the old rule applied to the longitude of our common maps. The time at Valentia, Ireland, being 5h. 9m., P. M., that of Heart's Content, Newfoundland, was 2h. 8m., P. M.—difference, 3h. 1m.—and that of New Orleans was 11h. 50m., A. M.—difference, 5h. 19m. That of New York (not given) would have been in the neighborhood of 4h. 25m. earlier than Valentia, or 12:44 o'clock. The exact adjustment of chronometers and determination of the time lost in transmission, must be approximated by repeated and nice experiment. Mr. Dean estimates that each single flash is transmitted in thirty-five hundredths of a second. The methods of comparing time may be various. One way would be to have all stations successively mark a concerted hour—say 12 M.—by a single flash through the cable, after giving notice one minute beforehand. Or, better still, stop watches being employed at every station, all might be stopped at the same instant by a concerted signal, and the time recorded within a fraction of a second.

LARGE STEEL ROLLERS.—The largest steel rollers ever made in this country were manufactured at Waterbury, Conn., for the Royal Mint of England. They were 14 inches diameter, of solid steel and hardened, intended for rolling the precious metals.

Correspondence.

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

The Power of Steam.

MESSRS EDITORS ;—The position taken on page 22 of the present volume, in relation to the "power of steam" is not a proper one for obtaining the true power of steam. The views there advanced are correct when steam is generated against the resistance of the atmosphere, but it is a great mistake to compute the power of steam from such data, as they have no general application in determining the power of steam.

The power value of steam varies with the pressure at which it is generated. For instance, in the calculation on page 22, a cubic inch of water is employed, and being converted into steam against the pressure of the atmosphere gives a return of 2,000 foot lbs. of work; but if the same amount of water were vaporized in a closed boiler and under a higher pressure, it would give a larger return in work, or power.

I am a warm admirer of Professor Vander Weyde's ability and varied scientific attainments, but in this instance I beg leave to call the gentleman to order. The error is an important one, and if not universal it is a too common one, and should be corrected.

To realize the full power of steam is beyond the present reach of science. The steam engine, to be absolutely perfect, should generate steam at a pressure of 25,500 lbs. to the square inch, with a temperature of 1,000° above the boiling point; and no expansion should be allowed to take place before the water has received heat enough to give it a vaporous form (supposing no work other than overcoming the resistance of the atmosphere is performed); and then steam would be generated under the most favorable circumstances which the case will admit of. The following would be the result, under these conditions, if a cubic inch of water were employed.

To vaporize a cubic inch of water, thirty-six units of heat are required, and if the water is vaporized under the pressure of the atmosphere, 2,000 foot lbs. of work will be the result: but if the cubic inch of water is confined in a boiler, so that no steam can form until after the whole thirty-six units of heat have been imparted to the water, then, when the water is allowed to take the form of steam, the lifting operation will begin with a force of 25,500 lbs., instead of 15 lbs, as in the former case; and the amount of power developed will be 6,797 foot lbs., instead of 2,000. In the case where the greater result is obtained, one-quarter of the heat is annihilated by the work done, and the expansion in this case ends at 1,275 volumes, instead of 1,700, as in the other case.

If the steam engine were absolutely perfect, it could return but 193 foot lbs. of work for each unit of heat expended in making steam; or return only one-fourth the amount of work which the mechanical equivalent of heat calls for. I have expended much time in inquiring into that mysterious and fearful gap which exists between present practice of motors, and what theory establishes as the actual power of heat; and I will say that it is a curious and interesting fact that a prolonged and laborious study of the subject gradually leads into, and finally ends in, *electricity*, and establishes the fact that electricity is the only element or vehicle which is capable of giving the full power of heat. Such a study also developes the reasons why different vehicles for converting heat into power, do give a like return in work; and there is beauty, order and consistency existing among the vehicles throughout the entire field, when we come to understand the reasons why they differ. Electricity is the beacon toward which the sails must be trimmed to reach perfection in motors. Our present methods of generating electricity are but crude, miserable contrivances, compared with what they will be at some future time; and Professor Tyndall, one of the leading scientific men of the day, but reiterates this when he says of electricity, that *we know nothing about it*. Some entirely new and radical method of generating electricity will yet be found, which will set civilization agog, and rejoice and lighten the hearts of millions. This is the conclusion that I have arrived at, after having followed the subject during available hours, which if brought together into working days, would make one year of constant application. The true method for generating electricity is the problem for the times: present methods must be departed from. Great improvements in thermo-electrics, in my judgment, are yet to be made.

NEW YORK, Jan. 8, 1867. F. A. MORLEY.

Permeability of Metals.

MESSRS. EDITORS :—In No. 24, Vol. XV., you have an article on the "Action of Acids on Steel." So far as said article refers to the case spoken of by your correspondent, F. L. K., I think that both your reason and his, for the peculiar effect on the steel wire, are probably incorrect. Some months ago I saw in one of our shops some sheets of zinc which had been tinned in a peculiar way, but I did not ascertain how it was done. I did not inquire, but it appeared to have been tinned by rubbing on a mixture of mercury and tin. The workmen on cutting it discovered that it was very brittle, and ceased using it. A strip taken in the fingers and bent would break up into pieces almost as easily as a piece of pie crust. I suppose that the zinc being very thin (No. 9) the tinning had penetrated, comparatively, to a great distance, and the sheet, instead of being a sheet of zinc with tin outside, was a sheet composed throughout of zinc and tin and perhaps mercury too—being entirely changed in its nature.

In coating one metal with another, the metal coated must be penetrated by the coating metal to some extent, perhaps to one fiftieth of an inch, and if the sheet is only one fiftieth of an inch thick, of course the coating will go entirely through.

Another case. In making milk strainers with wire gauze bottoms we first tin the brass wire gauze, not with chloride of zinc, but with sal ammoniac: but if the soldering iron is accidentally too hot, we melt the brass wire, showing that a new mixture of metals is formed by coating the fine brass wire with solder; for it would take a much higher heat to melt the brass wire alone. The same thing takes place in tinning zinc with a soldering iron.

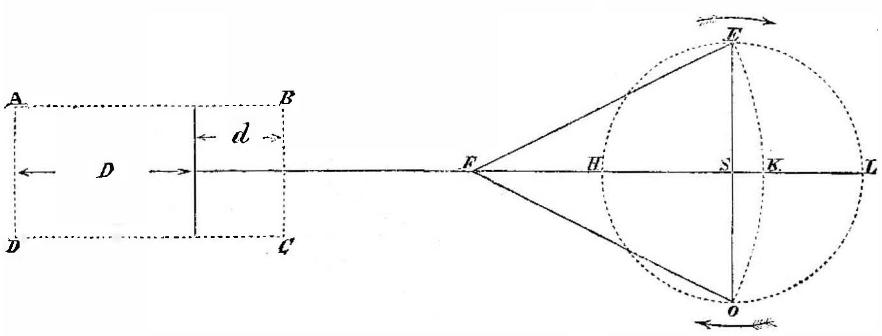
These facts lead me to think the peculiar results spoken of by F. L. K., are due to the tinning and not to the acids.

H. W. S.

"Position of the Piston when the Crank is Vertical."

In an article under the above title in the last number of the SCIENTIFIC AMERICAN, a correspondent makes the following singularly reckless assertion :—"The truth is, no formula can be given for all cases."

It is proposed to show that a formula *can* be given for *any* and *all* cases; a formula which is perfectly simple, requiring no trigonometrical computations, and which is within the comprehension of any schoolboy.



Let A B C D be the cylinder, E F, the connecting rod, S F, the crank, and H E L O, the circle described by the crank pin.

Put C=connecting rod.

c=crank.

D=distance of piston from outer end of cylinder when the crank is "vertical."

d=distance of piston from inner end of cylinder when the crank is vertical.

Conceive the connecting rod disconnected from the crank pin and revolved about E as a center, until it assumes the position E K. Then H K will be equal to the distance, D, of the piston from the *outer* end of the cylinder, and K L will be equal to the distance, *d*, of the piston from the *inner* end of the cylinder.

Now $HK=HS+KS$

$=HS+EK-ES.$

But $HS=c$, $EK=C$, and $ES=\sqrt{EF^2-FS^2}=\sqrt{C^2-c^2}$.

Therefore, substituting these values, we get

$$D=c+C-\sqrt{C^2-c^2}. \qquad (1)$$

Again, the distance of the piston from the *inner* end of the cylinder, at the same instant, or when the crank pin has arrived at O, will evidently be

$KL=LS-KS$

$=LS-EK-ES.$

Substituting for LS, EK, and ES their values as above, we have:

$$d=c-C+\sqrt{C^2-c^2}. \qquad (2)$$

The difference between D and d, as given by (1) and (2), is :—

$$2[C-\sqrt{C^2-c^2}]. \qquad (3)$$

If we suppose C to become infinitely long, the value of $\sqrt{C^2-c^2}$ will be come equal to C, and the difference between D and d will reduce to zero; and the piston will be at the middle of its stroke when the crank is "vertical."

It will be observed, therefore, that the longer the connecting rod the smaller will be the difference between D and d, and *vice versa*.

Example.—Let c=2·5 feet, and C=10 feet. Then from (1) we have

$$D=2{\cdot}5+10-\sqrt{100-6{\cdot}25}=2{\cdot}82 \text{ feet.}$$

(3) gives as the difference between D and d,

$$2(10-\sqrt{100-6{\cdot}25})=0{\cdot}64 \text{ of a foot:}$$

hence

$$d=2{\cdot}82-0{\cdot}64=2{\cdot}18 \text{ feet.}$$

If we make C=5 feet instead of 10, (1) gives us

$$D=2{\cdot}5+5-\sqrt{25-6{\cdot}25}$$
$$=3{\cdot}17 \text{ feet:}$$

while (3) gives, for the difference between D and d,

$$2[5-\sqrt{25-6{\cdot}25}]$$
$$=1{\cdot}34 \text{ feet, or more than twice as great as before.}$$

Finally, $d=3{\cdot}17-1{\cdot}34$

$=1{\cdot}83$ feet.

d might have been found in each case from (2); but the results would have been the same.

It appears, therefore, that this question is not so difficult after all: and it is clear that a resort to geometrical construction will always require more labor, while the results obtained will be less accurate than those obtained by the simple computations indicated in our formulæ. M.

Mrs. Wood on Snake Charming.

MESSRS. EDITORS : I am not a naturalist, nor yet a hunter, but was greatly interested in a paper entitled "Charming by Serpents," in No. 20, page 316, last volume of the SCIENTIFIC AMERICAN, and would like to add a few incidents that have come under my own notice.

One day in early spring time, hearing an unusual chippering under a cherry tree near the house, I stepped out to see what was the matter. On looking through the fence I saw a large garter snake, with glaring eyes distended to an unnatural size, and mouth wide open.

A common phœbe bird was rapidly flying—not in circles, but directly up and down from a small twig on the tree—toward the snake. As the bird receded, the snake closed its mouth, opening it again as the bird approached. I noticed a quantity of saliva or foam about the snake's mouth.

In a few moments the "combat" ended, if combat it was. The bird, with eyes as bright as the snake's, made a dive into the mouth of the snake, and was swallowed. I do not think the bird was injured by bites, though I did not examine it.

In this country (California) snakes are larger, more numerous, and of greater variety, than I ever saw at home (New York). Here, they are frequent visitors to the poultry yards, to the great discomfort of young chickens and turkeys: but whether they get possession of them by Mesmer's science, charms, or quarreling, I do not know. That they are swallowed in great numbers is certain. I have seen a large snake, in appearance like a rattlesnake with no rattle, with a good-sized young turkey's foot in its mouth; every time the snake drew or sucked, the turkey would cry out, and then it was perfectly quiet, with closed eyes. On applying a stick to the snake it let go its hold, to make its escape. The turkey seemed tired out, but in a short time was as well as ever.

It may be that snakes never charm. I know that they have never charmed me: they will only do to look at a good way off. It is rather a bold position to take, to tell a story of what one has seen with one's own eyes, that looks as if one believed that snakes do charm, when there is such good authority against the old supposition.

My little daughter, then eighteen months old, was out in the yard, accompanied by her little dog. Hearing him bark violently, I called the child; but receiving no answer, and fearing lest she had fallen into a prospect hole—there were many in that vicinity—I rushed out to find her. The horrible surprise I felt can not be easily imagined. She was standing near the verandah, and but a few steps from her was a great bull snake (so called here) with head erect, and eyes terrible to look at. The dog was barking, and running first toward the snake and then toward the door: his every motion was delight when I came, as I think, to the rescue. The snake did not notice me in the least, but was slowly raising itself from the ground. When I caught the child, the snake fell as though struck. Her body felt like a wilted plant. I thought she had fainted; but she was standing with eyes open, when she came to. She seemed just waking from sleep. I think the strange look in her eyes lasted not more than a moment, though it seemed an age. The snake measured seven feet in length, and very large in circumference, in comparison to its length.

I do not say there was any charm about it, but I think it a queer performance. MRS. R. E. WOOD.

Our Cosy, Napa, Cal., Dec. 12, 1866.

[It was a queer performance, indeed, and the facts as narrated appear to establish the fact that snakes have the power to fascinate.—EDS.

"Shut the Door, John."

MESSRS. EDITORS :—Many of the highest as well as the lowest traits of the human character, are often made known by very simple means. And very important principles in ethics, natural philosophy, and mechanics, have been discovered by accidents, incidents and details which are common in domestic life: but who would have thought, in olden times, of consulting with a four-paneled door, as a philosophic and a metaphysical friend, to obtain a knowledge of the hidden mysteries and the general effects of the human mind?

During the last ten years, in the winter season, according to our daily record, we have noticed the manner in which one thousand persons who called for work, have opened, shut or not shut our store door: this, you may say, is a futile and a useless undertaking; but we entertain a very different opinion. What are the facts, and what the deduction?

First, out of the 1,000 persons recorded, 355 opened the door and shut it after them carefully, when they came in and when they went out, without much noise.

Secondly, 226 opened it in a hurry and made an attempt to shut it, but did not and merely pulled it to, when they went out.

Thirdly, 202 did not attempt to shut it at all, either on coming in or going out.

Fourthly, 96 left it open when they came in, but when reminded of the fact, made ample apology, and shut it when they went out.

Fifthly, 102 opened it in a great hurry, and then slammed it to violently, but left it open when they went out.

Sixthly, 20 came in with "how do you do, sir," or "good morning," or "good evening, sir," and all these went through the operation of wiping their feet on the mat, but did not shut the door when they came in, nor when they went out.

REMARKS.—We have employed men out of all the above classes, and during that time have had an opportunity of judging of their merit, etc.

The first class, of 355, were those who knew their trade, and commenced and finished their work in a methodical manner, were quiet, had but little to say in their working hours, and were well approved of by those for whom we did the work, They were punctual to time, and left nothing undone which they had been ordered to do. They did not complain about trifles, and in all respects they were reliable men. and were kind and obliging in their general conduct.

Class the second, 225.—These were not methodical in their work, had much to talk about, were generally late, but were willing to quit work early. They were always in a hurry when we overlooked them, but they did not do as much work in the same time as class the first, and often left little things unfinished, and if they were told of it, would make many trifling excuses, but highly extol their own abilities.

Class the third, 202.—These were negligent in personal appearance and in their work. They talked much about their own good qualities, and were better acquainted with the business and domestic habits of their neighbors than with their own. They always belonged to the temperance society when first set to work, but in a few days afterward their breath would smell more like an old rum cask, than that of human beings. These men were not steady at their work, were always short of money, and could not be relied on in regard to truth and honesty.

Class the fourth, 96.—These were careless in their manner of work, committed many errors, but when they were pointed out to them, would apologize most willingly: soon forgot particular small items; were tenacious of their own rights, but not very nice about the rights of others: still, there was something pleasant in their manners at first sight, but they did not improve on further acquaintance. They required much watching and often talked about what they had done and what they had been, what they could do and what they intended to do, but they seldom did any thing properly.

Class the fifth, 202.—These were of a strong, nervous temperament—always in a hurry—little order and method in their work, often met with accidents, and often got themselves into difficulties by their hasty proceedings: otherwise, they were kind and willing to oblige, but the promises they so hastily made were soon forgotten.

Class the sixth, 20.—These were better dressed than the others, but were not good workmen, as they had tried many things, but had not mastered any one in particular. Their politeness was artificial, and one day was often sufficient to expose their deception. Innocent and small impositions seemed to be their legitimate business. They were too ignorant to blush at their own folly, and too proud to acknowledge their own faults. They were vain in the extreme, and unreliable.

REMARKS.—Whether these rules are applicable to all trades, professions and classes of men, I do not know, but I am thoroughly acquainted with the facts above stated, and also with the traits of character I have there described: therefore I leave the reader to make his own deductions.

JAMES QUARTERMAN.

New York City, January 5, 1867.

Extraction of Oils with Petroleum Naphtha.

MESSRS. EDITORS:—In an article on perfumery, which I wrote for your valuable paper last spring, I recommended the use of petroleum naphtha for the extraction of oils, showing its advantages over other solvents or other means of separating the oils.

Lately Dr. Vohl, in Cologne, has experimented in the same direction. As he came to similar conclusions with myself, I herewith give you his observations on this theme.

The usual method of extracting oils from vegetables, especially seeds, consists in a strong pressure after previous diminution by grinding. This mode extracts a number of substances from the seed, which produce rancidity of the oil or impart to it an unpleasant flavor, thereby impairing or completely destroying its utility for the table, while they by no means improve its value as a lubricator or for burning.

Among the first innovations upon this method was the attempt to extract oil with alcohol, ether, etc. These agents were soon laid aside on account of their limited solvent power and the faulty construction of the apparatus used in the experiments.

The introduction of bisulphuret of carbon into the market at a low price soon brought this substance into use for extracting oils from seeds, wool, etc., although its use is attended with many disadvantages, among which may be mentioned the decomposition of the bisulphuret by causes little studied as yet, producing a deposit of sulphur which imparts to the oil an unpleasant sulphurous odor and taste. The bisulphuret further dissolves, beside the oil, a resinous substance which on exposure to air soon produces rancidity and injures the quality of the oil for the purpose of lubrication.

During saponification such oil spreads an unpleasant odor, which it also imparts to the soap, together with the undesirable property of affecting the colors of metals which may be washed with it, as silver spoons, etc. Sometimes painted wood, doors, etc., are washed with such soap. If the paint contains lead, the change of its color to black will be no credit to the washing. The pressed seeds form moreover valuable feed for cattle, while seeds exhausted with bisulphuret of carbon are disagreeable to them from their offensive flavor.

The properties which a solvent for oils should possess, may then be said to be the following:—The solvent should be completely volatile and easily separable from the fat oil by distillation. It should not be decomposed during extraction of the oil or during distillation, or if decomposed it should not deposit any substance that dissolves in the oil and injures its quality. It should not dissolve any substance injurious to the quality of the oil. It should be cheap and procurable in large quantities.

My experiments have demonstrated that the Canadol, a volatile light hydrocarbon produced from Pennsylvanian and Canadian petroleum, possesses all the properties mentioned, and is therefore especially adapted for the extraction of oil.

A consideration of the first importance is the complete removal of sulphur from the hydrocarbon. For this purpose the treatment with sulphuric acid and bichromate of potash, or with sulphuric acid and peroxide of manganese, should not be omitted. Before using the canadol it should always be tested for sulphur.

Pure canadol has a specific gravity of 650 to 700 at 60° Fah. It boils at 127° Fah., evaporates completely, without leaving a residuum, is neutral and of a pleasant, ethereous odor. This substance behaves differently from other similar hydrocarbons toward fatty oils. Tar oils, benzole, etc., dissolve oils as well as resins produced by the oxidation of the former, and are therefore largely used for removing grease spots from clothes. The canadol, on the contrary, dissolves the unchanged fats and oils with facility and in large quantities, while it exerts very little or no influence upon dried or resinified oils, as well as resins and gum resins. Amygdaline and sinapine (sulpho-sinapisine or sulpho-cyanate of sinapine), contained in many oil-bearing seeds, especially the brassica varieties, are also insoluble in canadol. The yield of oil by this mode of extraction is 6 to 7 per cent greater than in the extraction by pressure, this amount remaining in the latter case in the residuum used as cattle feed.

The oil extracted by canadol is of a bright golden yellow, almost tasteless, and without odor. Its liability to become rancid is very slight, while its freezing point is as low as 18° below zero. It requires no further purification for table use. The canadol, charged with the oil, may be filtered through bone black before its distillation from the oil, when the latter will become almost colorless.

