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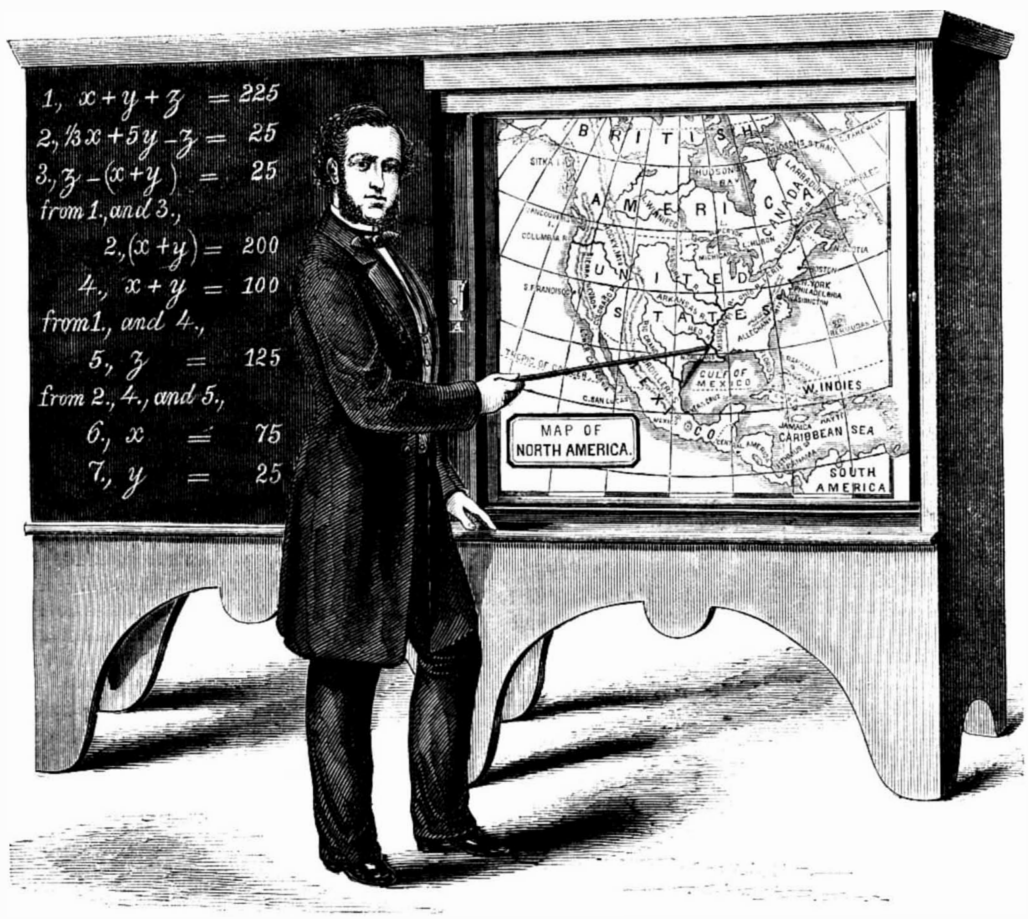
Combined Atlas and Blackboard.

The apparatus usually employed for instructing youths in the elementary branches of education is costly in character and liable to damage from want of proper protection. The colors of maps fade out and lose their freshness, mischievous little fingers remove whole continents bodily from the face of the earth, and more malicious youths destroy the apparatus entirely by throwing ink, &c., upon them. These troubles, which are well known to all who have ever had the care of a school, are obviated by the use of this combined map case and blackboard, in which the maps are framed as neatly as pictures and remain as bright and pleasing, externally, as when first printed, for as soon as the instructor has finished the lesson they are all inclosed until they are again required. In this engraving the door, A, which usually covers the maps, is shown withdrawn to one side, disclosing the maps behind. The maps are framed and slide back and forth in grooves at the bottom of the case; and as each one is required, the one immediately in front is pushed back until the desired one is reached; in this way a large number of maps are compactly stored, always ready for use and within easy vision. This latter feature is a very important one, since, by reason of it, children are not obliged to twist their necks all round the room several times in the course of a lesson to find different parts of the globe. On the left there is a blackboard placed upon which our artist has depicted a simple algebraic sum, and he has also shown the instructor in the act of pointing out some precise spot upon the map—doubtless the scene of one of our recent victories.



HERIDER'S COMBINED ATLAS AND BLACKBOARD.

The features embraced in this piece of school-room furniture are novel, and such as to render it useful; in other respects the case is handsomely finished and quite ornamental.

The invention was patented through the Scientific American Patent Agency on the 22d of Sept., 1863, by Wm. C. Herider, of Miamitown, Ohio. For further information address the inventor at that place.

Ventilating Ships.

The *Mechanics' Magazine* says:—"An important part of Dr. Edmonds' ventilating apparatus has been fitted to the *Royal Sovereign* cupola-ship, in which, by a simple arrangement, from 300 to 350 channels actually existing in every ship have been made available for the ventilation of the bilges and timber spaces. This is done by converting the latter into branch channels of one long air-shaft, constructed along each side of the ship. Through this air-trap a draft is created by communicating it into the funnel or ash-pit in steam-ships, or into ordinary ventilators in sailing-ships—in either case revolving fans, worked by hand or machinery, may be used in connection with this system if any extraordinary amount of ventilation is required, and from its diffused action injurious draughts, which are inseparable from all other plans in use, are entirely avoided. Ship-owners are interested in the success of this system, as it promises to prevent dry rot by the free circulation of air which it creates through the whole frame-work of the ship; but it serves another equally important object—that of the removal of all the foul smells usually prevailing between decks, which are engendered by dampness in the timber spaces, and decaying matter lodged in them. This is a very important result to obtain, particularly in troop or emigrant ships, as these are often causes of disease in hot climates. To perfect the ventilation, deep air channels are provided, which form part of the deck itself, and act immediately below it, but even without these a very efficient ventilation can be obtained. In the *Royal Sovereign* the efficacy of the plan has been already tested, so far as her present state of equipment admits of it, a very slight increase of temperature in the funnel being sufficient to draw a current of air through the air-shafts, and necessarily through the whole framework of the ship, which passing into the funnel is carried high into the open air."

The military authorities at St. Louis have closed all the gambling houses in that city and confiscated their contents.

Artificial Hoofs for Horses.

It is important to calculate the various useful purposes to which gutta-percha may be applied. One of the most ingenious applications recently made of this valuable substance is that of making artificial hoofs for horses' feet. Many ingenious devices have been resorted to, to attain this result, but the adoption of gutta-percha will, doubtless, supersede all others as soon as its efficacy becomes recognized. What is required by the veterinary surgeon is a substance possessing the consistence of horn, to retain the nails of the shoe; that will readily soften by heat so as to mold itself to the required form; that it be indissoluble in water, seeing that the horse's hoof is generally in contact with moisture; and, lastly, that it be capable of uniting perfectly with the hoof. No known substance possesses all these qualities except gutta-percha. For the purpose under consideration it is prepared by being cut into fragments the size of a nut and softened in hot water; the pieces are then mixed with half their weight of powdered sal ammoniac and melted together in a tinned saucepan over a gentle fire, keeping the mass well stirred; the mixture must assume a chocolate color. When required for use it should be melted in a glue-pot; the surface of the hoof must be scraped clean and the gutta-percha applied as required. The application may be facilitated by the use of a glazier's knife warmed, by which the surface of the artificial hoof may be smoothed and polished. In this manner many a valuable horse may be rendered useful which otherwise would only remain fit for slaughter. On the score of humanity, also, this application of gutta-percha is to be welcomed.

Copper.

The whole earth appears to be more or less impregnated with this beautiful and useful metal, and the sea contains a notable quantity of it. Copper is in great abundance in various parts of the British isles, in Hungary, in Siberia, in Cyprus, from which island it derives its name, and whence, no doubt, on account of the geographical position of that island, it was principally procured by the Romans. It is also found in China, in Australia, and in Brazil—in fact, almost everywhere. It appears, however, certain that gold and silver were known to the ancients prior to copper. According to Ezra viii. 27, "Copper was as precious as gold." Paul, in 2 Timothy iv. 14, lays a complaint against one Alexander, a coppersmith. These are the only instances in which mention is made of this metal in the Holy Scriptures. Copper takes a rank among metals from its peculiar color, which, when pure, is of a rose-like hue. Most metals when thep become rusty lose their beauty; not so, however, with copper, for it changes into various shades, from pink to a beautiful crimson, as in copper bronze powder, to blue, to green; hence the artist takes it as a pigment to produce upon his canvas "the fields and the forest." In the metallic state copper possesses so many useful qualities that various metal-workers find it of great service. It bears such "wear and tear" that it was adopted as money at a very early period, and retains its good name to the present time. Copper is one of the best conductors of lightning; hence it will be employed to transmit "the flash" below the restless Atlantic, in forming the submarine telegraph between England and America. This metal is so sonorous that few musical instruments can be made without it. The Handel organ and "Big Ben" of Westminster alike owe their tone to copper. Musicians, electricians, artists, and money-makers are not the only persons whose "occupation would be gone" were it not for copper. Color-makers and dyers are much indebted to it, as well as a host of others who follow the same trade as "Alexander the coppersmith."—*Piesse's Laboratory of Chemical Wonders.*

New Engine by Californian Mechanics.

