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## Improved Steam Boiler.

The grand desideratum in the construction of steam boilers, apart from their security against accidents, is to utilize the heat and to make steam rapidly with the smallest expenditure of fuel. To accomplish this there should be large heating surface, not too much water, and plenty of steam room. These are the objects sought in the invention herewith illustrated.

Fig. 1 presents a front elevation of the generator, part of which is left, in the engravings, unincluded by masonry, to show the iron work. Fig. 2 is a perspective view from the side, one wall down for convenience of illustration. The device consists simply in parallel layers of pipes, of any number that may be desired, set on an incline, the rear end being depressed, and the front, over the fire box, elevated. Water is supposed to fill the lower ends of all the tubes and the upper ends of the lower tier.

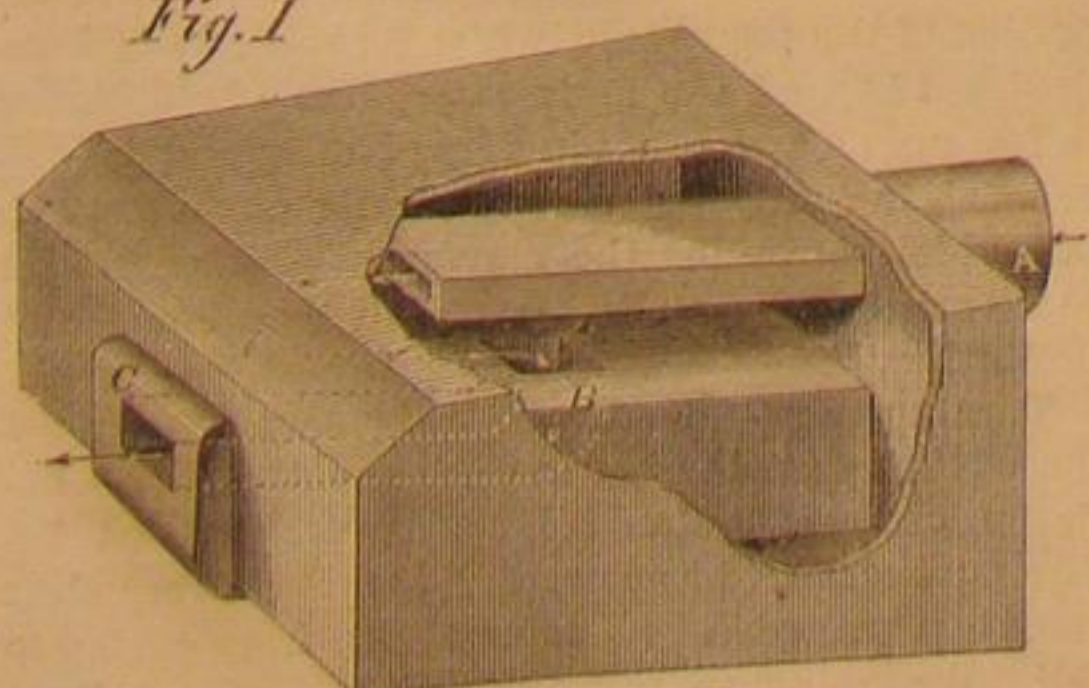
The tubes, A, are of cast or wrought iron, preferably of the latter material, having right-hand threads cut on one end and left-hand threads on the other, which engage with tapped holes in suitable projections on the horizontal cylinders, A. These are connected with upright cylinders, B, which, at the upper end, sustain the steam dome, C, of any convenient form. The safety valve and steam pipe are attached to this dome. The water inlet is at D, the lowest point.

It is claimed that by this form of generator simplicity and cheapness are secured; a large heating surface obtained, and perfect circulation of the water insured. The patent for this improvement was obtained Sept. 11, 1866, for C. S. Bell, of Hillsboro', Ohio, through the Scientific American Patent Agency. All communications relative to the invention should be addressed to Bell & Marlay, Hillsboro', Ohio.

## BAYLISS'S IMPROVED TWEER IRON.

In scarcely any department of iron working has here been more attempted improvements than in

Fig. 1



that relating to the mechanism connected with the air-blast for furnaces and forges. To a superficial

observer nothing could appear more simple than the introduction of air, or oxygen, to a fire, by means of an artificial blast; but, in practice few things are attended with more difficulty. A cold blast deadens the fire and hinders free combustion, while a hot blast quickens and forwards the ignition of the fuel. This is the principle of the construction of the tweer herewith represented.

Fig. 1 shows a perspective view of the device, A being the induction pipe for the blast. As seen by

Fig. 1

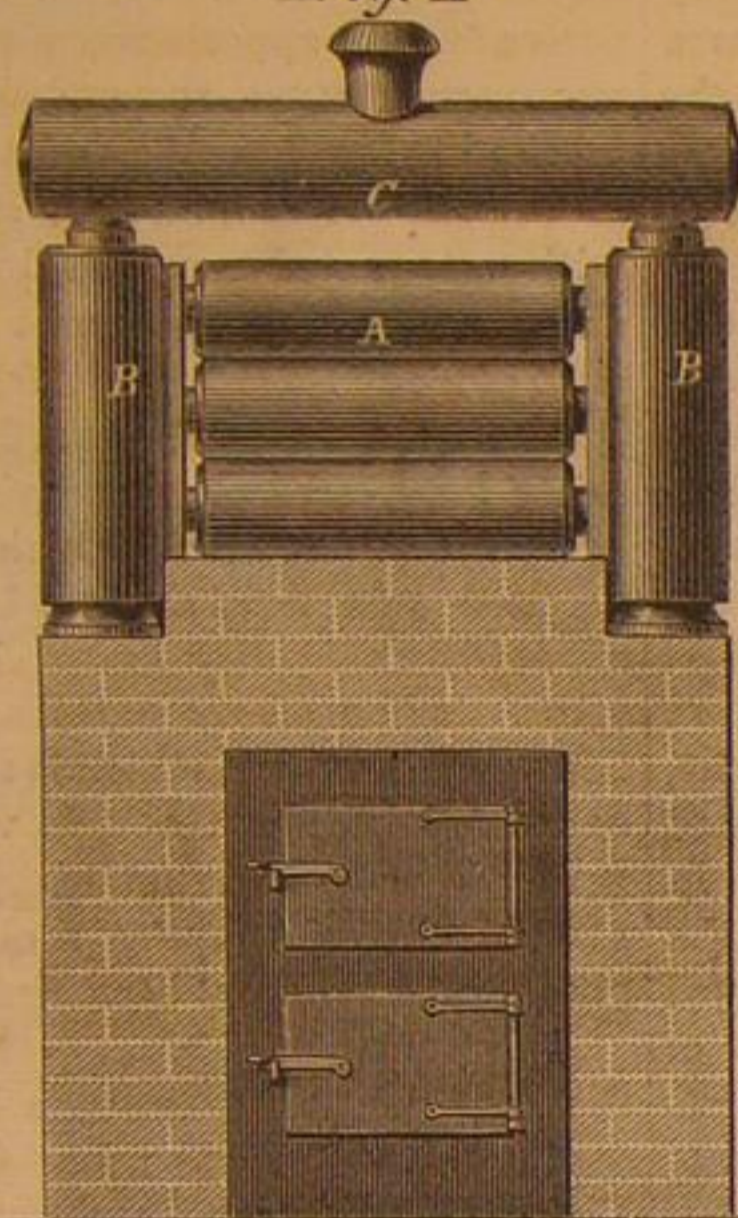
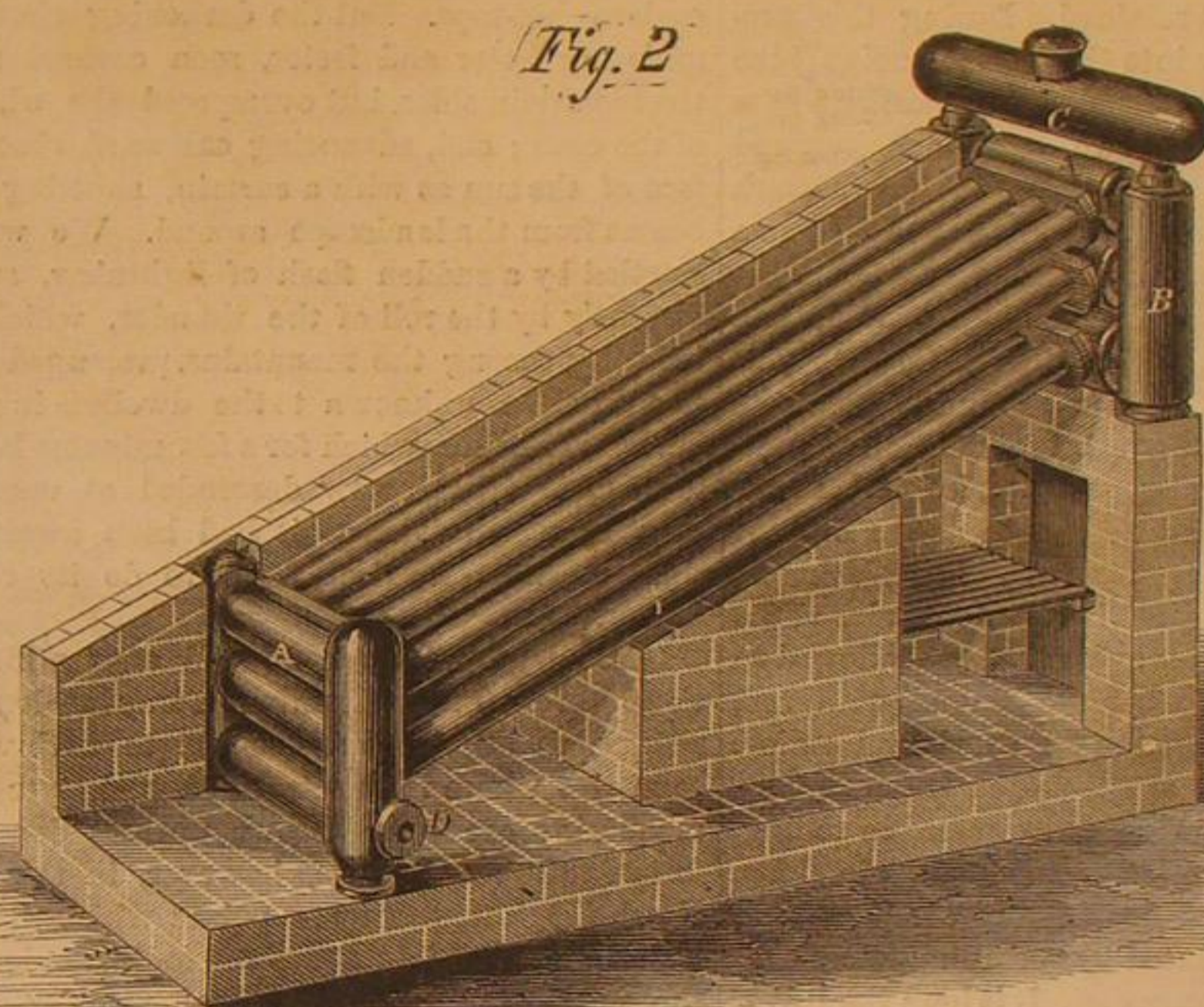


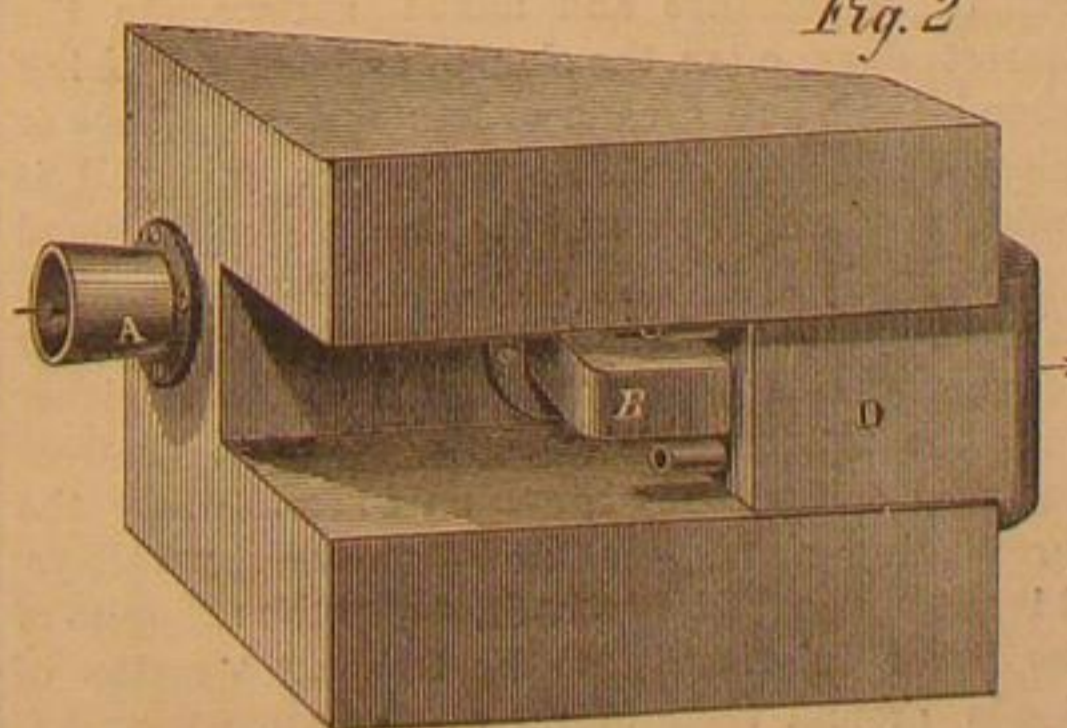
Fig. 2



## BELL'S PATENT STEAM GENERATOR.

the arrows, the air impinges upon the front, which is in contact with the fire, and finds its way, after being heated, through the bent pipe, B, Fig. 2, to the tweer proper, C. Fig. 2 is a view of the under side of the tweer, showing the construction of the

Fig. 2



water box at the back of the air outlet. This box, D, is hollow to the face, C, and has two pipes, seen on either side of B, which are connected, one with the bottom and the other with the top of a reservoir of water, not shown. The water pipe keeps the tweer box filled at all times with cold water, keeping the face of the iron cool, while the other pipe conveys the steam, which may be made by contact of the cold water with the heated surface of the box, back to the reservoir, there to be condensed.

The result is a cool face to the tweer proper, and at the same time a hot blast for the fire, both of them advantages to those who work at blast furnaces or common forges. By this contrivance it is claimed that there can be no making of slag in the mouth of the tweer, and that at all times the blast will be open and clear. Evidently, the idea which

lies at the foundation of this contrivance is a correct one.

The improvement was patented through the Scientific American Patent Agency, Aug. 7th, 1866, by John Bayliss, of New York City, corner 54th Street and Lexington Avenue, to whom all applications for rights or information should be made.

## Tea Culture in America.

Liebig, in one of his lectures, observes, 'We shall certainly never be able to discover how men were led to the use of a hot infusion of the leaves of a certain shrub, or a decoction of the roasted coffee seeds.' Fully accepting the assertion of the able chemist as to the hopelessness of the investigation, yet some cause there must be that will explain why the practice has become a seeming necessity to whole nations. The rapidly-increasing demand which followed the introduction of the herb into England, clearly showed the supply of a popular want, and what was at first a hazardous

experiment of the East India Company, is now a traffic astounding in its proportions. Competent authorities state that London alone imports 70,000,000 pounds of tea annually; if to this, the receipts of one English port, we add the ceaseless demand of the civilized world, we obtain some idea of the fabulous magnitude of this commerce.

China, from the date of its introduction, and in later years Japan, enjoy the sole monopoly of furnishing the world with tea. Yet this fortune resides in no favorable conditions of climate or soil peculiar to the Celestial Empire. The plant, contrary to general opinion, does not require a tropical temperature; its culture has never been successful in southern China, and it is really a plant indigenous to the warm, temperate regions. The English in India, and the Dutch on the island of Java, have attempted the cultivation of tea on the mountains whose elevation has given the requisite temperature so as to make it a success in this otherwise tropical climate.

We mentioned some weeks since that the tea plant was now being grown in Georgia with highly favorable results. This is not the date of its first introduction into the United States; the attempt was made by Dr. Junius Smith, of South Carolina, twenty years ago. Plants of five or seven years' growth were imported, and a small plantation in the mountainous parts of that State was stocked with them. They were planted in the most favorable situations, the soil and climate being all that could be desired, and the lack of experience appears to have been the only reason for their want of success.

In a communication to the *Southerner*, Wm. Jones, of Liberty county, the experimentist of Georgia above referred to, details his mode of preparing both black and green tea for market.

After several unsuccessful attempts, in March,

1860, he became the possessor of fifty flourishing young plants. These were set out in a loose, sandy soil, in rows five feet apart; they grew finely for two years, when the first leaves were picked, and from that time to the present the yield has been from five to six pounds yearly. To estimate the quantity which one acre of land planted in tea would make, a medium-sized plant was selected, and yielded one-quarter of a pound. The number of plants to an acre would be 1,764, giving 441 pounds of tea to the acre. An advantage of this crop is that neither cold nor heat, dry or wet, hail, winds, or insects, injure it. The process of drying is as follows:—

The leaves when picked are to be spread out on tables for ten or twelve hours, then they are to be rolled between the hands till the watery juices are expressed, again exposed to the sun for one hour, and rolled till each leaf is curled upon itself. Having undergone this operation, the process is completed by being placed in pans moderately heated and stirred with the finger till perfectly dry.

To make green tea, the leaves are not to be rolled, as in the above preparation of black, but are roasted immediately after the first drying, whereby the original green color is retained. During this process, the Chinese throw into the pan Prussian blue and gypsum, finely powdered, in proportions of a half pound of the mixture to every one hundred pounds of tea. When thoroughly diffused through the mass, this powder causes the leaves to assume a deeper and more brilliant hue.

According to a work published by Mr. Ball, late inspector of teas for the East India Company, in China, both varieties of tea are produced from the same plant, without the admixture of coloring matter, and the striking difference in color and flavor is due to the more violent and rapid action of heat employed in drying the green teas. For black tea, the leaves are slowly dried in the open air, sifted and tossed in large trays, and afterward allowed to lie until they begin to become tinged with red, when they are immediately roasted and rolled. Roasting and rolling are repeated three or four times, until juices are no longer expressed in rolling, when the final desiccation is commenced, in sieves placed over a charcoal fire in a common chafing dish. The fire is moderated by spreading ashes over it, as the evaporation proceeds. It is here the leaves begin to assume their black appearance. On the contrary, for the production of green teas, the leaves are immediately roasted after gathering, in a sort of iron kiln, which is heated red hot, about half a pound of leaves being thrown in at a time, and kept actively in motion. They are rolled and roasted alternately three times, and at the final roasting, begin to take on the tint of bluish green which distinguishes this description of teas.

Mr. Jones seems to have thoroughly mastered the art of preparing his teas in most approved Chinese style, and, according to his statements, his experiments must be a success. Whether the cultivation of the tea plant will attain any considerable importance in this country is still an open question. To prove profitable, we shall have to contend against the experienced labor of the Chinese, and if even the crop becomes one of our staples, it will be when the ingenuity of inventors has devised some more expeditious way to supersede the present tedious and primitive mode of curing the leaves; we may then hope to contend successfully against the exceedingly low price at which labor is rated in China.

#### FOGS, CLOUDS, AND RAIN, IN THE MOUNTAINS.

For the Scientific American.

A sojourn of a few summers in the southwest Alleghenies afforded me an opportunity of witnessing some of the interesting scenes, frequently occurring, in which fog and rain play their part. One morning, about 7 o'clock, while awaiting breakfast, I seated myself in front of the log cabin of Edward Delozier, with whom I had tarried over night. The house is located in Tuskegee cove, Cherokee county, North Carolina, and is surrounded on three sides, north, south, and west, by mountains, one of which ascends in a peak, fourteen hundred and fifty feet, and another eighteen hundred and fifty feet, above the Tuskegee Creek—the highest one having an altitude of about four thousand feet above the sea

level. To the eastward there is a wide opening, in which hills of a moderate elevation only are interposed. On the south, a gap in the mountain affords an outlet to the horseman, and on the west a deep notch serves a like purpose.

Suddenly, a few misty flakes of fog came moving slowly through the notch, from the Chevah valley, on the west. Presently, larger masses followed, and these, again, were succeeded by still more extensive volumes. Breakfast over, we resumed our seats, Mr. Delozier warning me not to set out upon my journey. The fog was now rolling through the notch tumultuously, and filing off gracefully to the right and left, like soldiers passing a defile and preparing to attack an enemy, by extending the wings of their battalions.

From our position, the fog wore the appearance of gigantic fleeces of the whitest wool. Onward, and still onward, its masses rolled along, the fore most seeming to be impelled forward, not by the winds, for it was calm, but by the fog in the rear; or rather, perhaps, by the force of an upper current in the atmosphere, or the changing condition of the air from the warming influence of the sun's rays, now shining fully into Tuskegee cove, over the eastern hill-tops. But the darkening clouds accumulating faster and faster, soon covered not only the mountain sides, but overspread the whole area of the cove; and, advancing eastward, obscured the face of the sun as with a curtain, shutting out his beams from the landscape around. We were now startled by a sudden flash of lightning, succeeded instantly by the roll of the thunder, which, reverberating among the mountains, prolonged its tones to a duration unknown to the dwellers in the lowlands. The rain, which for a few minutes had fallen in a feeble drizzle, now descended at once in a copious shower, as though it had been awaiting the signal of the electrical flash, to do its errand of mercy.