The manipulations on a large scale, in order to be successful, should secure a complete comminution of the seeds, which should then be treated with the extracting solution at its boiling point. The extracting medium should be separated completely from the oil as well as from the refuse seeds. The refuse yields, to boiling alcohol, resin, vegetable matter, and chlorophyll, beside minute quantities of oil. Sinapine may be prepared from it. Mixed with water to a thin mash and heated to 80—100° Fah., it develops ethereal oil of mustard. After treatment with alcohol, no such oil is developed, as the requisite sinapine is wanting.

The action of canadol upon oils is so energetic, that it may be employed for analysis, as it always extracts the oil almost completely, giving results which are at least accurate enough for practical purposes.

The Construction of Wharves.

MESSRS. EDITORS:—In your paper of Dec. 22, I notice that you advocate the construction of piers or wharves on cast-iron pillars, which will allow a free flow of the tides, deposit, etc. This, I think, will be found objectionable, and will have a tendency to cause the deposit to accumulate and fill up the slip or dock much faster than would be the case if constructed so that the tides could not flow under the pier.

Several years since, by an Act of the Legislature of this State, parties were allowed to extend their wharves into the Christiana Creek, provided the wharves were not made solid, but built on piles ten feet apart between the rows, the rows to be placed in the direction of the current. The result has been that the deposit has accumulated under and in front of these wharves, around the piles, so as to make it necessary to extend them into the creek for 80 to 100 feet. There is not now 12 feet of water 100 feet outside of where there was 18 feet thirty years ago. The building of all such wharves has been prohibited by law. GEO. G. LOBDELL.

Wilmington, Del., Dec. 29, 1866.

[The proposal of the New York Pier and Warehouse Company contemplated dredging between the piles.—EDS.

A Singular Celestial Phenomenon.

MESSRS. EDITORS:—On the night of January 1, 1867, at about 11.15 P. M., I noticed a strange appearance in the heavens. This remarkable phenomenon consisted in a bright bar of light, connecting two stars, which lasted several minutes. On consulting the atlas, I placed the position of the phenomenon in the constellation *Eridanus*. A star of the fourth magnitude, near *Theemim*, was connected with another of the same magnitude (about five degrees southwest), by a bright light resembling that of a comet. From the upper one of the two there was a bright light turned off a little more toward the northeast. The color of the light was about the same as that of the star *Aldebaran*. I wish you would inform me through your columns of the cause of this phenomenon.

J. JULIUS CHAMBERS.

In the Clouds.

The Polytechnic Institute appears to be rapidly going into the clouds, and unless it expels some of its superfluous gas it will soon be beyond the reach of the unassisted eye. The Institute as its name implies was established, or at least we so supposed, to furnish information upon the arts. It did very well for a while, but its members seem to be getting far too learned for the mass of mankind. In this number we present our readers with a conglomerate of a very sapient discussion of the nebular theory, solar segregation, cosmogony etc., which contains some atheistical speculations about the eternity of matter, which may do very well to stimulate the fancy but can afford no substantial good. We invite the gentlemen of the Institute to return to the bosom of mother earth, and to confine their investigations to things more practical. The SCIENTIFIC AMERICAN cannot be made the vehicle for ventilating such absurd nonsense.

CENTALS.—The Chicago Board of Trade have resolved that after the first of March, 1867, other Boards of Trade concurring, all transactions of grain shall be conducted by the cental or 100 lbs.: expressing a substantial instead of an apparent measure of food. It is expected the change will be general throughout the country.

IMPORTANCE OF ILLUSTRATING INVENTIONS.

Thousands of persons who have spent a little money in bringing their inventions prominently before the public, have realized rich harvests thereby. We believe, and have abundance of evidence in support of it, that greater results have been effected to the patentee oftentimes, by having his inventions illustrated in the SCIENTIFIC AMERICAN, at the expense of a few dollars, than by thousands spent in injudicious advertising. It is only subjects of merit or novelty that we will publish in these columns, and to the pages of the SCIENTIFIC AMERICAN the public refer for the latest improvements.

Patentees who have good inventions cannot over-estimate the importance of having them first illustrated and afterwards advertised in these columns. It will usually pay tenfold the cost, and has often paid a hundred-fold.

To patentees, and those who wish to have their inventions illustrated in this Journal, the following general directions will be a guide:—

In preparing engravings for publication in the SCIENTIFIC AMERICAN, the use of a model from which to make a design, is preferred. If it is inconvenient, however, to send a model, a well executed photograph, taken from a machine or model, will usually answer the purpose. The Letters Patent should be sent with a statement of the advantages claimed for the invention. After the order is received the engraving will be prepared and published, and the model, patent, and engraving returned by express. For further information address publishers of this paper.

A Pretty Fish.

Mr. Lord, an English traveler, and a clever sensation writer, has just published in London a book on British Columbia and the Pacific Coast, in which among other traveler's tales he gives a lively description of the octopus, in "the Brobdignagian proportions he attains in the snug bays and long inland canals along the east side of Vancouver's Island." The creature is a huge flat disk, with eight long radiating snake-like arms, fringed with numberless suckers, and which it uses like oars in mid-water, like spider legs on the bottom, as climbers on the sides of rocks, as hangers on the rank aquatic vegetation, and collectively as a hand for grasping its prey. These arms are gifted with prodigious strength and lightning-like mobility. The Indians display great skill and daring in hunting the monster in their canoes with long spears.

VARIOUS MINERALS.—We published lately a letter relative to the valuable manganese beds of Arkansas, discovered from geological indications, just before the civil war. To this may be added a more recent discovery of the same kind near Mission Dolores, Cal. Manganese is also mined on San Pablo bay. The rapidly increasing consumption of manganese in the manufacture of Bessemer steel adds greatly to the importance of these developments.—The Tennessee copper mines reopened since the war begin to turn out a large product; impeded however, by the want of sufficient facilities for transportation. Much attention is drawn to the iron veins of that state, by a geological report just published showing very extensive deposits.—The iron of North Carolina is of great value, particularly the mines of Lincoln Co., and the rich deposits on Deep river described by the late state geologist, Mr. Emmons. In the latter region are also found coal, gray and yellow copper, roofing slate, mill stones, and agalmatolite or image stone, a somewhat rare mineral.

CORRECTION OF LOCAL ATTRACTION.—We advise our friend, Captain Forbes, whose interesting communication on this subject we published on page 21 of this volume, to accredit his friend Capt. Martin to the Emperor of Russia. That enlightened potentate has just presented a gold pocket compass set with brilliants, to Mr. A. Smith Jr., of London, in recognition of the value of his mathematical researches into the deviation of the compass in iron ships. As the practical result of the researches of Mr. Smith and the rest of the transatlantic *savans*, according to Captain Forbes, is *nil*, the Emperor probably conceived a bauble to be the most appropriate reward. But as he is accumulating rapidly a great iron fleet, he would undoubtedly make it a very substantial object to a practical Yankee to cure his compasses, even if he could not so admirably diagnose the disease "in the language of the *savans*."

FLAVORING OF CANDIES AND PASTRY.—Chemical imitations of fruit and flower flavors have been carried to great perfection by the French of late years. Few persons suspect the poisonous ingredients which they roll as sweet morsels under the tongue, in mixed candies and flavored cakes. It is well to avoid all flavors that are not derived easily, cheaply and abundantly from nature. But even the oil of lemon, in consequence of the large demand for that flavor, was long ago adulterated or supplanted extensively with a vile imitation from turpentine. The fusel oils, which are very poisonous, give us the delicate and agreeable apple, pineapple and banana flavors now so common in candies. Gum drops and fig paste are not made from gum arabic or other valuable natural jellies, since a poisonous but cheap composition has been invented to supply the large demand for those confections. The cheaper candies for the wholesale trade are also colored with villainous stuff, of which arsenic and other poisons are essential ingredients.

PHOTOGRAPHING SHOT IN MOTION.—The feat has been accomplished of taking a photograph of a cannon ball in its passage from the gun when fired. The ball is shown just protruding from the muzzle of the gun. The front of the camera was covered with a revolving disk, with one or two holes so placed in it as to correspond with the line of the lenses when revolved to the proper point. A strong spiral spring was attached and wound up so as to propel the disk when released. The trigger which released the spring was connected with an electro-magnet so as to be drawn by it on the passage of the same galvanic shock which fired the gun. Sufficient experiment enabled the operator to adjust the apparatus so as to bring the passage of the shot and of the orifice in the disk across the line of his lenses simultaneously, and thus the picture was obtained.

BURNING FUEL.—It is a mistaken idea that large results of heat can be obtained with a reduced combustion of fuel. To get heat there must be combustion, and consequently an adequate supply of fuel. But these statements are not in opposition to improvements in furnaces or stoves. The object of these improvements, when made in accordance with natural laws, is to utilize the results of combustion, and to insure a more perfect combustion of the fuel. In this direction, we think, will be found the most important discoveries to be made in realizing the full value of the fuel burned, either under the steam boiler or in the dwelling.

Recent American and Foreign Patents.

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

SEEDING MACHINE.—Henry Barsalou, Saint Anne, Ill.—This invention consists in a novel construction and arrangement of parts, whereby a very desirable seeding machine is obtained.

CAR COUPLING.—C C. Cady, West Union, Iowa.—This invention relates to a car coupling of that class which are self-coupling, and it consists in having a fixed hook in each drawhead for the link or shackle to catch over, in connection with a link raiser, spring, and lever applied to each drawhead.

CULTIVATOR.—Henry Barsalou, Saint Anne, Ill.—This invention relates to a device for cultivating corn, cotton, and other plants grown in hills or drills, and it consists of a novel construction and arrangement of parts, whereby the device is placed under the complete control of the operator, and the parts rendered capable of being manipulated with the greatest facility.

BRICK MACHINE.—J. T. Carman, Springfield, Ill.—This invention relates to a machine for molding and pressing bricks from untempered or dry clay, and it consists in a novel means for receiving and discharging the molded clay or bricks, and in an improved means for regulating the feeding of the clay to the molds, and also for pulverizing and granulating the clay in order to insure it being properly fed to the molds; and, further, to an improved means for operating the plungers which compress the clay in the molds.

WATER WHEEL.—W. H. Elmer, Fair Water, Wis.—This invention relates to a horizontal water wheel, and it consists in a novel and improved manner of applying the water to the wheel, whereby several important advantages are obtained.

CULTIVATOR AND SULKY PLOW.—John H. Barringer, Hillsborough, Ala.—This invention relates to a combined cultivator and sulky plow, and consists in the arrangement of the parts in such a manner that they may be readily shifted for converting the machine into either a cultivator or a plow, so that the body and running gear of the implement shall serve for both purposes and thus save the farmer the cost of two machines.

PLOW.—J. and E. P. Miles, Bloomingdale, Ind.—This improvement relates to a device for preventing a plow from being choked and clogged with grass, weeds, etc., in front of the mold board.

STUMP EXTRACTOR.—David Stauffer, Spring Hills, Ohio.—This invention consists in a cheap and powerful machine for extracting stumps vertically from the ground by means of long and strong double-hand levers, with a very short adjustable purchase, the levers being so arranged as to loosen and raise the stump gradually both by depressing and lifting, with alternate changes of the fulcrum in two sets or rows of holes.

INVALID CHAIR.—James B. Wallace, Franklin, Ohio.—This invention relates to improvements in the construction of an extension chair for invalids, and consists in so forming the back of the chair that it shall exactly fit the small of the back and the loins of the patient when placed either in a recumbent or in a sitting position.

LOCK.—Lewis P. Decker, Williamsburg, N. Y.—The object of this invention is to furnish a lock of safe, cheap and simple construction. It consists in the combination of a female screw, male screw, and pivoted bolt with each other, and with the body of the lock.

HAND CORN PLANTER.—W. C. Lewman, Kansas, Ohio.—The object of this invention is to construct a hand corn planter, by means of which four or eight grains are placed in a hill, each grain or two planted three or four inches apart from the others, in a square.

GATE ATTACHMENT.—W. W. Sutliff, Town Line, Pa.—This invention consists in an arrangement for closing gates by a lever and weight, so that with a small weight upon the gate, it is operated with a lever of different powers, thus increasing or diminishing the force required to open it.

DISTILLING APPARATUS.—Lyman Pray, Charlestown, Mass.—This invention relates to a still, the fire chamber or arch of which is provided with two or more shelves, forming separate heating chambers one above the other, each of which connects by a suitable flue with a smoke stack, such flues being provided with dampers in such a manner that by means of said dampers and shelves the heat can be confined to the level of the liquid in the still, or nearly so, and the scorching of the vapors can be avoided without difficulty.

STEERING WHEEL.—Eben S. Coffin, Boston, Mass.—The object of this invention is to so improve the construction of the steering wheel as to overcome the tendency, especially in a rough sea, by its sudden thrusting motion, to take the tiller out of the helmsman's control, and make his labor exceedingly toilsome and dangerous.

COTTON-BALE TIE.—J. C. Lee, Gonzales, Texas.—This bale tie consists of a metallic band having one end bent in such a way that it will be firmly secured upon the bale by inserting the bent extremity between the bale and the encircling portion or main body of the metallic band.

PORTABLE FENCE.—Daniel Unthank, Spiceland, Ind.—This invention relates to a fence of that class which are commonly termed portable fences. It consists in constructing the fence in such a manner that it not only may be erected or put up with the greatest facility, but also be firmly secured in position when erected, and capable of being adjusted to suit the unevenness of the ground on which it may be placed, and also capable of having angles or corners formed without any difficulty whatever, and having any panel used as bars to allow wagons or carts to pass into and out from a field.

SELF-DUMPING MINE CAR.—Joseph W. Bancroft, Philadelphia, Pa.—This invention consists in an improvement in mine cars which are exclusively used in colliery slopes, underlying shafts on the dip of a coal seam, where the angle of descent exceeds twenty-five degrees.

DIES FOR IMITATION OF STRAW GOODS.—J. S. Kendall, New York City.—This invention relates to a method of procuring dies and counter dies for the purpose of embossing fabrics to imitate straw.

FLY TRAP.—Henry H. Potter, Carthage, N. Y.—This invention consists in an arrangement of pans and wires combined with springs, by which an effective trap for the destruction of house flies is made.

HAND SAWING MACHINE.—J. M. Marston and H. R. Huling, Roxbury, Mass.—This invention has for its object to furnish an improved hand sawing machine, by means of which sawing may be done easier, better, faster, and consequently cheaper than by other machines.

DITCHING MACHINE.—George Sullivan, West Liberty, Ohio.—This invention relates to the manner in which spades of a peculiar form are forced into the ground at any desired angle, and the spades being attached to a crane, the earth can be raised and deposited wherever desired.

FEED MECHANISM FOR SAWING MACHINES.—J. L. Beers, McAllisterville, Pa.—This invention relates to an improvement in the feed mechanism of sawing machines, and it consists in the employment of two pawls and gearing, arranged in such a manner that a continuous feed is obtained, and one which may be regulated to suit the speed of the cut of the saw as may be required.

CULTIVATOR.—R. B. Parks and J. R. Parks, Neponset, Ill.—This invention relates to a cultivator of that class designed for cultivating crops which are grown in hills or drills, and it consists in a novel construction and arrangement of parts, whereby the driver will have full control over the plows, so that the latter may be moved or adjusted in a lateral direction to conform to the sinuosities of the rows, and also raised and lowered to regulate the depth of their penetration into the earth.

SAW MILL.—Albert Buell, West Leyden, N. Y.—This invention relates to a saw mill, and consists in simple devices for holding the log in place, instead of dogs, and for adjusting the head-blocks against the log in such manner that it can be sawed bevelling, with one edge thick and the other thin, for siding.

LAMP.—Francis Burrows, Troy, N. Y.—This invention relates to a lamp, which is more especially designed for use in the laboratory, and in which highly combustible fluid is burned; the construction of the wick-tube and the provision of a water-chamber, serving to keep the heat from the oil and prevent explosion.

PACKING RINGS FOR BALANCED STEAM VALVES AND OTHER PURPOSES.—W. B. Robinson, Detroit, Mich.—This invention consists in so constructing the packing rings of balanced steam valves that the bearing surfaces shall be reduced so that a steam joint may be much more easily made when the valve is in motion than formerly.

AMERICAN TRIPOLI.—Thomas J. Platt, Newark, N. J.—This invention relates to certain substances which, when combined together in the manner specified form what is designated American tripoli, an article which has been thoroughly tested by many manufacturers of jewelry and others, and pronounced equal in all respects to the tripoli which has hitherto been imported from foreign countries.

FURNACE.—Virgil W. Blanchard, Bridgport, Vt.—This invention relates to a furnace designed for general purposes, and has for its object economy in fuel, simplicity in construction, and an adaptation for the heating of a large volume of air for warming apartments other than that in which the furnace is placed, as well as an adaptation for general use in the arts, such as smelting, wasting, etc.

WATER WHEEL.—Jason Hemenway, Deerfield, Mich.—This invention relates to an improvement in horizontal water wheels, and it consists in a novel application of the buckets, and a mode of adjusting them, whereby the capacity of the issues between the buckets may be varied as desired, and the wheel adapted to work, under the same velocity, with varying degrees of power commensurate with the quantity of water used.

APPARATUS FOR TREATING PETROLEUM.—Alexis Thirault, Williamsburg, N. Y.—This invention relates to an apparatus for treating petroleum, which receives the oil as it leaves the still, and which is composed of a condensing oil from which the oil passes into one or more tanks. These tanks are closed, and they are provided with steam-pipes extending down to different depths so that by letting steam into the oil, an agitation is produced whereby the light parts are carried off and separated from the heavy parts, and at the same time the waste of a portion of the useful constituents of the oil is prevented.

SELF-RENDERING TALLOW CUP.—Thomas Fleetwood, St. Johns, N. B.—This invention is designed to obviate the well-known objection to the use of tallow for lubricating steam cylinders, on account of the gummy matter which accumulates and clogs the action of the piston.

BLACKING-BOX HOLDER.—Amos Wilder, Calais, Me.—This holder is of such a construction that it can be applied to and detached from the blacking box with the utmost facility; and when used prevents soiling the fingers of the hand with the blacking.

COAL SCUTTLE.—Benj. F. Conan (assignor to himself, J. D. Sherrell, and John Sumner), 244 Water street, New York City.—The object of this invention is to produce a coal scuttle or hod whose bottom, by a simple movement of a lever or handle, can be changed from a condition in which it forms a complete, unbroken surface so as to hold coal, ashes, cinders, or refuse matter, which may then be carried in the hod with safety from place to place to the open condition of a grate through which the finer part of the contents of the hod can pass out.

CARPET FOOTSTOOL.—John G. Flagg, Philadelphia, Pa.—This apparatus consists of a disk or plate which is operated by a screw and made to stuff or press the filling tightly into its carpet cover, and retain the same in its compressed state while the carpet is being sewed around it by hand.

STEAM GENERATOR.—Robert Fanes, Maroa, Ill.—This invention consists in constructing a steam generator of a series of pipes provided at each end with transverse openings or eyes, and so securing the whole together that the eyes of one pipe will correspond with the eyes of another pipe of the same kind and size, whereby a communication for water and steam is effected between and through the center series of pipes.

PUNCH.—Richard Hughes, Virginia City, Nevada.—This invention relates to a punch for the punching of sheet metal screens, such as are used in the separation of ores, etc., and the invention consists principally in a novel manner of securing the needles of the punch, in the holder.

NUTMEG GRATER.—L. V. Badger, Chicago, Ill.—This grater is both simple and cheap in construction, and by its use no waste of the nutmegs is occasioned.

SPRING HOLDER FOR WIPING CLOTHS.—Henry Johnson, Chicago, Ill.—This invention consists of an arrangement of spring fingers adapted to be furnished with a wet or dry cloth to be used in cleansing exterior or interior surfaces, dishes, bottles, lamp chimneys, and other hollow articles, especially those difficult to be reached by the hand, and of varying interior diameter.

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 the correspondent 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 50 cents a line, under the head of "Business and Personal."

H. W. H., of N. H.—An enameled surface may be put on soapstone by the process used for enameling iron and copper and probably also by some of the soluble glass preparations. But there are many difficulties in the way of accomplishing all you desire.

G. P. H., of N. J.—For burning oil the ordinary refining process, distillation and treatment with acid and alkali, is very efficient and cheap: we do not expect to see the process supplanted. The natural lubricating oil is, however, materially injured by it, and something new in that line is very much in demand. Filtering through animal charcoal, bleaches this oil without injuring the lubricating quality, but the process is too slow and costs too much.