The *Bulletin* of San Francisco makes mention of a new beam engine recently erected by Californian machinists :—

"The Vulcan Iron Works Company, on First street, have just finished one of the finest pieces of machinery ever built on this coast. It is a high-pressure beam engine for the Gould and Curry Silver Mining Company. This engine, which is said to be the largest high-pressure, and the second of its kind ever made in California, is of the following dimensions: A solid bed-plate, 21 feet long and 6 feet wide, forms its base, and will be bolted to a massive foundation of stonework 22 feet long, 8 feet wide, and 16 feet deep. On the bed-plate at one end is bolted the cylinder, which is 30 inches bore and 6 feet stroke, with the valve chests and valve gearing. At the other end is the main pillow-block, while in the centre are elegantly moulded columns and diagonal braces of Gothic style which stand on each side and support the beam centres. Other columns of the same style are at each end, and sustain an entablature extending around the whole of the upper part. Brackets are bolted to this entablature, and will receive a platform with light iron standards and a brass rail or guard. This platform is intended for the examination and oiling of the machinery, and will be reached by a light cast-iron spiral staircase.

"The beam is of the same shape as used on board our low-pressure steamboats, and is 15 feet long, and 7 feet deep. The connecting rod of wrought iron, with the usual braces, is 15½ feet long. It is a handsome piece of forging, and is finished in a perfect manner. The crank is of wrought iron, as is the shaft—the latter being 12 inches in diameter and 14 feet long. It is made from a spare piston-rod which belonged to the steamship *Golden Gate*. The fly-wheel, which is intended for a 3-feet belt, is 18 feet diameter, 38 inches face, and weighs 25,000 pounds. The total height of the engine from the floor is 21 feet.

"The valve motion which is claimed to be especially excellent, consists of piston balance valves operated by an eccentric. It distributes the steam by a reciprocating motion similar to that of an ordinary slide valve. The variable and self-adjusting expansion gear or cut-off is controlled by the governor, which will regulate the motion of the engine with perfect precision. The operation of the governor is through a peculiar mechanism transmitted to a cam, the stroke of which is advanced or retarded in proportion to the variations of the resistance or work done by the engine. This cam is attached to the piston valves, and has the effect of twisting them without interfering with their reciprocating motion. It is claimed that steam is suppressed by this twisting motion at any requisite point of the stroke of the engine, although the adjustment of the cut-off can be left wholly to the governor, which is perfectly automatic in this respect. It may also be adjusted by hand if desired, and whilst the engine is running, as an index shows, at all times, at what point of the stroke of the engine the suppression of steam occurs. This expansion gearing was invented and patented by MacNaught, of Glasgow.

"That our readers may be enabled to form some idea of the unusual size of this piece of machinery, by far the largest stationary engine ever built in California, we may state that the beam weighs 7,500 pounds, the bed-plate 14,000 pounds, the cylinder 4,200 pounds, the main shaft and crank 6,800 pounds —and the total weight of the engine complete is 160,000 pounds. When working at its intended speed of 25 revolutions, with 100 pounds steam pressure, and cutting off at an average of ¼ to ⅓ stroke, it will exert a net force of 260 to 300 horse-power. This engine is capable of running a mill of 120 stamps, and other machinery attached. By itself, without boilers, shafting, &c., it has cost about $30,000. It is now being taken down, preparatory to its being shipped to Nevada Territory, where its influence on the future dividends of the Gould and Curry Company is expected to be great."

Brainwork and Longevity.

The philosophers ought to have length of days for their portion, seeing how their pursuits ought to elevate them above the disturbances of life. And such is, in fact, the operation of their mode of life, by which their faculties are furnished with constant entertainment on subjects which would seem to lie outside the range of uneasy passions, while creating or exciting the noblest moral emotion. And an unusual amount of healthy longevity is, in fact, found among philosophers—whether mathematicians, naturalists, or speculative students. Such things have been heard of as strifes in those serene fields of thought; such sights have been seen as faces furrowed with fretfulness, or working with passion; but the old age of many philosophers is, at this moment, an honor to their vocation. Peter Barlow was, when he lately died at 82, the same Peter Barlow that he had been to two generations of friends and disciples. Sir David Brewster is still active and occupied at the same age. The late Mr. Tooke did not puzzle his brain about the currency too much to be still up to the subject at 86. Sir Roderick Murchison is past 70, and so is Sir J. Herschel. Literature ought to have the same operation as science; but it seems to have more room for agitations and anxieties, except in the case of authors who live in and with their work, exempt from self-regard. Jacob Grimm was a very perfect example of the philosophic serenity which a literary career can yield; and he lived to 78. There is something remarkable in the longevity of literary women in modern times, even if we look not beyond our own country. Mrs. Piozzi and Mrs. Delaney perhaps scarcely enter within the conditions; and the still lamented Jane Austen was under an early doom from consumption; but Miss Edgeworth was above 80 when she died; Joanna and Agnes Baillie were older still; and Mrs. Trollope died the other day at 84. The artists who have departed lately have been old. Biot was 87, and Vernet 74. Our Mulready was 77, and Cockerell, the architect, was 73.—*Once a Week.*

The Wrongs of the Stomach.

In most of the early literature is to be found a dialogue between the Body and the Soul, in which each accuses the other of their mutual perdition, recapitulating the offences which have produced it. Something similar might be written, with good effect, dividing the imaginary conversation between, let us say, the Stomach and the Man, and making an attack of gout the subject of their recriminations. The man might accuse the stomach of having done its duty so badly that he is tormented with a burning fire in his extremities, which will neither let him eat, drink, walk, nor rest. The stomach might plead justification, and say that she had lighted the said fire as the only means of getting a moment's rest from an intolerable task-master. Again the man might complain that he had lost all enjoyment of life, that his spirits were depressed, his mind gloomy, his appetite gone, his once fine muscular system reduced to flabby indolence; that his food did him more harm than good, so that it had become a misery to eat, and that every meal was followed by a leaden oppression which rendered life an insupportable burden. The stomach, having listened to all this, delivered in a tone of angry accusation, would reply: "My case is just as bad as your own. Once upon a time, before you took to evil courses, I was as healthy a stomach as you could meet in a day's march; I went through my work regularly, and did it so cheerfully and so well that, like some unreasonable masters when they get hold of a willing servant, you seemed to think I could do without rest and didn't care even for an occasional holiday. Then you heaped burden after burden upon me. Before I had well digested your breakfast for you, you thrust a dinner upon me large enough for three stomachs. Not satisfied with that, you wound up the day with a supper, drenching me all the time with ale, wine, spirits, tea, coffee, rum, more wine, and more spirits, till I thought you had taken leave of your senses ; and when I heard you groaning in your sleep, starting up every now and then as if apoplexy had broken into the house, and was going to carry you off, I said to myself: 'Serve him right if it did.' And in this way you went on year after year, treating all my remonstrances with contempt. I gave you headache after headache; I tried to call you to reason with half a dozen attacks of influenza ; gave you a bilious fever ; made you smart with rheumatism ; twinged you with gout till you roared. But all to no purpose. You went on making me digest till the work broke my back, and now I can digest no longer." This reproach might be made even pathetic, by a description of the stomach watching its hard tasks come down to it from the regions above between dinner and bed-time. First comes a plate of soup and bread, and a glass of sherry; "I can manage that," says the stomach. Then a plate of fish, with more bread and more sherry ; "and that," adds the stomach, "though these sauces don't quite agree with me." Then comes beef, or mutton, or both, and stout; then game and sherry; then a dish of tart. "Confound this pastry," says the stomach, "it gives me more trouble than any thing else; but if the master will only stop here, I think, if I put out all my powers, I can get even this rubbish out of the way." But she has hardly taken this hopeful view of the case, when down come cheese, celery, apples, oranges, nuts, figs, almonds, and raisins, port, sherry, claret, and a tumbler of hot Hollands and water. "Good gracious, was there ever such a mess?" exclaims the stomach; "what can the man mean? Does he think one pair of hands can manage all this?" Still the willing slave goes to work, when presently there is a rush of hot tea from above, with a thin slice of bread and butter. And when the stomach, with infinite labor, has got the hodge-podge into some sort of homogeneous shape, and is preparing to take a nap after her exhaustion, lo! a devilled drumstick rushes into its laboratory, two devilled kidneys, a bottle of stout, and three tumblers of hot brandy and water.—*London Review.*

Singular Detection of Poison.