Like all mountains composed of stratified rocks, those of North Carolina run in lengthened ranges, mainly, from north-east to south-west. In countries where the unstratified rocks prevail, the mountains are often thrown up into dome-shaped forms. Here and there, however, in this part of North Carolina, there are points which rise dome-like, a thousand feet above the ordinary elevation of the mountains. Some of them reach an elevation of two hundred or three hundred feet above the line at which the ordinary forest trees can grow, and are destitute of timber, though covered with grasses and flowers.

These elevated domes have much to do with the formation of clouds and the production of rain. The philosophical explanation of this fact is presented in the previous article on water spouts. These domes are locally called *balls*, from their rounded appearance and naked surface. In the clearest days, often, the clouds can be seen forming around them at a greater or less distance above or below their summits. At times the rain fall is limited to the area around the ball, where the cloud spends itself, so that its remaining vapor is drifted off or dissolved again in the atmosphere. At other times, the clouds accumulate largely, and either from the influence of currents of wind, or from electrical action, they move off so as to water the surrounding mountains and intervening valleys. It is not unusual for two balls, or for the summits of the lower mountains, to be forming wreaths of clouds around their brows at the same moment. These clouds, not unfrequently, are attracted toward each other, and thus the vegetation of the intervening districts has an additional chance of receiving new life and vigor from the rains yielded by this means.

In 1857, in the month of July, I set out on foot from the head of Valley River, a branch of Hiwassee River, to measure, with Lock's level, the height of the Valley River Ball. The distance was five miles, and the proximate height above the Hiwassee proved to be within a fraction of three thousand feet. Before reaching the top of the main ball, a cloud came sweeping along from the direction of the Tusquitta Mountain, to the south-west, pouring down its rain as it progressed. This we could see very distinctly. It reached us in our elevated position in the form of a dense fog, as all clouds appear

when one is in their midst. It first struck our mountain at a point about five hundred feet below its summit, and rolled along, greatly agitated, amid the trees to the top of the ball. While hovering there, as a hen over her brood, it sent an arm down the eastern side of the mountain, above the tree tops, to a distance of several hundred feet; and then, as if reluctant to lose any part of its mass, this arm was drawn up again into the bosom of the cloud. Rendered light and airy, from the loss of its rain, the cloud soon swept off to the eastward, so that our measurements could be completed.

Nearly all the balls in sight, more than a half-dozen in number, and many of the higher portions of the lower ranges of these mountains, were repeatedly covered by rain clouds during the day, which were either formed upon them, or floated to them from one or another of the surrounding elevated points. Four or five of these clouds passed up Valley River toward us, but were generally exhausted of their rain before reaching our positions. These showers presented varied appearances, as they succeeded each other. The first was from a cloud, the margins of which were equal in depth and density to the main part of its body. Its breadth was nearly equal to the width of the valley. There being little wind, the rain fell vertically, and presented the appearance of a large curtain, of semi-transparent gauze, suspended from the cloud to the earth, having a length of two thousand feet. A second shower fell, an hour afterward, from a cloud with attenuated margins but dense center. The sheet of water falling from it presented the appearance of a semi-transparent fog in its center; but it gradually shaded off, toward the margins, into a misty haze, scarcely obscuring the objects in the background. A third, which occurred during our descent, was from a dense black cloud that overshadowed the valley and half the adjacent mountains. It had also great length to the westward. The body of water which it afforded was so dense, and the distance through which the eye had to penetrate so great, that every object in the background was as completely obscured as though the pall of midnight had been drawn across the valley.

A phenomenon of a very strange nature occurs at Clayton, Ga. This town is located a little to the south of Rabun Gap—a low depression in the Blue Ridge. The mountains on each side of this gap rise to the height of fifteen hundred feet. The sun was just rising on the morning after my arrival at this town. Looking toward the north, I beheld a vast volume of fog, filling Rabun Gap from base to summit, and occasionally extending even above the highest parts of the mountains on either side. It was as white as snow, and resembled a vast deluge of cotton as it falls loosely from the gin. In front of the main gap, and between it and the town, there stands a small mountain, detached from the principal range, with a gap upon each side. The fog, as it rolled through the main gap, was deflected into the smaller gap, to the east of the little mountain.

On viewing it for a few minutes, I was soon startled by noticing that, though the whole immense volume of the fog was rolling forward at quite an observable rate of speed, yet it never passed much beyond the southern side of the little mountain. Onward it came, with a sufficient force and bulk to overwhelm, in its shadow, the whole southern side of the Blue Ridge; but beyond the line named it could never pass. A barrier existed there, in the different conditions of the atmosphere, which at once dissolved the fog, and left the air beyond as transparent as ever. Once in a while a small portion of the fog would whirl forward, a few hundred feet beyond the main mass, like a bold leader in front of an army, but in vain; leader and follower being instantly involved in a common fate. The law which controlled the movement of the fog, said to it emphatically: "Hitherto shalt thou come, but no further."

Turning to my friend, who had patiently watched me while I was absorbed in contemplating this wonderful scene, I inquired if it had ever occurred before. "Yes, sir," he answered, "it occurs every clear morning, preceded by a calm night, from spring to fall. Beginning to roll through the gap a little before sunrise, it continues till eight o'clock sometimes, and as late as ten at others; and this it re-

peats every clear morning, as I said, and has repeated, doubtless, ever since the dry land appeared, and the mountains and the rivers were formed."

A word or two, only, of explanation: Saussure and Kratzenstein have investigated the nature of fogs and mists. The vapor in this condition, is found to consist of minute globules, upon which rings of prismatic colors were discovered like those seen upon soap bubbles, but which are never observed upon drops of water. From this discovery it was concluded that the globules are hollow, and filled with air or gas. The size of these globules is greatest when the atmosphere is very humid, and least when it is dry. With this explanation, the phenomena of the fog at Clayton can be readily understood.

The Little Tennessee River takes its rise in Rabun Gap, and runs north-west. It is walled in on each side by mountains of fifteen hundred to twenty-five hundred feet in height. The sun during the hottest hours of the day, teems down its rays into the valley, and imparts a great amount of heat to the waters of the river, as well as to the rocks among which it runs. The temperature of the water is thus kept up during the night, while, at the same time, the surrounding mountains cool the overhanging air. The vapor which rises rapidly from the heated water, coming into contact with the cold atmosphere above, is converted into fog. As the sun rises in the morning, his rays at once act upon the air south of the gap, where no obstruction exists; but his heat cannot affect that of the narrow valley of the Tennessee, till the sun attains a sufficient elevation to overcome the altitude of the mountain upon its eastern side. The rarefaction of the atmosphere on the south side of the Blue Ridge, while that of the Tennessee valley remains at a lower temperature, produces a current of air from north to south that bears the fog along with it through Rabun Gap. But here the increased heat, expanding the air or gas in the globules of vapor composing the fog, bursts the bubbles as fast as they advance, and the fog is dissolved by absorption into the warmer atmosphere, as transparent vapor.

D. C.

#### THE CULTIVATION AND USES OF FOREST TREES.

Something must soon be done in the oldest settled portions of this country to encourage the growth of our forests and to prevent the indiscriminate and wholesale destruction to which they appear to be exposed. The annihilation of forests has within a few generations greatly injured the productiveness of some soils, dried up the springs, and cut off the sources of streams. The same causes which have in the old world turned fruitful plains into sterile deserts, will work in time a similar result here. For this reason we welcome such sound advice as the following from the "Forest Tree Culturist," lately published by Geo. E. and F. W. Woodward, 37 Park Row, New York.

"I know many large land-owners who have been toiling for the past thirty years to lay up something to keep them in their old age and leave a balance to their children. They have worn themselves out as well as their land, and that something for which they have so ardently labored has not been obtained and their children are likely to inherit a poor, worn-out farm instead of that competency which their father expected to have left them. Suppose these men had left one half their farms covered with the original forest, or if it was already cleared when they came into possession, they had planted one half with forest trees, and then expended all their labor upon the other half, they would have produced better crops and with more profit; one half of their farms would have been rich, and the other half covered with a forest that would be a fortune worth inheriting.

"Thousands of men are toiling this day to lay up wealth for their children, when if they would invest a small amount in land, and then plant a few acres of our best forest trees, their money would grow into a fortune by the time their children had grown into manhood. To some this may appear visionary; but the writer has lived long enough to see trees grow from saplings that would hardly bear his weight at ten years old, up to great trees two feet in diameter, and he has scarcely passed the half-way house of three-score and ten.

"In many portions of our country we need forests, not only for supplying us with timber, but for protection against winds and hurricanes. The farmer's grain is often prostrated by winds that never reached his fields until these protecting forests were destroyed. Fruit-growers are seeking the best means of shelter for their orchards, and a remedy for that dry atmosphere which sweeps through their gardens, shriveling up their finest specimens, checking, if not entirely annihilating, their ardor for fruit-growing.

"The little stream that formerly came singing and dancing down from the great wood on the hill is now seen only for a few weeks in the early spring and fall, and then there is nothing left but its dry, pebbly track. Is it not time we began to retrace our steps and again cover our now barren hill-sides and many of our valleys with those trees which were not only an ornament and blessing to our land, but would now be a source of incalculable wealth?

"The great West, with its wide-reaching, treeless prairies, feels the need of forests even more than we do in the Atlantic States. The farmer on the prairies needs a shelter from the winds, the value of which no one but those who have experienced the want can appreciate. In no way can such a protection be provided better or cheaper than by a belt of trees. Then the convenience of having timber near at hand for building fences, stakes for vines, trees, and a thousand little necessities for which wood is indispensable.

"A farmer who has provided a belt of trees around his farm, has protected his fields from winds, and his grain will remain standing until ready to harvest. His fruit remains on the trees until ripe; and in a great measure his buildings are safe against those fearful hurricanes which frequently rush with such destructive force across those level plains. If people will persist in residing on those prairies, they certainly ought to be protected, but they should learn how to do it themselves, and not expect that Nature will rear it merely for the asking, without putting forth an effort on their part.

"I have a vivid recollection of spending several years near those grand old prairies where the wind went and came without hindrance. One afternoon, on coming home, I found my house unroofed, and the place where a greenhouse stood in the morning swept clean, not a flower-pot, brick, or piece of glass left to show that I ever possessed a conservatory of fine plants. I can call to mind several instances of like character, each of which leads me to think that a strong protection is often required to enable the settler in the West to keep his foothold after he has obtained one.

"The question is, How shall protection be the most readily provided?—how shall we get the trees we need? My only answer is, *Grow them!* This will require time and expense, most certainly—and what blessing does not? It takes time to get wealth, unless you are so fortunate, or unfortunate, as the case may be, as to have it given you; if so, it probably required time for the giver to obtain it. The great and important truth which I wish could be impressed upon the mind of every land-owner in America is, if you want improvements, *begin*, yes, *begin them now!* Do not put it off because you have no time to attend to it at present, nor because it will take so many years, and a little outlay at the start. You may say, 'I cannot wait so long.' Who asks you to wait? Time moves in spite of you. Plant the seeds to-day, and while you are making up your mind whether you will wait a few years for them or not, the trees will be growing."

#### THE McCALL AND SLOPER PROCESS FOR PRESERVING FRESH MEATS.

We have several times called attention to the results of the above process as shown in experiments on a large scale, the products of which were discussed, a few weeks ago, at a banquet given by the managers of the enterprise, in London. Knowing that our readers would be interested in ascertaining the *modus operandi*, we have procured from the English Patent Office a copy of the specification. It will be recollected that at the banquet referred to, beef, from the South American pampas, was served up in steaks, roasts, joints, boiled, in soups, and in

every style of cooking, and was pronounced good by all who partook. It was claimed on that occasion that good fresh beef could be brought to London and sold at retail for four pence per pound. The following are the specifications and claims in the patent of John McCall and Bevan George Sloper:

"Our improvements relate to preserving fresh meat, poultry, game, and fish. We treat such food in one or other of the following methods:—We immerse in or surround the meat for a short time, say from ten to fifteen minutes, more or less, with a solution of bisulphite of soda or potash, in the case or vessel in which it is to be preserved, and which must be capable of being made air-tight. By this immersion we remove the air which filled the vacant spaces in the case; we then withdraw the solution and replace it by carbonic acid gas; we repeat these immersions and supplies of gas occasionally as required. We introduce into the case containing the food a regulated quantity of dilute sulphurous acid, and an equivalent quantity of carbonate or bicarbonate of soda or potash separately. The acid and alkaline salt do not come into contact until the case is hermetically closed, when they are brought into contact by agitation, and the liquid resulting charged with carbonic acid bathes the surface of and impregnates the meat; or the acid and salt may be brought into contact before the case is closed; or we place the meat in a case provided with two stop-cocks, one in or near the bottom, the other in the lid. By the lower stop-cock we introduce a solution of bisulphite of soda or potash, filling the vacant spaces in the case; we then close the stop-cock in the lid and exhaust the case of its liquid contents by powerful hydraulic suction, or by the action of an air-pump. We leave the meat under this exhausting suction and thus draw out from the meat as much air as it will yield up, which we then expel from the case by the introduction of a solution of bisulphite of soda or potash, which we afterward withdraw and replace by carbonic acid gas. We repeat at intervals these alternate introductions of the alkaline solution and carbonic acid gas.

"When metallic cases are used either for preserving or packing the food we use a lining both for the top, bottom, and sides of a non-metallic nature, such as thin matting, wickerwork, veneers of wood, cloth, or other suitable materials.

"We preserve poultry, game, and fish in the same manner as that described for meat.

"And having now described the nature of our said invention, and in what manner the same is to be performed, we declare that we claim as our improvements in preserving fresh meat, poultry, game, and fish—

"First, the employment of bisulphites of soda and potash, substantially in manner hereinbefore described.

"Second, the process hereinbefore described whatever the antiseptic salt employed.

"Third, the employment of an alkaline salt together with carbonic acid, or the substances producing the same, sulphurous acid and carbonate or bicarbonate of soda or potash, acting in manner hereinbefore described.

"And we claim as our improvement in the vessels employed in preserving fresh meat, poultry, game, and fish, by any of the methods hereinbefore described, the lining of the same with matting, wickerwork, or other like suitable material to protect the substance being preserved from contact [with the vessels."

In a note on the employment of a double wire rheometer in experiments on radiant heat, sent to the Academy of Sciences by M. P. Desains, the author states that he employs a kind of differential apparatus essentially composed of a single source of heat, of two piles, of a double wire rheometer, and finally of a rheostat. The apparatus is so arranged that the equilibrium, once obtained, remains uniform however the heat from the source varies; but if the smallest variation takes place in one of the radiations the needle quits the zero point. M. Desains has applied this apparatus to the examination of the absorption of heat by transparent gases, and finds that it gives very delicate and certain indications.

## AMERICAN INSTITUTE--POLYTECHNIC BRANCH

The usual weekly meeting of this association was held on Thursday evening, Dec. 6th, Prof. Tillman presiding.

After the reading by the Chairman of the usual summary of scientific news, Prof. Fleury presented a new application of the old reacting steam engine, described by Hiero of Alexandria, 130 years B. C.

## IMPROVED EOLIPYLE.

The object to be attained by the use of this apparatus is purifying the vitiated air of churches, theaters, and crowded lecture rooms. The engine consists of a metallic disk-shaped vessel provided with four horizontal jet pipes, the open ends bent at right angles, the whole revolving on a vertical axis. On the application of heat, perfumed water within the vessel is given off as steam, which, disseminated by the rotation throughout the apartment, absorbs and precipitates the poisonous matters present. The apparatus may be made serviceable in other ways, such as destroying flies, mosquitoes, and moths, by projecting into the air steam from liquid preparations poisonous to these insects, but harmless when inhaled by man.

Mr. F. W. Bacon, of 84 John street, New York, described the construction and operation of the

## STEAM ENGINE INDICATOR.

As the stethoscope shows to the skillful physician the secret workings of the inner system, and detects any minute derangement, so this instrument is valued by the engineer as furnishing similar information for the steam engine. Its employment determines whether his valves are set so as to take and relieve the steam at the proper moment; it notes the pressure in the cylinder at each point of the piston's stroke, at what part the cut-off begins, and demonstrates the advantages of using steam expansively. Coeval with Watt, the infrequency of its employment at present has been owing to inaccuracy in results at high pressures, but within the past five years the instrument has been brought to a high degree of perfection, and its use is now as satisfactory, with a rapid velocity of piston and high pressure of steam, as was the old McNaughton indicator applied to slow-working engines. The leading points in construction are, first, a piston having an area of exactly one-half square inch, moving without friction in a cylinder, the motion being restricted by a spring of known rigidity. The varying pressure of steam is recorded by a pencil as a continuous line drawn on paper placed on a drum, which latter revolves by a connection with the cross-head or point coincident in motion with the piston. The invention was ascribed to Watt, by the speaker; the chairman dissenting, a debate arose as to how much credit Watt was deserving of as an original inventor. As the subject required more time for discussion, it was appointed as a special topic to be taken up at some future meeting.

## OCEAN CURRENTS.

Dr. Stevens re-opened this subject. In the investigation of the unknown, fragmentary truths are gathered and serve as a skeleton from which speculative minds form theories or hypotheses.

The origin of this earth has been a fruitful theme of investigation for philosophers. A brief reference was made by the speaker to the views advanced and defended at different times by able theorists, one school believing the planet to have assumed the spheroidal state while in a molten mass; that, losing heat by radiation, a crust was formed on the outside; that this crust fell in on the formation of a vacuum beneath, the surface then appearing as ridges, or mountain chains. Herschel, Laplace, and, later, Herbert Spencer, accepted the nebular theory or the condensation of nebulous matter into definite forms. The Plutonic theory of Hutton ascribes the origin of mountains to the action of internal fire.

The ocean, in either case, held no creative power, but its action was, change and reform. "Anthony's Nose" on the Hudson, the Iron Mountain of Missouri, and an important peak among the Rocky Mountains, were the leading features of our continent in the earliest times. The tidal wave was the agent by which the intervening areas were filled, carrying and depositing the debris from the dissolution of a previously existing continent.

Further elaboration of the speaker's view was not permitted owing to a misunderstanding on the part of Prof. Grimes, who, believing that the remarks were intended in some way as objections to his views, occupied the remainder of the evening until a late hour with a re-statement of his theory of ocean currents, presented at the last meeting, and fully laid before our readers in a previous report.

## THE LAW OF MARIOTTE--ITS RELATIONS TO THE LIQUEFACTION OF GASES.

We receive sometimes inquiries about the pressure of air under certain circumstances, which indicate that the above mentioned law is not as universally understood as it deserves to be.

The law of Mariotte is this: *The volume of a given weight of gas is inversely as the pressure to which it is exposed*; that is, the greater the pressure the smaller the volume, and *vice versa*; so if the volume is reduced to one-half, the pressure will be double, if the volume is reduced to one-tenth of the original bulk, the pressure will be ten times greater, etc.

Applying this to air and gases of which the mean pressure is 15 lbs. to the square inch, we find that by reducing the volume to one-half we have 30 lbs., to one quarter 60 lbs., to one-tenth 150 lbs., and to one-fortieth we have 600 lbs. pressure to the square inch, and this rule is correct for common use; but when great accuracy is required, deviations have been found, differing among themselves for different kinds of gases.

In the first place, in those gases which will liquefy by increased pressure, the law is only tolerably correct as long as the pressure keeps the gas far enough from its point of liquefaction; but the compressibility will strongly increase when the gases reach the point; that means, the volume will be less than the law would deduce from the pressure, as soon as the gas is about to be liquefied.

We may arrange the gases which have been liquefied by pressure into a table, adding this pressure in atmospheres and in pounds to the square inch, at the temperature of 32° Fah.:

Name of gas	Pressure in atmospheres.	Pressure in lb. to square in.
Sulphurous acid.....	1.5	23
Cyanogen.....	2.4	36
Hydriodic acid.....	4	60
Ammonia.....	4.4	66
Chlorine.....	9	135
Sulphureted hyd'n.....	26	330
Nitrous oxide.....	30	450
Carbonic acid.....	40	600

If the temperature be higher than 32° Fah. the pressure will be greater (at 90° it will be about double); if the temperature be lower the pressure will be less, therefore during the liquefaction process cold is always employed in addition to the pressure.

Not only have these gases and several others been liquefied, but these liquids have been frozen; we give here the temperatures at which liquefied gases freeze below zero:

	Deg. Fah.
Cyanogen.....	31
Hydriodic acid.....	58
Carbonic acid.....	76
Ammonia.....	103
Sulphurous acid.....	105
Sulphureted hydrogen.....	125
Nitrous oxide.....	150

Quite recently experiments have been made by Natterer with powerful condensing apparatus, by which he exerted a pressure of 3,000 atmospheres, or 45,000 pounds to the square inch; it was found that only 7 gases are left which withstood the pressure without being liquefied, out of some 40 which were liquefied. These uncondensable gases are:—air, oxygen, nitrogen, hydrogen, carbonic oxide, marsh gas, and nitric oxide.