R. M., of N. Y.—We understand it to be generally conceded that meniscus lenses for spectacles are preferable to other forms.

W. C., of N. Y.—Cascarilla bark in powder is sometimes put into smoking tobacco. In the form of a fine powder it may be mixed, with most of the ordinary fumigating preparations. An infusion of the bark in water or alcohol may be used in the preparation of fumigating paper. . . . Shellac makes an excellent cement for glass, porcelain and earthen ware. The edges to be joined are heated sufficiently to melt the shellac, when it is applied in powder and the edges brought together and closely pressed till the joint is cold. For white or transparent ware, bleached lac should be used.

R. N. L., of Mass.—Plumber's solder is purified and made tougher by stirring into it while melted common sulphur. The foreign matter rises to the surface and may be skimmed off. Lead may be refined in the same way. The sulphur acts mainly by attacking iron and copper; at least that is our theory.

P. H., of N. J.—"If the earth in its orbit is not passing through a perfect vacuum, why does not the air fall behind it like the tail of a comet? And if a perfect vacuum why does a comet become elongated to many millions of miles in length, as it is well known that all matter in a liquid or gaseous state tends to form itself into a globe by its own attraction?" We believe many of our readers will prefer to cypher out answers to such questions, without any assistance from us. They, the questions, are like conundrums or puzzles which lose their charm, unless there is a pause before the solution is given.

N. L. B., of Me.—There is more demand than ever for a good imitation of ivory. The production of natural ivory has been decreasing while its consumption is increasing, and the market price has been steadily advancing for many years.

S. L., of Wis.—Tin plate is not manufactured in America: we are dependent upon England for what we use. As soon, however, as we shall have found productive tin mines we shall change all that.

J. Q. B., of R. I.—Force, whether exerted as friction or percussion, is a prolific source of heat. Even the compression of gases will produce heat enough to ignite inflammable substances. This may be proved by fitting a piston in a tube having at the lower end a quantity of tinder or light cotton. The pressure of the air in the tube, when the piston is forced rapidly down, will ignite the tinder. So a blacksmith will by percussion heat a piece of nail rod on his anvil red hot and forge a nail from it.

A. B. J., of Pa.—A warped casting may be straightened often by hammering. The convex or rounding side should rest firmly on an anvil, that portion to be struck in immediate contact with the block, and the "pene" of the hammer should be used. This makes a series of narrow indentations and stretches the skin of the iron. But if these indentations are removed by planing, grinding, or filing, the iron assumes its original curvature. Heating nearly red and springing by weights or other mechanical devices will often straighten a crooked casting.

J. H. L., of Mass.—The name copperas comes from copper and that from the island of Cyrus, where first discovered in large quantities by the Greeks. The sulphate of iron commonly known by the term copperas or green vitriol gets its name of copperas from the fact that a solution of it gives a copper color to iron and steel. It can be obtained by dissolving iron in dilute sulphuric acid and evaporating to crystalization.

C. F. B., of Minn., desires to know whether there is any method or mechanism known by which the piston of a steam engine, or any reciprocating device, can be made to have a uniform velocity throughout its stroke. We know of nothing of the sort. It is against the fundamental laws of mechanics. Even the shot in a gun, when it receives the impact of the exploded gases, requires time before its inertia is overcome. You cannot bring a body to rest when in motion without a gradual retardation of its velocity, and to give it a reciprocating motion back requires a gradual acceleration of velocity.

Sundry Answers.—W. W.—Stone Filters are very old. See back numbers of SCIENTIFIC AMERICAN for illustrations and notices of the best.——W. G. S.—Apply at the railroad office in your place.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

A. S. Rager, Jr., New Albany, Ind., asks where he can have metallic checks with numbers, manufactured.

P. Spawn & Co., 58 State street, Albany, N. Y., wish to hear from parties having improved machinery for making paper bags for sale.

"Where can I get the best machine for re-cutting a 60-inch circular saw?" A. N. Osgood, Hancock, N. H.

J. A. Wilshire & Co., Memphis, Tenn., desire to know where Griffin's Air Light can be obtained.

R. W. Shriver, Woodland, Barry county, Mich., wishes to communicate with parties who will make churn castings.

N. Spencer, Mound City, Ill., inquires where he can procure a teacher's clock which strikes every five minutes.

Makers of machines for producing straw rope for cores, please address Homer Hamilton & Co., Youngstown, Ohio.

We want a hand bolt cutter for blacksmith shop. Keen & McKay, Rock Island, Ill.

Where can a machine for sawing wood with a horizontal saw by horse-power be purchased? Wm. Brown, Jr., Lawrence, Ill.

T. C. T. address J. B. Aiken, Franklin, N. H., for stocking-knitting machines.

Manufacturer, Box 1440, Norwich, Conn., wants to obtain a paper-bag machine.

NEW PUBLICATIONS.

MEMORANDA ON THE STRENGTH OF MATERIALS USED IN ENGINEERING CONSTRUCTION. Compiled and edited by J. K. Whildin, C.E. D. Van Nostrand, 192 Broadway, New York.

In this volume we have, conveniently arranged for reference and accompanied with explanatory plates, the results of authoritative experiments on the strength of materials used in the arts, under varying forms and conditions. Much of the knowledge of the properties of such substances has been the product of recent investigations and is scattered through books, periodicals, and treatises. Here it is all brought together in a form convenient for the practical man. Only five hundred copies have been printed, which is to be the extent of the issue. The book is sold at $2 per copy. Those who desire to secure it should apply at once.

MODERN MARINE ENGINEERING APPLIED TO PADDLE AND SCREW PROPULSION. By N. P. Burgh, Engineer. D. Van Nostrand, 192 Broadway, New York.

We have received from the American publisher twelve numbers of this work, each number a monthly part, containing two plates, tinted to represent the materials, and twenty pages of descriptions. Typographically the work is beautiful, the letter press clear and distinct, and the engravings *fac similes* of real engineering drawings properly colored. It is not a mere theoretical treatise, of value mainly as a curiosity, but a practical work by which the engineer and mechanic may correct their errors, or, at least, understand by the example of others the reasons of failure. Although from a slight examination of the work we may be compelled to differ with the author in some of his statements, we think his deductions from actual experiments and his illustrations of practice are mainly sound and eminently instructive. We consider the publication one of real value to the marine engineer, and of great use to the mechanic desirous of understanding the progress made of late years in the steam engine.

EXTENSION NOTICES.

Thomas J. Sloan, of New York City, having petitioned for the extension of a patent granted to him the 26th day of April, 1853, for an improvement machine for pointing and threading screw blanks, for seven years from the expiration of said patent, which takes place on the 26th day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 8th day of April next.

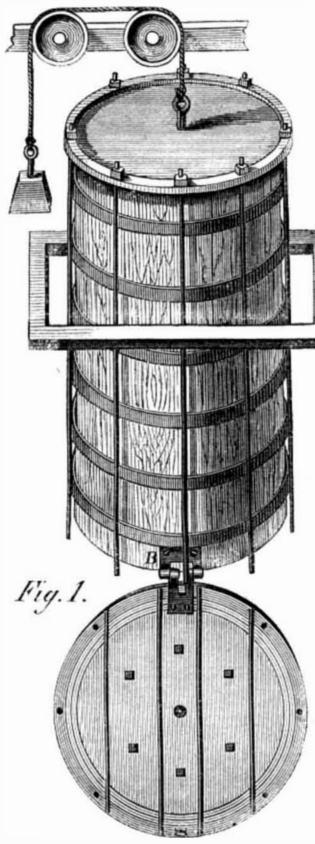
Christopher Duckworth, of Mount Carmel, Conn., having petitioned for the extension of a patent granted to him the 28th day of June, 1853, for an improvement in shuttle-box motion in looms, for seven years from the expiration of said patent, which takes place on the 28th day of June, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 3d day of June next, at 12 o'clock, M.

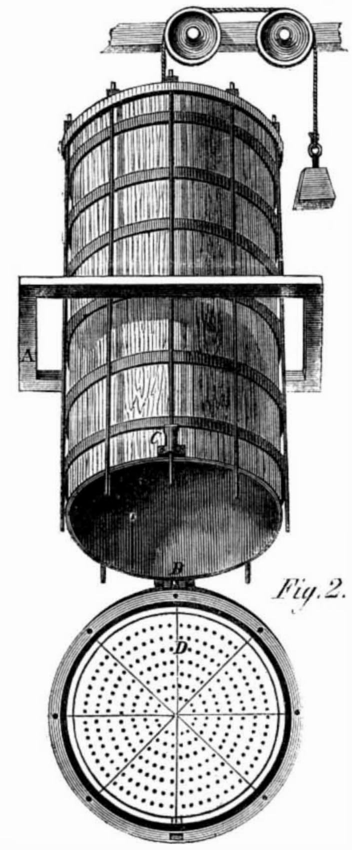
Improved Steam Leach.

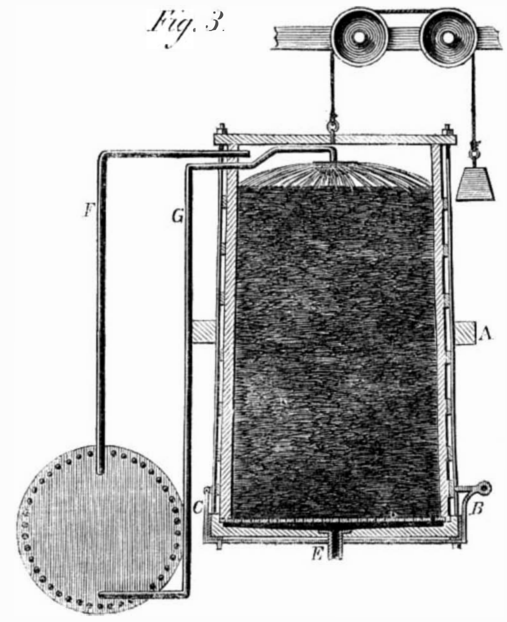
It is well known to tanners and persons employed in extracting essences of vegetable substances by decoction, that the processes usually made use of are not effective in eliminating the full strength of the material. The best spent bark—oak and hemlock—still contains more or less of the principle called tannin, which is thus wasted. To effect a more perfect extract and to facilitate the operation is the object of the improvement represented in the engravings. The leach tub may be of metal, or of wood strengthened with hoops and braces, like that shown in the engravings. It is suspended through a floor or a frame, A, at a sufficient hight to allow the bottom to swing open for discharging the mass after the leaching is completed. The bottom is hinged, as at B, and held in place when closed by the catch, C. It is also secured to the top by rods with nuts, and both top and bottom are packed on their rims by suitable flanges of elastic material. The true bottom is furnished with a false bottom of copper or other suitable material perforated with minute holes, as at D, and raised slightly from the inside of the main bottom. This forms a sieve to retain the bark, while the liquid extract finds its way through the fine holes and is discharged at the center through the pipe, E, the bottom being slightly concave, or furnished with radial grooves for channels, converging to the pipe in the center. The top of the tub may be readily raised by means of the line, pulleys and weight as shown.

Figs. 1 and 2 represents the leach in two positions, and Fig. 3 is a sectional view with boiler attached. By this figure the operation of the apparatus is easily comprehended. The tub is nearly filled with the bark, or other material to be treated, and the top and bottom secured, when steam is admitted through the pipe, F, and rapidly softens the mass. Water is then introduced from near the bottom of the boiler by the pipe, G, and distributed by means of the rose sprinkler over the surface. This combined water and steam quickly permeates the mass; and the decoction filtering through the perforated false bottom is discharged at E. By keeping the steam on continuously and introducing the water at short intervals the best results are obtained, the mass being constantly heated and saturated with steam and hot water. The apparatus appears to be also well adapted for cooking food for cattle, as the work can be done quickly and effectively.

Patented through the Scientific American Patent Agency Aug. 14, 1866, by N. Spencer Thomas, of Painted Post, N. Y., whom address for additional particulars.







THOMAS'S PATENT STEAM LEACH.

Improved Steel-headed Rail.

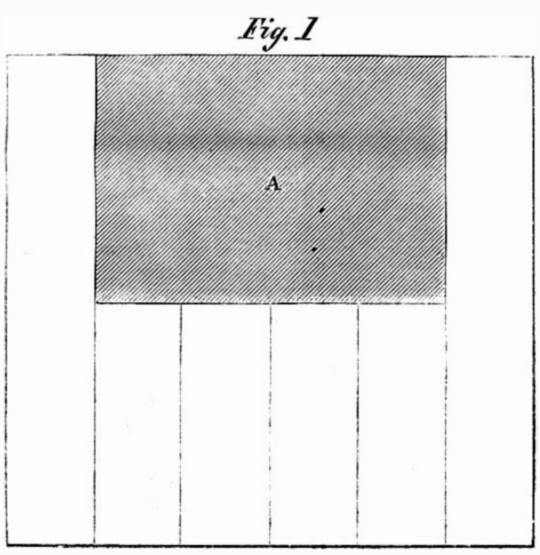
It is generally conceded by railway engineers that Bessemer steel rails will wear about sixteen times as long as common iron rails. If such be the fact, it is a matter of the utmost importance that railway companies renew their roads with steel rails or steel-headed rails as soon as those already in their tracks are worn out. Some of the first engineers in the country have expressed themselves in favor of steel-headed rails, provided the steel head could be welded perfectly to the iron; as in this country the weather is so intensely cold in winter that rails made entirely of steel are very liable to break. It is well known to all that until quite recently steel-headed rails have proved a failure, for the reason that it is such a difficult matter to heat a rail pile composed of iron and steel according to ing to the usual mode of piling; as the iron requires about double the heat to bring it to a welding state that steel does: consequently either the iron is not heated sufficiently to weld, or the steel is over-heated, which destroys its properties altogether: in either case the rail is unfit for use. As a general thing, the iron is not heated hot enough to weld to the steel, and the result is, that in a few weeks the steel cap separates from the iron, and the rail is rendered worthless.

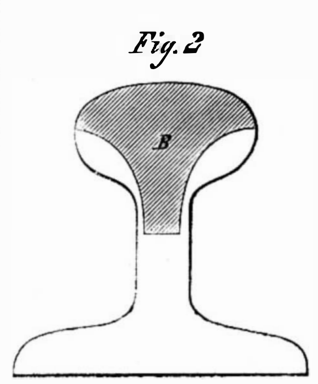
S. L. Potter, Superintendent of the Wyandotte Rolling Mills, claims to have discovered a plan by which a pile can be made of iron and steel, and disposed in such a manner that the iron will receive twice as much heat in the furnace as the steel, consequently, they are both brought up to a welding heat at the same time, without injuring the properties of either, and a perfect weld is secured.

By referring to Fig. 1, a section of the pile, it will be seen that a billet of Bessemer or other steel, A, about five inches by four inches—having been previously rolled or hammered from ingots seven or eight inches square—is introduced into the side of an ordinary rail pile, and charged into the furnace with the steel toward the flue, thus protecting the steel with the iron from the extreme heat. As it passes over the bridge from the fire chamber, the heat passes through the iron to the steel; and it has been proven by actual experiment that the two metals are brought up to a welding heat at the same time. The pile is then rolled on edge, working the steel in the head. In the first passages through the roughing rolls, a portion of the iron on either side of the steel is worked down in the lower part of the head, allowing the steel to form the head, as shown at B, Fig. 2.

More than fifty different pieces of rails made after this plan, have been subjected to one hundred blows from a two-thousand-pound steam hammer, literally crushing them, without impairing the weld in the least degree. Some of these rails are now in the track of the Michigan Southern and Northern Indiana Railroad, Michigan Central Railroad, and Detroit and Milwaukee Railroad, and have thus far given entire satisfaction. This plan is peculiarly adapted to re-rolling, as the old rails can be rolled into flat bars, then formed into a pile of the iron and steel as shown in Fig. 1. The old rails can at a very moderate cost be converted into a steel-headed rail, one-third of which being steel, and two-thirds iron that will be as durable and much less liable to break in cold weather than an entire steel rail. If it be preferred, a T-shaped piece of steel can be used instead of the square piece, and the same result obtained.

This invention is patented in the United States, England, France, Prussia, and Belgium, all of which patents were procured through the Scientific American Patent Agency. For further information address S. L. Potter, Supt. Wyandotte Rolling Mills, Wyandotte, Wayne County, Mich.





PATENTED STEEL-HEADED RAIL.

THE differences in metals is surprising. Although copper alloyed so as to come under the term bronze, has been made hard enough to receive and retain an edge, so as to be used for cutting instruments, yet it is softened by being heated and plunged in cold water, while iron and steel is hardened by precisely the same process.

Imitation Ivory Miniatures, Photo-Chromographs, Etc.

A method of coloring photographs intended to be set as brooches or in lockets, in imitation of ivory miniatures, has recently excited great admiration, and has been extensively employed by a few photographers, but, having been kept as a secret by those who have attained a knowledge of the method, it is not known to the general body of photographic colorists. The effect produced is so exactly like that obtained on ivory, that it is only by those who have had great experience in colored miniatures that the difference can be detected.

The method of proceeding is as follows:—The photograph to be colored, which must be on plain salted paper, must be printed rather larger than that part of it which is required to be finished, in order that a margin might be left to paste on the frame which is about to be described. An aperture is cut in a piece of thin wood or mill-board larger than the part of the photograph to be colored; the print is now damped, and the edges pasted on to the frame. When dry, the paper will be found to be stretched tight, exhibiting a smooth surface to work upon, and the back of the part required will be clear of the frame. The picture should now be painted in water colors, as described in a former part of this work, with the exception that the colors must be more forcible, and the face of the portrait darker than will be necessary in the finished result; the after operation making the picture paler than before the wax is applied.

When the picture is quite finished—and it is well to avoid any further alteration or corrections—melt a little pure white wax in a porcelain capsule, and, holding the picture before a fire, apply the wax to the back with a brush. The picture will appear to darken all over, but will regain its color on cooling. It should now be cut out of the frame and backed with a piece of warm tinted or cream-colored paper. If any alterations are absolutely necessary, they may be made by mixing a little soap with the colors employed, which will prove effective.

Another method on the same principle, but requiring less artistic skill, consists in coloring very forcibly and rudely one print which is mounted on cardboard. Another print from the same negative, printed somewhat lightly on thin, fine paper, and not toned too black, is made transparent either with wax or varnish made with Canada balsam and turpentine. This is stretched tight upon the face of a good piece of colorless glass, to which it is attached throughout with the varnish. It is then fitted so as to superpose accurately upon the roughly painted copy: the transparent print has the effect of softening and blending all the harsh coloring in the original, and giving a good effect with very little expenditure of skill or time. Care must be taken, however, that while the glass and transparent print superpose accurately, they must not be quite in contact with the roughly colored print: a strip of card must be pasted at the edges of the latter, the thickness of which strip divides the transparent print from the colored one, and gives a great appearance of relief and softness.

Another method on the same principle consists in first making the print transparent with wax or varnish, and then coloring at the back in oil colors forcibly but roughly. The print is then mounted and varnished with mastic varnish, and has the effect of a picture colored in oil.

Another method on the same principle yields, with skill and care, very pretty results, resembling enamel. A print on glass, by the Simpsontype or collodio-chloride of silver process, is produced, and, when dry, is coated with a solution of gelatine with which a little Chinese white from a tube has been mixed. When this is dry, the picture is colored at the back, on this gelatine surface, with either water or powder colors. If with the former, the gelatine surface should be first coated with collodion, to prevent it working up: if with powder, the instructions in the chapter on "Non-inverted Colored Positives" should be followed. A little practice will be necessary to ascertain the depth and tint to be applied, as the result can only be guessed at in course of coloring. When done, a piece of gelatinized paper is pressed into perfect contact with the picture, avoiding air bubbles; this is left to dry, and then the whole is removed from the glass by running a penknife around the edge, and a brilliantly-colored miniature, with an enamel-like surface, is obtained. The glass may be prepared with an almost imperceptible coating of wax dissolved in ether, before it is coated with collodio-chloride, in order to facilitate the whole readily leaving the glass when finished.—*Newman's Harmonious Coloring.*

STEREOCHROMY.—We have given in the SCIENTIFIC AMERICAN (page 22, present volume) a full account of the process of monumental painting employed by Kaulbach at Munich. We observe that Dr. A. Hill of Norwalk, Conn., has recently patented a process for painting on marble, by which it is claimed that the colors are rendered as durable as those of stained glass; the process being at the same time simple and quickly performed.