Paris has recently been much excited by a supposed case of poisoning, and singular discovery of evidence of the crime. A woman died under the care of a homœopathic physician—Dr. Courty de Lapommerais. The Judge of Instruction—the officer charged with the investigations preliminary to the public trial—went to the house of the deceased woman to inspect the room in which she died, but with no fixed idea as to what he should discover there, nor as to whether he should discover anything at all. He perceived some faint spots on the floor, and found, on inquiry, that they were made by the dejections of the sick woman. He ordered the floor to be scraped at the places stained, he carefully collected the scrapings and submitted them to the examination of competent chemists, and these scrapings are going to condemn the prisoner. They contained *digitaline*, the active principle of the *digitalis purpurea*, or purple fox-glove, one of the most deadly poisons of the "Materia Medica," and which acts by diminishing the heart's action. To show the wonderful power of this medicament, the *digitaline*, as prepared by Homolle and Quevenne, the preparation now principally in use at Paris, is given in doses of one or two milligrammes, or say of one grain, for fifteen days' use.

The chemists commenced their investigations by giving small quantities of the scrapings to animals, all of which died in a way to suggest poisoning by *digitaline*. They then selected the frog for the test experiment, because the heart of this animal, when laid bare, continues to beat normally. The test was made on three animals; the heart of the first one was laid bare, and continued its contractions and dilatations as if nothing had occurred; on the naked heart of the second one a minim of a solution of *digitaline* was dropped; the heart commenced to beat slower and slower; presently its pulsations ceased entirely, and the animal was dead. On the heart of the third frog they placed a small quantity of the avenging scrapings from the floor, and they produced exactly the same effect as the drop of pure *digitaline;* the heart's pulsations slackened by degrees, and presently the animal was dead.

These interesting experiments were made before the Judge of Instruction, and will be repeated before the jury at the trial. Until they were made the prisoner was indifferent and even joyous; he knew that there was no chemical test for the poison he had used; he had taken care to nurse the condemned woman himself, and to conceal all the probable sources of discovery; but he had not counted on the spots on the floor, nor on the peculiar properties of the heart of the batrachian tribe. Nevertheless he nad occupied himself a great deal with toxicology, and still maintains that he can prove his innocence.

A Longitudinal River.

A river that runs east or west crosses no parallel of latitude; consequently, as it flows towards the sea, it does not change its climate, and, being in the same climate, the crops that are grown at its mouth are grown also at its sources; and from one end to the other of it there is no variety of productions—it is all of wheat and corn, or wine or oil, or some other staple. Assorted cargoes, therefore, cannot be made up from the produce which such a river brings down to market. On the other hand, a river that runs north or south crosses parallels of latitude, changes its climate at every turn, and, as the traveller descends it, he sees new agricultural staples abounding. Such a river bears down to the sea a variety of productions, which one or another of the nations is sure to want, and for which one will send to the market at its mouth or the port whence they are distributed over the world. Its advantages are equally great for trade between the different sections through which it flows, as the staples of those sections are unlike, and productions lacking in one part of its course are supplied in another. The assortments of merchandise afforded by such a river are the life of commerce; they give it energy, activity and scope. Such a river is the Mississippi, and the Mississippi is the only such river in the world!

MISCELLANEOUS SUMMARY.

Substitute for Gutta-percha.—At a meeting of the French Academy of Sciences, M. Serres gave an account of the Valata, a shrub which abounds in Guiana, and affords a juice which he asserts, is superior, for many purposes, to gutta-percha, but especially as an insulating material for enveloping telegraphic wires. The milk or juice is drinkable, and used by the natives with coffee. It coagulates quickly when exposed to the air, and almost immediately when precipitated by alcohol, which also dissolves the resin of the Valata juice. All the articles made with gutta percha can be made with the sap of the Valata, and it has no disagreeable smell. When worked up it becomes as supple as cloth, and more flexible than gutta-percha. M. Serres exhibited a number of articles manufactured of Valata milk. Up to the present time it seems, from M. Serres's report, not to have become an article of commercial export.

Pickled Pork equal to Fresh.—A lady contributor at Perry, Ill., sends the following directions :—"Let the meat cool thoroughly : cut into pieces four to six inches wide : weigh them, and pack as tight as possible in the barrel, salting very lightly. Cover the meat with brine made as strong as possible. Pour off a gallon of the brine, and mix with it one tablespoonful of saltpetre for every hundred pounds of meat, and return it to the barrel. Let it stand one month ; then take out the meat ; let it drain twelve hours. Put the brine in an iron kettle, add one quart of molasses or two pounds of sugar, and boil until perfectly clear. When it is cold, return the meat to the barrel, and pour on the brine. Weigh it down, and keep it covered close, and you will have the sweetest meat that you ever tasted."

The Paris *Patrie* says that chemists have discovered in wool a new substance that has always been thrown away. This is yolk or grease and is said to constitute nearly one third of the gross weight of the fleece. Chemists purchase the lye in which the wool has been washed, and obtain from it a dry residuum by evaporation. That residuum, on being calcined produces hydro-carbureted and ammoniacal gases, from which ammonia and carbureted hydrogen are obtained by various processes, while alkaline salts are extracted from the residuum left in the retorts. These salts chiefly consist of carbonate of potash. It is supposed that 500,000 francs worth of potash may be procured from the wool washed in France.

The French submarine-boat *Plongeur* it is stated, does not draw more than 8 feet of water, her engine is of 80 horse-power, steam is replaced by compressed air, and her crew of 12 men are completely protected from all danger. The *Plongeur* is intended to be a formidable engine of destruction. Her spur is formed like a tube, and an incendiary shell may be placed in it. Should an enemy's fleet be at anchor the *Plongeur* will drive her spur into the nearest ship and then retreat, unrolling at the same time a metallic wire. When at a safe distance, an electric spark will cause a great explosion, the enemy's ship being blown up.

It would appear that the Government is in urgent want of a large number of locomotives, as the press, in different sections of the country, states that orders have been transmitted to the large locomotive-builders at Paterson, N. J., not to build engines except for the Government. The Boston *Traveller* says that "both the locomotive manufactories in Taunton have been forbidden for the past six months to build engines for other parties than the United States authorities."

Death in the Sweet-meat Jars.—A child was recently poisoned in Pennsylvania, so that death ensued, from eating apple-butter which had been kept in a glazed jar. This glazing contains an active poison—the oxide of lead—which is dissolved by fruit acids, and is extremely dangerous to life. All such substances as apple-butter and the like should be kept in wood or glass vessels, so as to avoid the possibility of mischief. The above is not a solitary instance, as many similar ones have occurred.

The East Douglas (Mass.) Ax-manufacturing Company runs the largest establishment of the kind in the world. It uses 1,200 tuns of iron per annum, about one-half of which is imported, and 250 tuns of cast-steel, much of which is procured from the works at Fitchburg. Its forges consume 18 tuns of coal per annum. Half a million dollars' worth of axes and other edge-tools are manufactured annually and sent not only to all parts of this country and Europe, but Cuba, Australia, South America and Africa.

The Boston *Transcript* says that the Type-setting Machine Company of Boston have had a hearing before the Committee on Manufactures at Washington, upon their petition to be allowed to commence business immediately. Since Mr. Felt first brought his invention to Boston, some five years ago, the task has been finally accomplished by the "justification" of type "more perfectly and uniformly even than by the ordinary hand process," as testified by a practical printer, who has recently witnessed the operation.

Dangerous Advertising.—We know a man who does the principal part of his advertising by writing his name and business on the back of bank-bills. Perhaps he is not aware that, in case those banks whose notes he thus endorses were to break, he could be held responsible for the face of the note. Courts have so decided in similar cases.