It was also proved that these gases, at moderate pressures, followed the law tolerably correct, but at very strong pressures, say of 100 or more atmospheres, their volume was much larger than after Mariotte's law the pressure would require, so that at 1,000 atmospheres' pressure, it is only one five-hundredth part, and at 3,000 atmospheres only one seven-hundredth to one-thousandth part of the original volume.

In our next article we shall treat the relations of Mariotte's law to steam pressure.

## AREA OF STEAM PORTS.

The proper area of a steam port, or any passage between a boiler and its engine, depends mainly on the following facts:—

First—That the boiler makes the steam at a uniform rate, say as many cylinder fulls as the engine makes strokes in a minute, if we take the cylinder as the unit of measure.

Second—That the rate at which the engine uses this steam at any point of the stroke depends upon the corresponding position of the crank and connecting rod with each other; for example, when the crank and connecting rod are in the same straight line the engine is using no steam, and when the crank and connecting rod are square with each other the engine is using steam fastest.

Third—That the pressure of steam must be the same in the cylinder and boiler during the admission, or until it is cut off, in order to have the engine work economically.

Fourth—If the port is so small as to cause the steam to move through it faster than at the rate of one hundred feet in a second (about one-twentieth of the velocity with which steam would rush into a vacuum) the steam will be "wire drawn," that is, the pressure of steam in the cylinder will be less than that in the boiler.

From the above it is plain that the port should be large enough to allow the steam to pass through it at a rate not exceeding one hundred feet in a second when the piston is at about the middle of its stroke, or at the moment when the speed of piston is the same as that of the crank pin. It is also plain that the proper area of the port is directly proportional to the area of the cylinder and speed of the crank pin, and inversely proportional to the proper speed of the steam when passing through the port fastest.

Therefore we can get the proper area of a port by multiplying the area of the cylinder by the number of feet that the crank pin passes through in one second, and dividing by one hundred (or simply cutting the two right hand figures from the product).

Example—What size should the port of a steam cylinder be, which is twelve feet stroke and seventy inches in diameter, in order that the engine may make seventeen revolutions in a minute? Area cylinder =  $70 \times 70 \times 7,854 = 3,848$  square inches. Speed of crank pin =  $12 \times 3\frac{1}{2} \times 17 \div 60 = 10\frac{1}{2}$  feet per second. Area steam port =  $3,848 \times 10\frac{1}{2} \div 100 = 404$ , square inches.

## The Canada Gold.

The recent gold discovery at Madoc, C. W., is the subject of increasing excitement. Miners, speculators, and prospectors throng into the little village at the rate of a hundred in a day, filling up the inns and farm houses for miles around; and one Yankee is preparing to put up a large hotel. Several thousand acres of land have been taken up by speculators, in Madoc, Hungerford, Huntington, Tudor, Marmora, and other neighboring townships. The noteworthy peculiarity of this region is that the discoveries of gold have all been made in the surface quartz on the hill tops; an extraordinary circumstance, from which is inferred the existence of very rich deposits at a proper depth, as well as of rich placers in the valleys. The latter are too much obstructed by water at present to allow of prospecting. It is remarked that in this instance, not for the first time, the prognostics of geologists in respect to gold were at fault, a professional survey having not long since resulted in a decision that gold did not exist in this region. It lies in Hastings county, about fifty miles north of Lake Ontario, and twenty-eight miles north of Belleville on the Grand Trunk Railway. It constitutes but a small portion of a country of similar general character, covering the shore of Lake Ontario for a hundred and fifty miles, and extending as far to the interior; broken, rugged, and filled with innumerable little lakes and streams. Probably the whole of this region will be alive with exploration and excitement, next season, if the rich reports of the two or three openings made at Madoc should be fully confirmed.

A bridge on the Mississippi is to be commenced at Quincy, Ills., in January.



### To Measure Belting.

MESSRS. EDITORS:—The subjoined is a very convenient rule for checking invoices of machinery belting, and far more expeditious than the ordinary method of measurement. It is derived directly from the equation of the spiral.

**Rule.**—Length of belt (in feet) equals the sum of the diameters of the roll and eye (in inches) multiplied by the number of turns in the roll; and this product multiplied by the decimal .1309.

**Example.**—Roll of 3 feet belting, the mean diameters of roll and eye are 36 and 4 inches. Number of turns equal 73.

36  
4  
—  
40  
73  
—  
2,920  
.1309  
—

Total length 382.23 feet.

To insure a perfectly correct result the diameters must be measured with great accuracy.

W. S. A.

### It Inspires the Habit of Thinking.

MESSRS. EDITORS:—I was a subscriber to your paper for several years, until my eyesight and health failed, and I am in honor bound to say that it would "pay" for every family to take, read, and study it. Reading your paper inspires the habit of thinking how to do anything to save time and labor.

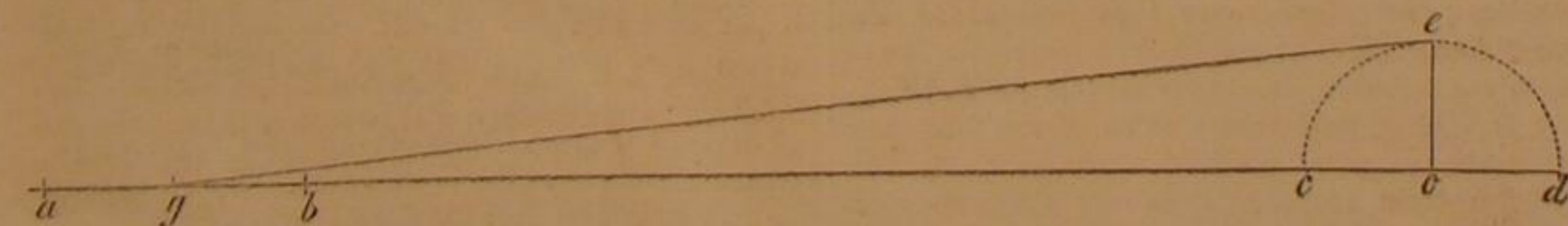
In 1848 I moved on a farm and hired a man to build me a barn. I assisted him to haul the sills by "doubling teams," that is, hitching my horses in front of his. We swung one end of the sill under the hind wheels of a wagon and "snaked" it to the barn, but broke one axle and wheel. I have since built another barn, and when doing so, used to send my two boys, then aged 11 and 14 years, with two horses only, who brought the sills with ease, in half the time required on the first barn. This was the result of mixing a little of the SCIENTIFIC AMERICAN with brains.

J. L. H.

[For the Scientific American.]

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

An advice I always used to give to young persons studying the mathematical sciences was, not to commence geometry before being perfectly familiar with arithmetic, and not to commence trigonometry before knowing well geometry and elementary algebra.



bra. All my colleagues in the department of mathematical instruction agree that the great drawback in this profession is the unsatisfactory preparation of the young men under their charge in the elementary branches, impeding powerfully, and sometimes checking entirely, their progress. Mr. H. W. S., from Cincinnati (who imprudently asserts, page 351, current volume, SCIENTIFIC AMERICAN, that the rule given by me, page 268, is incorrect), is a case illustrating this point. He appears to understand trigonometry without understanding plain geometry, otherwise he would have found the demonstration of my rule in place of doubting its correctness, which doubt was originated by his deficiency in arithmetic and elementary algebra, as is proved by the errors he committed in applying my formula; when he corrects his errors, he will find that the results perfectly agree with the trigonometrical calculations.

This problem is, in fact, one of my old examination questions, and some of my former students may give the demonstration which I omitted, not wishing to burden your paper with an unnecessary wood-

cut, supposing it simple enough to be found by any one acquainted with elementary geometry, not expecting that some one would think that I could possibly publish a rule at random, found by guessing at it.

It appears he found my rule correct in one particular case, because he accidentally committed no mistake this time; but his statement that for all lengths of connecting rod my rule gives exactly the same result, is as absurd as his assertion that no formula can be given.

**DEMONSTRATION OF THE RULE GIVEN PAGE 268.**—In this figure the piston rod is omitted for simplicity's sake, *co*, *co*, and *do* is the crank, and *cd* or *ab* the length of the stroke, *ge* the connecting rod which, for the sake of argument, I take quite long. Let the end of the connecting rod be in *a* and in *b*, when it is on the center, and in *g* when the crank *co* is vertical, we will have

$$ac=bd=ge$$

in the rectangular triangle *goe* we have

$$ge^2=go^2+oe^2 \text{ or } go^2=ge^2-oe^2$$

and consequently

$$go=\sqrt{(ge^2-oe^2)} \quad (1)$$

but

$$go=ac+oc-ag$$

or

$$go=ge+oc-ag \quad (2)$$

making an equation of these two values of *go* obtained at (1) and (2) we have

$$ge+oc-ag=\sqrt{(ge^2-oe^2)}$$

from which  $ag=ge+oc-\sqrt{(ge^2-oe^2)}$

Call now, for simplicity's sake, *ge* the connecting rod *m*, and *oe* the crank *n*, we have for *ag* or the distance of the piston from the further end of cylinder  $m+n-\sqrt{(m^2-n^2)}$

which is the rule given page 268, and "a perfect formula for all cases."

Let us now apply this rule in the cases Mr. H. W. S. mentions. Stroke, 4, connecting rod, 8, crank, 2, or *m*=8, *n*=2, we have

$$8+2-\sqrt{(64-4)} \text{ or } 10-\sqrt{60}=2.254033$$

the same as by trigonometry, and not 2.54 nor 2.265 For connecting rod, *m*=4, and crank, *n*=2 we have

$$4+2-\sqrt{(16-4)} \text{ or } 6-\sqrt{12}=2.535898.$$

For connecting rod, *m*=3, and crank, *n*=2, we have

$$3+2-\sqrt{(9-4)}, \text{ or } 5-\sqrt{5}=2.763932.$$

For connecting rod, *m*=2, and crank, *n*=2, we have

$$2+2-\sqrt{(4-4)}=4$$

showing that the piston is at the end of the stroke when the crank is vertical.

For connecting rod, *m*=2, and crank, *n*=3, we have

$$2+3-\sqrt{(4-9)}, \text{ or } 5-\sqrt{-5}$$

As the square root of a negative number is impossible, this result of the application of our formula agrees with the fact that the machine becomes impossible when the crank is longer than the connecting rod.

It is seen that for the solution of the problem in question, the resort to trigonometrical calculation is unnecessary, and a round-about way, but we may go a step further, and propose a new problem, namely:

**TO FIND THE ANGLE OF INCLINATION OF THE CRANK FOR EVERY GIVEN PORTION OF THE STROKE.**—Mr. H. W. S. has given us, page 353, the figure for this problem, without any demonstration, only communicating a few results of the trigonometrical calculation, stating that "no formula can be given for all cases." I will give the formula deduced from that figure but as this article is long enough, I postpone it to a later number.

P. H. VANDER WEYDE, M. D.

Formerly Professor of Higher Mathematics and Mechanics at the Cooper Institute, New York City. Philadelphia, Nov. 25, 1866.

### Goulding's Patent.

MESSRS. EDITORS:—Your issue of Nov. 10th, contained a notice of the late decree of the U. S. Circuit Court in the case of Jordan vs. Agawam Woolen

Company, involving the validity of the "Goulding Patent."

This case has already been appealed to the Supreme Court; therefore your statement that the decision of the Circuit Judge was a final one, was erroneous, and as this is, undoubtedly, as you characterize it, "in its effect one of the most important cases ever argued in this circuit," you will doubtless be gratified to give correct information on this point to the many so deeply interested who look to your columns almost as authority on such subjects.

T. QUINCY BROWNE, Chairman of Committee.  
Boston, Dec. 1, 1866.

### The Cotton Manufacture.

MESSRS. MUNN & CO., GENTLEMEN:—I am in receipt of your circular, and will make an effort. I have been a reader of your paper ever since 1849, with an intermission of four bloody years. I am superintendent of a large cotton mill—the only one out of eight left standing by Sherman. I took charge of this mill nine years ago, at a salary sufficient to support myself and family of eight persons, and am now paid by the company five hundred per cent more wages than at that time. I attribute this result to the fact of my being a constant reader of your paper, as no mechanic can read a single number without learning much.

I am glad to see you contemplate enlarging it. Without the advertisements it would not be complete. I will give you an illustration: A few months back we wanted a water wheel and advertised for one in the SCIENTIFIC AMERICAN and received about twenty-five circulars. After waiting four or five weeks to let them come in, we made our selection, and about a week thereafter came a letter from Paterson, N. J., containing a circular, which attracted our attention, and had it come to hand in time, the party would probably have sold a wheel. I wrote, advising him to subscribe to and advertise in your paper.

I wish to call your attention to a subject, that of cotton factories—cotton manufacturing in all its branches. For instance, our mill contains 2,400 spindles (will be increased to 5,000), and 45 looms; we turn off 45 yards per loom, 44 picks to the inch, 4.4 wide, No. 16½ yarn; we turn off 6 ounces to the spindle per day, No. 16½ yarn. Can any of your Eastern mills beat this? Now we want machinery that will do the most work well, with the least waste; our waste amounts to about 12½ per cent. Give this subject your attention, and I am confident you will see results very satisfactory. Although the above subject has been neglected, still, with all that, your paper is the best the world has produced.

I will write you again, entering into the subject more fully, and enable you to start the wheel.

HENRY G. HALL.

Fayetteville, N. C., Nov., 1866.

[Our correspondent has merely anticipated our own action. We have contemplated for some time giving some attention to the important subject of the cotton manufacture. We can, from our own knowledge of the business, give some items on this subject of a general nature, but possibly our correspondent may, by his contributions, add much to the interest of the matter.—Eds.]

### Rifle Practice.

MESSRS. EDITORS:—In perusing an article in your paper of Nov. 24th, on the needle gun, I find Mr. Wiard advances one or two statements which seem to me utterly at variance with my own experience in rifle practice.

In the first place he states that weight toward the muzzle is an advantage, as securing greater steadiness of aim; it may be so, if a man's left arm be of cast-iron, but otherwise it would, especially in rapid firing with a breech-loader, unsteady the hand, by overtaxing its strength, and render good shooting impossible. I have tried both ways, with the weight well forward in a heavy muzzle-loader, with thirty-six inch barrel, which I discarded on that account, partially, for my present weapon, a Wesson breech-loader, which has the weight well back, and which I find infinitely superior to the other both in comfort and accuracy of firing. He also considers a straight stock an advantage, as requiring less muscular effort to bring it into aiming position.

Now I think if he would try shooting twenty shots, first from a sporting rifle with a crooked stock which should "fit" him, and then with any army rifle, the needle gun, or other (they are all too straight), he would find a decided difference in the comfort and ease of aiming in favor of the former, and immediately abandon his position.

P. S. YENDELL.

Dorchester, Mass., Nov., 1866.

[Our report of Mr. Wiard's remarks on the Prussian needle gun was only a report. We no more indorsed his views than those of any one who presents them before the association. We believe the ideas of our correspondent to be correct. We have had some experience with fire-arms, and do not accept the opinions of any one man as conclusive. In regard to the heavy muzzle, we do not agree with Mr. Wiard, nor in his advocacy of a nearly straight stock. He says that "in the ordinary musket a considerable angle is formed (between the barrel and end of the breech), and in consequence a muscular effort is required to bring the gun into position for taking aim, and the force of the recoil is not so easily resisted."

We believe, with our correspondent, that the angle of the "ordinary musket," instead of being too great, is not enough. Certainly it is easier to bring the eye to a sight when this angle approaches the difference between the height of the shoulder and that of the eye, than otherwise. As to the recoil, also, we differ from him. In a straight-stocked piece the recoil is delivered from the breech of the barrel directly to the shoulder, while in a curved stock it must traverse the curve of the stock, which then acts as a spring, receiving and holding a portion of the recoil.

Mr. Wiard, however, approved of a straighter stock because it compelled more care in taking aim. We do not agree with him in giving the Prussian needle gun any advantages over American breech-loaders.—EDS.

#### Scattering Shot-Gun.

MESSRS. EDITORS:—In your issue of Oct. 27th, a correspondent gives his remedy for a scattering shot-gun. For the benefit of those who may think of trying the discovery, I will give my experience. I was induced to try it on one barrel of a double duck gun with thick barrels, No. 11 gage. I accordingly followed the direction by tinning the muzzle to the depth of a quarter of an inch, then ground it true and even to the thickness of thin card paper. On testing the gun with No. 5 shot, I found the shot not well distributed, but in clusters. The tin lining was much grooved and roughened by the discharge. On a second trial, the distribution of the shot was more satisfactory. The third time I discharged with No. 2 shot. The result was, the cross-piece between the muzzles which retains the ramrod was carried away, and the muzzles, as far as the extent of the tin, expanded out the whole circumference as true as it could be formed by hand; at the same time the interior of the muzzle was restored to its original size. I doubt if in all cases so perfect a bell-muzzle as the gun now has, after removing the tin, could be so easily obtained without incurring the risk of a scattering in the opposite direction to the one aimed at. H. P.

Boston, Nov. 26, 1866.

#### Liquefaction of Carbonic Acid Gas.

In answer to the inquiry of a subscriber, we give the following information on the subject of liquefaction of carbonic acid gas. When carbonic acid gas is compressed at the temperature of the freezing point of water, with a power of 40 atmospheres, that is, 600 pounds to the square inch, it liquefies, 500 pints being compressed to the volume of a single pint; consequently the space allowed for the liquefied gas must be only one 500th part of the volume of the gas developed, and it takes exceedingly strong vessels to hold it, as its pressure at our summer temperature is double that amount, namely 1,200 lbs. for the square inch at 90° Fah., a tension far exceeding the resistance of our strongest high-pressure steam boilers.

The apparatus commonly used for the liquefaction of carbonic acid, consists of two very strong closed retorts, made of heavy copper, lined inside with lead, and outside strengthened with iron; one re-

tort serves to receive the charge of bicarbonate of soda and sulphuric acid, the other to receive the developing gas, by means of stopcocks and connecting tube; this retort being placed in ice, condenses the gas to its liquid state. It is a very dangerous experiment when not made with a perfect apparatus. Hervy, in Paris, was killed by the explosion of a very strong iron retort of which the sides were more than an inch in thickness; it burst like a bombshell, by the pressure of the too rapidly developing gas. The enormous rate of condensation will not cause surprise, when we consider that the condensation of steam into water is more than three times as great; namely, to one 1700th part of its volume.

The liquefied carbonic acid gas is lighter than water, on which it floats, and which it freezes at once, when brought in contact with it; it shows in the most exalted degree the cooling properties of all very volatile liquids, as alcohol, ether, gasolin, etc. When drawn from the retort by means of a stopcock, the carbonic acid partially retakes its gaseous state, but in this change it robs so much heat from the remaining liquid, that its temperature descends so low, that its further evaporation is most powerfully checked, and the result is the solidification or freezing of about one-quarter of the gas escaping. This snowy-like substance will retain a temperature of about 100° below zero, Fah., and when it is dissolved in ether and thus forced to melt, the temperature will go lower still (to 140°) for the same reason that the temperature of common ice and snow is lowered (to 0°) by forcing it to melt by the addition of salt. This mixture of solidified carbonic acid and ether will produce the same sensation to the skin as a red hot iron; it coagulates and hardens the blood instantly by the intense cold, producing a blister and intense inflammation.

#### European Railway Tariffs.

It appears from a report prepared for the British Royal Commission on Railways, on a comparison of the fares charged per hundred miles on the railways of the principal European states, that the average rates of Great Britain and Ireland for first, second or third-class cars, are greater than on either of the continental lines.

In the first-class carriages traveling is cheapest in Bavaria, where the fare is but \$2 25 per hundred miles. This is nearly one dollar less than the average first-class tariff of the eighteen countries mentioned. Other states that charge below the average, are Prussia, the Rhine, Sweden, Belgium, Württemberg, Denmark, Saxony, Switzerland and Portugal; while Russia, Norway, Spain, Austria, Italy, Holland, France and Great Britain, exceed it. In the last named Kingdom the excess nearly equals the average, the rates being \$4 62 per hundred miles.

Traveling in second-class cars is cheapest in Württemberg, being 1 66 cent per mile; the English charging nearly four times that amount for the same distance. The average is 2 33 cent—the list of countries exceeding, and those falling short, being, with few exceptions, the same as of the first-class carriages.

The fares in the third-class cars range from 75 cents per hundred miles, in Russia, to \$2 00 for the same distance in the United Kingdom; the average is \$1 50.

In the report, Prussia, Sweden, Italy, and England, are noted as having express trains, for first and second-class carriages only. Traveling on these trains is enjoyed at an additional expense of two English shillings over the regular fares. It should be stated concerning those countries where charges are so low, that if the roads do not actually belong to the state, the shareholders receive considerable government assistance, in consideration of their being obliged to adopt a low tariff.

A NEW mechanical excitant of vital action is called the "iron treatment." It consists in incasing the limbs in iron "tights" to which one or two thousand oscillations per minute are communicated by machinery. The operation sends the blood to the extremities with almost intolerable force and heat, and must be very easily overdone. Gov. Morton of Indiana, is said to be trying the experiment with apparent benefit.

A MICROSCOPE, with double the power of any previously constructed, has lately been completed in England, magnifying 15,000 diameters.

TEN or eleven distinct shocks of earthquake were recently experienced at Sorel, C. E., occupying a period of 30 or 40 seconds altogether.

THE Government standard of penetration for the Enfield rifle ball is twelve half-inch elm planks which have been soaked forty-eight hours in water; distance 30 yards.