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VOL. XVI., No. 4....[NEW SERIES.].... *Twenty-first Year.*

NEW YORK, SATURDAY, JANUARY 26, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

THE CARE OF TOOLS.

We believe—although we are not certain that it is capable of demonstration—that more tools are ruined by want of care than broken or worn out by proper use. It is surprising how easily the man forgets the "bridge that carried him over," how ready even the thoughtful workman is to leave to neglect the tool which has just subserved his purpose. Carelessness in the use of tools is a source of enormous annual expense to manufacturers and others, an expense which, if aggregated would probably surprise even the most observant. On the farm the plow is left in the furrow, the hoe between the rows of corn, the shovel in the pit, the scythe on the tree, and the ax in the log—left to rust and to the liability of accidents. The wood-worker, called away suddenly from the job he is doing, leaves his plane on the board he has been smoothing, to be knocked off by the first passer-by, or allows the auger bit or the saw to remain in the half-pierced timber to be broken by the first swinging board in the hands of the apprentice. The blacksmith leaves his tongs at the vise when he needs them at the anvil, and the machinist drops tap, drill, reamer, or hammer, where last used.

Order is the "first law" in the shop as in heaven, and care, no less than cleanliness, is "next to godliness." Next to the advantage of having a place for every thing is the wisdom of keeping every thing in workable condition. In the machine shop the use of impure oils in drilling, tapping, etc., is an expensive economy. Oil containing mineral or earthy matter is only a grindstone in solution. It cuts and abrades the edges of the tool, while in use, precisely as does the grindstone or buff-wheel. Gummy oils are scarcely less injurious. They add to the friction of the tap or drill and demand increased strength to resist torsion. A "gummed-up" tap or file is almost useless until thoroughly cleaned. The application of warm soapsuds, benzine, or turpentine, will not always remove this gum. In such a case they can be readily cleaned by covering them with oil, turpentine, or any inflammable substance, and exposing them for a moment to a flame until the liquid takes fire; then card or wipe them and they will be found to be in excellent order. Finishing files not unfrequently become clogged, and when the card is useless to remove the "gurry," this process will be found efficient.

Sometimes, also, in filing wrought iron the tough particles of the iron are torn off by the teeth of the file and lodge, producing scratches on the work, and thus impairing the efficiency of the tool. A simple device, which we used for years, that easily and quickly dislodges these clinging particles, is a piece of soft iron wire flattened under the hammer at one end to a chisel point, or disintegrated like a broom and used thus: The point of the file resting on the bench, the handle held by the left hand; then strike across the face of the file, in the direction of the "first cut" teeth, with the flattened end. It certainly and thoroughly dislodges the snags, and the file is ready for work. The wire instrument may have a ring turned at the handle end, or be affixed to a wooden handle. No. 8 wire is large enough.

Turning tools, after being tempered and ground, are frequently left wet from the stone until wanted for use. In this state the keen edge is acted upon by rust, and a re-grinding becomes necessary. If not put at once to the oil stone they should be wiped with oily waste. These little matters are more important than they seem at first sight. A saw or chisel which has been used in unseasoned wood, should be carefully wiped and oiled, otherwise it contracts rust and wears away fast. A new file should not be put upon the scale of east iron or of unannealed steel, and a file kept for brass or bronze should not be used on a harder metal. Back saws for cutting iron and other metals are often ruined in inexperienced hands. If drawn forward and back too rapidly they heat and lose their temper, when they become almost useless.

A hundred other instances might be adduced to show the depreciation of tools by neglect and the necessity of paying attention to these "little things." The real economist, however, needs but a hint, while the constitutionally careless are slow to see their errors.

PRESERVATION OF MEAT.

It is a well known fact that lean meat, as beef, for instance, becomes dry, hard, and innutritious by salting. Salt being chloride of sodium, and its chlorine having a great affinity for the soluble portions of the flesh—albumen, fibrine, etc.—it attracts the juices, forming a brine, containing the larger portion of the nutritious qualities, with the elements of phosphoric acid, potash, and other mineral ingredients. As these are removed from the meat so is its fitness for food diminished. When lean meat is subjected to the action of salt, the deliquescent properties of the salt attract the juices of the meat, and the brine resulting contains the mineral bases of the meat—the phosphoric acid, potash, etc—with the albuminous elements, all being held in the saline solution.

Fat meat, or rather fat itself, is impervious to salt. The outside becomes indurated by the salt, and refuses entrance to the decomposing gases. Still, salt is a solvent, and it assimilates with the substances with which its solvent properties harmonize. If not adapted to its action as a chloride of sodium, readily uniting with the elements of animal substances except the fatty principle, it drains the meat subjected to its operation of its most valuable qualities. The action of salt, it will be seen from these brief remarks, is almost confined to the lean flesh to which it is applied; although, in fact, it is a necessary element in the preservation or preparation of animal food for the market.

In this connection we desire to say a few words as to the management of animals designed for the slaughter house and the market. Animals which have been subjected to considerable fear and agitation before being slaughtered have their flesh relaxed. They have been in just the worst condition to preserve the fat already deposited on their bones, and in just the best condition for them to make good the waste, if offered the opportunity, to which they have been subjected. How necessary it is then, for the cattle brought from peaceful pastures to the abattoirs of the metropolis to have some days of rest, with proper shelter and good food, before being hurried to the shambles.

The albumen, from which waste of exercise or work is to be made up, is exhausted. Why? Simply this. Muscular action is supported and sustained by the decomposition of carbon in the food eaten, and violent exercise, like a high chimney, induces a strong draft. The carbonaceous or life-giving elements burn out rapidly, when either forced exercise is demanded, or the agitation of the mind is allowed to react on the physical organism; and we are among those who believe that mind, or reason, or intellect, exists among the lower orders of animals as well as in the *genus homo*. These animals, then, intended for the slaughter, may, by the exercise or the excitement of driving, or the fear of unknown harm while *in transitu* on the cars, waste the vitalic force stored in the cellular tissues of their fat and be in a collapsed condition, to speak mechanically, when they arrive at the shambles.

A few weeks ago we made a notice of the new abattoir at Communipaw, and we had something to say as to the matter of bringing meat to market. We then approved of the principle of the management at that establishment, especially in regard to its humanitarian tendencies, believing that what is merciful to the beast is merciful to the man, thereby reversing the form of the old saw: "A man that is merciful to his beast, is merciful."

In fact in this preservation of animal food for human consumption there is involved a law of nature. We have not time nor space to detail the particulars. There is a latent force, or there is a latent heat—in this respect synonymous terms—in all substances, and especially in substances taken by the animal as a part of its organism. Vegetable substances are taken up by grazing animals and as soon as the processes of digestion act, in fact sooner, become a living force in the animal. This force can be expended by violent exercise or by anxiety or trouble, reaching through the sensual or the mental perceptions and affecting the tissues of the physical structure. This may be seen every day. A worried man is never a fleshy man. Swine sometimes refuse to be fatted. They have trouble on their minds. To be made fat they must be free from care and take to their food kindly. Care in their case is dyspepsia. In the case of men, anxiety, producing or at least inducing dyspepsia.

The flesh of wild animals, those we obtain as food, is lean. They are full of anxiety, have no time to get fat, and their meat when salted is not nutritious. Take our domestic animals and they live "in clover," having no care, not harassed nor troubled. They grow fat, and not only put layers of fat over and under the muscles but extend it through the lean tissues. This is the meat, when properly killed, that delights the taste of the epicure and nourishes the frame of omnivorous humanity. We seldom think of preserving the meat of wild animals, especially those which hold their lives by a tenure of grace from unresting enemies, by salt. We view them like fish as fit to be eaten only while fresh. We do not salt down lean animals. Even from the meat of those given to fat we select, the fat for salting, the lean for eating fresh or at most "corning."

Our meat for preservation by salt must be either fat in itself or have fat enough in the lean to neutralize the deliquescent quality of the salt and leave us the juices which contain nutriment, otherwise our "corned beef" would be only the whaleman's "mahogany" or the soldier's "salt horse," and we should be subject to the mishaps of the long sea voyagers or the commissaries of the camp.

PATENT LAW OF PRUSSIA.

The recent extraordinary military success of Prussia, and the consequent expansion of her dominions, have attracted great attention in this country. We notice a manifestation of this interest very marked among the large class of our citizens known as inventors. They are making many inquiries of us concerning the patent system of Prussia, which we regret to say does not correspond in its scope and application to the liberal and enlightened character of the past, present or future of the kingdom.

The existing ordinance relative to patents in Prussia went into operation, if our impression is correct, as long ago as October, 1815, and has as little in common with the modern age in spirit as in date. Under it, the tenure of a patent right in Prussia is analogous to that of real estate in Turkey: it can be held only by a subject of that power. Foreigners can obtain no foothold in the kingdom for their ingenuity or enterprise, but in the name of some Prussian and dependent on the equity of a private contract with such representative before the law as they may be able to employ. Furthermore, the patented manufacture must be actually introduced within six months, or the protection is forfeited. These two restrictions operate to deter ingenious Americans from undertaking to procure Prussian patents. The protection is too indirect and uncertain, and the time allowed for introduction is much too short to be of any use in most cases, especially with the more important class of inventions. In the absence of available protection, without which men will not engage in new branches of manufacture, the introduction of many valuable improvements and industries that enrich a nation, is retarded or wholly prevented, to the great detriment of that country. It cannot be that a government so enlightened and enterprising as that of Prussia should remain insensible to the mistake in principle and policy contained in this obsolete kind of legislation. Our own patent system is very liberal, and does not discriminate against inhabitants of other nations unless the laws of those nations discriminate against our citizens. The impulse which has been given to invention in this country since the liberal Patent Amendment Act of 1861, has been truly wonderful. During the five preceding years, from 1856 to 1860 inclusive, the number of patents granted was about 18,000. From 1861 to 1865, inclusive, the number increased to nearly 22,000, and that in the midst of our deplorable war, which shut off nearly one half the states from the privilege of the Patent Office.

It seems most probable that the subject will come before the re-organized German Federal Government of which Prussia is the predestined and acknowledged head. Demands are already put forth through the German press, for a uniform patent system for the whole German Confederacy embracing the following points:

Patents to be issued for fifteen years, securing the article patented to the inventor, his heirs, administrators and assigns; no preliminary examination to be required, and inquiry into novelty or priority of invention to be made only when protest is entered against the application; patents to be refused on general principles, without reference to the particulars of construction or use, excluding such articles as may be opposed to public morals or welfare; no limitation of the period for introducing patented articles; patents to be granted without charge until after a limited period, when the fees will be exacted and will be gradually increased; the Government to have the right of appropriating a patent to its own use by paying a suitable fee to the inventor; aliens and citizens to have equal rights before the German Patent Law, and local laws conflicting therewith to be over-ruled.

CHEESE AS FOOD.

Compared with other people the Americans place but little value on cheese as an article of food. We use it as a condiment, sauce, or side dish, rather than as necessary or proper food. In England, Scotland, Ireland, Wales, and in many parts of continental Europe, it is regarded as a common and sometimes a necessary article of food. There is reason why it should be so regarded. Its composition is very similar to that of flesh, the casein representing the muscular fiber, and the buttery matter the fat portion. Casein is an albuminous substance, useful in building up the muscles, and the buttery matter is a concentrated carbon as useful, in its way, for food as fat meat. The Swiss chamois hunters take on their expeditions among the higher alps, where they remain sometimes for days together, exposed to intense cold and undergoing the hardest of exercise, only a small quantity of cheese and a flask of brandy. The English harvesters live on ale, cheese, bread, and occasionally a bit of mutton. The Germans and Hollanders use cheese as a common article of food.

With some persons cheese is not in favor because of its constipating qualities. Eaten raw it is less so than when toasted or made into the popular dish known as Welsh rarebit. In this form it is scarcely fit for the human stomach. The fatty particles are separated from the albumen and appear simply as liquid oil, while the albumen is changed to a tough, stringy substance, without nutritious qualities and almost as indigestible as sole leather.

Cheese derives a factitious and market value from the districts in which it is produced. The Stilton cheese is a synonym of superior excellence to the English palate, and those who have made themselves acquainted with Teutonic tastes understand well what is meant by Limburger and Sweitzer kase. But for years past the American cheeses have been growing in favor, not only here, but in England. A late number of the London *Grocer* says:—"The Americans and Canadians are emulating our most successful dairymen, and really choice American and Canadian cheese may now be obtained from those English importers who have made themselves well acquainted with the best sources of supply."

If cheese could be afforded at a fair price as compared with meat, there is no reason why it should not become, in a measure, a substitute, as it seems to be especially adapted to restore the force expended by those whose work is extra laborious and exhaustive; and, indeed, it may be questioned, now, whether it is not as cheap, all things considered, as fresh meats. It is a subject worthy some consideration.

ITEMS OF THE STATE OF IRON MANUFACTURE IN PORTIONS OF THE EASTERN STATES.

One of our reporters has recently made a flying trip through some of the Eastern States, and noticed that in general iron workers appear to be doing well, having orders enough on hand to last some time.

In Hartford, Messrs. Geo. S. Lincoln & Co., an old established and well known house, are doing their usual line of castings and machine tools. Messrs. Lincoln & Co. have built most of the tools for Colt's Armory, and large numbers of milling and other machines for Wheeler & Wilson and various sewing machine factories. Their work is first class, and in the dullest times they have been busy.

Pratt, Whitney & Co., have one of the handsomest and most convenient machine shops in the state, and the proprietors are both known as superior mechanics. They manufacture machine tools of all classes, and also the Weed Sewing Machine. Pratt & Whitney's engine lathes are most excellent machines, and are fitted with a patent attachment for turning tapers without moving the centers out of line with each other, as is the case when the tail stock is set over.

Woodruff & Beach have a lot of orders for stationary engines on hand. They make a strong, substantial, and highly-finished machine. They have built engines for the United States Government, and also for many factories throughout the country. Their engines are fitted with a variable cut-off of Green's patent which gives great satisfaction.

In New Britain, Conn., Messrs. Landers, Frary & Clark have recently erected a large and splendidly appointed cutlery establishment, near the depot, which is now in active operation. The Stanley Works are also about taking up another line of manufacture, for which they have put in one of the Shaw & Justice Hammers. Messrs. Thomas Humason & Beckley are running on their usual class of goods, cast-steel hammers, etc., etc.

In New Bedford, the Gosnold Mills are at work on horse shoes, employing a few men at present. In this town, however, we were much pleased to notice an innovation in the machine line that is creditable to the employer and beneficial in a moral point of view; namely opening a new branch of trade to female labor. These opportunities are so few that it is matter of congratulation that another chance is offered them. The Morse Twist Drill and Machine Company employ twenty-four female machinists in the manufacture of their tools, and we saw them hard at work a few days ago, cheerful and contented. These girls do filing, of a light nature, just as well as men could, and much better than boys who were "so full of the devil," as Mr. Morse stated, that nothing could be got out of them. They earn good wages, are exposed to no bad influences, being in an apartment by them selves, and seemed contented and prosperous. Beside filing they tend light machines, grind drills, and do other miscellaneous tasks. This is certainly much better than being stifled up in a noisome workroom, cramped over a needle for a miserable stipend. We wish our space permitted further mention of this admirable little shop. Mr. Morse is an alive mechanic, takes the SCIENTIFIC AMERICAN as a matter of course, and believes in going ahead. He has just built a large addition to his shop, and is prepared to do machine work of all kinds. Mr. Morse is an inventor of a remarkably original turn of mind, and has got up special machines for almost all his work.

In Worcester, Mass., Messrs. L. & A. G. Coes are making their celebrated screw wrenches which they have had in market for many long years. The Coe wrench is an "indispensable institution," as their orders prove conclusively.

Messrs. Ethan Allen are making their celebrated Damascus guns, and also pocket pistols and revolvers. The several machine-tool makers are doing a fair amount of work.

In Winsted, Conn., the scythe and axle makers are doing well. Mr. Hurlbut, axle maker and general forger, informs us that he has no reason to complain.

In Seymour and in various towns along the Naugatuck Railroad we find a fair activity for the season, particularly in cutlery establishments. The axle trade of this country must be something enormous, for we find establishments very busy and more going up. The Ætna Spring and Axle Company are just starting at Bridgeport, and the Spring Perch and Axle Company of that place, some time established, are doing a good business.

New Year's.

J. B. Aiken, of Franklin, N. H., has sent us a nice bundle of warm stockings knit on his patent machine. He also sends us a package of photographs, taken by him last summer in Colorado—being his first attempt in the art. The specimens would do credit to an experienced artist. Another friend in Pittsburg has forwarded some "Old Rye." put up in one of Stoekel's patent graduated bottles. Will the donor be kind enough to inform us what he wishes us to do with the contents?

SHOES VS. SANDALS.---THE CLASH OF ATOMS.

BY PROFESSOR CHARLES A. SEELY.

In the state of nature the feet of man are the least vital parts of his body, and as they were intended to perform heavy service they were endowed with extraordinary powers of endurance. But fashion and art long ago ignored these good designs of nature, and now our feet are proverbially weak and sore. Every one at some time has his corns, or that other disease quite as common, which make his presence hateful to his best friend. Although the feet are not the seat of fatal diseases, yet they are the open portal which invites to the lungs its most terrible enemy. We learn from the ancient poets that the feet were regarded as objects of beauty, but now our feet are so pinched out of shape, that we may search a long time for a well formed foot, unless we go to the ancient statuary, or among the semi-barbarians of the east.

This state of things did not exist in ancient times: if corns had been invented in his time, Job would surely have told us about it. And at the present day the poor Indian of untutored mind knows nothing of our fashionable diseases. Corns and mis-shapen feet are incidents of modern civilization.

Such a statement of the case as this is sufficient to suggest to the minds of most people, the cause and perhaps a remedy. The radical view of the subject is, that the cause is leather and the remedy is sandals: leather obstructs the healthful perspiration and ventilation of the feet almost as effectually as would sheet iron: the feet need no more protection than the hands or the face: down with leather. But I am no radical. The fashion of centuries is too respectable to be dealt with in a violent way. "Nothing like leather" has been too long a household proverb to be forgotten in a day.

It is entirely practicable however, to institute the beginning of reformation without making ourselves obnoxious to the reasonably fastidious. Thus: We may refuse to wear shoes which pinch us or tend to press the feet out of shape, we may prefer thin porous leather, and wear cloth shoes whenever fashion will permit us. And we may think of the reform and reason upon it with our neighbors. In these little ways, we shall strengthen ourselves in the faith and hasten so much of the millennium as pertains to the feet.

In my opinion here is to be a fruitful field for the inventor. I suggest a few problems: How to make leather less unsuitable for shoes: Better ways of uniting cloth uppers to leather soles: How to weave a shoe and attach a sole: The best fiber for a cloth shoe: How to protect the feet from rain and yet secure ventilation: To make a shoe of net work, or of perforated leather.

THE CLASH OF ATOMS.

Prof. Tyndall and others advocate the theory that the heat of combustion and chemical action generally is only the heat of collision or percussion. In combustion of coal, for example, the atoms of carbon and oxygen rush upon each other and thus strike fire. This view of the case involves some very interesting consequences.

One pound of carbon in burning, as determined by experiment, gives out 8,000 units of heat, that is, heat sufficient to raise 8,000 lbs. of water one degree. Now the theory implies that an equivalent amount of force (*vis viva*) has been expended or converted. The mechanical equivalent of 8,000 units of heat is $772\times8{,}000=6{,}276{,}000$ foot pounds. Now on the supposition that the pound of coal is burned in one minute we have the force represented in horse-power, thus: $6{,}276{,}000\div33{,}000=187{\cdot}15$ horse-power. But we know that by pulverizing the coal and burning it in pure oxygen it may be consumed in an indefinitely short space of time. Suppose that the time taken be so long as one second, then the number of horse-power concerned in that time is $60\times187{\cdot}15=11{,}229$!

Yet this calculation gives still a very imperfect notion of the immensity of the force involved in the burning of a pound of coal. The distance through which atoms move to unite chemically is unmeasurably and insensibly small. The velocity which a pound of matter must attain in order to evolve 8,000 units of heat by percussion is ($\frac{1}{772}\times\frac{V^2}{2}=8{\cdot}000$) 3·514 feet per second. What must be that force which can start matter from a state of rest, and in an insensible space give it such a velocity? What the resistance that instantly destroys the momentum? Gravity, which moves the universe, requires 1,600 feet of space and 20 seconds of time.

OUR STEAM NAVY.