Best Time to paint Houses—Experiments have indicated that paint on surfaces exposed to the sun will be much more durable if applied in autumn or spring, than if put on during hot weather. In cold weather it dries slowly, forms a hard, glossy coat, tough like glass; while if applied in warm weather, the oil strikes into the wood, leaving the paint so dry that it is rapidly beaten off by rains.

New Jersey has opened a new trade with South America. Twenty-five tuns of white oak spokes have just been shipped from Sussex county for that market.

The Rome Table at the New York Fair.—There is to be a remarkable attraction to the approaching Fair for the Sanitary Commission in this city, in the shape of a table laden with works of art from American artists at Rome, and with a variety of rare and curious gifts from our friends and countrymen and countrywomen in that city. Mr. Ropes gives one of his admirable landscapes. Mr. Tilton a small picture, and a proof engraving of Turner's. Mr. Handley a marble bust of a faun, which he has executed altogether himself. Mr. Freeman a charming picture of a little Saxon girl. Dr. Butler gives a very valuable collection of old Roman coins. Miss Foley contributes one of her exquisite bas-reliefs of a famous model in Rome. Dr. and Mrs. Gould and others, resident in that city, have been exerting themselves nobly in the good cause, and will send on a rich variety of photographs, marble ornaments, &c. Nowhere in the new world, or the old, have our soldiers, or has our country, better friends than in Rome.

It is stated in a letter from Paris that the French are applying to their iron-plated ships the bronzing process which they find so successful in their street lamp-posts. The plates are first painted (?) so as to prevent any galvanic action between the copper and the iron, then rubbed with black lead, and finally plunged into the bath, there they remain till the copper is deposited to the thickness of one-tenth of an inch.

The Sanitary fairs recently held at Chicago, Boston, Cincinnati, Albany, Brooklyn, Cleveland, and Buffalo, have realized $1,002,000. It is anticipated that the New York fair will nett over a million dollars. It opens on April 4th, and will be an object of great interest.

So great was the anxiety of the Chinese authorities to obtain some of the Whitworth guns which formed the armament of Commodore Osborne's squadron, that they are said to have offered to place silver, weight for weight, in the scales to purchase them.

A new style of shell, invented by Captain William S. Williams, of Ohio, has recently been successfully experimented with at Vicksburg, in a 20-pound Parrott gun. One shell, weighing twenty pounds, by his means of explosion, was broken into one hundred and twenty-seven pieces, which surpasses any of a similar kind now in use.

In proving some 68-pounders, lately received at Woolwich from the Lowmoor Iron Contract Works, one of the guns gave way at the breech, and was shattered to fragments, a very unusual circumstance. It was discovered that a bar of wrought iron, weighing eight or ten pounds, had fallen into the casting machine, as the bar was found imbedded in one of the fragments.

An iron flag has been placed on the Patent Office at Washington. It is handsomely painted in waving folds to imitate the national colors, and is said to present a good appearance. These metal flags are made by the patentee, A. Watson, of Washington city.

The hard-rubber factory of A. G. Day & Co., Seymour, Conn., was recently consumed by fire. Loss $50,000; insurance only $12,000. This is the "old story," of almost every-day occurrence. When will property-owners learn the fact that a small yearly investment in insurance is the safest plan in the end ?

Paul Morphy, the chess-player, has just returned from Paris to New Orleans. He went to Paris about four years ago as a loyal man, beat all the Europeans at chess, and was flattered and honored immensely. He made his late visit as a rebel, got beaten at chess, and attracted no attention whatever.

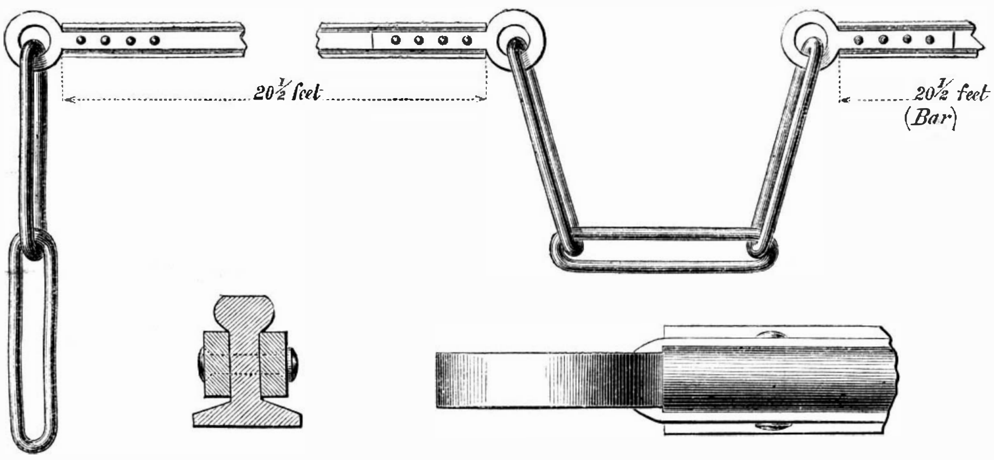
A correspondent "out West," engaged in repairing reaping machines for farmers in his vicinity, desires to know what color he must let the cutters down to give them the proper temper. Any one who can give the information will confer a favor by sending it to us.

The maple sugar season is industriously improved in Michigan and Wisconsin. The sap runs copiously, and there will be a large yield.

We are indebted to Hon. D. P. Holloway, Commissioner of Patents, for volumes of the Patent Office Reports for 1861.

OBSTRUCTIONS OF CHARLESTON HARBOR.

We take pleasure in presenting accurate diagrams of the famous obstructions in Charleston harbor, by which our fleet was prevented from advancing up to the city. The principal reliance was upon the buoys attached to the bars of T-iron; if these had been once destroyed the whole thing would have gone to the bottom. We have no doubt but that if the same spirit had been displayed before Charleston as Colonel Bissel evinced in cutting the canal through the main land near Island No. 10, the obstructions could have been removed as easily as any other. "All things are possible to him who wills." The official report says :—"The obstructions consist of two bars of T-iron, 20½ feet long, to the ends of which strong eyes are fastened to receive three connecting links of iron, 33½ inches long and 2 inches in diameter ; the whole weighing 1,500 lbs. They were doubtless supported by logs throughout their entire length, or by buoys at each end, forming a very formidable barrier."



POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting on Thursday evening, March 24th; the President, S. D. Tillman, Esq., in the chair. After the President's usual summary of scientific and industrial news of the week, Dr. Stevens, having just returned from an examination of the district, was invited to give a description of the

CUMBERLAND COAL DEPOSIT.

Dr. Stevens—"Mr. Chairman, I have made a sketch on the blackboard here, of the rocks as we find them deposited in a line extending from the north-east corner of this State south-westwardly 300 miles into Pennsylvania. While the surface of the ground rises gradually, as indicated by this upper line, the rocks still lie in their original horizontal position, so that in going from the north-east to the south-west we meet first with the lowest rocks, and then in succession with those which are lying above. We pass over the sloping edges, first of the Lower Silurian, then of the Upper Silurian, then of the Devonian, and lastly of the Carboniferous. These beds are lying almost exactly horizontal, with a very slight inclination toward the south-west, and with only one break or fault in their whole extent. In the Cumberland coal district of Maryland we find these same rocks lying one upon another in the same relative pasition, but folded in great plications, and affording the most impressive evidence of the tremendous forces by which they have been heaved up and bent from the horizontal strata in which they were originally formed on the bottom of the sea. These lines represent the formation of the mountain when it was first pushed up—the upper stratum or Carboniferous being upon the outside, and the lower strata being rounded up in corresponding form below. But to represent the present condition of the mountain we must not only wipe off its top, but we must scoop out a great valley in its center. We now find the lower Silurian rock paving the bed of the valley, and the Upper Silurian, the Devonian and the Carboniferous cropping out on each side of the valley above, the several formations being of just about the same thickness on each side of the valley, and lying one upon another in the same relative position. This valley is five miles in width and 1,800 feet in depth. There is no reasonable explanation of the mode in which this great mass of rock has been carried away except the wearing of water. When the mountain was thrown up, cracks were doubtless formed along its summit; into these the rain fell, streams were formed, and thus the heart of the mountain was worn away. The debris from those denudations was carried by the rivers to the sea, and is now found spread along the shore, extending inland in some places many miles, and lining the banks of the rivers from their mouths upward to distances proportioned to the size of the streams, being in the case of the Mississippi 600 miles."

The remainder of the evening was spent in listening to a paper by Mr. Heaton, which contained no new statement of facts.

HOW SUGAR IS MADE FROM THE CANE.