THE great suspension bridge over the Ohio river, from Cincinnati to Covington, Ky., was opened to foot passengers on the 1st inst. It will not be fully completed for vehicles until the first of January.

THE principle of rotation in tanning vats is again attracting the attention of leather-manufacturers. It is asserted that the action of tannin is increased 500 per cent by keeping the hide slowly moving through the liquor.

THE total earnings of railways in the United Kingdom, says the London Times, amount to a good £40,000,000 a year; and if we allow even fifty per cent for working expenses, there will remain £20,000,000 to represent profits.

THE revolution in trade anticipated through the working of the Atlantic telegraph, begins already to be realized. English orders on the California markets for wheat pass under ocean and over land, and advices of the purchase return by the same path, within the business hours of a single day.

A FLOATING railway, the invention of M. Freland, of Bordeaux, has just been patented in France. It is described as likely to be of considerable service in loading and unloading vessels in ports having insufficient quayage accommodation, or where the depth of water does not permit ships of heavy tonnage to enter, except at high tide.

VAST as are the dock works at Birkenhead, the present dock space can be easily increased by some additional 90 acres of water space, with 18,000 yards of lineal quay space, which would afford loading berths of 3,000 feet each to upward of sixty vessels. Upward of a million and a half has been spent in dock works at Birkenhead since 1863.

THE project of a ship canal to connect Lake Huron with Lake Ontario, by way of Lake Simcoe and the Severn river, is again looking up. The county of Simcoe has guaranteed half a million of dollars to aid in the work. By cutting across an isthmus about forty miles wide, the upper lakes will be brought from 300 to 400 miles further eastward.

THE Prussian War Office has published a statement to show that it was not the superiority of the needle-gun, but of the men who carried it, that gave victory to the Prussian arms in the late war. The total consumption of cartridges during the campaign was only seven to each infantry soldier. In the bitterest engagement the highest figure was 13 per man of those present. During the war 900 cannon were brought into play, and each gun fired 40 rounds.

THE New Orleans Times announces a large manufacturing scheme in the South-west. The "Chatawa Water Power and Manufacturing Company," organized under a charter from the State of Mississippi, has secured nearly all the water power on the Tangipahoe river, sufficient to turn innumerable spindles. This little stream empties into Lake Ponchartrain, about 30 miles north-west of New Orleans. The first enterprise proposed is a paper mill, which will be pioneer in that part of the Union.

THE Agricultural committee of Sologne, France, has awarded the gold medal offered some time since to the inventor of a process which should enable French wines to be conveyed by land and sea, and preserved in any climate, without alteration in flavor. M. Pasteur, who receives the award, has succeeded in establishing the fact that the heating of ordinary wine to the extent of 50 degrees centigrade, is sufficient to kill all microscopic vegetation, or the ferments by which it is produced, without affecting color or flavor, and to insure the preservation of the wine in closed vessels, for an indefinite period. The various morbid changes in wines are found to be due to various stages or phases of microscopic vegetation, which M. Pasteur has accurately described.

## NEW INVENTIONS.

The following are some of the most prominent of the patents issued this week, with the names of the patentees:—

**THREADING SEWING-MACHINE NEEDLES.**—M. B. FOOTE, Northampton, Mass.—This invention relates to an extremely useful implement for the threading of sewing-machine needles, whereby they can be threaded with the utmost ease, facility and rapidity.

**STREET LANTERN.**—A. R. and E. A. HENRY, Newark, N. J.—This invention consists in forming the supporting frame of a street lantern, for the glass, of cast-iron, and in such a manner that the several parts of the same can be either secured together or taken apart, in a most expeditious manner, and when together, be sufficiently firm and strong for all practical purposes.

**VENTILATOR AND PUMP.**—J. W. FOARD, San Francisco, Cal.—This instrument is for the production of a partial vacuum by means of a current of air being passed through it, and whereby air or water, as the case may be, may be raised as by means of a suction pump, this instrument constituting a ventilator for the ventilation of ships and other like vessels, chimneys, houses, mines and other places, as also a pump for raising water.

**STOVEPIPE ELBOW.**—JAMES WILSON, Wilmington, Del.—This invention has for its object to furnish an improved stovepipe elbow, which when choked up by burning soft coal or other soot producing fuel, can be readily cleaned and the soot removed.

**ROTARY CUTTING MACHINE.**—J. J. BUTLER, Cincinnati, Ohio.—The object of this invention is to so construct a machine that disks of any material may be rapidly cut in the same.

**PINS.**—R. J. NUNN, Savannah, Ga.—The object of this invention is to construct a pin for securing together parts of garments and other articles in such manner that it will not be so liable to casually slip out of place as the ordinary style of pins.

**FORGE ROLLING MACHINE.**—HUGH BAINES, Manchester, England.—This invention consists of a perforated movable table, and two or more hollow and perforated rollers, having sectional perforated and engraved rings fitting around the same. These rings are made so as to be easily removed and changed, to forge and roll different kinds of work, according to the patterns engraved, cast or otherwise properly secured upon the rings. The rollers and table are supported by a strong and suitable frame, and worked by reversible gearing or straps.

**COMBINED LUMBER PLANING, SAWING, AND TONGUING AND GROOVING MACHINE.**—OTIS BRIDGEMAN, Steuben, N. Y.—This invention consists in combining in one and the same machine, a revolving cutter head for planing, a circular saw for sawing, and suitable revolving cutter heads for tonguing and grooving, in such manner, and in such positions with regard to each other, that by properly feeding the lumber into the machine at one end, will be in turn subjected to the action of the respective parts of the same, one after another, in the order above mentioned, so that when it passes out of the machine at the opposite end, the board will have been planed, sawed, tongued upon one edge and grooved upon the other, and thus ready for use.

**ARTIFICIAL BREASTS.**—JOHN STADERMANN, New York City, and HENRY SATERBER, Newark, N. J.—This invention consists in constructing artificial breasts out of wire cloth or wire gauze, swaged or struck up by dies, or other suitable means, in such a manner that the two breasts will form projections on one and the same piece of wire cloth made to conform to the chest of the wearer.

**DRYING APPARATUS.**—G. D. JONES, New York City.—This invention relates to a new and improved apparatus or device for drying substances, and is more especially designed for drying earthy materials used in the arts which are ground in water or are rendered plastic or tempered in the same, such, for instance, as whitening, clay, etc.

**COTTON GIN.**—F. M. McMEKIN, Morrison's Mills, Florida.—This invention relates to a new and useful improvement in that class of cotton gins in which rollers are employed for separating the lint or fiber from the seed, and which are commonly termed "roller gins," and has for its object the thorough and rapid separation of the lint or fiber from the seed without injuring or breaking the former.

**HEAD BLOCK FOR SAWMILLS.**—B. F. MCKINLEY, Cincinnati, Ohio.—This invention relates to a new and improved head block for sawmills, and it consists in a novel means employed for operating or moving the knee, whereby the log is set to the saw, and by which the log may be set with accuracy and so as to cause the log to be sawed into boards or planks of varying thicknesses, as may be required.

**LEVELING OR GRADING INSTRUMENT.**—S. L. DONNELL, Spring Creek, Tenn.—This invention relates to improvements in a leveling or grading instrument, and secured to by Letters Patent bearing date September, 11, A. D. 1890, and it consists in a novel arrangement and construction of the leveling or grading instrument, whereby simplicity and efficiency are secured and the instrument also susceptible of a much easier and a more ready adjustment of its several parts, as may be desired or found necessary.

**BALING PRESS.**—G. D. HOWE, Lewisport, Ky.—This invention has for its object to furnish a baling press by means of which two bales may be pressed at the same time, and which may be built and operated in a less space than is required for the presses now in use.

**CIRCULAR SAW MILL.**—J. A. HOLFORD, Guilfordville, Ind.—This invention relates to certain improvements in circular saw mills, by which the whole machine will work automatically in all its parts, and by which a log when placed upon the carriage, is cut into boards of the requisite thickness without requiring the constant attention from any man.

**STUMP EXTRACTOR.**—N. M. HEALY, Flushing, Mich.—This invention consists in so arranging an upright hoisting bar and levers on an upright frame, and operating them by chains and ropes that a very great lifting power shall be imparted to the

bar, thereby enabling one to extract stumps from the ground in a cheap and simple manner.

**SPRING TOY.**—JOHN H. BROWN, New York City.—This invention relates to a spring toy which is operated by means of a spiral or tension spring in contradistinction to the coiled spring heretofore used. One end of this spiral spring is connected to a cord which winds on a drum provided with a ratchet wheel and pawl in such a manner that by turning said drum the tension of the spring can be regulated at pleasure. The opposite end of the spring connects to a lever which is rigidly attached to the body of the horse, and which is provided with two or more holes to receive the spring in such a manner that by changing the point of connection between said spring and lever the leverage of the spring can be accommodated to the greater or smaller weight of the child occupying the toy. By the use of said lever the hind legs are relieved from all strain, and a strong and durable toy is obtained.

**GRINDING MILL.**—JOHN M. MILLER, Hamilton, Ohio.—This invention consists in the arrangement of a suction blower in combination with the case inclosing the millstones of a grinding mill, and with a suitable receiver in such a manner that by the action of said suction blower the dirt, flower, vapor, and hot air created by the action of the grinders are removed and the grinders enabled to work free and without danger of heating. Suitable slides in the case serve to regulate the power of the draft created by the suction blower, and the receiving box into which the dust, vapor, etc., are driven, is provided with an escape opening for the wind.

**CAST-IRON CHAIN PULLEY.**—JAMES BIRD, New York City.—The object of this invention is to construct chain pulleys in such a way that they will be more enduring and better able to resist the wear to which they are subjected.

**TWEED IRON.**—T. E. C. BRINLEY, Louisville, Ky.—This invention consists in the combination of hooks secured to the cap of a tweed iron with lugs or ears secured to the side of the body or chamber of the tweed so that at the cap may be readily removed in order that access may be had to the interior of the air chamber for the purpose of removing the cinders that may have collected there.

**BRICK MACHINE.**—WILLIAM C. BARTOL, Huntingdon, Pa.—This invention consists in an improved brick machine so constructed and arranged that the empty molds may be raised automatically from the lower to the upper part of the machine and lowered, passed beneath the hopper, filled, and passed out upon shelves at the other end of the machine ready for removal to the drying floor, while the machine is being drawn back and forth between the clay pit and drying floor.

**SLED BRAKE.**—R. B. DUTTON, Iron Hill, Iowa.—This invention consists principally in the combination and arrangement of the jointed dog clasp, lever, fulcrum rod, ratchet bar, and spring with each other and with the rave and runner of the sled.

**JEWELING WATCHES.**—A. C. CROSBY, Union, Pa.—This invention is designed to facilitate the setting of jewels in watch plates by avoiding the comparatively tedious burnishing operation and forming the burr over the jewel at a single operation.

**BRADES FOR WAGON SPRINGS.**—JAMES H. LOCKIE, Humphrey, N. Y.—This invention has for its object to prevent the backward and forward swaying and the consequent twisting and breaking of wagon, carriage, and buggy springs.

**ROLL CARDING MACHINE.**—GEORGE BRUCE, Corydon, Ind.—This invention principally consists in the simplicity and novelty of the feed works, they being so constructed as to be nearly automatic in their operation of spreading and feeding the wool from the apron to the machine, and to require but little aid or assistance.

**PROPELLING HORSE.**—JOHN H. BROWN, New York City.—This invention relates to a propelling horse, the front wheel of which is placed out of the center so that by its action the centering motion of a horse is imitated. The hind wheels are rigidly attached to a double crank shaft and the cranks connect with two hand levers in such a manner that by the action of each hand lever the tractive power of both wheels is utilized and the horse can be propelled with considerable speed. The hand levers pass through the body of the horse, which also incloses the connecting rods and cranks, so that the propelling mechanism does not interfere with the child's limbs or clothes.

**WASHING MACHINE.**—E. BECKWITH, Smith Pass, Ill.—The object of this invention is to provide a machine by which fabrics may be washed easily and in the most perfect manner and without injury.

**MANNER OF ATTACHING HANDLES TO TRAPOTS AND OTHER VESSELS.**—JOHN H. BROWN, New York City.—This invention has for its object the attachment of handles to trapots or other vessels of similar nature in such a manner that the said handle can be freely turned on its bearings, while the pot is standing, but as soon as suspended on the handle it will not be able to swing free.

**CIRCULAR SAWING MACHINE.**—LEWIS FOSSEE, Jeffersonville, Ind.—This invention consists in devices to operate in connection with a circular saw for sawing plank with beveled edges or with curved edges or sides when required, as well as straight edges and sides. The machine is particularly designed for use in ship yards for edging plank of all kinds, and sawing in curved lines and outgauge, so that bottom plank of vessels may be finished upon the circular-saw table.

**OIL CAN.**—WILLIAM C. NEWKIRK, Piqua, Ohio.—This invention consists in constructing an oil can in such a manner that coal oil and other oils or liquids of like nature can be handled and used without the disagreeable necessity of soiling every spot where the oil can is placed, as is almost invariably the case with the common oil can.

**CORSET.**—MRS. CLEMENTINE D. RUTHERFORD, Brooklyn, N. Y.—The object of the present invention is to so construct and form the corset, that while sufficient support is imparted by it to the waist and form of the person by whom it is worn, yet it will be comfortable and cool to the wearer; such corsets being especially adapted for use during the summer season.

**CORN PLANTER.**—J. G. WALKINSHAW, Leavenworth, Kansas.—This invention relates to improvements in the construction of

an implement for planting corn, and consists of devices for dropping the corn evenly in hills at regular distances apart, in connection with an arrangement for dropping at the same time either a small quantity of guano or other similar fertilizing material, or planting beans with corn.

**SPRING BOTTOM FOR SEATS, ETC.**—WM. J. HASWELL, Waverly, N. Y.—This invention relates to a bedstead or other frame, the side and end pieces of which are slotted and provided with a series of rollers. Over these rollers are drawn a series of straps which connect at their upper ends with a piece of canvas or other suitable flexible material, and at their lower ends with springs retained by rods which extend along the lower edges of the side and end pieces of the bedstead, being retained by suitable buttons. By these means a bottom for beds, chairs, sofas, etc., is obtained, the tension of which can be easily regulated, and which is free to accommodate itself to the form of the body.

**STEAM VALVE.**—G. G. HUNT, Bridgeport, Conn.—This invention has for its object the construction of a valve in such a manner that it will serve as a perfect regulator as regards the admission of steam to the cylinder of an engine, and admit of the governor operating perfectly to regulate the admission of steam, when applied to an engine of any size and power.

**COAL SCUTTLE.**—EDGAR ELTINGE, Kingston, N. Y.—This invention relates to an improvement in the construction of coal scuttles, and it consists substantially in providing them with self-adjusting covers or shields, having on their sides flanges that extend over and outside the edges of the scuttles, as low as desirable, for the purpose of controlling and guiding the coal or other contents of the scuttles to the place of discharge, preventing it from piling over the sides of the scuttles. The covers or shields are hinged to ears which also hold the ends of the balls.

**WATER WHEEL.**—SAMUEL HICKS, Orangeville, Ind.—This invention relates to a new and useful improvement in that class of water wheels which are placed on a vertical shaft, and are commonly termed horizontal water wheels. The invention consists in a novel manner of constructing the wheel and the scroll, and arranging said parts within a penstock, whereby a very simple, economical, and efficient wheel is obtained, one which will give out a large percentage of the power of the water, and will operate favorably in back water.

**SCHOOL AND FAMILY SLATE.**—JOHN H. FRENCH, Geddes, N. Y.—This invention relates to a slate, the frame of which is made in two compartments, one of which contains a slate, while the other is so constructed as to admit of the insertion of any convenient number of cards of pasteboard, paper or other material, upon which are printed, drawn, painted, or photographed lessons or copies for writing, printing, marking, or drawing, and exercises in arithmetic, either, any, or all combined in such a manner that the pupil is enabled to copy the lessons upon the slate in the other part of the frame below, and that he has a great variety of exercises always in convenient reach. The operation of copying the lessons is materially facilitated by horizontal, perpendicular, or slope lines, permanently pressed, drawn, marked, stamped, printed, ruled, or cut upon a part or the whole of one or both surfaces of the slate as guide lines, whereby the pupil is enabled to make his letters, figures, or drawings of the proper proportionate heights, widths, and slope.

**SELF-REGULATING TENSION.**—THEODORE ZINCK, New York City.—This invention relates to a tension, which is applicable to the thread of sewing machines or to ropes, telegraph cables, or other strands which are wound off from a bobbin, and the tension of which is to be kept as nearly as possible uniform. Said tension consists of a friction spring bearing on the bobbin from which the thread or strand is to be unwound, in combination with an arm which is secured to the spring, and over which the thread or strand passes, in such a manner that whenever, from any cause whatever, the tension of said strand increases, the friction spring is forced back and the bobbin is relieved, and by those means the tension is equalized and rendered self-regulating.

**PISTON PACKING.**—BARKER LOWE, Fall River, Mass.—This invention relates to a piston packing in which a spiral spring is used, which is beveled off from the center toward both ends, so that the operation of inserting the spring in its place is facilitated. The rings which surround the spring are so formed that they in case the head and follower of the piston, and they are provided with an internal flange which is surfaced to the inner surface of the head or follower, in such a manner that the escape of steam is prevented, and the head and follower are not allowed to come in contact with the cylinder.

## Business and Personal.

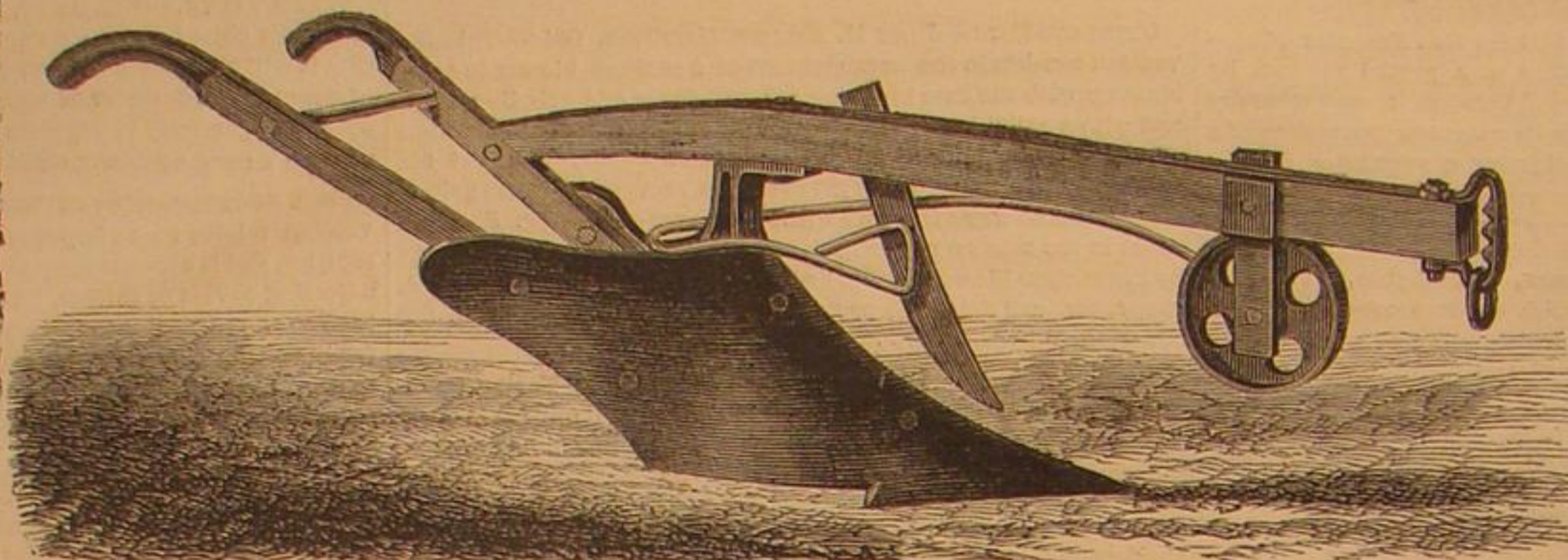
- D. W. Johnson, 469 Broadway, wishes a good second hand hydraulic press, of three to four hundred tons.
- J. J. Detwiler, Easton, Pa., wants market for large quantities of kaolin or china clay.
- V. H. Lyon, Plainfield, Ind., wishes to obtain one of Powell & Lealand's Microscopes, described in Vol. 12 SCIENTIFIC AMERICAN.
- Information upon enameling castiron is requested by Jno. B. Overton, Frederick, Md.
- J. E. Treat, Oxford, Mich., wants to become an engraver; wants to put himself under the instructions of an engraver; wants the address of all glyptographic engravers; also wants the address of all engravers generally.
- Where he can learn Scientific farming is asked by J. E. Peaslee, Dover, N. H.
- W. S. T. wants to purchase the best Peat Machine, and thinks that if owners of such machines would advertise in the SCIENTIFIC AMERICAN, they would find it to their advantage.
- Makers of Morrison's Shingle Machine please address, H. P. Guilford, Reading, Mass.

**Device for Clearing Stubble from Plows.**

In using the ordinary plow, especially on stubble fields, or in heavy grass land, the angle between the colter and beam frequently becomes choked to such an extent as to raise the share from its proper depth, and necessitate stopping the team and removing the obstacle by hand. In the accompanying engraving there is represented a very simple contrivance designed to remedy this difficulty.