It may be said with some truth that a man's rivals are his true critics. So in nations we learn of our failings from rival nations. We copy a critique on our present steam navy, from *The Engineer*, which embraces a very sensible discussion of a subject that concerns deeply the interests of our country. We may say *en passant* that the management of the engineering department of our steam national marine has offered the opportunity of which *The Engineer* avails itself. There is evident need of improvement, as may be seen by the comparison which the English periodical institutes between English and American vessels.

MARINE ENGINES IN THE UNITED STATES NAVY.

If reliance is to be placed on the reports which reach us from America, it is not only probable but perfectly certain that the efficiency of the new navy now springing into existence in the States, will be seriously impaired by the defective nature of the machinery with which it is being supplied. The American press denounces the Bureau of Steam Engineering—a Government department of which Mr. Isherwood is chief—in no measured terms; and apparently the complaint is not without foundation. It is quite possible that all that is said of the engines of the new fleet is not perfectly true; but the arguments put forward by such of Mr. Isherwood's subordinates as have ventured to defend the practice of their chief are so weak, and the results of practical trials of his machinery are so inferior to those obtained with the marine engines of the old world, that we are forced to the belief that the tales which are told of official incompetency and the failure of engine after engine are substantially correct. Nor is it to be supposed that engines defective in design and workmanship are supplied to Government ships only by Government officials. Even private manufacturers appear to be singularly unfortunate in their dealings with the American navy. Those are not wanting, however, who with much plain speaking—to use somewhat of a cuphemism—assert that the fact is due to the interference of men who are unable to supply good engines themselves, and who are unwilling to be beaten by others. In a word, both the theory and practice of American marine engineering as far as concerns fighting ships is, at present, in an extremely anomalous condition, while the literature of the subject as represented by both the editorial and correspondence columns of the scientific and daily press is simply unique in its character.

Mr. Isherwood's screw engines of the largest class are for the most part similar in type to those of the Miantonomah, already described in our pages. They are back-acting, and so far resemble Maudslay's double piston rod engines, but there the resemblance ceases. They have single piston rods laying hold of a rectangular frame consisting of a crosshead, to the center of which the piston rod is affixed; a cross tail, off which the connecting-rod works; and a pair of round side rods, one of which passes above and the other below the crank shaft. In all this there is nothing remarkable. But the capacity of the cylinder for a given power is very much less than English engineers consider sufficient; while the dimensions of the boilers and the weight of the machinery, taken as a whole, is much greater. Mr. Isherwood does not believe in expansion, and therefore his cylinders are small, be cause the terminal is nearly as great as the initial pressure. But his boilers are large because he uses steam uneconomically. As an illustration of his most recent practice, we may select the machinery of the *Franklin*, one of those magnificent wooden unarmored frigates intended to steam at a high speed and to carry very heavy guns, with which it is proposed to keep American commerce safe from *Alabamas* in future. Much has been heard of this new fleet in this country, and all that relates to it possesses great interest. We learn from our American advices that the *Franklin* is an enormous ship of splendid model and as strong as wood and iron can make her. It is obvious that in ships intended to act the part of police of the seas, speed is the first essential, yet Mr. Isherwood promised that he would get ten knots! out of her, and it appears more than probable that even this poor result will not be realized. The *Franklin's* machinery consists of two "back-acting"—return connecting-rod—engines with cylinders 68 inches in diameter and 3 feet 6 inches stroke. These are obviously moderate proportions for a ship of the class, and if the boilers were designed in accordance with English practice we should simply say that the vessel was underpowered. But the boilers are designed in accordance with Mr. Isherwood's practice which is sufficiently original. There are four main boilers constructed with vertical tubes under Martin's well known patent, and two superheating boilers of similar construction, the only difference being that very little water is carried in them; the steam being dried in the upper portions of the tubes. Without going into details, for which we have not space here, we may give a fair idea of the steam generating powers of these boilers by stating that they have no fewer than 583 square feet of grate area, and about 14,500 feet of heating surface. Let us compare these proportions with English practice. The *Lord Warden*, of 1,000-horse power nominal, has 700 feet of grate and 19,000 feet of heating surface. Her boilers are designed to supply three cylinders, each 91 inches in diameter and 4 feet 6 inches stroke, the steam being cut off at about one-sixth of the stroke. The displacement per revolution, omitting clearance and waste in ports and passages, being 1219·5 cubic feet. The *Franklin* has, as we have said, 583 feet of grate, and 14,500 of heating surface, intended to supply two cylinders 68 inches diameter and 3 feet 6 inches stroke, representing a displacement per revolution of 353 cubic feet only. Assuming that the engines of the *Lord Warden* are properly designed—and Messrs. Maudslay and Field do not make mistakes—we find that the proper displacement for the cylinders of the *Franklin* would be 1015·66 cubic feet, equivalent to a pair of cylinders of 113½ inches in diameter, the stroke remaining 3 feet 6 inches; or 100½ inches diameter if the stroke were increased to 4 feet 6 inches—that of the *Lord Warden's* engines. The accuracy of the deductions to be drawn from a comparison of these proportions depends, of course, on the piston speeds being the same. Assuming the number of revolutions in the case of the *Lord Warden* to be 60, we have a piston speed of 540 feet per minute. It is not likely that the pistons of the *Franklin* will be run at more than this, which is equivalent for a 3 feet 6 inches stroke to rather over 77 revolutions per minute. It is therefore obvious that her cylinders are out of all proportion too small for the boilers. Indeed they could not possibly work up the steam which the boilers ought to make, were it not that the cut-off valve does not close till the stroke is nearly completed.

It is not in the cylinders alone, however, that Mr. Isherwood's design is objectionable. Catching at the idea that plenty of surface is essential to the life and easy working of a bearing, the chief of the Bureau of Steam Engineering carries out the principle like an amateur, manifesting an utter disregard for the teachings of practice. The bearings of the crank shaft are made half as long again as the longest in use in English marine engines, and as a result they bind and cut. Americans are peculiarly attached to a system of trial which consists in lashing a vessel to aquay wall, and then running the engines, usually for a pariod of seventy two hours. During her trial under these circumstances, instead of seventy-seven revolutions, which ought at least to have been got out of the engines as we have seen, the journals of the *Franklin's* machinery heated so much even at twenty revolutions, that that speed could not be maintained; and the engines were run for the greater part of the trial at but from fifteen to eighteen revolutions per minute. As to the condenser, constructed under Sewell's patent, it is enough to say that the vacuum never exceeded 24 inches; while the superheater acted so efficiently that the temperature of the entering steam being 270 degrees, that of the issuing steam on its way to the cylinders was 272 degrees. It is not easy to imagine a more miserable fiasco from begining to end; and yet the *Franklin* is by no means an isolated example of the defects proper to the system under which American men-of-war are engined. There appears to be a total lack of that open competition and of those fair public trials which have done so much to foster British talent and enterprise. In their stead we have a Government department not free from the imputation of corruption, and certainly ruled by the demon of red tape; and a system of trial which, assuming it to be founded on the true principles of scientific inquiry is really open to every species of abuse; while, more astounding than all, we find what should be a great naval nation entrusting the construction of its machinery on which it must like every other nation be mainly dependent for the maintenance of its power at sea, to an individual who blatantly denies the truth of principles which not only bear the test of the most searching scientific investigation, but are here verified daily in actual practice. Mr. Isherwood may, perhaps, think that we write harshly of him. Possibly he has reason to complain. He may perhaps find some consolation in knowing that in the old country little or no sympathy is felt with those who would wish to see his post taken by another. On the contrary, we believe him to be the right man in the right place. Indeed we could wish to see his principles and his practice adopted by every naval power in existence—except Britain. —*The Engineer.*

Simple Device for Printing Pictures.

Professor Towler, in *Humphrey's Journal*, suggests the following simple and excellent method:—

"We will premise that the piece of opal or porcelain plate is of the same size as the negative, is quite flat, has already been sensitized by the collodio-chloride process, and is now ready to be placed on the negative. With a diamond cut off two corners from one end of the porcelain plate: these corners are about the same size as the glass corners of an ordinary printing frame. Be careful not to interchange these corner pieces, so as to put the right corner piece on the left side and *vice versa*, and do not turn them wrong side up, but place each in its place from which it was broken off exactly as it was before the diamond was used. Now take a small fragment of shell-lac, or a little piece of shoemaker's wax or of pitch, and melt it upon the lower side of these dissevered corner pieces, and place it upon that corner of the negative on which the prepared porcelain will rest when in position. Apply heat to the corner of the negative until the piece of opal is accurately cemented in its place. The other corner piece is now cemented in its place on the opposite side, and in such a manner that the sensitized porcelain plate, when placed in the negative, shall be in accurate apposition with the triangle pieces that were cut off.

"By holding this combination so that the lower end rests on the table whilst the plate itself is inclined at an angle of about forty-five degrees, it is evident the porcelain plate will slide down until it is stopped by the two corner pieces, which originally belonged to it. You may remove the porcelain plate as often as you like, it will always regain the same position when restored to the negative under the conditions mentioned. It remains only, therefore, to clamp the two plates together with four clothes pins, one in the middle of each side: more may be used when the plate is large, as for instance, a plate twenty-two inches long and seventeen wide.

"During exposure the cdmbination is reared against a blackboard, or a board covered with a piece of black velvet or cloth to exclude all light from the back."

To Light a Dark Room.

The London *Builder* recommends a plan for lighting a dark room in which the darkness is caused by its being situated on a narrow street or lane. The *Builder* says if the glass of a window in such a room is placed several inches within the outer face of the wall, as is the general custom in building houses, it will admit very little light, that which it gets being only the reflection from the walls of the opposite houses. If, however, for the window be substituted another in which all the panes of glass are roughly ground on the outside, and flush with the outer wall, the light from the whole of the visible sky and from the remotest parts of the opposite wall will be introduced into the apartment, reflected from the innumerable faces or facets which the rough grinding of the glass has produced. The whole window will appear as if the sky were beyond it, and from every point of this luminous surface light will radiate into all parts of the room.

WELDING WITHOUT HEAT.—It is a curious fact that iron, and even steel, can be welded by pressure, or by pressure combined with friction or rubbing. This may be seen in the action of the nail machine where two or three nails or tacks come together between the header and the dies. In this case we may saw across the sections of the connected tacks without discovering any evidence of separation. So sometimes the steel point of an upright shaft turning under a great pressure will weld itself to the step if this is of a metal similar to the steel.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 8, 1866.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

60,987.—BOOTS AND SHOES.—David M. Ayer, Lewiston, Me.

First, I claim forming air cells or spaces between the outer and inner soles of boots and shoes by means of corrugated or fluted sole leather, substantially as described.

Second, In combination with air cells or spaces between the outer and inner soles of boots and shoes, formed by corrugated or fluted sole leather, as described, I claim air ducts or passages communicating with the outer air, substantially as described.

60,988.—PADDLE WHEEL.—Eli Banks, Millport, N. Y.

I claim the combination of the spoke, A, and paddle, B, when made as described and used for the purpose set forth.

60,989.—COMPOSITION FOR LUBRICATING JOURNALS.—Bernard Battle, Pittsburg, Pa., assignor to Daniel Coyle, Soho, Pa.

I claim the preparation of a lubricating compound composed of the above-named ingredients, viz.: animal grease or residuum plumbago, sulphur, steatite, carbonate of magnesia, glue, resin, and hydrate of lime, with or without molasses, substantially as above set forth, and in the proportions and for the purposes above designated.

60,990.—FURNACE FOR STEAM BOILERS.—John Best, Lancaster, Pa.

I claim the prolongation of the outer cylinder, B, of the boiler beyond the flues, when closed with a partial head, N O, and doors, D D, so as to form a chamber, C, directly over the front part of the furnace or fire box, F, constructed in the manner and for the purpose specified.

I also claim the vertical partitions, P, in boilers, in combination with a partition or chamber, I M, for conveying the heat first under, then through a series of flues, E', on one side of the water level, and returning it on the same place on the other side of partition, P, through the flues, E' E'', to the rear of the boiler, substantially in the manner specified.

60,991.—STEAM GENERATOR.—William Branagan, Burlington, Iowa.

I claim applying a jacket, D, to a boiler, which is constructed substantially as described, so that this jacket can revolve around the boiler, substantially as specified.

60,992.—CIDER MILL.—E. W. Branch, East Henrietta, N. Y.

First, I claim the windlass wheel, K, having three separate functions of operation, composed first of the side pin, h, and rod, M, for rapidly turning up the screw wheel, H.

Second, The hand pieces, f, for imparting the initial pressure.

Third, The ratchets, g, and lever, L, for producing the final pressure, arranged and operating conjointly with the screw wheels, H H, and follower, D, substantially as set forth.

Fourth, I also claim the employment of a series of inverted troughs or tiles, V V, closed on their upper sides, but provided with apertures, k k, on a level with the face of the bed, to receive and conduct away the expressed juice, substantially as set forth.

60,993.—HARVESTER RAKE.—Franklin Brua, Gordonville, Pa.

I claim the peculiar construction of the horizontal wheel, o, with its stops or lugs, P, centrally-elevated radiating arms, M, with slots, m, in combination with the elbowed heel, K L, of the rake shaft, T, the whole being arranged and operated in the manner and for the purpose herein set forth.

I also claim the arrangement of the double head, B, center pin or shaft, I, bracket, D, pinion, F, and slotted cog wheel, O, when constructed and operated in the manner and for the purpose set forth.

60,994.—MACHINE FOR MAKING TIN CANS.—Walter S. Buck, Philadelphia, Pa.

First, I claim the cast iron base plate, A, with its recesses, B and G, in combination with the steady pin, L, for the purpose substantially as described.

Second, The expanding metallic cylinder, S, when constructed and adjusted substantially as described.

Third, The combination of the slotted blade, H, with the slotted and vibrating arm, C, and set screws, O, arranged and operating as described.

Fourth, I claim the sliding guides, y, in combination with the cylinder, S, substantially as described.

Fifth, I claim the combination of the pressure arm, C, baseplate, A, and expanding cylinder, S, when arranged and operating for the purpose substantially as described.

60,995.—ROTARY PUMP.—W. Butterfield, Madison, Wis.

First, I claim a rotary pump, having a circular cylinder and the chamber, E, in the casing, so arranged that the valves in passing under the chamber shall force the water out in the opposite direction, as described.

Second, I claim constructing the end plates, H, with the concentric rings, n, forming a bearing for the springs, a, substantially as set forth.

Third, The combination of the cylinder, C, provided with the buckets or valves, D, and set eccentrically in the case, A, in combination with the chamber, E, and the side plates, H, provided with the rings, n, when arranged and operating as set forth.

60,996.—EXTENSION TABLE.—Nelson Carl, Cincinnati, Ohio.

I claim the combination of the central-boxed slide, F, and legs, G, with the ends, A B, of the table, forming the outer slides, the whole constructed and arranged to operate as and for the purposes described.

60,997.—BUTTON.—Hector Carlos (assignor to himself and Henry C. Watson), New York City.

I claim, as a new article of manufacture, the novel button herein described, composed of the body, A, shank, B, confining pivot, C, and pointed hinged part, D D', combined and arranged so as to be applied to the garment and secured thereon, substantially in the manner and for the purpose set forth.

60,998.—BREECH-LOADING FIRE-ARM.—M. J. and H. M. Chamberlin, Springfield, Mass.

First, We claim using the trigger as a brace to support the recoil block, substantially in the manner herein set forth.

Second, So combining and arranging recoil block, hammer, and trigger, that when the recoil block is raised up against the rear end of the barrel and the trigger pulled for the purpose of firing, the recoil block is supported by the trigger, acting as a brace and kept in place by the hammer, and when the recoil block is down and the trigger in the notch of the hammer, it (the trigger) is kept from being pulled out from under the hammer by the recoil block, substantially as herein set forth.

Third, The projection, M, when constructed and arranged in the manner and for the purpose set forth.

60,999.—STAVE MACHINE.—W. S. Colwell and F. Veazie, Pittsburg, Pa.

First, We claim the arrangement of the saws, A and B, arms, 1 and 2, shaft, 3, connecting rod, 5 and 6, and crank, 4, when said arrangement is used for sawing out the concave and convex sides of a stave at one operation as herein described.

Second, The arrangement of the guides, D and D', clamps, e f g and h, provided with arms, J K, rack, m, lever, l, endless screw, 1, and wheels 12 and 13, when said parts are arranged and operating as herein described and for the purpose set forth.

Third, The arrangement of the rack, w, wheels, 30, shaft, P, lever, u, provided with pawl, t, when said parts are used in connection with the clamps, e f g and h, as herein described and for the purpose set forth.

61,000.—FEATHERED CLOTH.—Alice A. Condit, Muncie, Ind.

I claim an article of manufacture formed by trimming, folding back, and sewing upon cloth or other material, the feathers of geese, birds, or fowls, as herein shown and described.

61,001.—BED BOTTOM AND SEAT.—Edward S. Cross, Lime Rock, Conn.

First, I claim the spiral spring, E, attached to the end of the slat, B, or of the bedstead, A, by means of an attachment inserted into the end of the spring and having one or more spurs standing in the helical spaces in the spring, so as to allow of being turned, substantially as and for the purpose herein specified.

Second, I claim, in combination with the above, the within-described arrangement of the castings, C and D, and axis, c and d, adapted to turn in the vertical plane, substantially as and for the purpose herein specified.

61,002.—DEVICE FOR HANGING PAINT POTS TO SIDES OF BUILDINGS.—James H. Flagg, Perkinsville, Vt. Antedated Dec. 22, 1866.

I claim the lever, A, and forked brace, B, in combination with each other, in such manner as to provide a device substantially such as and for the purpose herein shown and described.

61,003.—CAR COUPLING.—A. M. Freeman and A. M. Stoner, Springfiield, Ohio.

We claim the combination of the shaft, C, bolt, O, and latch, m, when said parts are arranged to operate in connection with each other, substantially as and for the purpose herein set forth.

61,004.—APPARATUS FOR CARBURETTING AIR.—Charles N. Gilbert, John F. Barker, and E. N. Ives (assignors to New England Portable Gas Works Company), Springfield Mass.

First, We claim in a gas apparatus, constructed on the principle before-mentioned, arranging the generator in a fire-proof and gas-tight chamber, substantially as set forth.

Second, Arranging a tank for holding the fluid in a separate and detached building, and connecting the same with the generator by means of a force pump and pipes, substantially as set forth.

Third, Arranging the pipes connnecting the generator with the tank and pump, in such a manner that the syphons can be filled and the generator emptied from the tank house.

Fourth, The arrangement of the gas-pipe in such a manner that the condensed vapor together with the gas in the generator and pipes can be withdrawn from without the building substantially as described.

Fifth, Heating the generator by means of the radiating box or pipe passing through the chamber outside of the generator, substantially as described.

Sixth, The use of gages for the purpose of indicating the presence of fluid in the generator or pipes, instead of petit cocks.

Seventh, The use of metalic flanges for the purpose of securing the pipes to the generator and tank, constructed substantially as described.

Eighth, The improved form of generator, in which the reservoir, h, is added to the evaporating pans, o, o, o, both enclosed in one case, substantially as described.

Ninth, The attachment of the metallic box B, arranged substantially as and for the purpose shown.

Tenth, The improved can for filling with the union and hose attachment arranged substantially as shown.

Eleventh, The arrangement of the pipes g and v, with the cock p, and the cock s, communicating with the syphon tubes and the gage P, in such a manner that the syphons may be operated and fluid withdrawn from the pans by the naphtha let down from the reservoir, h, in the manner substantially as described and shown.

Twelfth, The syphon cups, E, E, E, arranged substantially in the manner and for the purpose specified.

Thirteenth, We claim the general arrangement of the gas-tight chamber, with the enclosed closet, having the glass front and metallic door, into which closet the various pipes enter together with the damper-rod, arranged in such a manner that the generator can be inspected and operated without necessitating an entrance to its chamber, substantially as described.

Fourteenth, The general arrangement of the air-tight chamber, with pipes for venting the generator and chamber having the damper, u, and man-hole, w, substantially as described.

61,005.—BEARING FOR SHAFTS FOR STEAMSHIPS.—George K. Gluyas, San Francisco, Cal.

I claim the arrangement of the frame, A, enclosing the adjustable blocks, B, guided by the slides, C, and the blocks, D, and combined with the rubber springs, E, and adjustable screws, F, substantially as set forth for the purpose specified.

61,006.—ARTIFICIAL FUEL.—George Gray, Temperanceville, Pa.