A correspondent of the Boston *Trumpet and Freeman*, writing from the Island of Mauritius, describes the process of making sugar in a clear and concise manner. The narration will be found worth reading:—

"My readers doubtless know that the great staple of Mauritius is sugar. While all the productions of the tropics may be grown here, and nearly all are grown here to some extent, yet the great, the almost sole reliance is sugar. The crop of 1862–3—the crop year terminates on the last day of July—amounted to about one hundred and sixty thousand tuns, or upwards of three hundred millions of pounds. Some idea of this enormous quantity may be gained by considering that it is sufficient to load three hundred and twenty vessels of five hundred tuns each. The foregoing statement will also furnish as good an idea as can easily be got of the amazing fertility of the island. For be it remembered that this little-dot upon the map of the globe is only about thirty-five miles long, and less than that in breadth, being a little more than one hundred and three miles in circumference. On the estate visited there were about one hundred and fifty laborers, mostly Indians, though with a few negroes. As we approached the building, we saw men busily occupied in bringing forward the canes. These are cut and stripped of all their leaves in the fields where they are grown, and only the thick, heavy, juicy stalk brought to the sugar-house. The machinery here is all propelled by steam. We entered first the grinding-room. Two men were engaged in bringing in the canes, and placing them on the apron of the mill. Two others, one standing upon each side of the apron, fed the mill; while a fifth stood behind the mill to receive and dispose of the crushed canes after they had passed through the mill. The mill consisted mainly of three solid iron rollers, about twelve or fifteen inches in diameter, with shafts running out on one side and connecting with the propelling power. Two of these rollers were at the bottom, and the third directly over neither, but over the line which separated the two lower ones, and in such relations to them that the canes, in passing between them, did, in effect, pass between two pairs of rollers, or were subjected to two grindings. These were so geared that they could be made to press more heavily or lightly upon each other, at the option of the overseer. Once passing the canes through was sufficient thoroughly to expel the juice. As it was expressed it fell into a shallow tank below, from which it was conducted off through an open trough into another apartment. Entering this other apartment, we found the cane-juice pouring through a coarse seive into a large tank, where it was allowed to remain for a little lime, until the grosser impurities had risen to the surface, when the purer liquid below was drawn off through iron pipes into immense kettles or pans, where it was reduced to the proper consistency by boiling, and where men were constantly engaged in skimming off the feculence which the violent agitation threw to the surface. From these kettles or pans the sirup was conducted into what are called 'wetzells'—a machine named from the inventor—in which the sirup is 'cooked.' It is maintained here at boiling heat, and is kept in constant motion to prevent its burning. This machine consists mainly of two parts—one, a half cylinder about ten feet long, placed horizontally, which contains the sirup, and under which, I believe, is a chamber filled with steam; and the other a skeleton cylinder, somewhat smaller in circumference than the aforesaid half cylinder, which revolves within the latter, and the frame, or bones oi which, so to speak, is composed of iron tubes also filled with steam. This skeleton cylinder, revolving in the half cylinder, or trough, not unlike the manner of some patent Yankee churns, though not so rapidly as to throw over any of the contents, keeps the sirup in constant motion and prevents its burning. When the 'cooking' is completed, the contents of the 'wetzells' are drained off into large and shallow vats, where the sirup is cooled, and the sugar crystallized. Hence it is passed through a crushing mill, where whatever large or small lumps may have formed are reduced to powder. Then the sugar is put into the 'turbines,' where the sirup still remaining in it is expelled, and the sugar dried sufficiently for bagging or barrelling. These 'turbines' consist of two upright iron cylinders, one within the other. The outer is stationary, and strongly secured in its place. Between the two there is a space perhaps an inch wide. The inner cylinder revolves within the other. Its rim is perforated with small holes; the bottom of it is tight, and the top is open. Into this open place is put the sugar, wet and black with molasses; in from five to eight minutes it is taken out comparatively dry and light colored. The great and sudden change is effected by the rapid movement of the inner cylinder, it revolving no less than twelve hundred times per minute. The sugar is taken hence to the bagging-room, where it is prepared for the market.

"As above described the process of sugar-making seems quite summary; and indeed it is. The cane-juice expressed each day is manufactured into sugar before the work ceases at night: the grinding commencing and ending a few hours earlier than the processes. Unlike the sugar-growers in Cuba, the planters here do not run their mills night and day the season through, but commence anew with every morning. That to do so is much less exhausting to the men may readily be supposed; while a better quality of sugar is thought to be obtained by the closer attention to the work thus secured."

Testing Armor-plates at Portsmouth.

Some testing of armor-plates has taken place at Portsmouth, England. The plates were of 5½ inches in thickness, 15 feet 6 inches in length, and 3 feet 3 inches in width. One from Messrs. John Brown and Co., of Sheffield, was for the iron frigate *Agincourt*, and the other for the iron frigate *Northumberland*. Both were tested in the first place with cast-iron shot from the 68-pounder gun in the ordinary way. Both passed through the ordeal satisfactorily, although tried severely by clusters of shot impacts and edge blows. The maximum depth of the indents was 2 inches and the minimum 1 1-16 inches. On Brown and Co's plate in its upper right centre, four shots struck in a semicular line, that measured but 32in. through the greatest extent of the curve. Throughout this space there was only one small surface crack. On the left lower corner of this plate five shots struck, impinging on each circumference. Two of them were only half on the plate's edge. The plate exhibited wonderful tenacity and solidity, without the slightest appearance of brittleness. The Millwall plate was also struck in several places on its right lower edge, but without penetration being effected, although a small semicircular piece, 24in. in length by 10in. in width, was broken out through half the plate's thickness. The laminæ were opened on the plate's edge in the vicinity of the places struck. The plates were of undoubted excellence both in the quality of the metal and in their manufacture. Messrs. Brown's plate was then selected for firing against, with improved cast iron spherical (crucible) shot from the Elswick 100-pounder smoothbore gun, (diameter of bore 9in. and weight 120 cwt. 2qrs.,) with a charge of 25lbs. of powder. Three shots were fired. No. 1 struck the lower edge and touched a bolt. It produced an indent of 4in. at its greatest depth, with a diameter of $9\frac{1}{2}$in., and with only a surface crack round the indent. No. 2 struck just over the lower edge, producing an indent of 10in. in diameter and a greatest depth of 3 8-10in. with a slight surface crack in the indent. Both these shots were destroyed in the ordinary manner of casting projectiles. No. 3 shot struck fairly on the plate, and part of it remained fastened in the plate's outer surface. It will be seen that the damage inflicted by these improved cast-iron shot was hardly commensurate with their increased weight and the extra 9lbs. of powder charge as compared with the 68-pounder gun. The Millwall plate had next three steel shot sent against it from the same Elswick gun, with a similar charge of 25lbs. of powder, the result being—No. 1 shot struck about 4in. below the upper edge of the plate, a distance away from any damaged part, and breaking right through, buried itself, and the broken parts of the plate in the ship's side 12in. beyond the plates inner surface. No. 2 shot struck the plate in a central and undamaged part, went clear through and buried itself with the broken fragments in the side of the ship, the outer surface of the shot being 3in. below the plate's outer surface. No. 3, the last shot, also struck the plate in a central and undamaged part, and about 2ft. aside of the last shot. It cuts its way in with $9\frac{1}{2}$in. diameter, about one-third of the plate thickness, and then carried everything before it on the lower deck of the target ship. The shot in passing through the broken pieces of plate increased the diameter of the hole it made on entering the plate from $9\frac{1}{2}$in. to 3ft. at the other end. It passed entirely through one side of the ship, and struck against the opposite side. The shot entering the plate by a hole $9\frac{1}{2}$in. diameter passed into the ship by a hole 3ft. in diameter, tearing five planks away from the inside, and covering both sides of the deck for some distance round with broken pieces of wood and iron. One piece of plate, measuring 17in. by 14in. was picked up on the ship's deck, 15ft. from the side of the ship where it had entered with the shot. The shot itself was found on the opposite side of the ship's deck, and was but very little changed in form.

Estimating the Weight of Cattle by Measurement.