In the guide wheel is placed a stud or pin, which forms a crank, and to this pin is pivoted the end of a rod of iron, which is carried along under the beam and around the lug of the share to the colter, as seen in the engraving. As the guide wheel rotates, a reciprocating with a vertical motion is given to this vibrating rod, so that as the rod advances to the front of the colter edge it pushes the stubble from the blade and throws it down into the furrow.

Patented through the Scientific American Patent Agency, September 25, 1866, by William Veber, Jr., Shingle Creek, St. Lawrence Co., New York, whom address for further facts.

**VEBER'S COLTER CLEARER.****Device for Lubricating Axles of Vehicles.**

This engraving represents a new device for applying oil to the axles of vehicles, without the usual troublesome and laborious operation of taking off the wheels. It is very simple and effective, accomplishing the delivery of the lubricating material upon the axle as certainly as if the wheels were removed. A vehicle provided with it can be lubricated in two minutes' time, by a single person, whether standing in the shed or on the road. It saves oil as well as labor and time, and it renders the process of oiling a wagon neat and clean, and vehicles provided with it will doubtless be oiled much oftener, and wear much longer for that reason. A represents the hub of a carriage with the lubricating apparatus inserted, showing only the cap; B represents a section of the apparatus itself, which is secured to its place by the screw thread, C. To lubricate a vehicle, the cap and piston, D, is unscrewed and removed, and the oil introduced through the tube, which is of the same diameter inside the whole length except just at the bottom, where it is finished like a valve seat. The cap and piston is then replaced and screwed fast, which presses the lower part of the piston tight against the bottom of the tube, preventing the oil in the axle-box from returning. As frequently the oil is thick (being congealed by cold and other causes), the lower part of the piston is made to fit the tube exactly, and when the oil is placed in the tube, the replacing of the piston and cap will always force the oil through the hub and deliver it on the axle. This improvement can be easily applied to any vehicle, old or new, and would not weaken or disfigure any wheel, even of the finest carriage; and, being of very moderate cost, will doubtless prove popular.

It was patented November 27th, 1866. Rights are for sale. For further information, address the Patentee, Geo. W. Parsons, 424 Market St., Harrisburg, Pa.

**Life of Steel and Iron Rails.**

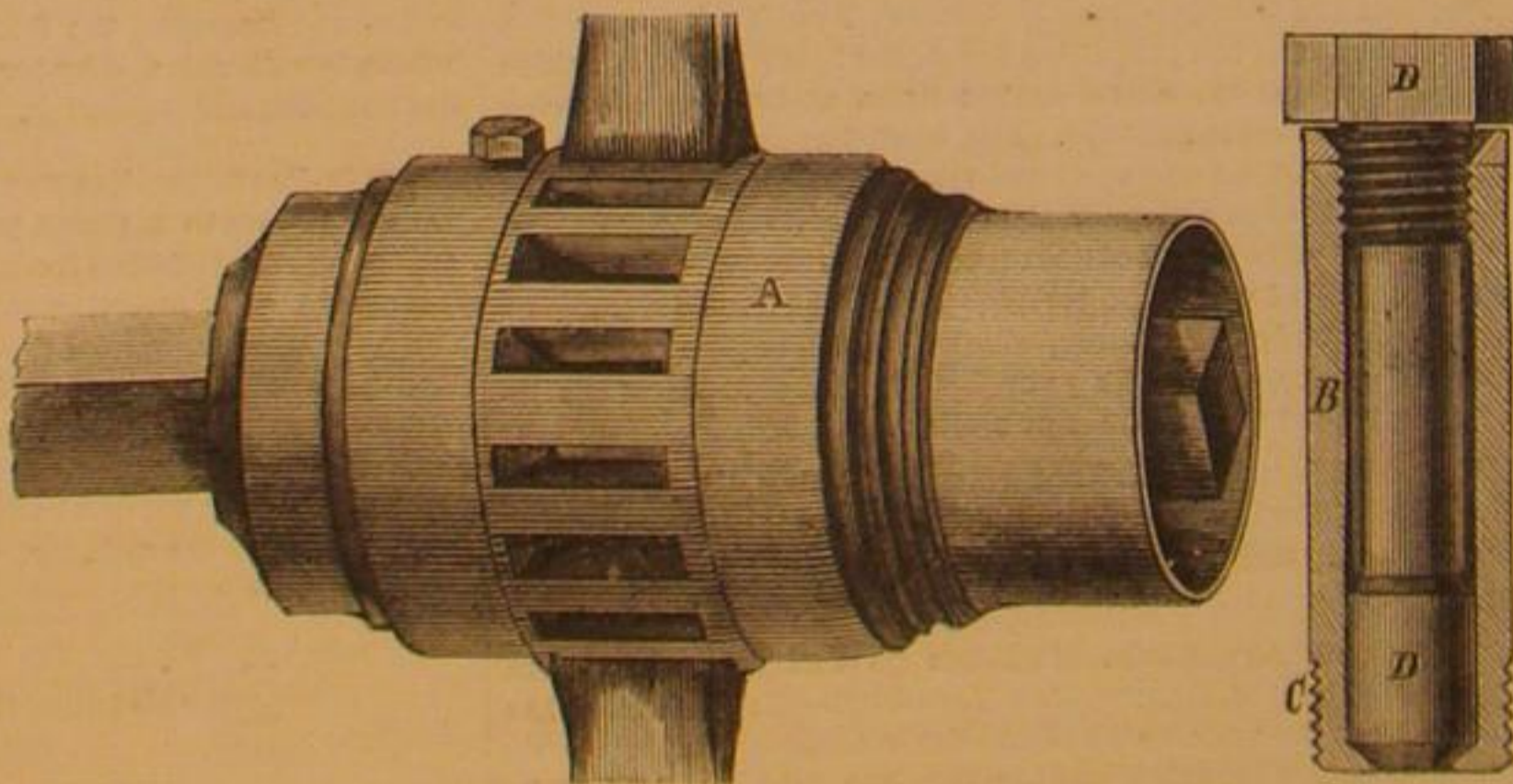
An examination of the steel rails laid down two years and a half since in the Woodhead tunnel of the Manchester, Sheffield and Lincolnshire railway, resulted in a striking illustration of the relative endurance of steel and iron rails. This tunnel is about

three miles long, with a station at each end, where trains generally stop, and where the wear of the rails is extraordinary, from the starting of heavy trains with the aid of sand on iron constantly wet with drippings from the roof. The life of an iron rail at these stations was but about five months on one head, and three or four months on the other after turning. The new rails are 75 lbs. Bessemer steel, double-headed,  $2\frac{1}{4}$  inch face,  $\frac{3}{4}$  inch stem, and 5 inches deep. Rails were taken out at the places of greatest wear, at each end of the tunnel, and on being carefully measured and compared with the

original templates from which they were made, were found to have lost as nearly as possible one-eighth of an inch in the thirty months' use under at least 8,000,000 tons of traffic as computed from the books of the station. The rails were in admirable condition, and good for five times as much further wear, both heads together; making, in insurance phrase, an "expectation of life," equal to fifteen years, or twenty times as long as that of iron.

**Coffee and its Adulterations.**

The report of the Internal Revenue Commission shows that the usual yearly consumption of coffee in the United States has been about 200 millions of pounds. Allowing the small modicum of one quarter of a pound per week to each person using coffee, it is seen that the number of coffee-drinkers in the whole country can hardly exceed fifteen millions, or less than one half the population. But the consumption of coffee in the four years, 1862-5, averaged only half the usual amount, owing, in great part, to the extensive adulteration compelled by the war prices. Chicory root, peas and rye, are familiar ingredients of artificial coffee; burnt bread-crust is

**PARSONS'S DEVICE FOR LUBRICATING AXLES.**

also a well-known domestic substitute, and the Revenue Commission has revealed the important fact that all kinds of spoiled, condemned, and refuse bread, and especially the surplus stock of stale black bread brought ashore by emigrants from Europe, supply a favorite material for adulterating both coffee and black pepper. Unmerchantable or very inferior sugar and molasses are also collected and reduced to caramel for the purpose of coloring the adulterations of coffee. These de-appetizing considerations will probably send the consumers of ground coffee in a rush to the hardware stores where hand coffee-mills are sold. The properties of the grand ingredient, chicory, if understood according to the medical authorities, would lend additional impulse to the hand-coffee-mill trade. Prof. Johnston says that its prolonged use produces among other

things, heart-burn, loss of appetite, nervous affections, constipation with intermittent diarrhea. A writer in the *Journal of Materia Medica*, gives observations showing its decidedly aperient effect; for which, in fact, it is in domestic use in France and Germany. This tendency, in connection with the presence of cholera, and in view of the free and universal use of the chicory-coffee among the poorer classes, seems to deserve the careful attention of the sanitary authorities.

**Practical Hints.****TO CLEAN A FOUL GUN.**

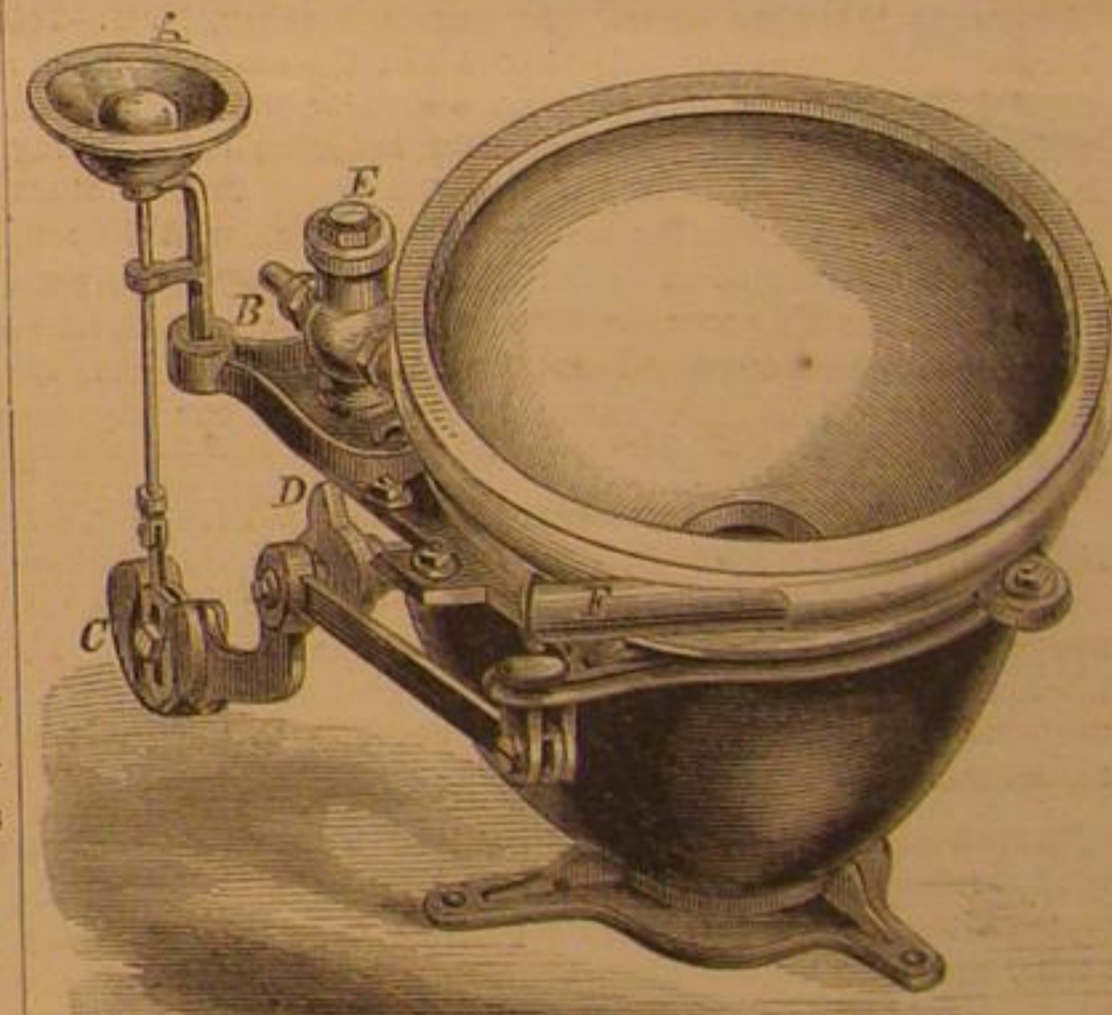
—I hand you the following as a reliable fact—the reason I leave to others. In hunting, a gun often becomes foul from use, and the exploding of a cap will fail to ignite the powder. With a knife sharpen a piece of dry pine wood—or common match wood will answer; drive the splint right into the nipple of the gun, cut off the bruised part of the wood even with the top of the nipple; put on a cap, and it will not fail to

explode the gun. Any one wishing can test this by putting a little powder in his gun, then driving snugly the plug—it will go every time. For a reason.

QUIEN SABLE.

**WELLINGTON'S PATENT WATER CLOSET.**

"Modern Improvements" comprehend all appliances that tend to the convenience and advantage of



man. Among these is the water closet in dwellings and offices. The one herewith illustrated seems to be admirably adapted, from its simplicity, to security against injury, unfailing operation, cleanliness, and freedom from noxious effluvia.

The cup, A, can be raised or lowered to adjust it to any height by a set screw, not shown, in the projection, B, and the pull lengthened or shortened by adjusting the bolt in the slot of the weight, C. The stop, D, prevents turning the pan more than 90 degrees, sufficient to entirely empty it. The water is introduced through the pipe and valve, E, shown as disconnected with the bowl pipe, F. The valve is always, in this closet, directly under the seat and in front, so that it can be reached for repairs without disturbing the wood-work and without disconnecting the supply pipes. No water stands in the pipe between the valve and the bowl, as, immediately after using, the water runs into the receiving pan. The drippings from the couplings also all find their way to the same receptacle, so that there can be no disarrangement of the parts in moving, nor any annoyances from leakage in use. The manufacturers make every part in duplicate, and when repairs are needed, parts can be readily obtained which absolutely fit.

Patented Nov. 15, 1859. Hayden, Gere & Co., 84 Beekman street, New York, are the manufacturers, to whom orders should be addressed. Dalton & Ingersoll, 19 Union street, Boston, Mass., can furnish the closet.

# THE Scientific American

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## EXPIRING SUBSCRIPTIONS.

The present number closes the volume, and in accordance with our usual custom, we discontinue the paper upon expiration of the time for which the subscription was paid. We expect to keep all our old subscribers, and to add largely to our list on the new volume.

## NO. 1 ADVERTISERS.

Parties who intend to advertise on the outside page of the first number of the new volume, should send their advertisements without delay. The terms are seventy-five cents per line for each insertion. To enable advertisers to calculate how much they must remit, we will state that, independent of the head line, about seven words will make a line of agate type. It will be safe to estimate but four words for the head line.

Engravings will be inserted with advertisements at \$1 a line for the back page and 75 cents a line on the inside. The rates for ordinary advertisements in the inside, 40 cents a line.

## BRING OUT YOUR INVENTIONS.

The enlargement of the SCIENTIFIC AMERICAN, commencing with the next issue, will enable us to insert in each issue a much larger number of engravings than our limited space has heretofore admitted. We have increased our force of designers on wood, so that orders for engraving of new inventions and machines can be filled more promptly than heretofore.

There is no way in which any new invention can be so extensively and advantageously brought to the attention of the public as by having good engravings of it published, with a description, in the SCIENTIFIC AMERICAN. Thousands who have tried it can testify to this fact.

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

In preparing engravings for publication in the SCIENTIFIC AMERICAN, the use of a model from which to make the 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.

## IMPORTANT SUGGESTIONS.

The enlargement of the SCIENTIFIC AMERICAN will enable us to publish all the patent claims in each regular issue, and obviate the necessity of the extra claim sheet, which we have lately been obliged to add.

Other important improvements are to be made which will render the paper more attractive than any publication of its class heretofore published. Subscribers, whose time expire with this issue, should renew their subscription at once, so as to be sure of all the numbers.

We shall endeavor to print enough of the few first numbers to supply all demands, but the great rate at which new subscribers are coming in renders it difficult for the Publishers to determine the extent of the edition to print at first.

## THE VALUE OF A SCIENTIFIC AND MECHANICAL JOURNAL.

Before the advent of railroads and the establishment of the telegraph, when travelers went from point to point by the stage-coach or by private conveyance, information was as slow and uncertain in transmission as passengers. The knowledge gathered by one man, under circumstances and by experiences not common, but liable to all, was his own personal property to be transmitted to his children, or mayhap to die with him. There were secrets in every trade and profession (there are too many now), and he who obtained the lore gained from the niggardly teacher, experience, was compelled to pay a price wrung from his golden years and laborious sines.

To a certain extent this is true now, but knowledge is like the water poured into an overflowing bucket. He who has not capacity to hold, or capability to use, must let it go from him, although when it has only moistened his lips, it fills and satisfies others. Mystery in mechanics has had its day. The cabalistic formulæ of the chemists have been interpreted, and all who choose, may walk the road of knowledge, gleaning here and gathering there; in fact, stopping at stations by the way, and drawing from magazines filled with the experiences of ages and enriched with the experiments of those who have but just preceded them.

These magazines of valuable information for the scientist and mechanic, are the journals devoted to scientific and mechanical subjects. In these the stray and floating particles of knowledge are gathered, sifted, and presented in their real character. If some of them are but froth on the sea of knowledge, they are dissipated in the rays of true science; if real and valuable, they are divested of the barnacles of prejudice, egotism, persiflage, and trash, and shown as they really are.

This work of sifting, choosing, and preparing is the proper business of the journalist—the editor of a scientific paper. He saves the seeker after knowledge from the dreary labor of searching records, the impossible task of endless correspondence, and the continual inquiry after "some new thing." To the scientific student, the beginner in mechanics, the seeker after the hidden wisdom of nature's laws, and the practical worker in accordance with those laws, the scientific and mechanical periodical is an ever-present friend and assistant. It saves him hours of hard thinking, days of fruitless labor, the shame and vexation of unaccomplished endeavor, and periods of weary waiting. It assists him in his attempts at discovery, unravels hard knots in his line of theory, gives him valuable hints in his attempt to use the forces of nature, shows him his error, and points to the right road. By knowing the

errors and failures of others, he is enabled to steer clear of obstacles, or by understanding the methods used by others, he is assisted in surmounting them. If a practical man, he is periodically informed of what is being done in his specialty, and thus kept from wasting his energies on labors already accomplished, and is enabled to utilize the brains and labors of others. In short, a "live" mechanic must as certainly keep up with the times as a politician or a statesman. To do this there is but one course, and that is to read a journal which is devoted to the recording and elucidating of the truths necessary for him to know.

## IMPROVED PIER AND WAREHOUSE SYSTEM FOR NEW YORK.

The pending legislative inquiry into the harbor accommodations of our great seaport cannot be considered premature. The character of its wharfage is a drag and a disgrace to the prosperity of a commercial metropolis like this. Rude, primitive, rotten structures of logs, crowded and choked, exposed and insecure, infested with thieves, and more or less embanked with ship-stranding mud, are not the sort of accommodations to which the commerce of the world should be invited. The want of proper space and apparatus prolongs the discharge and taking in of cargoes, often four-fold. The entire absence of wharf storage involves a constant waste of time and expense, and an aggravated obstruction of the streets, in transporting merchandise back and forth between the shipping and the warehouses. Warehouses scattered all over town, and interspersed among other buildings, hazardous in every degree, involve the frequent destruction of vast amounts of merchandise by fire. The ill-constructed water-front promotes instead of preventing the obstruction of the docks and channels, and the detention of a pestilential sewerage. The whole system, wretched as it is, instead of being a profit, is a constant expense to the city treasury.

It is to be hoped that the labors of the legislative commission will not be completed without the adoption of a mature system of wharfage, uniform, and adequate to meet the wants and remedy the evils now so severely felt, together with a business-like plan for carrying the improvement into effect without creating inordinate monopolies, whether moneyed or municipal.

The comprehensive and convenient plan of wharf structures put forth by the projector of "The New York Pier and Warehouse Company" (Mr. G. Burrows Hyde), seems eminently worthy of consideration. It may be stated in a very few words. A continuous bulkhead of durable stone masonry is to define the water front, and act as a deflector for the discharges and deposits which now accumulate in the slips. Piers are to be built of prescribed dimensions, according to the requirements of the channel and tides, resting upon great hollow pillars of iron, exhausted and driven down by pneumatic pressure, and then filled with masonry or concrete under pressure, so as to form artificial stone. The space between these pillars will allow a free flow of the tides and deposits, and will be sufficient also to admit of dredging. The pier will support a fire-proof warehouse of iron, five stories high: the first story, on the street level, being open on all sides as a wharf, yet covered from the weather, and capable of being securely closed at night by iron gates or rolling shutters, and furnished with steam hoisting apparatus for the rapid discharge and loading of vessels, and dispatch of carts. The second floor may be used, where necessary to avoid obstructing the pier, for the temporary deposit of goods awaiting stowage or removal; and the whole warehouse proper will afford secure storage for merchandise, on the spot, to any required extent, at the least of expense and inconvenience to parties or the public. The steam, always up in these warehouses for hoisting purposes, would also be available in connection with powerful stationary fire engines, for extinguishing fires among the shipping, which have been so calamitous in repeated instances. Wharf thieving and smuggling could also be effectually circumvented. It is evident that the profits of warehousing and wharfage on this plan would attract abundant capital for the construction of the buildings, in accordance with proper legislative regulations, and

under a profitable water rent to the city. Thrown open on safe and liberal terms to the enterprise of all, in lots of some limited extent, and under supervision of government, a perfect system of piers and warehouses may be made a public benefit without becoming a public charge, a center of monopoly, or a source of corruption.