I claim the artificial fuel composed of the ingredients, prepared in the manner and proportions, substantially as set forth.

61,007.—BACK SIGHTS FOR FIRE-ARMS.—Henry Hammond, Hartford, Conn.

First, I claim the combined action of the oscillating disk, i, with the clasp, f, relative to the standard, d, substantially as and for the purpose described.

Second, I claim the oscillating disk, i, with its fastening screw, k, and sight, n, with the standard, d, substantially as described.

Third, I claim the employment of the screw, h, with the oscillating disk, i, and standard, d, substantially as and for the purpose described.

61,008.—INHALERS.—Ira Holmes, Moscow, N. Y.

I claim the cap, C, with its chamber, E, valves, c, i, and tubes, D, F, when arranged in the manner and for the purpose set forth.

61,009.—STONE DRESSER.—B. S. Hunt, Philadelphia, Pa.

I claim the hammer, H, R, and its cutter, c, c, constructed and combined with lever, M, O, lifter, L, F, and springs, S, P, and S' P', regulating nut, M, A, so as to obtain the intended and herein described effect.

Second, The lever, L, pinions, P and P', with gearing and ungearing movement plate, N, S, with notches and lug, N, S—N, S, when combined and constructed in the manner and for the purpose above described and set forth.

Third, Wheels, R, A, and R', A', provided with a rim made of india rubber, gutta percha, leather or any equivalent substance, when combined and constructed in the manner and for the purpose above described and set forth.

61,010.—SELF-LUBRICATING BOLSTER AND STEP FOR SPINNING FRAMES.—Barton H. Jenks, Bridesburg, Pa.

I claim the hard-metal bolster, a, with oil chamber, e, and separated removable bearings, c, c', substantially in the manner and for the purpose described.

Second, The spindle step, g, h, m, constructed in the manner and for the purpose described.

Third, The combination of the bolster, a, c, c', e, step, g, h, m, and spindle, B, substantially in the manner and for the purpose described.

61,011.—SKIRT-SUPPORTER.—John L. Kendall, New York City, assignor to Ellen A. Vail, Southold. Antedated Sept. 23, 1866.

I claim a skirt-supporter composed of a tape or strip of fabric furnished with a hook and eyelets and adapted for attachment to the skirt as and for the purpose described.

61,012.—WRINGING MACHINE.—J. W. Latcher, Albany, N. Y., and John Young, Amsterdam, N. Y., assignors to John Young, Amsterdam.

First, We claim the employment or use of conically-bored wheels, F, F, applied to shafts of clothes wringers, for the purpose shown and described.

Second, We claim in combination with the gears, F, F, the variable bearing-plate, E, all constructed and arranged to operate substantially as set forth.

Third, We claim in combination with the wheels, F, F, and bearing-plate E, the elastic cushion, k, for the purposes set forth.

Fourth, We claim in combination with the conically-bored gear wheels, F, F, and cushion, k, the relay spring, l, for the purpose described.

61,013.—TORCH AND MATCH-SAFE.—William J. Ludlow, Chardon, Ohio.

The described invention is a new article of manufacture.

61,014.—SAWS.—A. C. Martin and J. Woodrough, Hamilton, Ohio.

Inserting the saw tooth in its seat by moving it toward the periphery or edge of the saw and securing it in place by the means, substantially as specified.

61,015.—BARRELING COCKS.—Alexander, John and Thomas McKenna, Pittsburg, Pa.

We claim combining with a barreling cock, a whistle or other contrivance, that will indicate by sound the flow of liquid while filling, and so constructed as that when the liquid reaches the nozzle, the sound will cease, whereby the person in charge may know that the barrel is full.

61,016.—DEVICE FOR PROTECTING HORSES' NECKS.—Jacob P. Meyer, Waukesha, Wis.

I claim the pad composed of the slats, A, flexibly united and having a middle space which spans the sore and ends which rest upon the neck or withers, with or without the cushions, substantially as described and represented.

61,017.—METHOD OF SEPARATING HARD RUBBER FROM PORCELAIN TEETH.—Alexander G. Nye, Weymouth, Mass.

I claim the employment of a bath of heated or boiling fat or oil, in connection with one or more teeth and a mass of vulcanite, in manner and for the purpose as specified.

61,018.—MANGLE.—S. U. J. Foreman and N. Palmer, Auburn, N. Y., assignors to selves and David Lyman, Middlefield, Conn.

First, We claim the application to the rollers of mangles of hard rubber or vulcanite, substantially in the manner and for the purposes described.

Second, Combining and connecting the lever frames in which the stationary and movable rollers are hung by a system of links and levers, arranged substantially as described so that the same may be actuated by hand weight or otherwise, substantially as and for the purposes herein shown and described.

Third, In combination with the movable roller, when hung in the short arms of angular levers for the purpose of adjustment with reference to the stationary roller, we claim the internal and external gear wheels and intermediate pinion under the arrangement shown and described so that the said gear wheels, while at variable distances from each other, shall bear fixed and invariable relations to the said pinion, substantially as and for the purpose set forth.

Fourth, We claim the method of gearing the rolls of mangles, or other like machines, when arranged so as to move with equal or different velocities, but at variable distances from each other by mounting upon the said rolls, respectively, internal and external gear wheels which mesh with an intermediate pinion, stationary with relation to said rolls, substantially as shown and set forth.

Fifth, In a mangling machine, we claim marking and ornamenting the material passing between the mangle rolls, by means of letters or other devices or designs cut or formed in intaglio in one or both of said rolls, substantially as herein shown and described.

61,019.—ORE CRUSHERS.—William P. Parrott and John J. Bordman, Boston, Mass.

We claim the mode hereinbefore described of making either or each of such crushing rollers of a series of peripheral segments or sections, e', a body, d', d', d', d', and clamp rings, f', f', formed and applied together, substantially as specified.

We also claim the mecharism as described, for imparting reciprocating endwise movements to the rollers of either or each pair of crushing rollers, as described.

We also claim the combination of a movable thopper, a pair of crushing rollers and mechanism for moving the hopper la erally in reference to such rollers, in manner as set forth, while they may be in revolution, as specified.

We also claim the construction of each hopper, viz: with two or more receiving and discharging apartments arranged in it, substantially as and for the purpose specified.

61,020.—Propeller for Vessels.—Charles M. Raynale, Birmingham, Mich.

I claim a vessel, constructed with pipes, B B, opening directly astern, and bent at right angles upward, in combination with reciprocating plungers, C, open above, and work ng vertically in each, said plungers being constructed with outwardly-opening valves, C', and arranged to operate substantially as and for the purpose set forth.

61,021.—Horse-Railway Car.—Daniel T. Robinson, Boston, Mass.

I claim so applying the pole of a horse car to its connection or draw bar as to be enabled to disconnect it therefrom instantaneously by itself, or without the whiffletree, essentially in manner and to operate as hereinbefore described.

61,022.—Coffee Pot.—Daniel T. Robinson (assignor to Pane P. Todd), Boston, Mass.

I claim, in combination with the pan, B, and foraminous cup, C, the shield or tube, D, essentially in manner and for the purpose as described.

61,023.—Horse Rake.—Andrew V. Ryder, Germano, Ohio.

I claim the above described construction and arrangement of the levers, A and F, in combination with the links, D, for operating the rake by treadle action, substantially as set forth.

61,024.—Water Elevator.—T. Scholze, Steuben, Ind., and J. B. Bickel, Elkhart County, Ind.

We claim the crank, C, as constructed with an arm and hook, d, in combination with the pawl catch, g, and perforated plate, A, substantially in the manner and for the purpose as herein set forth.

61,025.—Spring Lock.—Anthony M. Smith, Brooklyn, N. Y.

I claim the combination of the extension tube, A, and nut, s, the elongated catch, d, and arm, e, operating in recess, o, by means of the set screw, u, substantially as described.

61,026. — Flour Sifter. — Harlow C. Smith, Champaign City, Ill.

I claim the combination of wire, E E, pivot, N, aperture, H, rod, L, rod, I, and hooks, O, as described and for the purpose specified.

61,027.—Wringing Machine.—S. Squires, Boston, Mass.

I claim pivoting the portions, H, to the frame, so that their position can be reversed, for the purpose described.

I also claim, in combina ion with the above, projecting one end of both shafts, C D, of a wringing machine beyond its frame so that when the portions, H, are reversed, and the position of the rolls thereby changed, the crank may be applied to the lower shaft, as and for the purpose set forth.

61,028.—Paper Box.—R. N. Stewart, Philadelphia, Pa. Antedated Dec. 30, 1866.

I claim securing the edges of the pasteboard, of which the said paper boxes are made, permanently together by means of the double clamps, A, of thin sheet metal, constructed and applied substantially as and for the purposes as described.

I also claim the combination with the said double clamps, A, the small metallic loops, a3, substantially as and for the purpose described.

61,029.—Attachment for Center Boards of Vessels.—George Storer, New Britain, and George W. Storer, Portland, Conn.

We claim the screw socket, c, receiving the center pin, d, of the center board, and forming a water-tight connection with the trunk, a, substantially as specified.

61,030.—Decocting Apparatus for Tea and Coffee.—Eli Thayer, New York City.

I claim a decocting apparatus wherein the main body of water is separated f om that portion which saturates the material from which the decoction is made, by some non-conducting material which partially intercepts the heat and circulation, whereby ebullition may be produced in the latter portion of water, and its vapor condensed by the former and cooler portion, substantially as is herein set forth.

61,031.—Steam Generator.—Eli Thayer, New York City.

First, The discharge chamber, e, in combination with a tubular steam generator, substantially as set forth.

Second, The arrangement of the several doors, n n w w, for feeding the fuel among the pipes constituting the upper grate, and for clearing them of cinders or other obstructions, substantially as set forth.

Third, The feeding chamber, m m substantially as set forth.

Fourth, The upper grate, substantially as set forth.

61,032.—Pliers.—Sylvanus Walker, New York City.

I claim pliers constructed and arranged substantially as and for the purposes herein set forth.

61,033 —Method of Carbureting Gas. — C. M. Williams (assignor to Henri L. Stuart), New York City.

I claim carbureting illuminating gas by mixing or combining with it the vapors of volatile hydro-carbons before it is introduced into the service mains for distribution, substantially as described.

Second, I also claim the devices, herein shown and described, for carbureting gas in the holder before its distribution to the service mains.

61,034.—Process of Treating Cleaned or Scaled Iron.—W. Dewees Wood, McKeesport, Pa.

The process, hereinbefore described, of subjecting the iron, immediately after it has been washed in water to remove the remains of acid or alkali, to a hot-air bath in a suitable oven or chamber, heated to a low temperature, sufficient to evaporate all fluids from the pores of the metal, and then, while the iron is yet hot, immersing it in or coating it with a mixture of oil and turpentine, or other similar fluid or mixture, which will leave a very slight film or coating on its surface, for the purpose hereinbefore described.

61,035.—Sash and Blind Fastener.—Max Adlor and Louis Knell, Buffalo, N. Y.

We claim, in a sash and blind fastener combined, the points or beaks, d d, beveled concave, e, bent lever, f, knob, g, and the part, a, of the hinge, in combination with the ratchet wheel, h, and dog, k, substantially as set forth.

61,036.—Composition for Roofing.—Chilion B. Allen, Chicago, Ill.

I claim the use of pulverized plaster (land or boiled), in combination with slate flour and other ingredients, for roofing, covering the sides of buildings, boat decks, etc., substantially as herein described and set forth.

61,037 —Nutmeg Grater.—L. V. Badger, Chicago, Ill.

I claim the sector-shaped case, B, having hollow cylinder, H, hung in and between its side plates, D, in combination with the plunger, I, of said cylinder, substantially as and for the purpose described.

61,038.—Dumping Car.—J. W. Bancroft, Philadelphia, Pa.

I claim a mining car, supported by large wheels, B, behind, and small wheels, B', in front, in combinat on with a swinging door, C, latch, b, and yoke, D, all constructed and operating as and for the purpose set forth.

61,039.—Cultivator and Sulky Plow.—John H. Barringer, Hillsboro, Ill.

First, I claim the arrangements, herein described, of a combined cultivator and sulky plow connected, and operating separately when the parts are shifted, substantially as herein described.

Second, I claim the arrangement of a shifting plow, E, connected with the beam, a, by the adjustable plates, u u, and suspended in the front by the joint, b, and the bar, c, and in the rear by the hook, e, to the arm, f, and the vibrating bar, g, substantially as and for the purposes herein described.

Third, I claim, also, the arrangement of the shifting cultivators, n n, attached out of line with each other to the bent iron beams, p, and suspended in front by the jointed connections, r, and behind by the hooks, t, to the arms, f1 f2, on the vibrating bar, g, substantially as and for the purposes herein described.

Fourth, I claim, also, the arrangement of a guide rod or lever, k, connected with the draft pole, D, substantially as and for the purpose herein specified.

61,040.—Cultivator.—Henry Barsalow, Saint Anne, Ill.

First, I claim the beams, G, attached to the front of the frame, A, by an adjustable universal joint connection, and suspended by chains near their rear ends to traveling rollers, i, on the raised cross bar, b, of frame, A, substantially as and for the purpose set forth.

Second, The combination of the mounted frame, A, plow or share beams, G G, and detachable seat, E, stirrups and foot piece, E', all arranged substantially as and for the purpose specified.

61,041.—Seeding Machine.—H. Barsalow, Saint Anne, Ill.

First, I claim the curved extension of the hounds, E E, beyond the rear of the bar, C, of the front part of the machine, in combination with the lever, J, provided with the cross bar, L, for the rear parts of the hounds to rest upon, and the segment rack, K, and catch, L', or their equivalents, all arranged substantially as and for the purpose set forth.

Second, The operating of the seed slide, M, automatically from the wheel, I', by means of the gear, l, adjustable gears, i k, rod, Q, and the bent lever, P', all arranged substantially as and for the purpose specified.

Third, The combination of the hinged or jointed rear part or frame, G, of the machine, with the extended hounds, E E, lever, J, with cross bar, L, attached, substantially as and for the purpose set forth.

61,042.—Saw Mill.—J. L. Beers, McAllisterville, Pa.

I claim controlling the feed motion by means of the lever, L, rod, K, pitman, F, pin, b, notched plate, M, T-shaped slotted arm, G, and pawls, H H, arranged and operating substantially as described for the purpose specified.

61,043.—Hot-air Furnace.—Virgil W. Blanchard, Bridport, Vt.

First, I claim the air heater, N, fitted within the fire chamber, A, and arranged or provided with one or more tubes, k k, communicating with the tubular axis, J, and having partitions, l, for the purpose of conveying or transmitting a current of fresh heated air to the combustion chamber, E, and directly in contact with the products of combustion from the fire chamber so that the inflammable gases contained in said products may be consumed within the combustion chamber, substantially as set forth.

Second, The tubes, n o, placed at the inner end of the air heater and arranged as shown, or in an equivalent way for the purpose of ensuring a proper mingling of the fresh heated air with the products of combustion from the fire chamber, within the combustion chamber as described.

Third, The perforations, r, at the end of the space, g, between the tubes, n o, in combination with the perforated disk or valve, s, the apertures, t, of which are inclined or beveled at their ends to deflect the products of combustion from the fire chamber, through the current of fresh heated air issuing from tube, u, as set forth.

Fourth, The tubes, c', d', applied to the inner end of the air heater in combination with the tubes, n o u, the perforated rotary disk or valve, s, and the perforations, r, in the end of the space, q, all arranged substantially as and for the purpose specified.

Fifth, The combustion chamber, E, in combination with the air heater, N, fire chamber, A, and the tube, M, the latter forming a communication between the combustion chamber and a reservoir of oil, water or other substance which may be decomposed and consumed within the combustion chamber, all arranged substantially as and for the purpose set forth.

Sixth, The arrangement of the disk or damper, s, with the tube, u, and rod, v, attached, the latter extending through the tube, j, of the air heater, N, whereby the disk or damper may be turned at will, and the passage of the products of combustion into the combustion chamber, regulated as desired.

Seventh, The slide, a', in the outer end of the tube, j, of the air heater in combination with the disk or valve, s, and draft passage, q, at the inner end of the tube, j, of the air heater for the purpose of regulating the proportion of fresh heated air, and the products of combustion passing into the combustion chamber as set forth.

Eighth, The sliding damper, F, at the rear of the fire chamber, in combination with the air heater, N, and combustion chamber, E, substantially as and for the purpose specified.

Ninth, The ratchet, O, and pawl, P, or their equivalents for the purpose of regulating the position of the air heater within the fire chamber, as set forth.

Tenth, The arrangement of the pipes, K, in the compartment, G, in the case, D, above the fire chamber, in combination with the tubes, L, fitted within the pipes, K, and the compartments, H I, cold air spaces, d d, and tubes, M, provided with necessary valves, all arranged to operate in connection with the fire chamber of the furnace, substantially as and for the purpose specified.

61,044.—Hay Stacker.—Joseph T. Breneman, Springfield, Ohio.

I claim the construction and arrangement of the rollers, D, sheaves, E, block, C, catch, F, arm, H, links, I, and rope, L, substantially as and for the purpose set forth.

61,045. —Medicated Plaster.— W. S. Bright and J. G. Morey, New Orleans, La.

We claim a medicated plaster made and coated with a medicated compound formed of the ingredients mixed together in and about the proportions named, substantially as and for the purpose described.

61,046.—Head Block for Saw Mills.—Albert Buell, West Leyden, N. Y.

I claim placing the log in a position to be sawed in levels by means of movable cleats, b, screws, f, and adjusting screw, e, held by the holding screw, a, arranged and operating substantially as described for the purpose specified.

61,047.—Car Coupling.—C. C. Cady, West Union, Iowa.

I claim the fixed hooks, B, in combination with the link raisers, D, connected to levers, E, the springs, F, and the link, C, all arranged and applied to draw heads, A A, to operate in the manner substantially as and for the purpose set forth.

61,048.—Brick Machine.—J. F. Carman (assignor to himself, John W. and Lee W. Fulton), Springfield, Ill.

First, I claim the sliding box, A', provided with the plate, C', in combination with the fixed molds, D', and the plungers, R, all arranged to operate in the manner substantially as and for the purpos set forth.

Second, The sliding bottom, K, operated substantially as shown in combination with the fixed molds, D', plungers, R, and the plate, C', on the sliding box, A', substantially as and for the purpose specified.

Third, The adjusting of the bottom, K, to regulate the supply of clay to the molds through the medium of the rod, m, pinions, l k, screw rod, L, and nut, j, substantially as set forth.

Fourth, The pulverizing or reducing of the clay by means of the oscillating screen, C, and the teeth, c, on the rotary shaft, F, substantially as shown and described.

61,049.—Center Board for Vessels.—Robert Chambers, Detroit, Mich.

First, I claim the keel box, A, having fixed keel, a', and piece, a, forming passages for the center boards, B b, pivoted thereto, having ratchet edges, f, in combination with the striking device, g, of the belt, D, substantially as and for the purpose specified.

Second, The center boards, B b, operati g in combination with the alarm bell, D, for the purpose described substantially as specified.

61,050.—Roller Temple for Looms.—Nathan Chapman, Hopedale, Mass.

I claim the use of two ribbed or grooved rollers, or one ribbed or grooved roller and one plain roller, arranged in separate frames and pressed toward each other or the cloth by a spring, and allowed to turn freely as the cloth is drawn through between them.

61,051.—Butter Tongs.—J. S. Clark, Auburn, Mass.

I claim the combination of the blades or plates, A A, with the wire coiled and bent, substantially in the manner and for the purposes herein shown and described.

61,052.—Steering Apparatus.—Eben S. Coffin, Boston, Mass.

First, I claim the combination and arrangement of the screw shaft, E, barrel, G, ropes, F, quarter blocks, H, tiller, C, and rudder post, B, in the manner as and for the purpose specified.

Second, Giving a longitudinal movement to the barrel, C, and shaft, E, so that the said barrel may move forward or aft at each turn of the wheel, D, a distance equal to the diameter of the wheel rope, F, substantially as herein shown and described and for the purpose set forth.

61,053.—Paint Brush.—W. Cover, Jenners X-Roads, Pa.

First, I claim a brush provided with a tubular handle, B, and having the reservoir, C, attached thereto, substantially as shown and described.

Second, The combination of the brush, A, tubular handle, B, reservoir, C, and the compressing device, E b, arranged to operate substantially as set forth.

61,054.—Coal Scuttle.—B. F. Cowan (assignor to himself, J. D. Shewell and John Sumner), New York City.