The *Canada Farmer* in reply to a correspondent, says :—

Many experiments have been made by graziers and salesmen to ascertain the net weight of cattle by measurement, and a number of rules and tables have been formed from the results obtained. None, however, can be regarded as absolutely correct. With the most accurate measuring is required a practical acquaintance with the points and forms of animals, and allowance must be made according to age, size, breed, mode and length of time of fattening, &c. ; conditions which require a practical eye and lengthened experience to correctly appreciate. We have found the following method to lead generally to trustworthy results :—

Measure carefully with a tape line from the top of the shoulder to where the tail is attached to the back; this will give the length. For the girth, measure immediately behind the shoulder and fore legs. Multiply half the girth by itself in feet, and the sum by the length in feet, and the product will give the nett weight in stones of 8 lbs. each. For example, with an ox or cow 5 feet in length and 7 feet in girth, the calculation will be as follows:—

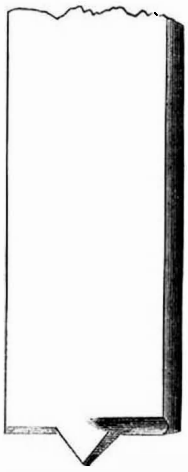
Multiply half the girth by itself in feet	3.5
	3.5
	12.25
Multiply by the length in feet	5
Weight in stones	61.25

THE DRILL AND ITS OFFICE.

[Continued from page 213.]

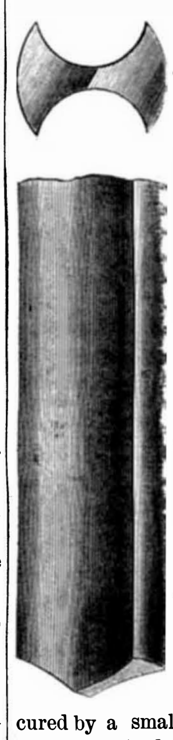
In our last article on this subject we considered counter-borers or composite drills, and we will now allude to the same class on different plans.

There is still another kind of drill for peculiar work which is employed by some machinists, though for our own part we see no special virtue in it, for it is troublesome to use and to make, and very liable to break. It is called the tit or center drill and here is an engraving of it.

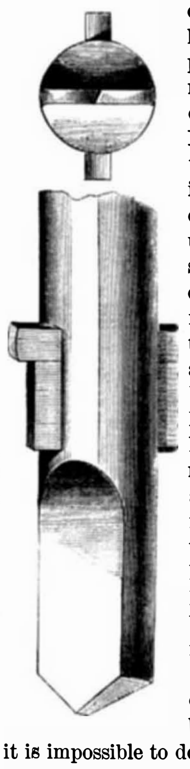


The center marked out by the punch is of course the point where the tit is inserted on the work. This tit is the cause of all the trouble with the tool; it must be filed up in the vice, it tries the tool-dresser's patience to harden it, for the small quantity of metal in it compared to the heavier parts in proximity causes it to get hot in the fire more speedily and also to cool quicker, so that while the cutting edges are of the right temper the tit is soft or hard as the case may be; for all ordinary purposes the common flat drill is far superior.

Another kind of drill is illustrated below; it is a turned drill and will go, if it runs true in the machine, as straight as a die in the work. These two figures are side and end views; the tool is simply forged and then turned up in the lathe afterward, and it is much used for drilling holes in the tube sheets of surface condensers.

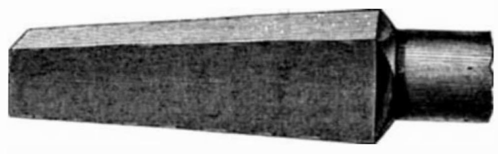


Composite drills are those made by combining cutters with drills in such a manner that while the hole is being drilled or just after the operation, it is also countersunk on top, or counterbored to a certain depth; and this without removing the drill from the hole, thus saving a great deal of time. When the tube sheets of surface condensers are drilled, such tools do good service, for the vast number of holes requires some such method to render it economical as well as to expedite the job. The plans for a drill capable of being used for such work are given below. The drill is simply a turned steel bar flattened on the end for but a short distance; as the plate to be drilled is not thick it does not require to be long but should be made as short as possible. There is a key-way or slot, in the shank in which the cutters are set, and secured by a small key at the back. The shape of the cutter fitted in the key-way, of course varies with the work to be done, and the corners may be rounded off to make a round-bottomed hole, or made to conform to any pattern desired, and the key may be made short so that the cutter can go clear through.

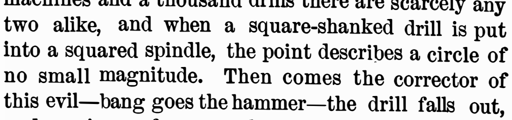


Drills of this kind are also extremely useful for counter-boring in lathes; a dog may be slipped over the round shank and screwed up while the center in the drill shank is received by the dead center of the lathe. It is much more economical to use a tool of this kind where the circumstances admit of it, than to bother with boring tools of the usual pattern. It is in the minor details of this kind that workshop economy may be practiced to advantage, and there is nothing that calls more for the exercise of ingenuity than the simple matter of drilling holes speedily and accurately. In every instance it must be borne in mind that it is of the utmost consequence that the drill should run *true* on its end. Without this the finest temper and the best shape are of no value, and it is impossible to do good work where the point of the drill describes a circle of greater or less diameter.

From specific designs of drills let us depart at present and turn our attention to the other end of the same tool, where we shall find something worthy of attention. We might fill page after page with drills of peculiar shapes; those with and without lips, those with lips or cutting edges curved so that a section would be like this, ∞ ; others with round corners, &c., but as the main principles of drills have already been given it is not necessary that we should follow out every design, as it would interfere with more important matters. Let us look at the drill shank. It is a common and a favorite expression with many that the minor trials of life cause more sharp annoyance and vexation than severe visitations. Be this as it may, it is very certain that the simple matter of the formation of the drill shank has caused more profanity, delay, and actual pecuniary loss than any similar part of any other tool. The shank is in general made square and taper as in this engraving,



and the adherence to this form, the most injudicious and expensive that could be devised, is remarkable. Drilling machines upon new plans are made every day, and are fitted with some ingenious device for expediting the work, but for some inexplicable reason the spindle is squared out, duly tapered, and with—the hight of absurdity—a set screw in addition. It is among the impossibilities of mechanical practice that a square-shanked drill should ever run true by any possibility except one involving great expenditure of time and consequently money. It must be acknowledged by every unprejudiced person that the true shape for a drill shank is round and parallel, not tapered like a lathe center. With this form the drill in all cases will run much truer than with any other shape; not only is this assertion correct, but the labor or cost of making the drill shank in this form is not to be mentioned with a square or taper one. The round hole in the spindle of the machine is capable of being wholly finished in the lathe, so that when it leaves that tool it is completed and does not require to be chipped out or even filed. Squaring the hole makes it untrue with the center of the spindle, even when great care is used, and the drills themselves have to be forged exactly alike or else they will not fit. In a shop where there are thirty or forty drilling machines and a thousand drills there are scarcely any two alike, and when a square-shanked drill is put into a squared spindle, the point describes a circle of no small magnitude. Then comes the corrector of this evil—bang goes the hammer—the drill falls out, and a piece of emery cloth is wrapped about it because it is rough and holds better; the tool is replaced and the same process goes on again and again, sometimes varied by breaking the drill short off at the shank, at others only succeeding after much time and trouble in making the drill run true. Each time it is dressed the drill is altered so that it is no exaggeration to say that it never runs twice alike. The set screw is a nuisance, it is of no use at all; when set up to its place it strikes one-sided, and instead of securing the drill actually pushes it out. How easy it would be to avoid all this complexity by making the shank in this form, or forging the drill of round



steel! There are many advantages in this, although round steel is not uniformly of as good a quality as square steel. The most marked advantages are lessened first cost of construction, greater efficiency of the tool itself and less time expended in straightening and setting the drill; a standard size for all drills so that each one will fit every machine in the shop, and less work in making the drill machine itself. The taper round shank drill is not so good for these reasons: It costs more than either of the others, it is troublesome to get out of the machine, for a key has to be driven in at the end, which often gets lost. The hammer is used to loosen the drill by men too lazy to take the key when it is not lost; the taper gets bruised by the blacksmith in dressing the drill; when the drill has to be upset, as it does at times, the taper is injured on the end and don't fit without filing, and lastly it cannot be extended as the straight round shanked drill can. By this we mean that sometimes a drill is just an eighth or one-fourth too short to go through the work with all the screw that can be got. If a taper round-shanked drill is used the workman must either get another or else derange his work to block it up higher; but if we have a straight shank we may put a piece of round iron in the spindle and let the end of the shank bring up against it, and thus attain the end with but little trouble. Thus the straight round shank appears to have decided advantages over any of the other plans.

This article concludes the series under this head, but we shall at an early date present some views of the latest turning tools in connection with those formerly used, so that the new and the old may stand side by side for a verdict from the impartial.