The trouble now-a-days with about every new project of a public character, is, that the promoters start off with a gigantic stock operation; we have heard this objection raised to the New York Pier and Warehouse Company's scheme, which we hope is not true.

#### Volkman's Self-holding Plow.

Our attention has recently been called to a novel self-holding plow which seems to possess much merit. The peculiarity of the plow is such that the share will keep in the furrow without being guided. A boy old enough to drive a team is capable of managing the implement; or rather the plow will take care of itself without the attention of the driver. The share and beam are similar in construction to the ordinary plow. The front end of the beam rests in a light carriage and is so arranged as to turn freely in every direction. When in use, the plow is set so that it points slightly toward the land side, the draft being from the opposite direction, which renders it impossible, with the arrangement for supporting it in position, to be thrown out of the furrow unless it strikes some obstruction, and then as soon as passed it resumes its former position. Any depth may be plowed by setting the implement the desired scale before starting.

If we are not mistaken Mr. Volkman's patent plow will come into quite general use. For further information see advertisement in another column.

LYNN contains 220 manufactories, turning out an aggregate of not far from twelve million dollars' worth of boots and shoes, annually.

THE Agricultural College of Massachusetts is to be opened for students on the first of September next. Five buildings are to be erected, including a chemical laboratory and a model barn, at a cost of \$65,000.

THE exhaustion of the British coal-fields proceeds at the rate of nearly one hundred million tons per annum, or five times the present product of the American mines. On the other hand, the extent of the American coal-fields is more than twelve times that of the British.

AN extensive system of adult schools has been inaugurated in France, under the auspices of the Minister of Public Instruction. Last winter, nearly 5000 such schools were opened, with 30,000 teachers, and about 600,000 pupils of both sexes; nearly half of whom were unable to read.

PITTSBURGH contains five hundred large manufacturing establishments. It has fifty glass factories and sixteen potteries, forty-six iron foundries, thirty-one rolling-mills, thirty-three machinery establishments, and fifty-eight oil refineries; beside miscellaneous works of almost every variety; the whole turning out an annual product worth \$100,000,000.

THE Public School System of Lower Canada, by a recent report, comprises 10 universities and professional institutions, with 818 students; 210 secondary institutions, as classical and industrial colleges and academies, with 28,613 students; 3 normal schools; 4 special schools; and 3,479 primary schools, with 172,733 pupils. The total amount levied for the support of this system, in 1865, was nearly \$600,000.

SUBTERRANEAN PHOTOGRAPHY.—A firm in Cincinnati have obtained the exclusive right of taking views in the Mammoth Cave of Kentucky, for five years. The process successfully used in taking pictures of the interior of the Great Pyramid is adopted, using the magnesium light. The dampness of the cave, the smoke arising in the consumption of large quantities of magnesium, the divergency of the artificial light, and the magnitude and proximity of the objects to be photographed, present a number of serious difficulties. Powerful reflectors are used to throw a flood of light upon the object, and the plate is allowed about twice the exposure required by the light of the sun.



## Patent Claims

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING DEC. 11, 1866.

Reported Officially for the Scientific American.

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.

60,319.—HAME FASTENING.—W. J. Alexander, Manchester, Iowa.

First, I claim the hame fastening consisting of the catch piece, B, and the socket, C, with the spring catch, D, and notches, E, respectively, and united to the loops of the hames, substantially as and for the purpose described.

Second, The arrangement of the button, F, shaft, G, eccentric, H, and spring, M, operating as described.

Third, The pin, L, as and for the purpose described.

60,320.—MANUFACTURE OF BRICK OR BUILDING BLOCKS.—Henry W. Angell, Waukesha, Wis.

I claim a brick composed of lime, sand, small stones, and gravel, prepared and molded in the manner described.

60,321.—SAW.—James E. Atwood, Trenton, N. J.

I claim the teeth, H H, when inserted and secured in the manner herein described and for the purposes set forth.

60,322.—MACHINE FOR ROLLING METAL.—Hugh Baines, Manchester, England.

First, I claim the combination of the hollow perforated rollers, c, with the reversible gearing, H I, when constructed, arranged, and connected together so as to operate substantially in the manner described and for the purposes set forth.

Second, In combination with the above, the movable table, 7, arranged and operating substantially as and for the purpose specified.

60,323.—BRICK MACHINE.—William C. Bartol, Huntingdon, Pa.

First, I claim operating the machinery for molding brick from the drive or supporting wheel or wheels of the machine, substantially in the manner herein shown and described.

Second, The combination of the slides, H, racks, C', cog wheels, G, and shaft, D, with each other, substantially as herein shown and described, for the purpose of raising and lowering the shelves and molds, as set forth.

Third, The combination of the catches, E', spring, G', and arms, H' I', with each other and with the racks, C', and wheels, G, substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the racks, A', and cog wheels, I, with each other and with the molds, J, and shaft, D, substantially as herein shown and described and for the purpose set forth.

Fifth, The combination of the pins, B', connecting rods, M', pivoted levers, K', and springs, L', with each other and with the projections, J', of the racks, C', substantially as herein shown and described and for the purpose set forth.

60,324.—BATTING AND WADDING.—Samuel Baxendale, Boston, Mass.

I claim the batting or wadding composed of a layer of fibrous material attached by any adhesive substance to opposite sides of a sheet of paper, as herein described, the same being a new article of manufacture.

60,325.—ROAD SCRAPER.—J. B. Beall and B. F. Grime, Westerville, Ohio.

First, I claim, in a reversible road scraper, constructing the latch, c, to a loosely-turning handle piece, b', by means which will allow of the movement of said latch by turning the handle piece without removing the hands from either of the handles, substantially as described.

Second, The combination of a vibrating latch, c, a sliding spring latch, d, and a movable hand piece, b', substantially as described, with a reversible scraper.

60,326.—WASHING MACHINE.—E. Beckwith, South Pass, Ill.

The combination of the pendulum, J, with the bar, K, counterpoise, L, uprights, G, and rubber, E, substantially as and for the purpose herein shown and described.

Second, I claim the levers, C, in combination with the board, B, and rubber, E, all constructed and operating substantially as herein shown and described.

60,327.—APPARATUS FOR DISTILLING GRAIN.—J. B. Beebe and T. F. Lloyd, Albany, N. Y.

First, We claim the generator, C, constructed with two or more chambers, C' C' C'', for the purpose set forth substantially as described.

Second, We claim the drop pipe, I, in combination with the enclosing pipe, h, for the purpose set forth substantially as described.

Third, We claim the indicator, E, combining the pipes, n' and g, together with the permanent hydrometer, x, and thermometer, t, the bell glass or dome, o, and the cock, r, for the purpose set forth substantially as described.

Fourth, We claim the combination of the registering meter, s, or its equivalent, with the indicator, for the purpose set forth substantially as described.

60,328.—SOAP.—S. J. Beeler, Wales, Ill.

I claim the use of the ingredients herein named in the proportions and manner substantially as set forth, for the manufacture of soap.

60,329.—CAST-IRON CHAIN PULLEY.—James Bird, New York City.

I claim, in cast-iron chain pulleys, making their projections, which hold the links of the chain, with a "chill," substantially as and for the purpose above described.

60,330.—MASH MACHINE.—M. Brand and C. P. Hoffmann, Chicago, Ill.

First, We claim the adjustable scraper on bottom of tub.

Second, The vertical propeller-shaped wings in combination with the machine.

60,331.—FENCE GATE.—W. W. Bratt, Ottawa, Ill.

First, I claim the two rollers, G G, on which the gate slides sidewise.

Second, The guide board, K, fitting in the circular grooves of the rollers, G G.

Third, The guide, L, at the lower end of the swinging post, B.

Fourth, The part, L, of the gate, H, back of the rollers, G G, lying against the fence when closed, substantially as and for the purpose described in the foregoing specification.

60,332.—PLANING MACHINE.—Otis Bridgeman, Addison, N. Y.

First, I claim the arrangement of the cutter head, K, adjustable rollers, A3, saw, N, feed table, U, cutter head, S and T, frame, L2, and its flange, S2, strip, P2, screw shaft, O2, arms, A3, and feed rollers, V2, substantially as described for the purpose set forth.

Second, The arrangement of the frame, L2, carrying the circu-

lar saw blade, N, and revolving cutter head, suitable either for tonguing or grooving, substantially as described and for the purpose specified.

60,333.—TWEED.—T. E. Brinley, Louisville, Ky.

I claim the cap, E, provided with a flange, a, and hooks, e e e, body, A, with the raised center forming an annular air chamber, C, and ears, n n n, when arranged as herein set forth, and operating as and for the purpose specified.

60,334.—GRATE FOR STOVE.—Albert Brown, Troy, N. Y.

First, I claim the permanent bar, G, in combination with the frame, F, and convex center, E, or equivalents, as and for the purposes specified.

Second, I claim the cavity, C, in combination with the cross pin, I, and the convex center, E, as and for the purpose set forth.

Third, I claim the grate, B, working upon the center, E, so arranged as to dump on a line with the shank, J, at any point within the sphere of its movement, as and for the purpose set forth.

60,335.—PROPELLING HORSE.—John H. Brown, New York City.

I claim the combination and arrangement of the wheel, B, axle, c, horse, A, wheels, D, shaft, E, and levers, F F, as herein set forth, operating in the manner and for the purpose specified.

60,336.—SPRING TOY.—John H. Brown, New York City.

First, I claim the lever, C, spring, D, and regulating drum, b, in combination with the toy, A, constructed and operating substantially as and for the purpose set forth.

Second, Graduating the lever, C, so that the leverage of the spring can be accommodated to the weight of the child occupying the toy.

Third, Supporting the toy on a fulcrum, a, at its back end, substantially as and for the purpose described.

60,337.—MODE OF ATTACHING HANDLES TO BOILERS AND OTHER VESSELS.—John H. Brown, New York City.

I claim the pear-shaped slots in the ears, a, in combination with the flattened ends of the ball or handle of the kettle, A, connected and operating substantially as and for the purpose described.

60,338.—FEEDING DEVICE FOR CARDING ENGINES.—George Bruce, Corydon, Ind.

First, I claim the pitman, G, pawl, L, ratchet wheel, M, toothed wheels, O P, and pinions, Q and R, in combination with the aprons, B and B', for the purposes and substantially as herein described.

Third, I claim the manner of accelerating or reducing the feed by lengthening or shortening the stroke of the pawl, L, by means of the lever, G, and cord, J, substantially as herein set forth.

60,339.—COMBINED TABLE AND BEDSTEAD.—Sanford S. Burr, Dedham, Mass.

I claim the combination of the table top, I, and its connections, with the slat frame, H, and box, A B C D E F and G, for the purpose and operating substantially as above described.

I also claim a combination of the sides of the table, L M and b, with the top, I, and the leaf, N, so constructed and arranged by means of the pin sliding in the groove, E, that the same can at will be transformed into the bottom end and support of the bed, in the manner and for the purposes substantially as herein described.

I also claim the combination of a table with a bedstead, in one piece of furniture, adjustable at the will of the operator by means of the pin sliding in the groove, E, constructed and operating substantially as herein described.

60,340.—MODE OF FASTENING AND UNFASTENING DROP DOORS IN COAL CARS.—William Burr, Marquette, Mich.

I claim the combination of the lever, B, shaft, L, cam, C, attached to the said shafts, L, pins, P, with drop doors, a, when the same are constructed and arranged in the manner and for the purpose set forth.

60,341.—ROTARY CUTTING MACHINE.—James J. Butler, Cincinnati, Ohio.

I claim, First, The rotary knife or cutter, M, and arm, L, in combination with the mandrels, C and G, for the purposes and substantially as described.

Second, I claim the bevel gearing attached to a crank for driving the mandrels, to which the cutter or knife is attached, substantially as and for the purpose set forth.

Third, I claim the upright screw, D, in connection with the mandrel pressing on the disk, I, or material, substantially as herein shown and described.

60,342.—TAP BORER.—Silas S. Crocker (assignor to himself and D. R. Crocker), Maquoketa, Iowa.

I claim the volute shaped tool with a sharpened, salient, spiral edge, with the gimlet point, substantially as described.

60,343.—TOOL FOR SETTING JEWELS IN WATCHES.—A. C. Crosby, Union, Pa.

I claim the securing or setting jewels in watch plates by means of a die or tool constructed in the manner substantially as shown and described.

60,344.—MEASURING LIQUIDS.—George W. Devoe, New York, city.

I claim, First, The suspension and arrangement of the weighted funnels, M, in relation with the series of measuring vessels, E, and with the cans, C, as they are pushed under the said funnels, substantially as herein set forth for the purpose specified.

Second, A measuring apparatus consisting of one or more measuring vessels, E, arranged in relation with a reservoir, B, and furnished with inlet and outlet valves or stop cocks, F K, and with a suspended funnel or funnels, M, and a whistle or whistles, c, substantially as herein set forth.

60,345.—FEATHERING PADDLE WHEEL.—John V. Dinsmore (assignor to himself and M. Harris), Milford, Mass.

I claim the combination for operating each of the paddles while the wheel is revolving, the same consisting of the cam, G, the sliding and rotary shaft, F, its bearing, b, said, g, notch, i, shoulders, d e, arm, m, cams, n and g, and the arm, p, and the roller, o, or the equivalent thereof, the paddle being applied eccentrically upon the shaft, and the whole being in other respect, substantially as hereinbefore described.

I also claim the cam, G, as made in two parts hinged together, and applied to the side of the vessel, so that one of them may be stationary thereon, and the other movable, as and to produce with the wheel, results as above set forth.

60,346.—GRADING INSTRUMENT.—Samuel L. Donnell, Spring Creek, Tenn.

I claim the bubble block, D, mounted upon a collar, G, swiveled upon the stand, A, or its equivalent, in combination with the balance ball or weight, H, suspended from the said block, and about and around the stand, A, substantially as herein described and for the purpose specified.

Second, In combination with the above, arranging either one or both of the legs, J J2, in the bubble block, D, from which the balance ball, H, is suspended in such a manner as to be susceptible of being adjusted therein, substantially as and for the purpose described.

Third, The combination with the sights of the bubble block of the thumb or set screws, R, and fixed pointer, U, arranged substantially as described and for the purpose set forth.

Fourth, The use of a transverse swiveled block, V, for the purpose described.

60,347.—POTATO DIGGER.—M. T. Drake, Pleasant Ridge, Ohio.

I claim, First, The main frame, A, vibrating inner frame, A', gaging frame, A'', and axle, B, constructed substantially as above described and for the purpose specified.

Second, The arrangement of the frame, L2, carrying the circu-

Second, The levers, m, constructed and operating as above described and for the purpose set forth.

Third, The levers, m, and cutters, k, in combination with the frame, A, substantially as above described and set forth.

Fourth, The plow, F, consisting of shovel, g, share, r, and mold boards, s, as above described when used for the purpose set forth.

Fifth, The shovel, g, in combination with the vibrating inner frame, A, constructed and operating as above described and for the purpose set forth.

Sixth, The endless bucket elevator, D, constructed substantially as above described.

Seventh, The pulverizing board, S, in combination with the endless bucket elevator, D, for the purpose specified.

Eighth, The irregularly reciprocating screen, I, in combination with the crank shaft, 3, constructed and operating as above described and for the purpose set forth.

Ninth, The dumping box, 9, in combination with rod, 10, and lever, 11, constructed and operating substantially as above described and for the purpose set forth.

Tenth, The clutch gearing, f and x, in combination with the levers, y and y', and eccentric, z, as above described and for the purpose set forth.

Eleventh, The frames, A A' and A'', levelers, m, circular cutters, K, plow, F, endless bucket elevator, D, pulverizing board, S, irregularly reciprocating screen, I, dumping box, 9, and clutch gearings, f and x, combined and operating as above described, and for the purpose set forth.

**60,348.—SLED BRAKE.**—R. B. Dutton (assignor to himself and N. C. White), Iron Hill, Iowa.

I claim the combination and arrangement of the jointed dog, G, clash, H, lever, F, fulcrum rod, E, ratchet bar, I, and spring, K, with each other, and with the rave, D, and runner, A, of the sled, the whole being constructed and operated substantially as herein described, and for the purpose set forth.

**60,349.—COAL SCUTTLE.**—Edgar Eltinge, Kingston, New York.

I claim the shield, D, when constructed, as described and applied as and for the purpose specified.

**60,350.—BLOWER.**—John A. Evarts, Meriden, Ct.

I claim the combination of the outer cylinder, A, the inner cylinder, C, and the plate, F, when the said plate, F, is connected by a strap or straps, G, to and so as to be operated by the inner cylinder, and the whole constructed and arranged substantially in the manner and for the purpose specified.

**60,351.—BED CLOTHES CLAMP.**—William Fisher, Ripon, Wis.

I claim the combination with the spring lever arms, E, hinged and joined together in pairs, of the jaw rails or bars, C, connecting the several pairs of said levers, substantially as described for the purpose specified.

**60,352.—VACUUM VENTILATOR.**—J. W. Foard, San Francisco, Cal.

I claim the apparatus above described for raising fluids, gaseous or liquid, by means of natural or artificial currents of air composed of horizontal tubes or pipes, a, c, which are supported by means of the collar, b, upon the vertical pipe, e, so as to be free to revolve thereon, and which are guided and maintained in proper position by means of supplementary pipe, d, that extends from pipe, a, into said vertical pipe, e, substantially as above shown.

**60,353.—NEEDLE THREADER FOR SEWING MACHINES.**—M. B. Foote, Northampton, Mass.

I claim the frame, A, with its handle, B, springs, D, and the arms, C, to the lower one of which the slotted eye, E, is secured in combination with the slotted right-angular gage, G, all operating substantially as described for the purpose specified.

**60,354.—CIRCULAR SAWING MACHINE.**—Lewis Fossee, Jeffersonville, Ind.

First, I claim the adjustable slotted frame, G, and set screw, f, for canting the saw, arranged and operating substantially for the purpose specified.

Second, Sluicing the plank by means of the segment racks, F, wheels, G G', radiating shafts, m m', guide rod, H, and dogs, I I', substantially as described for the purpose specified.

**60,355.—POTATO MASHER.**—Vincent Fountain, Jr., Castleton, N. Y.

I claim as a new article of manufacture, a potato masher constructed as described to wit: the cylinder or tubular receptacle, A, provided with the detachable perforated bottom, B, and handles, one in each side, and the plunger, C, all as shown and set forth.

**60,356.—SCHOOL AND FAMILY SLATE.**—John H. French, Geddes, N. Y.

First, I claim the frame, A, made with two compartments, one of which contains a slate, while the other is so constructed, as to admit of the insertion of any convenient number of cards of pasteboard or other material containing lessons or copies for writing, printing, marking or drawing, and exercises in arithmetic, either any or all combined, substantially as and for the purpose described.

Second, The arrangement in one or both surfaces of a slate of permanent perpendicular and slope lines, in combination with the ordinary horizontal lines, substantially as and for the purpose set forth.

**60,357.—CRIB FOR CHILDREN.**—William L. Gerard, Fort Wayne, Ind.

I claim the panels, A, in combination with the elastic hinges, B, and the mat, C, the whole being arranged and constructed in the manner and for the purpose described and set forth.

**60,358.—FENCE.**—Thomas Glover, Woodbury, N. J.

First, I claim the post, A, and plate, a, in combination with the braces, b, b, and detachable blot, d, or its equivalent, the whole being constructed and arranged substantially as and for the purpose described.

Second, The post, A, and plate, a, with its slots, x x, in combination with the detachable braces, b, b, enlarged at the lower ends for the purposes set forth.

Third, The shoulder, e, on the post, A, for the purpose specified.

**60,359.—MACHINE FOR PULLING HEMP AND COTTON STALKS.**—Artemus W. Goddard, Clinton, Mass.

First, I claim the sectional flexible wheels, d, d, of the form substantially as herein described, or their equivalent, arranged to gather and operate as described.

Second, The spur belts, e, e, for carrying the tops of the stalks to the rear, or their equivalent, substantially as described.

Third, The rollers, 1111, and frames, ff, for keeping the sectional flexible wheels together, arranged as and for the purpose specified.

Fourth, The combination of the whole consisting of the sectional flexible wheels, d, d, the spur belts, e, e, the rollers, 1111, and the frames, ff, arranged together as and for the purpose specified.

**60,360.—SEWING-MACHINE GUIDE.**—H. C. Goodrich, Chicago, Ill.

First, I claim the rigid plate, B, having its under surface corrugated, as shown when hinged to the guide plate, A, as herein set forth, so that it can be folded over back on the plate, A, when not in use.

Second, I claim the plate, B, hinged as shown to the plate, A, and having its inner end made heavier than its outer end, substantially as and for the purpose set forth.