I claim making the bottoms of coal scuttles of plates having slots or openings and solid parts intermediate, and so arranged that the slots are opened and closed by the oscillation of one of the plates, substantially as above described.

61,055.—Lock.—Lewis P. Decker, Williamsburg, N. Y.

First, I claim the combination of the pivoted bolt, D, male screw, E, and female screw, F, with each other and with the body, A, of the lock, substantially as herein shown and described.

Second, The combination of the rubber packing, C, with the beveled or hollowed shoulders, b,' of the link, B, substantially as shown and described.

61,056.—Cement Composition for Pavements, Floors, etc.—Bernard Doud (assignor to himself and A. Holmer,) Cortland, N. Y.

I claim the composition cement for the construction of cellar and stable floors, vaults, walks, drives and pavements, and roofing for buildings, etc., composed and applied in the manner substantially as set forth in the foregoing specification.

61,057.—Portable Fence.—Philip S. Dusenbury, Boscobel, Wis.

I claim the arrangement and combination of the foot block, D, yoke, B, stake, C, and notched and interlocking rails, A, as and for the purposes specified.

61,058.—Potato Digger.—W. H. Elliot, New York City.

First, I claim the support, h, in combination with shaft, a, and tines, f, substantially as and for the purpose described.

Second, Handle, l, with one or more auxiliary handles in combination with a support, h, or their equivalents, for the purpose set forth.

Third, Joint, i, in combination with two or more handles, substantially as herein shown.

Fourth, A joint, i, in combination with an elongated foot, k, substantially as and for the purpose specified.

61,059.—Water Wheel.—W. H. Elmer, Fair Water, Wis.

I claim a horizontal water wheel provided with buckets, G, composed of radial and segmental portions, b c, as shown, in combination with a central case, E, and chutes, F, all arranged to operate substantially in the manner as set forth.

61,060,—Steam Generator.—Robert Faries, Maroa, Ill.

I claim the combination of the parallel pipes, C C, perforated cross pipes, D, elbow pipes, G, secured as described and plate, H, substantially as and for the purpose specified.

61,061.—Burglar Alarm for Safes, etc.—B. G. Fitzhugh, Baltimore, Md.

I claim, in combination with a fire-arm block on the inside of such safe, or other apartment or receptacle, a lever or arm connected with the door thereof and controlled by suitable guides so that the act of closing the door from the outside shall connect the lever or arm with the dog or sere lever of the lock, and the opening of said door trip the hammer and let it fly upon the cap or fire a charge of poweer, substantially as described.

61,062.—Steam-engine Lubricating Cup.—Thomas Fleetwood, Carleton, N. B.

I claim a self-rendering tallow cup for lubricating steam engines, constructed and operated substantially in the manner herein described.

61,063.—Medical Compound.—John Gregory, Marion, Ohio.

First, I claim the application of petroleum oil produced directly from the pipes of the well with its natural gases, as and for the purposes specified.

Second, The use of the above-described chemicals, in the manner substantially as and for the purposes set forth.

61,064.—Composition for Coating Ships' Bottoms.—W. J. Hay, Lymington Lodge, Southsea, England.

First, I claim protecting iron and wooden ships, caissons, dams, and other wooden or iron structures from decay and from fouling, by coating or covering the same with the materials, and in the manner hereinbefore described; and

Second, Preparing the materials for the purposes aforesaid in the manner hereinbefore described.

61,065.—Passenger Register.—William Helffricht, Philadelphia, Pa.

First, I claim a box capable of being opened at pleasure and containing a roll of paper on which is printed a continuous series of tickets, the paper passing through a slit or opening against the edge of which it can be torn off, all substantially as and for the purpose set forth.

Second, The combination of the pulley, B, containing the roll of paper and the rollers, D and E, in combination with the casing or box, A A', having a slit or opening in front for the passage of the paper, the whole being constructed and arranged substantially as described.

61,066. — Water Wheel. — Jason Hemenway, Durfield, Mich.

I claim the pivoted buckets, C C', connected with the ring, E, on the wheel shaft, F, by rods, D, in combination wilh the bent lever, G, rod, H, and screw, J, all arranged to operate in the manner substantially as and for the purpose herein set forth.

61,067.—Washing Machine.—J. S. Hittell, San Francisco, Cal.

I claim the combination of the wheel (made of the axle, C, the paddles, E E E E, and handle, D), with the cross board, A, and a pivot or socket at the base of the axle to keep it in place.

61,068.—Apparatus for Forming Boilers.—W. W. Hornberger, Chicago, Ill.

First, I claim the springs, A, arranged to operate in connection with the arms, C, pivoted to the bar, B, in combination with the bars, D, operated by the bolt, E, and nuts, c, substantially as described.

Second, I claim the frames, F F', united by the screw bolt, E, when arranged to operate as and for the purpose set forth.

61,069.—Punch.—Richard Hughes, Virginia City, Nevada.

I claim the holder, A, having spring arms, or jaws, C C, socket, E, to receive needles, b, and separating plates, c, substantially as and for the purpose described.

61,070.—Whip Stock.—Liveras Hull, Charlestown, Mass.

I claim the improved whip stock made substantially as described, viz., with each of its rattan strips, b, having its joint with the next strip arranged in the plane of that face of the heart piece to which the former strip may be applied, the strips and heart piece being glued together and subsequently turned into shape, as set forth.

60,071.—Combined Corn Planter and Cultivator.—Marshall J. Hunt, Rising Sun, Md.

I claim hinging the rear of the cultivator frame to the axle and to a lever in close proximity to the driver's seat and supporting its front by a tongue and the necks of the team so that it may be self raising to pass over any obstruction, and be raised by the driver when desirable to do so and held up by a catch, substantially as herein described.

I also claim, in combination with the standards or down hangers, b, a cast or other iron socket or stock, L, with wings, o o, for holding the cultivators and allowing them to be adjusted, removed or replaced, substantially as described.

I also claim a removable and replaceable bed or frame, M, for carrying a seeding mechanism substantially such as described, so that the machine may be used for laying off the ground, planting corn, and cultivating it in rows, as herein described and represented.

60,072.—Attachment for Stills to Test the Proof of Spirits.—William James, Richmond, Va.

I claim the combination of the indicator tube with the bend or depression in the pipe through which the spirits is conveyed, whereby I am enabled continuously to test the strength or proof of the spirits passing through said pipe, substantially in the manner and for the purpose described.

I also claim the arrangement of the valves or vent pipes in combination with the still or worm pipe and the indicator tube for preventing the formation of a vacuum and equalizing the pressure, substantially as described.

I also claim the employment of the vent or discharge pipe at or near the base of the indicator tube, substantially as described.

61,073.—Eye Glass.—E. H. Josselyn, Cambridge, Mass.

I claim the extensions, c c, either as part of the frames, a' a', or fastened to the same by any suitable fastening, substantially as described and for the purpose set forth.

61,074.—Electrotype Die for Making Imitation Straw Goods.—John L. Kendal (assignor to himself and R. H. Trested), New York City.

I claim the within-described process of preparing a die and counter die for pressing textile and other fabrics in imitation of straw, as set forth.

61,075.—Plow.—John W. Lewis, Fetterman, West Va.

I claim the combination with the casting, A B C, forming the sheath, mold board, and landside, of the separate reversible share and the wrought portion, E G F, forming the cutter point and sole, the whole substantially as described and represented.

61,076.—Hand Corn Planter.—W. C. Lewman, Kansas, Ohio.

I claim a hand corn planter which is composed of the blades, A B and C, of the flexible partition or walls, F G and H, and the four seed slides, b b and c c, which slide in the seed boxes, D and E, all made and operating substantially as and for the purpose herein shown and described.

61,077.—Wind Mill.—Robert O. Lowrey, Taber, Iowa, assignor to himself and E. N. Kellogg.

First, I claim the application of the stops, h, to hinged arms, e e', which are connected together in pairs, and acted upon by a loaded sliding ring, G, upon the shaft, B, substantially as described.

Second, The combination of the stops, h, arms, e e', and wings, D, in such a manner that the stops, when tripped, will again assume vertical positions, substantially as described.

Third, Providing adjustable stops, h, on each side of the radial arms to which the wings, D, are pivoted, for supporting the latter in the two positions which they assume in each revolution, substantially as described.

Fourth, Providing for allowing the stop arms, e e', of the upper and lower series to separate vertically when forced outward, employing the curved rods, f' f', for effecting this object substantially as described.

61,078.—Machine for Cleaning and Ginning Cotton.—George Macdonald, Aston, England.

I claim making the acting surfaces of cylindrical buffs to be substituted for the rollers ordinarily employed in machinery or apparatus for cleaning or ginning cotton, and other fibrous substances of compressed fiber, substantially as hereinbefore described and illustrated in the accompanying drawing.

61,079.—Sawing Machine. — J. M. Marston, and H. R. Huling, Roxbury, Mass.

We claim the slotted curved support, K, attached to the lower feed roller, M, and screw, E, for the purpose of allowing different-sized gear wheels to be placed upon the spindle, A, of the support, K, so as to regulate the speed of the machine, when all are constructed and arranged as herein shown and described.

61,080.—Cork Screw.—Wm. C. McGill, Cincinnati, Ohio.

First, As a new article of Manufacture, I claim the parts, A B C D E, and G, constituting an instrument for drawing corks, cutting wire, and opening cans.

Second, The arrangement of parts, A B and G, constituting a combined cork screw and can opener.

Third, The can opening instrument, consisting of the handle, A, blade, B, shearing bar, C, and foot, D, arranged and operating as set forth.

Fourth, The arrangement of parts, A B, and C D E, constituting a combined can opener and wire cutter.

Fifth, The described arrangement and combination of the right and left hand screw on one stem, F G, with the rest or foot, I, and handle, A, as and for the purposes set forth.

61,081.—Evaporator.—J. A. McKinney, Griggsville, Ill.

First, I claim the skimmer, T, and carriage, W, constructed and arranged as herein described in combination with each other with the pan, M, and with the supporting frame, X, substantially as herein described, and for the purpose set forth.

Second, Operating the slide gates, J, with levers, K, constructed and arranged substantially as herein described, and for the purpose set forth.

61,082.— Breech-Loading Fire-arms.— Isaac M. Milbank, Greenfield Hill, Conn.

I claim the spirally grooved locking bolt, D, operating in combination with the fixed screw, h, and pivoted breech block, C, on the rear of the breech receiver, substantially as and for the purpose set forth.

61,083.—Plow.—J. and E. P. Miles, Bloomingdale, Ind.

We claim the arrangement of the curved sliding plate, e, connected with the elbow lever arm, m, by the rod, n, and operated by the arm, m', in combination with the spring p, or its equivalent, for cleaning a plow of grass and weeds, substantially as herein described.

61,084.—Drinking Cup.—Alexander Millar (assignor to himself and E. A. G. Roulstone), Roxbury, Mass.

I claim the construction or formation of the cup, with a base composed of a stepped flange on the bottom piece, substantially as described.

61,085.—Steam Generator.—Joseph A. Miller, New York City.

I claim the sectional boiler, constructed substantially as shown and described, and made up of the pipes, A', with their diaphragms, S', constituting steam generating spaces, d', and return water passages, e', arranged in relation to the steam space and fire grate of the boiler in combination with cross pipes situated below the latter, the whole being bolted or united together, essentially as specified.

61,086.—Steam Generator.—Joseph A. Miller, New York City.

I claim the sediment collector, constructed substantially as herein represented and described for use in connection with vertical water tubes of a steam boiler, essentially as herein set forth.

61,087.—RETURN GRACE HOOP.—Francis Munson, Cincinnati, Ohio, assignor to himself and J. W. Layman.

I claim the combination of the grace hoop, A, with the elastic thongs, B C, for the purpose herein described and set forth.

61,088.—HOOP SKIRT.—Cæsar Neumann, New York City.

First, I claim a hoop skirt with its upper wires closed by means of a spring clasp substantially as described and represented.

Second, A hoop skirt, with its upper opening wires arranged in sections and provided with spring catches for the purpose described.

61,089.—MAGNETIC BRAKE FOR CARS.—Joseph Olmsted, Knoxville, Ill.

First, I claim the arrangement of the magnet, D, armature, E, lever, F, with the shaft, G, clutches, H J, and gear wheel, I, operating substantially as and for the purposes described.

Second, I claim the combination and arrangement of the shaft, G, clutches, H J, gear wheel, I, and spur wheel, K, with the axle substantially as shown and described.

61,090.—CONSTRUCTING LATCH BOLT.—Solomon Oppenheimer, Peru, Ind.

I claim the peculiar manner and means by which the two several parts are connected and held together, namely, the additional prongs, A A, and the raised flanges, c c, on the same forming clamps for holding the shank firm and steady. I also claim affixing side flanges, a' a', and beads or projections, b b, to the shank for the purpose as stated, also the grooves in the clamps for the said beds or projections to fit into.

61,091.—CULTIVATOR.—R. B. Parks and J. R. Parks, Neponset, Ill.

First, We claim the angular bars, H, pivoted to bar, I, and connected with the treadles, J, by link, e, in combination with the beams, D, and operating substantially as described for the purpose specified.

Second, The pivoted bars, L, in combination with the plows, K, and standard, E E', and set screw, g, substantially as described for the purpose specified.

61,092.—LAMP CHIMNEY CLEANER.—Richard Pattin, Marietta, Ohio.

First, I claim forming the rings or eyes by which the two wires are connected out of the body of the wires, instead of additional pieces, in the manner set forth.

Second, The wires, H and K, arranged to move freely one upon the other, in combination with the elastic metallic strips, G, substantially as described.

61,093.—DAMPER.—W. W. Paxson, Point Pleasant, Pa.

I claim the new article of manufacture herein described being a section of stove pipe with suaged deflector, a, cleats, b, and slide, B, as and for the purpose set forth.

61,094.—ARTIFICIAL TRIPOLI FOR POLISHING.—Thomas J. Platt, Newark, N. J.

I claim a polishing material composed of the substances herein named and described, substantially as and for the purposes set forth.

61,095.—GRAIN BIN.—Orin J. Porter, Hudson, Ohio.

I claim the rib, C, groove, D, rollers, E, and bin, B, in combination with the counter or its equivalent, for the purpose and in the manner as set forth.

61,096.—FLY TRAP.—Henry H. Potter, Carthage, N. Y.

First, I claim the vessel, C, in combination with the two pans, A A, for receiving the remains of the entrapped flies, when the pans are opened, substantially as herein shown and described.

Second, The bent wires, a a their upper arms supporting the pans, A A, and their lower end interlocking and holding the pans open until released by the detent, f, as and for the purpose specified.

61,097.—WRENCH.—Thomas Pratt, Valparaiso, Ind.

I claim a wrench in which the jaw, A, is formed by a solid extension of the handle, and the movable jaw, B, is connected therewith by the stem, C, passing through a mortice at the base of the jaw, A, being retained in place by the pressure of the spring, D, upon the side thereof, substantially as set forth.

61,098.—DISTILLING APPARATUS.—Lyman Pray, Charlestown, Mass.

I claim the arrangement of one or more shelves, d e, in the fire chamber, B, of a still to operate in combination wit the still A, flues, f g h, and dampers, f' g' h', substantially as and for the purpose set forth.

61,099.—EYE GLASS.—James Prentice, New York City.

I claim the nose pieces, a a, on the eye glasses, A A, extending from a point below the center of the glass to a point above said center, with gradually increasing width, in order to conform to anatomy of the nose, as herein shown and described, and for the purpose specified.

61,100.—PAPER COLLAR.—Geo. W. Ray (assignor to Ray & Taylor), Springfield, Mass.

I claim paper, whether plain or enameled, embossed, either before or after its conversion into articles of wearing apparel, by means of a woven fabric applied under pressure, substantially as herein described and for the purpose set forth.

61,101.—(A.)—SEWING MACHINE.—Geo. Rehfuss, Philadelphia, Pa., assignor to the American Button-hole, Cording, Braiding and Machine Co., New York City.

I claim the combination of a stationary sewing machine and two inclined rails which are traversed by a truck or carrier adapted for the reception and retention of a fabric to be sewed, when the required traversing motion is imparted to the said truck by the operation of the feed device of the machine, substantially as described.

61,102.—(B.)—SEWING MACHINE.—Geo. Rehfuss, Philadelphia, Pa., assignor to American Buttonhole, Cording, Braiding and Machine Co., New York City.

I claim, First, A hook, y, in combination with a reciprocating eye-pointed needle bent near its lower end and with the within-described operating devices or their equivalents, the whole being constructed and arranged for joint operation substantially as set forth.

Second, The lever, I, constructed for the retention, removal and replacement of the loop-carrying bars, J or J', substantially as described.

Third, The said lever, I, and its loop-carrying bar, J or J', in combination with the within-described devices or their equivalent, whereby the said bar can be readily adjusted to act in conjunction with the needle for forming the edge binding or for making the ordinary loop stitch.

61,103.—(C.)—SEWING MACHINE.—G. Rehfuss (assignor to the American Buttonhole Sewing Machine Co.), Philadelphia, Pa.

I claim, First, The adjustable jaws, k, k', with their ribs or flanges, s t, constructed and adapted for attachment to a sewing machine, substantially as and for the purpose described.

Second, The pins, i i, applied to a feeding device and combined with a slotted presser foot into the slot in which the pins project, when above the work plate, substantially as and for the purpose described.

Third, The adjustable plate, K, with its inclined projection, r, constructed and adapted for attachment to a sewing machine, substantially as and for the purpose set forth.

61,104.—SPINNING MACHINE.—John Rich, Worcester, Mass., assignor to himself, D. Ruggles, J. E. Bacon, Worcester, Mass., and A. Daniels, Franklin.

I claim opening and closing the fingers on the twisting tubes by the motion of the bar or the equivalent thereof, substantially as and for the purpose specified.

And I also claim delivering the roving by the rolling of the periphery of the roll of roving on the spool against the surface of the delivery plate, operated substantially as and for the purpose described.

61,105.—STEAM-ENGINE SLIDE VALVE.—W. B. Robinson, Detroit, Mich.

I claim, First, Making packing rings or packing strips of differential surfaces and with the recess, o, substantially as described.

Second, I claim the holes, p, through the flange, g, in combination with the packing rings or strips, substantially as set forth.

61,106.—CURTAIN FIXTURE.—Chas. Rose, Allentown, Pa.

I claim the arrangement of the toothed nut, H, the lever, I, and spring, L, with the disk, F, shaft, D, and roller, A, the several parts being constructed and used as and for the purpose specified.

61,107.—FRUIT AND ICE HOUSE COMBINED.—J. S. Ross, Hiram, Ohio.

I claim, First, The special arrangement of the fruit and ice rooms, when constructed and combined with a suitable building, as and for the purpose described.

Second, The mold or frame, E, with adjustable tapering sides or ends, in combination with the pan or vat, H', substantially as and for the purpose described.

61,108.—BRICK MACHINE.—Wm. A. Shepard (assignor to himself and John M. Morehead, New York City.

First, I claim the combination of the hopper, F, rollers, G and H, and screw, E, with each other and with the revolving horizontal wheel, V, substantially as herein shown and described.

Second, The combination of the pitman, R, arm, S, hub, T, pawl, I', with each other and with the ratchet wheel, H, of the wheel, V, for the purpose of revolving the said wheel intermittently, substantially as herein shown and described.

Third, Operating the plungers for the double purpose of pressing the brick and delivering them from the molds by toggle bars, when constructed as herein shown and described.

Fourth, The combination of one or more sets of toggle bars, Z, and sliding blocks, X, with each other and with the plungers, W, and wheel, V, substantially as herein shown and described.

Fifth, The combination of the pitman, A', and arm, B', with the toggle bars, Z and E', and with the hub, T, substantially as herein shown and described.

Sixth, The combination of the plate, L', and arm, K', with the pitman, R, arm, S, and wheel, V, substantially as here shown and described and for the purpose set forth.

Seventh, The sliding bar, D', in combination with the toggle bar acting pon the follower.

60,109.—LUBRICATING JOURNALS.—Nelson S. Snedeker, Philadelphia, Pa.

I claim a lubricator composed of woolen plush interwoven with a wire warp and united to metallic back with rivets or their equivalents.

61,110.—STUMP EXCAVATOR.—David Stauffer, Spring Hills, Ohio.

I claim the inverted frame B B and C C, set upon runners, A A, combined with the levers, D D, working in C C, and operated by moving the fulcrum bolts, b b, in the holes, a a', and alternately lifting and depressing the levers, for the gradual extraction of stumps, constructed and arranged to work substantially as herein described.