Another article entitled "How to lay up an eight strand gasket," fully and completely illustrated, so that any person can make one as easily as a child braids its hair, will be given in an early number. This will be a useful article to engineers and they should not hesitate to avail themselves of it.

The Sunken Monitor "Comanche" at San Francisco.

Many of our readers are aware that the vessel which carried out the California monitor-battery sunk alongside the dock in San Francisco with the battery on board, in pieces. It seems there was not skill enough in California to raise the ship, and they are now working at her contents piecemeal; the progress made is thus recorded by the *Bulletin* of San Francisco :—

"The wrecking party has been working most successfully in recovering the portions of the *Comanche* stored in the between-decks of the *Aquila*. Their operations have resulted thus far in getting about 350 tuns of iron work, and it is believed that the whole between-decks will be cleared out in a week. All the most important parts of the *Comanche's* machinery have been recovered, as well as the turret plates, pumps and attachments. When the present deck is cleared of cargo, the same programme of operations will be gone through with in the lower hold, the work of discharging to be commenced aft, and thence forward. This action on the part of the wreckers is made necessary on account of the position of the ship, the stern being the highest part. Captain Merritt thinks that the 15-inch guns will be got out in about 20 days from date, by which time he will have worked from aft up to the main hatch, where the guns lie. It is Capt. Merritt's intention, if possible, to discharge the *Aquila* entire, with the exception of boilers, before attempting to raise her, for which purpose he is now having made 8 large air-tight wooden boxes or camels. These 'camels' are made of heavy timbers, strongly bolted, which are covered on the bottom and top with 4-inch and on the sides with 3-inch planking the whole being thoroughly caulked and pitched. They are to be 32 feet long, 12 feet broad, and 7 feet 3 inches wide, and are estimated to have a lifting capacity of over 80 tuns each. To each of these camels two heavy chains drawn under the wreck are to be attached, the strength of which is deemed sufficient to lift the *Aquila*. In addition, considerable lifting power is expected from the boilers, which are in the lower hold. These boilers are represented to be very large, and to have been placed in the ship's hold completely air-tight.

Pure Copper Paint.

A new pigment, calculated at the same time to increase the resources of the decorative painter, and to afford a ready means of preserving iron and other metals, has recently been introduced at Paris by M. L. Oudry of the Auteuil Electro-Metallurgic Works. He first obtains a pure copper by throwing down the metal by the galvanic process ; he then reduces the precipitate to an impalpable powder by stamping. This powder is then combined with a particular preparation of benzine, and used in the same way as ordinary paint; beautiful bronzed effects are produced upon it by means of dressing with acidified solutions and pure copper powder. The articles painted with the new material have all the appearance of electro-bronze, whilst its cost is less than one sixth; it will last from eight to ten years. Mr. Oudry also proposes to substitute benzine oil for linseed and other oils, over which he states it possesses great advantages.

Correspondence.

The Comparative Efficiency of the Screw and the Paddle.

MESSRS. EDITORS :—Seeing on page 67, current volume of the SCIENTIFIC AMERICAN, a notice of a trial of speed between the paddle-wheel steamship *Asia* and the screw steamship *City of Edinburgh*, in which the paddles came off victorious, perhaps I will be excused for making the following communication on the subject of screw propulsion—a subject of interest to many.

Perhaps the screw-propeller has arrived as near perfection as it ever will. English engineers, as a rule, seem to prefer a short pitch of screw, while American engineers appear to like a long pitch ; the efficiency of each form depends mostly on the sort of craft to be propelled—if for freight, a short pitch is the best ; if for speed, a long pitch is preferable. This has been established by experiment with different wheels on the same boat ; but the question of speed with similarity of model for screws and side-wheels has never been decided by actual experiment since the screw has arrived at its present perfection. Such experiments were made in the early days of using the screw as a propeller ; they are recorded by Bourne in his "Treatise on the Screw Propeller," the last of them were made in 1849, since which time the screw propeller has been much improved. In those experiments the paddle-wheel steamer did not run so fast as the screw, except when indicating more power; with the same indicated power on both, the screw was the faster. If such experiments could be made *now*, it would settle the question for a long time to come, at least until one or both are further improved.

Great improvements have been made in the engines for propellers, and there is room for still further improvement ; but to get as good speed, screw vessels must have as fine "lines" as the paddle ships. Screw steamers are seldom made so sharp, and never, I think, with so much engine power, every thing else being equal, as those with side wheels. When this is done, screw steamers will have better speed than side-wheel ships built for the same carrying capacity. The steamer *Water Witch*, lost on Lake Huron last Fall, was the only one ever built on the lakes with as fine lines as side-wheel ships commonly have. Her model was made for side wheels ; she was 170 feet long and 26 feet beam, was propelled by a Loper wheel, 9 feet diameter and 18 feet pitch, making 75 to 80 turns per minute; this was driven by a beam engine, set athwart-ships, and geared to the propeller shaft. Her speed and seaworthiness were remarkable ; she made as good passages and carried more freight than side-wheel boats of the same tunnage ; and it is believed, by those familiar with such things, that had she been fitted with paddle-wheels, with the same engine, her speed would have been much less with the same load.

It is not possible, perhaps, to apply as much power to one screw wheel as to two side wheels with advantage ; but two wheels, one under each quarter, have been used with much success on the lakes for a long time, and with separate engines. There was an account published in the London *Illustrated News*, dated Nov. 29th, 1862, of a screw steamer with two wheels and independent engines ; that being the first of the kind ever built in England, and they seem to have been used on our own coast but a few years ; while it is nineteen years or more since such arrangements were used on the lakes.* A propeller was built in 1845, at Malden, C. W., of about 300 tuns, fitted with two wheels and separate engines ; for a long time she was a first-class propeller. She was originally called the *Earl Cathcart ;* but her name has since been changed to the *F. W. Backus*. She is now in existence, and ran last summer on the "Chicago and Lake Superior Line."

If two vessels were built from the same lines and the same power applied to both, say to two screws, if they were light draft of water, let both be loaded the same, and when indicating the same development of power, I think the screw would run the faster. Side-wheel boats are the best for river and light-draft navigation ; but for 10 feet draft and over, screws will demonstrate in time their superiority over paddles. J. W. C.

Sugar Island, Mich., Feb. 22, 1864.

[*The *Quinebaugh*, an old propeller running to Norwich, Conn., some years ago, had two screws driven by one engine. It was built by C. H. Delamater in—we think—1848; certainly as long ago as that. English engineers have made so much ado over twin screws, claiming precedence among one another for the idea, that one would think they had invented them; but after twenty years use in this country they are just found to be novel and advantageous in England.

The Drill and its Office.

MESSRS. EDITORS :—On page 181, present volume of the SCIENTIFIC AMERICAN, in your article on Drills, I noticed some excellent remarks ; but in the engraving of the "twist drill," the construction is wrong—the lips are flat like the common drill, and would cut no better. The twist should continue to the extreme edge of the lip. I believe a twist drill properly made, and of the right temper, in the hands of a workman who knows how to use it, will drill more inches without sharpening than any flat one can be made to do. The only reason why the twist drill feeds easier is because the angle of the lip is more acute than the flat one. The flat-lipped drill will feed as easy as the twist, the angle of cut being the same. I think it important that the pod or shank be evenly finished, but quite as important that the twist should be irregular, or a "gain" twist. I find in practice that the best twist is about one turn in two inches at the point, and gain to one turn in three inches at six inches from the point, that is for drills of one-half inch and upwards. Smaller drills require a finer twist in proportion. The serrated "tit" on the counterborer would spoil the tool for a good work man. To get a good hole and countersink, the first tools should be rimmed to fit the "tit," and the tit should be rounded, then you would have a perfect hole. The manufacture of twist drills by machinery has been in progress for some two years in two places —South Bridgewater, Mass., and Newark, N. J. The manufacturers, I believe, make any size ordered ; but I think that there are none so good as the hand-made ones. A. M. W.

New York City, March 28, 1864.