**60,361.—GRAPPLING TOOL.**—N. W. Green, Cortland Village, N. Y.

First, I claim the self-adjusting grapple, B B, the adjustable fulcrum, c, c, in combination of the lever, D D.

Second, I claim the frame, F F F, including the standard, A A, in combination with the grapple, B B, the adjustable fulcrum, c, c, and the lever, D D, for the purpose described.

**60,362.—PORTABLE WASH STAND.**—Samuel B. Guernsey (assignor to himself and Richard S. Pain), Chicago, Ill. Antedated Nov. 26, 1866.

I claim, in combination with a portable wash stand, a water re-

servoir permanently attached thereto, having two compartments, C D, and a recess, E, beneath one of them, substantially as and for the purposes specified.

Second, I claim, as arranged with the foregoing, the wash basin, H, pipes, I J, cover, K, and can, L, as and for the purposes specified.

**60,363.—CHURN DASHER.**—A. W. Hall, New York City.

I claim an atmospheric churn dasher constructed with a series of inverted funnels or hollow cones arranged one above the other and attached firmly and air-tight to the stem of the common dasher, in combination with the plate, B, at bottom of the stem, substantially as shown and described.

**60,364.—DISH MOP.**—Aaron S. Hadley, Boston, Mass.

I claim the combination and arrangement of the auxiliary or internal mass of the fibrous material, C, projecting from the end of the socketed handle, A, with such handle and either or both the masses, D E, of fibrous material extended from the periphery of the head of such handle, as set forth.

**60,365.—ROTARY PUMP AND ENGINE.**—Dexter D. Hardy (assignor to Thomas H. Foulds), Cincinnati, Ohio.

I claim the rotary pistons, B B', whose peripheries are formed by quarter circles, a' a' and b' b', of different diameters, connected by suitable sides, c, in the described combination with the two central tongue-tongues, D D', of the case, A, as and for the purpose specified.

**60,366.—ROTARY PUMP AND ENGINE.**—D. D. Hardy and J. J. Morris, Cincinnati, Ohio.

We claim, first, constructing the rotary pistons, B B', of arcs of circles, a' a' b' b', of different diameters, connected by epicycloid faces, c', in the described combination with the elastic gibs, G', as and for the purpose specified.

Second, We claim, as arranged with the above combination, the set screws, J, for preventing lateral play of the shafts and pistons, as set forth.

**60,367.—TOOL FOR INSERTING SCREW EYES.**—Benjamin T. Harris, Brooklyn, N. Y.

I claim the device for inserting screw eyes in picture frames, etc., consisting of the eye holder, e, formed substantially as specified, and rotated by the mechanism herein described, substantially as set forth.

**60,368.—BED BOTTOM.**—W. J. Haswell, Waverly, N. Y.

I claim the springs, d, passing down through mortises in the sides and ends of the bedstead or frame, A, in combination with movable rods, e, straps, c, and the flexible bottom, B, all constructed and operating substantially in the manner and for the purpose set forth.

**60,369.—PACKING REVOLVING JOINTS.**—Jonathan Hatch (assignor to himself, C. Smith, and H. Winchester), South Windham, Conn.

I claim the combination with the stuffing box, b, and gland, C, of the pipe, B, formed with a collar, e, and provided with packing, f f', on each side or face of said collar, substantially as and for the purpose or purposes herein set forth.

**60,370.—CONDENSED EXTRACT OF MALT.**—Thomas Hawks, Rochester, N. Y.

I claim condensing the extract or infusion of malt by evaporation in vacuo, for the manufacture of ale, beer, and other liquors, substantially as set forth.

I also claim, as a new product, the extract of malt when condensed to a solid or nearly solid substance, substantially in the manner and for the purposes herein set forth.

I also claim, as a new product, the extract of malt, either with or without the addition of hops when condensed in vacuo, substantially in the manner and for the purposes set forth.

**60,371.—SAWHORSE OR BUCK.**—Henry M. Hayward, Boston, Mass.

I claim the improved sawhorse, as constructed with stop joints, as described.

I also claim the application or arrangement of the roller with a sawhorse so as to operate or turn on its middle connecting rod or bar, in manner and for the purpose as hereinbefore set forth.

**60,372.—STUMP EXTRACTOR.**—Nathan M. Healy, Flushing, Mich.

I claim the hold-fast bars, E', slotted blocks, C', levers, F, and chains, G, in combination with the notched bar, E, cap piece, C, uprights, D, inclined supports, B, and runners, A, arranged and operating substantially as herein shown and described.

**60,373.—WATER WHEEL.**—Samuel Hicks, Orangeville, Ind.

I claim the wheel having an inverted conical head, D, with buckets, E, attached, curved at the lower ends, and secured to a ring or annular bar, F, substantially as described for the purposes specified.

**60,374.—SAWMILL.**—James A. Holford, Guionsville, Ind.

First, I claim the automatic log-setting device consisting of the head blocks, I and K, pinions, o and p, shaft, L, ratchet wheel, r, pawls, r', lever, r'', adjustable rest, t, and incline, S, all constructed substantially as and for the purpose herein shown and described.

Second, I claim the automatic feeding device, consisting of the carriage, H, reversing lever, h, spring, m, and stop levers, h' and h'', constructed substantially in the manner and for the purpose herein shown and described.

**60,375.—CORN SHELLER.**—Michael and Simeon Housman, Huntington, Ind.

We claim the pin passing through the jaws or blades, and the coiled spring around the same, constructed and arranged as hereinbefore described and substantially set forth.

**60,376.—BALING PRESS.**—Guy D. Howe, Lewisport, Ky.

I claim the movable boxes, C, when used in combination with a suitable press, constructed and operating in the manner and for the purpose herein specified.

**60,377.—STREET LANTERN.**—A. R. and E. A. Hunt, Newark, N. J.

We claim a street lantern having its various side frames, H, and top frames, F, made of cast iron, and constructed and joined together, substantially in the manner and for the purpose described.

**60,378.—STEAM VALVE.**—G. G. Hunt, Bridgeport, Conn.

I claim the arm, G, applied to the valve rod, F, and secured thereto by means of a set screw, g, in connection with the slotted plate, h, attached to the stuffing box, i, substantially as and for the purpose specified.

**60,379.—STEAM PIPE.**—G. A. Jasper, Charlestown, Mass.

I claim the register as a device to be used in combination with a steam apparatus, for the purpose of more efficiently controlling and utilizing the steam, substantially as described.

**60,380.—TOOL FOR CUTTING TUBES.**—John V. Jepson, Brooklyn, N. Y.

I claim the combination of the stationary knife, D, with the adjustable knife, F, and the jaw, A, of the wrench, constructed and arranged substantially as described.

**60,381.—FIRE-PROOF FELT FOR ROOFING AND OTHER PURPOSES.**—Moses A. Johnson, Lowell, Mass.

I claim a felted fabric of hair or other material, covered on one or both of its sides with paper, and with silicate of soda or soluble glass, and whether painted or otherwise, rendered water-proof or not, as herein described.

**60,382.—DRYING ARTISTS' MATERIALS.**—Gilbert D. Jones, New York City.

I claim the rotating heated drum or cylinder, A, having its periphery partially inclosed by a jacket, C, forming a hot-air passage, a, in connection with a spreading knife or trowel, G, and a scraper or discharging knife, H, all arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the roller, F, when used in connection with the heated drum or cylinder, A, and trowel, G, to operate substantially as and for the purpose herein set forth.

**60,383.—BASKET.**—Horace C. Jones, Dowagiac, Mich.

First, I claim the combination of the inside hoop or band, g, with the outside hoop or band, g', in the construction of the stave basket, substantially in the manner described.

Second, The manner, herein shown and described, of securing handles, G G, to the basket.

**60,384.—CAR COUPLING.**—Elias H. Keith, Peoria, Ill.

First, I claim the swinging loop, B, with projections, g, and limited by stops, i and k, as described, and for the purpose set forth.

Second, The combination of the hook, C, crank, D, and rod, d, and reversing bar, a, in mortise, m, or their equivalents, as and for the purpose set forth.

**60,385.—HOMINY MILL.**—Bernard Kemp, Knoxville, Md.

I claim the arrangement of the frame, A, with its case, D, screens, H, doors, I, board, J, fan, C, arms, E E, and teeth, G, in the manner substantially as and for the purposes herein specified.

**60,386.—WOOL-OILING APPARATUS FOR CARDING ENGINES.**—P. C. Kirk and M. Pendergast, Lawrence, Mass.

First, We claim operating the supply cocks of a wool-oiling apparatus by the traveling motion of the reservoir, substantially as set forth.

Second, We also claim operating the cocks, j, k, by the pinions, l, m, and rack, I, substantially in the manner and for the purpose described.

Third, We also claim the pipe, K, with its cock, n, for admitting air into the passage between the cocks, j, k, substantially as set forth.

Fourth, We also claim the agitator or mixer, o, when operated by contact with the pin, p, projecting from the ralling, L, for the purpose set forth.

**60,387.—MACHINE FOR OPENING AND CLEANING COTTON.**—Richard Kitson, Lowell, Mass.

First, I claim the fender, D, arranged beneath the seed rack, substantially in the manner and for the purpose set forth.

Second, I claim the communication between the seed chamber, C, and throat, E, so as to allow the air to pass from the seed chambers to the dust trunk, K, giving vent to the seed chamber, C, and preventing the seed being sucked back again with the cotton, substantially as set forth.

**60,388.—NARROW-WARE LOOMS.**—L. J. Knowles, Warren, Mass.

I claim the combination of the slot, v, or its equivalent, with the mechanism, substantially for operating the lay rack as set forth, such mechanism consisting not only of the link, l, the straps, e, e, and their guide wheels as applied to the lay and its rack, substantially as described, but of the crank, n, the shaft, o, and the bevel gears, t, u, or their mechanical equivalent or equivalents, operated by the cranked shaft of the lay.

I also claim the above-described mode of making each of the series of take-up rollers, viz: of two heads a series of annular and cross bars or connectors, as set forth.

I also claim the application of each of the top or pressure rollers to the loom, viz: by means of an inclined hanger, to operate substantially as described.

I also claim the application of one series of take-up rollers to the other series thereof, substantially in the manner as described, that is, by means of the head, c', the journal, a', socket, d', and stud, f', arranged and applied to the two series as set forth.

**60,389.—BABY CHAIR AND TABLE.**—John Kopp, Bridgeport, Conn.

I claim the combination of the reversible chair with the table, whereby the chair may be used either as a high or a low chair, substantially as herein described.

**60,390.—FIRE SHIELD.**—Joel Lee, Galesburg, Ill.

I claim the arrangement of the pulleys, C C, supports and guides, B B, chains, G G, and stay braces, D D, with the metallic plates, A, substantially in the manner and for the purpose specified.

**60,391.—CHURN.**—George H. Lenher, Richmond, Va. Antedated Nov. 30, 1866.

First, I claim the arrangement of the hollow spindle, L, perforated rotating tube, M, and vertical fixed counter dashers, o, o, constructed and operating in the manner and for the purpose herein specified.

Second, I also claim fastening on the covers of churns by means of hooks on opposite sides of their bodies, and of revolving cams on the edges of the covers, substantially as described.

**60,392.—HARVESTER RAKE.**—Samuel K. Lighter, Hamilton, Ohio. Antedated October 28, 1866.

I claim the arrangement of rake, E, universal joint or fulcrum, F, timber heel, G, fixed cam, H, pitman, J, and guide, K k, the whole being constructed, combined and adapted to operate in the manner set forth.

**60,393.—BRACES FOR WAGON SPRINGS.**—James H. Lockie, Humphrey, N. Y.

I claim the combination of the short levers, C, the connecting rods, D and F, and the T braces, E and G, with each other and with the reach, A, and box frame, B, of the wagon, substantially as herein shown and described and for the purpose set forth.

**60,394.—MODE OF DISINFECTING NOXIOUS VAPORS FROM RENDERING HOUSES, HOSPITALS, ETC.**—Radcliffe B. Lockwood (assignor to Lockwood & Everett), New York City.

I claim controlling, disinfecting and deodorizing the noxious gases or vapors generated in rendering houses, slaughter houses, hospitals or sewers, by forcing or drawing said gas or vapors from said building, houses, or sewers through a superheating or other furnace, or through a chamber, charged with a disinfecting and deodorizing material, by which said gases or vapors are disorganized and rendered innocuous and inodorous, or are consumed.

**60,395.—PISTON PACKING.**—Barker Lowe, Fall River, Mass.

I claim the rings, a b, incasing the head and follower, and provided with the flanges, a' b', in combination with the beveled spiral spring, c, constructed as described, substantially as and for the purpose specified.

**60,396.—PROCESS OF DISTILLING PETROLEUM OILS AND OTHER SUBSTANCES.**—Orazio Lugo and T. O. L. Schrader, New York City.

First, We claim the admission of air or gas into the still at a temperature equal to or greater than that of the oil or substance undergoing the distilling process, substantially as herein described.

Second, The heating of the air or gas previous to its admission into the still, by the same means or medium employed for the heating of the still itself, and in such manner that the temperatures of the substance undergoing distillation and that of the air or gas admitted to the still will increase or decrease in or nearly in the same ratio, substantially as herein described.

Third, The utilization of the waste heat from the still by its employment to effect a preparatory heating of the air or gas which is to be admitted into the still, substantially as herein set forth.

Fourth, Causing the air or gas while in the heated state, but before its admission into the still, to pass through or in contact with an oil of suitable character, substantially as herein specified.

**60,397.—PEAT MACHINE.**—James B. Lyons, Cornwall, Conn.

I claim the construction of the molds, c, c, they having racks

b, b, on both sides for the action of the plungers, a, a, to convey them into and through the receiving box, D, as arranged, and operating substantially in the manner and for the purposes herein set forth.

**60,398.—APPARATUS FOR GRINDING PEAT.**—James B. Lyons, Cornwall, Conn.

I claim the perforated end cylinder, H, in combination with the wiping wings, I I I, cutting and grinding mechanism, F F H, operating to discharge the pulverized mass, substantially as and for the purposes herein set forth.

**60,399.—MAKING BUTTER FROM CHEESE WHEY.**—Homer C. Markham (assignor to himself and Charles G. Riggs), West Turin, N. Y.

I claim the separation of cream or butter from wheys by the means of heat and in the use of an acid liquid, substantially as herein described.

**60,400.—FOLDING LOUNGE.**—James W. McDonough, Chicago, Ill.

I claim the rails, A, A, of the frame of the folding lounge, constructed and operating substantially in the manner herein described and specified, and the folding head, H, of the lounge constructed and operating substantially as herein described and specified.

**60,401.—HEAD BLOCK FOR SAW MILLS.**—B. F. McKinley (assignor to himself and H. R. Mathias), Cincinnati, Ohio.

I claim the regulating of the movement of the slide, B, and knee, C, by means of the adjustable head, N, or its equivalent, on bar, L, substantially as and for the purpose specified.

I further claim so adjusting head, N, or its equivalent, on bar, L, as to bring the pivot centers of link, M, and the fulcrum of lever, K, all on line when starting in combination with a similar arrangement of levers or links on head block, A, the centers of which are brought in line in stopping, and the slide, I, pawls, H, and rack bar, G, all arranged substantially as and for the purpose set forth.

**60,402.—COTTON GIN.**—F. M. McMeekin, Morrison's Mills, Florida.

I claim the combination of the roller, C, roller, D, with adjustable bearings, also plate, E, reciprocating rake, G, and teeth, F, as described, and brush, I, arranged and operating substantially as and for the purpose specified.

**60,403.—KNUCKLE JOINT.**—J. H. Mears and C. W. Yale, Oshkosh, Wis.

I claim the pentagonal socket, Fig. 1, in combination with the head, Fig. 2, substantially as set forth.

**60,404.—GRINDING MILL.**—John M. Miller, Hamilton, Ohio.

I claim the arrangement of the tube, G, blower case, H, and receiving box, K, in combination with the case, E, provided with regulating slide, b, operating substantially as and for the purpose described.

**60,405.—SAFE.**—L. H. Miller, Baltimore, Md.

First, A burglar proof wall for safe and other similar purposes, of wrought and cast metal, made and held together by secret studs, a, a, all constructed substantially as described.

Second, The studs a, a, projecting from the inner surface of one of the wrought metal plates, but not extending to the inner surface of a contiguous plate, in combination with a cast metal filling between said plates, substantially as described.

**60,406.—TAGS.**—Charles A. Moore, West Brook, Conn.

I claim the interposing or placing between metallic fastenings, the thread, tape, or twine, substantially as specified and for the purpose herein set forth.

**60,407.—TATTLING SHUTTLE WINDER.**—James D. Moore, Grinnell, Iowa.

I claim the frame, A, formed of a single piece of metal, and bent into form substantially as described, in combination with the wheel, G, and H, and spool, B, supported in said frame as set forth.

I also claim in combination with said frame the spring, I, which holds the shuttle in its place, and opens the jaws of the shuttle to receive the thread freely, substantially as specified.

**60,408.—WATER WHEEL.**—Henry G. Nelson, Lockport, N. Y.

First, I claim making the arms of the bridge tree grooved for the purpose of conducting water into the step for lubrication, substantially as described.

Second, The adjustable hub, E, in combination with the hub, D, for the purpose and substantially as described.

Third, A water-wheel bucket having the parts, f, f, f, and f, in combination substantially as set forth.

Fourth, The stationary scrolls, J, and horizontally-moving gates, L, when arranged with a segment ring, N, operating gear and arms, Q, and friction rollers, S, as a means of opening and closing the gates, L, substantially as described.

**60,409.—OIL CAN.**—William C. Newkirk, Piqua, Ohio.

I claim an oil can with a projecting rim around the outside, either at the bottom or above it, forming a channel, substantially as described for the purpose herein set forth.

I claim the extra spout, B, in combination with the said channel, substantially as described.

**60,410.—WASHING MACHINE.**—L. L. Newman, Jackson, Mich., assignor to himself and A. C. Zearing, Dayton, Ohio.

I claim the combination of the parts, C C and F, with their several rollers, pieces, D, the shaft and box, A, when arranged and operated substantially as described.

**60,411.—PIN FOR ATTACHING WEARING APPAREL.**—R. J. Nunn, Savannah, Ga.

I claim a pin consisting of a shank, a disk, ball, oval, or other head, an enlarged portion and a retaining shoulder, substantially as described.

**60,412.—DAMPER OR DRAFT REGULATOR FOR STOVES.**—Solomon Oppenheimer, Peru, Ind.

I claim the cup, A, constructed as shown, and provided with the discharge cap, E, or its equivalent.

I also claim, in combination with the above, the arm, C, and the handle, D, and the connecting rod.

**60,413.—DUMPING WAGON.**—J. L. Ordner, Cleveland, Ohio.

I claim the rollers, c, and frame, F, when constructed and arranged in relation to each other as set forth, in combination with the described box, A, provided with fastenings, n, the whole supported upon the bolsters, G, when used conjointly in the manner and for the purpose set forth.

**60,414.—CHURN.**—V. Palmer, Castalia, Ohio.

I claim the perforated dasher, I, the adjustable wings, I', and cheeks, d, as arranged in combination with the links, H and G, and the handle, F, in the manner and for the purpose set forth.

**60,415.—FARM GATE.**—Enos H. Peck, Brownhelm, Ohio.

I claim the cap, d, inclined plane, h, i, and balls, j, k, in combination with the center post, B, brace, C, and counter balance gate, as and for the purpose set forth.

**60,416.—LAMP.**—John M. Perkins and Mark W. House, Cleveland, Ohio.

First, We claim the combination of the annular reservoir, A, the annular air chamber, D, the burning chamber, B, the supply pipes, P, and vent tubes, V, constructed and arranged substantially as and for the purposes described.

Second, We also claim the collar, C, in combination with the perforated burner, G, when both are so constructed and arranged as to extend the cold air chamber, D, up around the perforated portion of the burner, substantially as shown and described.

**60,417.—APPARATUS FOR CHARGING AIR WITH GASOLIN.**—Barton Pickering, Milton, Ohio.

First, I claim the tube, O, to supply mixed air or gas to the vessel, C, from the vessel, D, connected substantially as described, for the purpose set forth.

Second, I claim the supply tube, O, connecting the vessels, C and D, substantially as described and for the purpose set forth.

Third, I claim arranging the supply vessel, C, within the vessel, A, substantially as described.

Fourth, I claim the construction of the generating vessel, D, with the partitions, I I I, bagging or other suitable material on these surfaces, the orifices, k k k, giving an alternating direction to each, the air and gasoline, as described and for the purposes set forth.

Fifth, I claim the vessels, A and A', vessels, B and B', the vessel C, the vessel, D, the tubes, e f g h n, the stop cocks o1 o2 o3 o4, the whole being constructed and combined substantially for the purposes set forth.

**60,418.—SEWING MACHINE.**—Francis A. Pratt, Hartford, Conn.

I claim the employment of the gib or shoe, d, and cross head, a, with the way, c, substantially as and for the purpose described.

**60,419.—STOVE BOILER.**—Miles Pratt, Boston, Mass.

I claim the improved boiler as made, with the flue arranged against its sides and rear.

**60,420.—WELDING OF IRON AND STEEL.**—John P. Price (assignor to Frank K. Hipple), Philadelphia, Pa.

I claim the welding of iron or steel by the aid of kryolite, as set forth.