61,111.—WOOD LATHE FOR TURNING KNOBS.—J. Stevens and J. A. Way (assignors to John H. Session), Bristol, Conn.

First, We claim the cylinder, C, in combination with the notch wheel, Q, ratchet bar, R, lock bar, R2, bolt, S, and actuating pin can, T, for the purpose of giving periodical movement to said cylinder, C, substantially as described.

Second, We claim the tool stocks, 1 2 3 4 5 6 7, in combination with the cams J, arranged upon the plate, K, lever, U3, with its connecting arms actuated by the cam, T4, substantially as and for the purpose described.

Third, We claim the clearer clutch, M, in combination with the lever, O, and cam, P, vibrating spindle, N, substantially as and for the purpose described.

Fourth, We claim organizing in one machine the above enumerated successive operations for turning, finishing, and clearing the knobs from the machine, as described, when arranged substantially as set forth.

61,112.—EVAPORATOR.—Joseph J. Stout, Greensburg, Ind.

First, I claim constructing the pan of an evaporator with inclined longitudinal partitions forming compartments arranged one higher than the other, and with alternately disposed openings, so that the juice shall flow from the central and highest part through the length of all the partitions, substantially as and for the purpose set forth.

Second, I claim the rod, F, and bars, E E, in combination with the set screw, I, and valve, D, substantially as and for the purpose set forth.

Third, Constructing the bottoms of evaporators with corrugations or other irregularities of surface, substantially as and for the purpose set forth.

Fourth, I claim the arrangement of the grate bars, B, and grated guards, B', substantially as and for the purpose set forth.

61,113.—BIT STOCK.—A. W. Streeter, Shelburne Falls, Mass.

I claim the combination of two griping jaws, an undivided socket to control the end of the shank of a tool and a locking ring turning concentrically around the socket to close and unclose the griping jaws upon the tool all being and acting in combination, substantially as specified.

61,114.—DITCHING MACHINE.—Geo. Sullivan, West Liberty, Ohio.

I claim a ditching machine constructed, arranged and operating as herein shown and described.

I claim the windlass and crane in combination with the inclined guide frames, substantially as described.

61,115.—GATE.—W. W. Sutliff, Town Line, Pa.

I claim the lever, C, the weight, D, and the rod, d, constructed and arranged substantially as herein shown and described, in combination with a gate or door, as and for the purposes set forth.

61,116.—TARIFF INDICATOR FOR TELEGRAPHS.—Edward De Loss Sweet, Chicago, Ill.

I claim in combination with a map, M, the arrangement of a tape or its equivalent, divided into spaces or divisions numbered as shown, said spaces being so proportioned as to indicate upon said map the variable tariffs adapted for varying distances, substantially as herein described and shown.

61,117.—ALLOY FOR SABOTS OF PROJECTILES.—Thomas Taylor, Washington, D. C.

I claim an alloy for a composition for metallic sabots of projectiles, within the limits or proportions described, and for the purpose set forth.

61,118.—BELT COUPLING.—Eli Thayer, New York.

I claim the key as shown in Fig. 2, in combination with the clasp and belt, as shown in Figs. 1 and 3.

61,119.—BOOTS AND SHOES.—Eli Thayer, New York.

I claim the making the tap-soles of boots and shoes in several transverse sections of leather, substantially as set forth.

61,120.—DISTILLING PETROLEUM.—Alexis Thirault, New York.

First, I claim the apparatus constructed as above described, the object of which is, to secure a continuous distillation by one single operation, being a combination of boilers, A B C, and the tar-cock, F, with the hot-air chamber, U, and all the pipes and other parts composing the said apparatus.

Second, I claim separately as my invention, the still composed of boilers, A B C, as to their form and combination, for the use and purpose above described.

Third, I claim separately as my invention, the tar-cock, F, as to its construction, the object being to clear the still of all residuum without retarding the distillation.

61,121.—BORING TOOLS.—Nathan Thompson, St. John Wood, England.

First, I claim the construction of a tool of a thin cylinder and axis, for cutting a hollow cylinder out of wood, substantially as herein shown and described, and

Second, I claim the employment of thin steel cylinders, a, and short tubes or cylinders, c, for cutting a series of hollow cylinders out of wood, in the manner and for the purpose substantially as herein shown and described.

61,122.—COFFEE POT.—Howard Tilden, Boston, Mass.

I claim the use of the strainer, E, in form as shown when provided with the rim, F, and the air chamber, D, in combination with the cylinder, C, the tube, g, and the body of the pot, A and B, the whole constructed substantially as described and for the purpose set forth.

61,123.—PORTABLE FENCE.—Daniel Unthank, Spiceland, Ind.

I claim a portable fence having its posts formed of two upright bars or posts, A A, connected by pins, B B', in combination with the braces, C F, either or both, and the notched bars, D D', fitted on the pins, B B', substantially as and for the purpose set forth.

I also claim the bars, D', in connection with the blocks or supports, F, between the bars, D', and the bars, D, below them, substantially as and for the purpose set forth.

I further claim the supplemental vertical strips, a*, attached to the bars, D, of the end panel at the angle of the fence, in combination with the notched bars, D*, of the panel which forms the other side of the angle, substantially as and for the purpose set forth.

61,124.—APPARATUS FOR WASHING ORES.—Richard Uren, Houghton, Mich.

I claim washing ores or minerals by causing the same to flow across a revolving belt, substantially as and for the purposes described.

61,125.—REFINING PETROLEUM AND LUBRICATING OILS.—P. H. Vander Weyde, M. D., Philadelphia, Pa.

First, I claim the heating of the heavy petroleum in a steam coil in the manner described, there preparing it for the filter, and in the same time saving and condensing the vapors arising, namely, gasoline, naphtha and benzine.

Second, The combination of this continuous heating apparatus with a percolator or filter, substantially as described.

Third, The rapid draining, cleaning and partial drying of the exhausted filtering or percolated material, by placing it in the elongated boxes described, and submitting it to the action of a centrifugal machine.

Fourth, The manner of reviving, by distillation in a retort, the filtering material, producing in the same time a quantity of kerosene for illuminating purposes.

61,126.—INVALID CHAIR.—James B. Wallace (assignor to himself, R. Walling, and Joseph Crook), Franklin, Ohio.

First, I claim the leg-support, E, hinged to the arm-rests, F, and pivoted to the bottom, C, below its juncture with the arm-rests, by the plate, H, in the manner described and for the purpose specified.

Second, The bottom, C, in combination with the standard, B, cyma reversed springs, a a a, and legs, A, substantially as herein set forth, and for the purpose specified.

61,127.—WATCH CASES.—Benjamin J. Warner, Brooklyn, N. Y.

I claim the hinged ring, e, applied between the lid, c, and body, a, and fitted for the reception of pictures, and provided with catches, substantially as and for the purposes set forth.

I also claim the ring, o, snapping outside of the flange of the opening, receiving the glass or crystal, and securing the same in place as shown.

61,128.—BLACKING-BOX HOLDER.—Amos Wilder, Calais, Me.

I claim as a new article of manufacture the holder, consisting of the bent wire, A B, formed of one piece as herein described, and having a ferule, D, as herein set forth and for the purpose specified.

61.129.—FRUIT STEP-LADDER.—James F. Winchell (assignor to himself and George C. Steele), Springfield, Ohio.

First, I claim the combination of the ladders, A and B, when constructed and arranged to operate substantially as shown and described.

Second, The circular brace, C, when arranged as shown for locking the part, B, in position.

Third, I claim pivoting the ladder, B, by means of the hinge, D, made to embrace the bars, A, as shown and described.

61,130.—FRUIT-DRYING HOUSE.—James F. Winchell, assignor to himself and George C. Steele, Springfield, Ohio.

I claim a dry-house constructed substantially as described, and having the pipe, H, with its valve, m, and the return flue, E, combined and arranged for joint operation, as herein described.

I claim the removable bottoms, p, constructed of wire gauze or its ebuivalent, arranged to be used in connection with the drawers, D, substantially as herein set forth.

I claim providing the drawers, D, with the guide pieces, t, as shown and described.

61,131.—MODE OF BURNING HYDRO-CARBON LIQUIDS AS FUEL.—A. J. Works, Fair Haven, Conn.

First, I claim the combustion of naphtha, crude petroleum, or any other liquid hydrocarbon, on an open surface or receiver, connected or surrounded with air channels in connection with ignited hydrogen gas, the flames of both uniting while in a state of combustion, substantially as and for the purpose set forth.

Second, I also claim the arrangement of a series of receivers, two or more, in combination with each other, and with a suitable supply pipe, constructed and operating substantially as and for the purpose described.

Third, I also claim the secondary receiver, B, in combination with the main receiver, A, substantially as and for the purpose described.

Fourth, I also claim the central air channel, c, and annular air channel, d, in combination with the receiver, A, constructed and operating substantially as and for the purpose described.

Fifth, I also claim the ecomposer, F, provided with jet openings, f, near its bottom, in combination with the jacket, E, receiver, A B, and air channels, c d, all constructed and operating substantially as and for the purposes set forth.

Sixth, I also claim the hood, G, in combination with the jacket, E, decomposer, F, receiver, A B, and air channels, c d, all constructed and operating substantially as set forth.

61,132.—MACHINE FOR ROUNDING LEATHER.—Josiah Yeager, Berrysburg, Pa.

I claim the employment of the tubular cutter, arranged and operating substantially as and for the purpose described.

I also claim the arrangement of the guide or perforation in relation to the tubular cutter, substantially as and for the purpose described.

I also claim the employment of a series of cutters and guides, mounted upon the drum, c, or its equivalent, substantially as and for the purpose described.

I also claim making the cutter adjustable upon the drum or cylinder by means of the wedge and set screw, or equivalent devices, substantially as described.

I also claim the drum or cylinder, mounted in the uprights or standards in such manner as to be free to turn in bearings therein, in combination with a means for setting or holding the said drum, together with the cutters, in any desired or convenient working position, substantially as described.

RE-ISSUES.

2,447.—HAND PEGGING MACHINE.—Wil iam N. Ely, Stratford, Conn., assignee of E. M. Stevens, Patented Aug. 6, 1861.

I claim, First, Feeding the machine forward upon the work by means of the awl, or a piercing instrument, substantially as described.

Second, Graduating the spaces between the peg holes by regulating the throw of the awl substantially as described.

Third, Making the awl and peg-driver in two pieces, and uniting them in a plunger, so that whilst both rise and descend together, one of them shall have a lateral motion, for the purpose of feeding the machine to the work substantially as described.

Fourth, Feeding forward the peg-wood by means of the action of the plunger in combination with the device, I, or its equivalent, substantially as described.

2,448.—NECK-TIE HOLDER.—J. Albert Eshleman, Philadelphia, Pa., Patented Jan. 31, 1865.

I claim, First, A plate or holder, A secured in front of a collar, so as to be detachable from the same, and adapted for the reception and retention of a detachable ribbon or tie, substantially as described.

Second, In combination with a plate or holder, I claim the elastic loop, c, composed of wire, parts of which are rendered elastic by being coiled, and the transverse portion of which is plain, so as to readily fit over the stud or button.

2,449.—COTTON-BALE TIE.—John C. Lee, Gonzales, Texas, assignee of Z. W. Lee, Patented Oct. 16, 1866.

I claim the metallic band, B, having the bend, b, at one end, and applied substantially in the manner and for the purpose described.

2,450.—EGG PAN AND CAKE BAKER.—The Russell & Irwin Manufacturing Company, New Britain, Conn., assignees of Nathaniel Waterman, Patented April 5, 1859, Re-issue June 19, 1866.

We claim a baking-pan composed of a series of distinct cups or baking compartments, all connected together, cast in one piece, and forming one utensil, but perforated with intermediate open spaces, C, for the distribution of currents of heated air among the several compartments, the whole article being substantially such as specified.

DESIGNS.

2,542.—PICTURE FRAME.—John H. Bellany, (assignor to himself and D. A. Titcomb), Charleston, Mass.

2,543.—BRACKET.—John H. Bellamy (assignor to himself and D. A. Titcomb), Charleston, Mass.

2,544.—MEDAL.—David K. Hitchcock, Newton, Mass.

2,545.—MEDAL.—David K. Hitchcock, Newton, Mass.

2,546.—FLOOR OIL CLOTH.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York City.

2,547.—ORNAMENT OF AMERICAN JOCKEY CLUB.—C. L. Tiffany, New York City.

THE MARKETS.

PRINT CLOTHS.—We have received from Mr. T. J. Abbott, print cloth broker, Providence, a circular containing tabulated statements of monthly sales of print cloths, in that market, for the year ending with December. The total sales and re-sales amounted to 2,953,000, against 4,112,700 in 1865. These goods have been almost entirely used for printing purposes, fewer having been sold for gray shirtings or bleaching purposes than for the previous two years. The present stock in the hands of the manufacturers and merchants is very small, but the increased production of the large number of spindles now in process of erection will materially increase the supply during the coming year. The highest price reached in the past twelve months was 20 cents; this was early in the year, then a gradual decline took place, until in May the sales were at 10½ cents. During the active season the ruling price was 14 cents, but the year closed with dull sales at 12 cents. Less of speculation has been noted than for several years past, sales having been more direct from manufacturers to printers.

For years past the foreign trade of this country has been gradually centering at New York, until now fully two thirds of the imports and exports are made through this port. It is for this reason that the following statements, culled from the annual tables published by the commercial papers of the city, have such significance. We learn from these statistics that the total foreign imports at the port of New York have reached the enormous sum of $306,613,184 in foreign gold value. If the freight and duty is added, and the whole is reckoned in its relative value in paper currency, we have a total but little less than $600,000,000, an amount without precedent in the history of this port. Without enlarging on the degree of national extravagance, shown by this excessive importation, we turn to the statement of shipments from this to foreign ports. The entire exports during the year, reckoned as before in currency value, amounts to $254,886,254. These figures tell their own story, and show how heavily the balance of our foreign trade is against us.

The annual produce statements show a decrease in imports from the receipts of last year, in flour, wheat, oats, cotton, and most articles of provisions; and an increase in corn, barley, naval stores, cheese and petroleum. The exports show a decrease as compared with 1865, in ashes, flour, wheat, tobacco and provisions; and a gain in corn, cotton, naval stores, lard and petroleum. The changes, as compared with other previous years, are still more unfavorable.

The highest point reached by the fluctuations in gold during the past year was 167¾ on January 18: the lowest point was reached April 24, when it stood at 124½. The year closed with a steady decline.

COAL.—The Philadelphia *Ledger* foots up the amount of coal supplied from the Pennsylvania mines at 12,235,963·17 tuns. This is a large increase in the product during the past year as compared with the supply in 1865, which amounted to 9,581,685·03.

COTTON.—The total exports from Jan. 1 to Dec. 31, in 1865, was 249,369 bales: for the past twelve months, 423,981 bales, For the week ending Jan. 8, 9,059 bales were exported, against 8,612 during the corresponding time in 1866.

TIN.—The imports of 1866 at Boston and New York amounted to 15,000 slabs Banca, 70,000 slabs Straits, and 22,500 slabs (750 tuns) English, making a total of 107,500 slabs, against 80,550 in 1865. The market for Spelter remains dull. Imports for the past year were 4,375 tuns, against 2,400 in 1865.

It is difficult to form an estimate of the stock and consumption of Copper for the year. The Lake Superior mines have produced 500 tuns more than in 1865, but the Atlantic smelters have not worked steadily. The Tennessee mines have furnished probably 1,250,000 lbs. of ingot. At this date the market is firm and business small, Baltimore being quoted at 28c., Portage Lake at 28½c., and Detroit at 29c.

The Wool market is still unsettled, with perhaps a slightly better tone consequent upon the prospect of a reduction of the manufacturers' tax and the resumption of work by some of the mills that during the past autumn were obliged to suspend operations. The wool growers of Illinois, in a caucus lately held in Springfield, resolved "that the true policy of the government is protection of the producing and manufacturing interests of its own people," and pledged themselves, irrespective of political parties, not to support any person for any public office who is opposed to the protection of American industry.

Reissues.--A reissue is granted to the original patentee, his heirs, or the assignees of the entire interest, when by reason of an insufficient or defective specification the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

The general rule is, that whatever is really embraced in the original invention, and so described or shown that it might have been embraced in the original patent, may be the subject of a reissue.

Reissued patents expire at the same time that the original patent would have done. For this reason, applications for reissue will be acted upon immediately after they are completed.

A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications.

Each division of a reissue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts.

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But in all such cases, after the action of the Patent Office has been made known to the applicant, if he prefers the patent originally granted to that which will be allowed by the decision of the Office, he has the privilege of abandoning the latter and retaining the old patent.

The documents required for a Reissue are a Statement, Petition, Oath, Specification, Drawings. The official fee is $30. Our charge, in simple cases, is $30 for preparing and attending to the case. Total ordinary expense, $60. Reissues may be applied for by the owners of the patent.

By means of Reissue, a patent may sometimes be divided into several separate patents. Many of the most valuable patents have been several times reissued and subdivided. Where a patent is infringed and the claims are doubtful or defective, it is common to apply for a Reissue with new claims which shall specially meet the infringers.

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Many valuable patents are annually expiring which might readily be extended, and, if extended, might prove the source of wealth to their fortunate possessors.

All the documents connected with extensions require to be carefully drawn up and attended to, as any failure discrepancy, or untruth in the proceedings or papers is liable to defeat the application.

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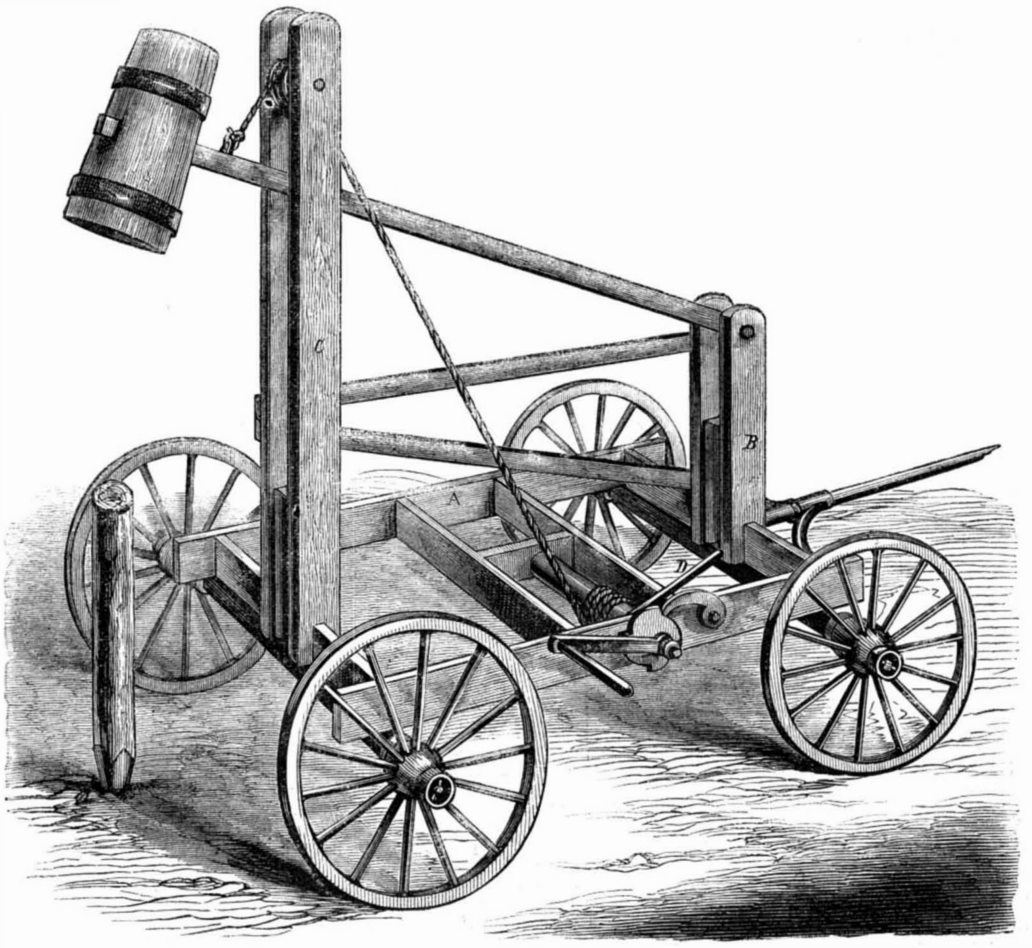

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