**60,421.—DICE BOX.**—Edmund W. Quincy, Lacon, Ill.

I claim the arrangement of the disk, D, and its connection with the flat spring, E, by means of the piston or rod, C, and the open bottom which enables an easy renewal of the spring when necessary, all as and for the purposes set forth.

**60,422.—CULTIVATOR.**—Barbery S. Rich, Pennfield, N. Y., Administratrix of the Estate of J. C. Rich, deceased.

First, I claim the standard frame, C, provided with the lugs, I', at the top, and the parts, h h h, at the bottom, when combined with expanding arms, E E, of a flexible metallic cultivator, the whole operating substantially as and for the purpose specified.

Second, The gage wheel stirrups, composed of two counter-pieces, r r, and provided with the projections, t t, when combined with the flat side, a, of the cultivator frame, as herein set forth.

**60,423.—HYDRANT.**—J. P. Riley, Philadelphia, Pa.

First, I claim the hollow plug, H, and shank, h, in combination with the box, G, substantially as described for the purpose specified.

Second, The combination and arrangement of the stock, D, base, B, cap, C, section, A, key, K, and its shield, plug, H, as described, and box, G, substantially as described, as and for the purpose specified.

**60,424.—BOTTLE STOPPER.**—Daniel T. Robinson (assignor to himself and Nathaniel Jenkins), Boston, Mass.

I claim the improved bottle stopper fastening as composed of the slotted stopper or plug, B, the cammed lever, C, or its equivalent, and the wire, c, the whole being arranged and combined together in manner and to operate as specified.

And in combination with the above described arrangements of parts, I claim the rubber masher or covering, h, essentially in manner and for the purpose as described.

**60,425.—MODE OF CONSTRUCTING BUILDINGS.**—Frederick O. Rogers, Niles, Mich.

I claim constructing the walls and roofs of wooden buildings, whole or in sections, by the union of two or more series, or layers, of laths or battens, crossing each other transversely, the said walls and roofs, or sections thereof, being united so as to form a firm structure without the use of additional walls, frame work, or braces, substantially as and for the purpose herein specified.

**60,426.—CURTAIN FIXTURE.**—Levi Ross (assignor to himself and Oliver K. Phillips), Springfield, Mass. Antedated Nov. 24, 1866.

I claim the mode of hanging window curtains herein described by means of the two rolls, A, B, connected with the curtain by the tapes, E E F F, when combined with the two cords, G H, and their respective rollers or pulleys, c d, arranged and operated substantially as herein set forth.

**60,427.—HARVESTER.**—Nathaniel Rowe, Emmitsburg, Md. Antedated Dec. 4, 1866.

First, I claim arranging the entire gearing at the center of the machine and surrounding it with a casing, E, the gearing and casing being constructed and arranged substantially as set forth.

Second, I claim the detachable piece, P, in combination with the shaft, N, and casing, E, when the latter is constructed with a movable cap that covers the gearing on the axle and the pieces, P, substantially as and for the purpose set forth.

Third, I claim attaching the braces of the tongue, T, by a collar to a flange, E2, projecting from and being a part of the casing, E, substantially in the manner set forth.

Fourth, I claim the combination of the driver's seat, V, and springs, V2, with the standards, U, when the same are permanently attached to and on the opposite side of the axle from the braces of the tongue.

Fifth, I claim the slotted and bifurcated lever, S, when connected with the cutter-bar in front and rear, substantially as and for the purpose set forth.

**60,428.—CORSET.**—C. D. Rutherford, Brooklyn, N. Y.

I claim a corset made of a skeleton or open form, in combination with the net work, F F, the whole being constructed substantially as herein described and for the purpose specified.

**60,429.—OIL CAN.**—Stephen Sargent, Lowell, Mass.

I claim the combination of the venting chamber, A, venting tube, C, passage, c or g, or their equivalent, with the oil can, the whole arranged substantially as and for the purpose set forth.

**60,430.—MACHINE FOR CUTTING BUNGS FOR BARRELS.**—John George Schmidt, Rochester, N. Y.

I claim adjusting the cutters of a bung cutter by means of the screws, g, springs, i, and pins, K, so as to enable it to cut bungs of different sizes and taper, substantially as described.

**60,431.—SKATE.**—George Scott and John W. Smith (assignors to themselves and James Smith), Boston, Mass.

We claim, as our invention, the arrangement as well as the combination of the rocker, B, and the two runners, C C, and the foot rest, A.

We also claim the combination of the foot rest with the inclined toe beak, a, arranged on it, and to operate with the beak, c, when applied thereto, substantially as set forth.

We also claim the mode of applying the heel screw to the skate, viz., by extending it up through the foot rest, and supporting its head in a bearing to extend into the neck of the screw, as described.

**60,432.—MAGNET FOR TELEGRAPHS.**—Tal. P. Shaffner, Louisville, Ky. Antedated Nov. 25, 1866.

I claim making an electro magnet of the armature by means of a current induced by the main circuit, substantially as herein set forth, in connection with the electro magnet, A A, or its equivalent, for telegraphic purposes.

**60,433.—SEWING MACHINE.**—Isaac Merritt Singer, Yonkers, N. Y.

First, I claim the combination in a sewing machine of the following instrumentalities, viz.: the reciprocating needle carrier

and an oscillating shuttle, having its delivery eye coincident with its center of oscillation, substantially as set forth.

Second, The shuttle oscillating substantially as described, having a delivery eye arranged at one side of the plane of oscillation of the shuttle point, substantially as set forth.

Third, The combination in a sewing machine of the following instrumentalities, viz.: the shuttle, spring holder, and stop for the spring holder, substantially as set forth.

Fourth, The combination in a sewing machine of the following instrumentalities, viz.: the block for holding the shuttle in place at one side, and a shuttle guide for holding the shuttle at its other side, so arranged that it guides the shuttle only when its point is in the vicinity of the needle, leaving it free at other times, substantially as set forth.

Fifth, The combination in a sewing machine of the following instrumentalities, viz.: the oscillating shuttle drivers, reciprocating connecting rod, and spring acting crosswise to said rod, substantially as set forth.

Sixth, The combination in a sewing machine of the following instrumentalities, viz.: the needle holder, oscillating shuttle, take-up lever, cam, and spring, substantially as set forth.

Seventh, The combination and arrangement in a sewing machine of the following instrumentalities, viz.: the spool support, thread tension, and thread-slackening mechanism, substantially as set forth.

Eighth, The combination in a sewing machine of the following instrumentalities, viz.: the feeding instrument, bar reciprocating crosswise to the movement of said instrument, and turning, slotted, regulating plate, with its slot extended at opposite sides of the center on which it turns, substantially as set forth.

Ninth, The combination in a sewing machine of the following instrumentalities, viz.: the reversing and regulating lever that controls the feed, and two stops, substantially as set forth.

**60,434.—BRIDGE.**—Frederick H. Smith, Baltimore, Md.

I claim constructing a suspension truss in such a manner that all posts other than the center one, C, shall be supported by bars or braces, one of which, as D2, extends from the foot of the post, C, to be supported to an end of the straining beam, B, and the other bar or brace, D', supporting said post, C', being in a prolongation of the line of the bar or brace, D, supporting the center post, C, from the opposite end of the straining beam, substantially as described.

**60,435.—GATE.**—Stephen Spoor, Phelps, N. Y. Antedated Nov. 21, 1866.

I claim the combination with a vertically-revolving roller supporting the upper rail, of a roller support, C, having a horizontal joint and composed of guards, k k, recessed standards, l, l, and bearings, h h, socket, b, and conical bearing pin, c, constructed and arranged substantially as shown and described.

**60,436.—BREAST PROTECTOR.**—John Stadermann, New York City, and Henry Sauerbier, Newark, N. J.

We claim artificial breasts formed by swaging or striking up, out of one and the same piece of wire gauze or wire cloth, two protuberances of proper dimensions, and having the outer portion of the wire gauze or cloth swaged or struck up to conform to the shape of the chest of the wearer, substantially as shown and described.

**60,437.—METER FOR GAS AND LIQUIDS.**—Homer H. Stuart, Jamaica, N. Y.

I claim, as my invention, rotating the axle of a meter by vanes that are alternately extended and folded or retracted, substantially as described.

And I also claim by this invention to measure a fluid body by passing it transversely through a cylinder or other circular vessel containing vanes revolving in said cylinder or circular vessel, in such a manner that the said vanes, while moving in the direction of the flowing body, are radii of a circle as large as the inner surface of the cylinder, and while returning through the lower part of the cylinder to the point where the fluid is received they are folded or retracted so as to be the radii of a circle smaller than the periphery of the cylinder.

**60,438.—CHEESE PRESS.**—William Thomas and William Rhoades, Mukwonago, Wis.

We claim the combination of the notched levers, I and K, with the pawls, T T, arms, V V, bed piece, M, and cross beam, B.

**60,439.—STAMP FOR MARKING SHEEP.**—Asahel Todd, Pultneyville, N. Y.

I claim as an improved article of manufacture, the metallic skeleton marking stamps, constructed as and for the purposes herein shown and described.

**60,440.—CUPOLA FURNACE.**—Charles Truesdale (assignor to William Resor & Co.), Cincinnati, Ohio.

I claim the provision in a cupola or blast furnace of the several tiers of twyers in an ascending series with diminished issues, substantially as set forth.

**60,441.—ELEVATOR.**—Otis Tufts, Boston, Mass.

I claim attachment of a suspending rope of an elevator car by means of an intermediate device, f, adjustable with reference to the car or drum, substantially as described.

Also, in combination with an elevator car, its winding drum, and two or more ropes or chains for hoisting or lowering the car, means for relative mechanical manipulatory adjustment of the length and tension of said ropes or chains, arranged to operate substantially as described.

Also, in combination with a winding drum of two rope bed curves reversed in position with respect to each other as set forth.

**60,442.—ELEVATOR.**—Otis Tufts, Boston, Mass.

I claim, for the purpose of automatically adjusting the strain upon the ropes or chains, b b, the mechanism herein described, when arranged to operate substantially as specified.

**60,443.—ELEVATOR GUIDE.**—Otis Tufts, Boston, Mass.

I claim combining the suspended car of an elevator with the ways or rails which confine it, by means of guides kept by springs constantly in contact with said ways or rails, when said guides are so arranged as to be capable of motion toward and from the rails.

Also, combining with the car and rails of an elevator, guide wheels provided with soft-surfaced peripheries, so as to operate as set forth.

Also, combining with the car and rails of an elevator, guide wheels having elastic peripheries, for the purpose specified.

Also, the rails or ways, a, provided with ratchet teeth, b, re-enforced by flanges, c, c.

**60,444.—MEANS FOR OILING BODIES ROTATING AROUND SHAFTS.**—Otis Tufts, Boston, Mass.

I claim the construction, substantially as shown, of a loose pulley, clutch, or other similar device, or the hub thereof, with a removable head or heads, when the removable head or heads are provided with suitable packing, so as to form a closed cavity for containing lubricant directly around the parts to be lubricated.

Also the oil cups, h, when arranged within the cavity aforesaid, so as to operate as described.

**60,445.—CONTINUOUS PERCOLATOR AND FILTERING MACHINE.**—P. H. Vander Weyde, Philadelphia, Pa.

I claim, First, The above-described upward-acting percolators, into each of which the liquid enters below the solid material and overflows at the top into the next one.

Second, The placing of them on steps so that the liquid flows from the more exhausted solid material into that which is later added, coming in its course all the time in contact with fresher material.

Third, The manner described of displacing a series of any number of them on the incline rail track by turning the wheels, A and B, in order to remove only the vessel above containing exhausted solid material, and supplying one with fresh material at the lower end, without interrupting the operation, thus effecting a saving in material as well as of time.

**60,446.—COOKING STOVE.**—Geo. W. Walker, Boston, Mass.

I claim the construction, substantially as shown and described, by which the space above the ordinary high hearth or ash pit of

the fire box of the common form of cooking stove is utilized for the purpose specified; said construction consisting of the extension of the top and sides of the stove over and to the front of said hearth or ash pit, when provided with doors which inclose the space and retain the heat therein while capable of being opened for the various purposes connected with the utilization of said space.

Also, in combination with such an inclosed space over the aforesaid hearth or ash pit, of the inclosure of the space below the same so as thereby to increase the capacity of the oven of the stove, substantially as described.

An I also claim the arrangement of the oven of the stove with side and front doors and double walls or plates on either side and at the front of the oven between the front and side doors thereof, when the spaces inclosed between said double walls open into the lower flue so as to become charged with heated air and thus heating the oven as well as affording the strength needed in the structure of the stove.

**60,447.—CORN PLANTER.**—J. C. Walkinshaw (assignor to himself and Jos. W. McGonigle), Leavenworth, Kansas.

First, I claim the arrangement of the ears, b b, on the driving wheels, A A, in combination with the dropping bar, F, the vertical slides, k k, the seed compartments, a a, and the conductors, g g', constructed and operating substantially as and for the purposes herein described.

Second, The lever frame, l l, connected with the plows, h h, for raising and lowering them, constructed and arranged substantially as shown and described herein.

**60,448.—TRAVELING-BAG FRAME.**—Cornelius and Zachariah Walsh, Newark, N. J., assignors to Cornelius Walsh.

I claim the combination of jaws, A A', with the ends, a, as described, the bar, B, with tenons, c, secured in the jaw, A, all constructed and arranged in the manner and for the purpose herein specified.

**60,449.—CULTIVATOR.**—William T. Watson, Nottingham, Md.

First, I claim the teeth, C, of a cultivator, when constructed as set forth.

Second, The combination of the frame, A, teeth, C, and metallic sockets, D, when said several parts are respectively constructed and the whole arranged substantially as set forth.

**60,450.—TYPE-DRESSING MACHINE.**—Patrick Welch, New York City.

First, I claim setting up the types in lines standing upon their feet in the manner described to prepare them to be fed to the machine, substantially as herein set forth.

Second, The combination with a table or bed having a channel for the types formed upon it, substantially as described, of the knives, M M, and feed bar, D, as and for the purpose set forth.

Third, The combination with the knife beds, L L, forming a portion of a channel for the types of an adjustable support, W, substantially as herein set forth.

Fourth, The combination of the knives, N N, with the knives, M M, and feed bar, D, substantially as set forth.

Fifth, The combination of the movable guide, U, and the pusher, V, with the knife beds, L L, forming a channel for the types, and knives, M M, substantially as described.

Sixth, The combination of the feed bar, D, with the frame or pusher, J, the said pusher being operated substantially as described.

Seventh, The combination of the stop, u, with the feed bar, D, and pusher, t, substantially as herein set forth.

Eighth, The combination with the movable guide, U, and pusher, V, of the yielding guard, y, and adjustable guard, u', substantially as set forth.

Ninth, The combination with the puncher, V, and adjustable guard, u', of the stop or holder, c', substantially as herein described.

**60,451.—LATHE CARRIER FOR DOG.**—L. P. Wilcox, Brooklyn, N. Y.

I claim the saddle or supplementary block, B, constructed and fitted to the carrier, substantially as herein set forth for the purpose specified.

**60,452.—LANTERN.**—Samuel R. Wilmot, Bridgeport, Ct.

I claim the construction of the base of the lantern with an internal oil reservoir and with cavities, s, on opposite sides of the said reservoir for the reception and manipulation of the spring catches a, by which the base is attached to the body of the lantern, substantially as herein set forth for the purpose specified.

**60,453.—STOVEPIPE ELBOW.**—James Wilson, Wilmington, Del.

First, I claim an improved stovepipe elbow formed by combining the door frame and door, C D, the plates A and B, and the part, E, with each other, substantially as described and for the purpose set forth.

Second, The combination of the sliding damper, F, with the elbow, substantially as described and for the purpose set forth.

**60,454.—PADLOCK.**—John E. Wootten, Cresson, Pa.

First, The combination of the case, A, cylinder, B, and its arm, C, with the hasp, E, and the catch on the end of the same adapted to a catch on the end of the arm, C, the whole being arranged and operating substantially as and for the purpose herein set forth.

Second, The combination of the cylinder, B, circular tumblers and their projections, the hollow cylinder, h, and the cylinder, H, with its wards, the whole being arranged and adapted to the casing, A, substantially as and for the purpose herein described.

**60,455.—HYDROCARBON BURNER FOR HEATING PURPOSES.**—James Youmans and John Reed, Davenport, Iowa.

We claim a gas generator constructed with a chamber, C, divided by a partition, D, into two compartments, E and F, and having also a pipe, I, burners, L, disk, m, and stem, N, said several parts being respectively constructed and arranged in relation one to another substantially as set forth.

**60,456.—SELF-REGULATING TENSION FOR SEWING MACHINES, ETC.**—Theodore Zinck (assignor to himself and F. W. Kalbfleisch), New York City.

I claim the arm, C, in combination with the friction spring, B, and bobbin, A, constructed and operating substantially as and for the purpose described.

#### REISSUES.

**2,414.—MACHINE FOR PULVERIZING CLAY.**—George F. Blake and P. Hubbell (assignees of George F. Blake), Boston, Mass. Patented November 26, 1863.

First, We claim, in combination with a machine for cleaning and pulverizing clay or other plastic material, the reciprocating wiper or plunger, W, constructed and operating substantially as described.

Second, The revolving grate, constructed and operating as described.

Third, The stationary fingers, w, constructed, arranged and operating as set forth.

Fourth, The arrangement for conjoint operation of the inclined blades or sweeps, G, with the horizontal grate, G', in the manner described.

Fifth, We claim the arrangement for conjoint operation of reciprocating, oscillating, or rotating wipers, blades or sweeps, with rotating or stationary screens or gratings, substantially in the manner and for the purpose set forth.

**2,415.—CARPET LINING.**—George W. Chipman (assignee by mesne assignments of John R. Harrington), Boston, Mass. Patented April 1, 1856.

I claim, as a new article of manufacture, a carpet lining made up of a long or continuous sheet or sheets of stout paper, and a layer or layers of fibrous material applied thereto, substantially as set forth.

**2,416.—MACHINE FOR MAKING CARPET LINING.**—

George W. Chipman (assignee by mesne assignments of John R. Harrington), Boston, Mass. Patented April 1, 1856.

I claim the process of making a carpet lining by progressively bringing into contact a sheet or sheets of stout paper, and a sheet or sheets of batting or soft fibrous material, so that upon contact of the contiguous surfaces they shall be caused to adhere together, substantially as described.

Also, in combining with a roll or rolls upon which the sheet or sheets of paper are wound, feed and presser rollers, operating to compress together and feed the paper and batting, substantially as set forth.

Also, in combination with the paper roll or rolls and feeding and compressing rolls, a paste or cement-applying mechanism, operating substantially as described.

Also, in combination with a wadding-forming apparatus, creasing or fold-forming rolls, operating as and for the purpose substantially as set forth.

Also, in combination with such fold-forming mechanism, the box or platform into which the wadding is delivered in folds, and from which it is removed for baling by letting down the fall, substantially as described.

**2,417.—HOOP LOCK FOR COTTON BALES.**—E. Victor Fassman, New Orleans, La. Patented April 18, 1865.

I claim the plate provided with slots, when the same is constructed with ridges or projections on both side of the plate, substantially as set forth.

**2,418.—TANNING.**—Sanford A. Hickel, Roane County, W. Va., Calvin, James, and Benj. F. Armstrong, Jackson Court House, West Va., assignees of Sanford A. Hickel. Patented November 7, 1865.

We claim the employment or use of manure, in combination with bark or other tanning material, substantially as and for the purpose set forth.

#### DESIGNS.

**2,523.—PICTURE FRAME.**—John H. Bellamy, Charlestown, Mass.

**2,524.—BRACKET.**—John H. Bellamy, Charlestown, Mass.

**2,525 and 2,526.—CLOCK CASE.**—William A. Giles, Chicago, Ill. Two Cases.

**2,527.—TRADE MARK.**—Daniel B. Kimball, New York City.

**2,528.—SHAFTING HANGER.**—C. C. Klein (assignor to Thomas Wood), Philadelphia, Pa.

**2,529.—BUGGY.**—John Reynolds, Washington, D. C.

#### Inventions Patented in England by Americans.

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

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**2,187.—BREECH-LOADING FIRE ARM.**—Thomas J. Vail, Hartford, Conn. Aug. 25, 1866.

**2,470.—COMPOSITION AND PRODUCTION OF ARTIFICIAL STONE CEMENT, ETC.**—George E. Vanderburg, New York City. Sept. 25, 1866.

**2,517.—APPARATUS FOR FITTING GARMENTS.**—Silas O. Brigham, San Francisco, Cal. Sept. 23, 1866.

**2,575.—CONSTRUCTION OF LAMPS FOR BURNING VOLATILE OILS OR SPIRITS, ETC.**—Philip Lieutens Nadt, New York City. Oct. 6, 1866.

**2,687.—MEANS FOR PREVENTING, INDICATING, AND CORRECTING AN UNDUE DEGREE OF SUPERHEATING OF STEAM IN STEAM ENGINES, ETC.**—Norman Wiard, residing at present in New York City. Oct. 17, 1866.

**2,718.—SEWING MACHINERY.**—Lewis B. Bruen, New York City. Oct. 20, 1866.

**2,729.—MACHINERY FOR MANUFACTURING CARTRIDGES.**—Timothy J. Powers, New York City. Oct. 23, 1866.

**2,740.—SEWING MACHINE.**—Henry W. Fuller, New York City. Oct. 23, 1866.

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