[We are very glad to receive such sensible criticisms as the one above, and we take pleasure in publishing them even though they conflict with our own views, for every man has a right to be heard. Our correspondent must bear in mind, however, that all men are not accomplished mechanics ; and while the use of the serrated tit would be objectionable in *standard fine work*, in common jobs it is not only useful but indispensable, as in drilling many holes for the tit, some of them will be smaller than the others, even if the drill is never ground, for the wear of the sides is a considerable item; then it is that the serrated tit is useful, for it cuts its way through whether the hole be small or not. There is this objection to continuing the twists to the very lip of the drill—it makes the edge too thin, so that it is more like a wood-cutting tool than one for iron. Such a drill may work well for a few holes ; but in the long run and with men of average intelligence, the drill we illustrated is really better to be straight for a quarter of an inch at the end than to have the twists run to the edge, for in drilling down a quarter or half an inch no drill clogs, and after that distance the twists take hold of the chips and raise them. A "gain" twist may be better than a regular turn; but it strikes us that our correspondent's figures are too quick in the pitch, and that in long holes the sharp pitch would hardly effect the object.—EDS.

Do Ladies appreciate Science ?

MESSRS. EDITORS:—I hope you will excuse me for occupying your time while you read this, as I have really nothing of importance to say, except to fulfill the desire I have long entertained of expressing to you my high appreciation of your paper, which I have weekly perused, with a greater satisfaction that any other journal, for several years past. I find that the SCIENTIFIC AMERICAN is not only acceptable to mechanics as a promoter of their interests, but it is attractive to the *ladies* in the highest degree. My wife would sooner give up the "picture papers," lov stories, and all, than lose the SCIENTIFIC AMERICAN, and my lady patients (I am a dentist), while waiting in my office, express their estimation of it by choosing it, generally, from among several others—journals of "light literature," illustrated papers and magazines.

C. G. D.

New Bedford, Mass., March 28, 1864.

The India-rubber Patent Controversy.

MESSRS. EDITORS:—I have read, with very great satisfaction, your determined opposition to the further extension of the Goodyear rubber patents. [See pages 152, 169, 185, 201, and 216, present volume of the SCIENTIFIC AMERICAN.] It is quite time the interests of the public should be considered. The late Mr. Goodyear and his family, have collectively received immense sums from those patents. The plea of poverty is not, or ought not to be, a valid one. Great stress was laid, in Goodyear's last application, upon his early struggles and necessities; but this, you know, is the hard lot and experience of most inventors in humble circumstances. The large amount that Mr. Goodyear received and expended in forwarding his invention, and his private expenditures, were not prominently brought forward. With Mr. Goodyear's private (and some think his extravagant) disbursements, the public would have nought to do, if it was not that "poverty" is the plea for *further* extension! It is not right to establish the precedent, that the duration of a patent should depend altogether upon whether an inventor, with ample means, has or has not provided for the future of his household.

Again; you are doubtless aware that Mr. Goodyear's family have but a minor interest in this application. In all probability, in this case as on the last extension, the *licensees* contract to bear all the expenses of the application, and to pay a certain stipulated sum contingent upon success; the sum agreed to, upon the former occasion, was $100,000. Who are the parties most concerned in wishing to defraud the public? A body of millionaires—men of great wealth accumulated under the protection of these patents, and some also of the most prominent lawyers in the United States. I name Mr. H. Durant, of Boston, who resigned a lucrative practice to become president of a rubber company; Mr. E. N. Dickenson, son of Judge Dickenson, largely interested; Mr. Jencks, of Rhode Island, chairman of the Congressional Committee on Patents, (before whom these applications must come), who is also either president or director of one of the large rubber companies. To those who have peeped "behind the scenes," on former occasions, this is, to say the least, a *most curious coincidence*. Newspaper reports say that this gentleman will not sit as judge on his own case; does he authorize or confirm that report?

It is currently spoken of, as a fact that the licensees intend spending one million of dollars to force the patents through Congress; this amount is not large, compared with their means and the vast interest at stake. I know that formerly there existed a secret agreement between the companies, by which a certain per-centage was set aside as a "law-fund," to scare all interlopers from the track, whether they had rights or not; possibly it is in existence now—but no matter! Truly the SCIENTIFIC AMERICAN needs all its courage and persistency—it must buckle on its armor and burnish up its weapons of truth and justice, if it intends to do battle with this huge Giant Monopoly in defense of the public.

There is another class interested, whose consistent champion the SCIENTIFIC AMERICAN has ever been; I allude to the "operative mechanics." There are men who, like myself, toiled at the birth-throes of that great invention, the "vulcanizing" of rubber—men whose zeal and perseverance surmounted difficulties which staggered even the inventor, and who have waited patiently but wearily for 24 long years for the field to be open, when their turn might come. You know and understand the merit due to many workmen in "licking crude ideas into shape." This invention did not spring forth perfect from the first inventor's brain. It has been stated on oath, by experts, that they could not have manufactured merchantable articles of vulcanized rubber by the light of Goodyear's original patent. The art has been perfected in different factories, at various times, by many hardworking and intelligent men—men whose improvements are recorded in the patents of their employers; the value of these improvements being demonstrated by the dividends declared in the directors' parlor. What chance have these in opposition to money, corruption, and legal subtlety?

I fear I have trespassed too much upon your valuable time. We working-men know that the SCIENTIFIC AMERICAN is potent in every good cause; "give the word," then, and testimony will come forward abundantly, with active and persevering opposition to unjust claims, if we are guided by your counsel and experience.

H. G. TYER.

Andover, Mass., March 21, 1864.

Diamonds for dressing Mill-stones.

MESSRS. EDITORS:—I take the liberty of forwarding you the following for insertion in your valuable paper, if you think it merits the favor. In Volume X, number 9 (new series), "E. F.," of Wisconsin, inquires respecting the durability of the diamond for dressing mill-stones. I have been using one for this purpose about three months, and dress my burrs once in five days. My plan of dressing (say a four-foot stone) is to crack with the diamond from the periphery or skirt 8 or 9 inches toward the eye, and thence to the eye I dress with the pick; this leaves the faces in the best possible condition to perform the desired operation. Now in regard to durability I say, after having used a diamond for three months, I am not able to detect the slightest indication of injury, or defect in its cutting qualities. My theory is that, if a man is satisfied with the manner in which the dressing is done by the diamond, as a question of economy, the advantages of this instrument for the purpose specified are beyond cavil or doubt. A run of four-foot stones may be dressed with this tool in from two to four hours, whereas with the pick twelve hours is the usual time they are kept up; this gives a saving at least eight hours in time, and at the usual profits of this business, would pay for a twenty-five dollar diamond in three or four dressings.

H. A. ANDERSON.

Elmwood, Ill., March 24, 1864.

Cause and Preventive of "Interfering" of Horses' Feet.

MESSRS. EDITORS:—If any reader of the SCIENTIFIC AMERICAN has a "cutting" horse and wishes him cured (which doubtless he does), permit me to say that if he will add twenty-five per cent. to the *quantity* of his food—supposing it to be good food, such as oats or corn, corn-meal, hay, &c.—he will most probably correct the evil. This is very simple; it may be expensive, but yet it is economical. Symptoms of fatigue, in either man or beast, are nearly always first visible in the raising of the feet; and a horse of a certain formation about the shoulders and haunches will first exhibit this weakness in striking the inner forward portion of the hoof against the neighboring fetlock joint, which action is termed "cutting" or "interfering." I have tried the correction frequently and it has never failed me; but the owner must not be content with the theory; he must see that his horse actually gets the feed. A "cutting" horse is frequently cured by taking him away from a livery stable and feeding him at home. This experiment is easily tried.

R. H. A.

Baltimore, Md., March 22, 1864.

A Suggestion in regard to the Metrical System.

MESSRS. EDITORS:—I am pleased to find by the notices which appear in your excellent paper from time to time, that you are in favor of the adoption of the metrical system of measures in this country. Your suggestion that Congress should pass an act legalizing the new system will most likely be carried into effect ultimately; therefore, in the meantime, would it not be wise to recommend that rules be made with the French measures on one side and the English on the other? By this means mechanics and others would become gradually acquainted with the new system; and I believe it is only necessary for this new measure to be *understood*, to be universally adproved. Although I have been but a few months a reader of the SCIENTIFIC AMERICAN, I am satisfied you are a sound advocate of every substantial improvement; and that the new measures, founded upon a simple and universal system, will receive the powerful aid of your influence in the mechanical world.

F. S. DAVENPORT.

Jerseyville, Ill., March 21, 1864.

P. S.—I have received my Letters Patent, and beg to offer you my thanks for having conducted my case to a successful issue, and for the promptness with which you have replied to all my communications.

F. S. D.

Armor-plated Frigates for the Austrian Navy.

THERE are now in course of construction, at private yards near Trieste, two Austrian iron-clad frigates, designed by Herr Romako, and named the *Hapsburg* and the *Archduke Ferdinand Max;* both vessels being of the same dimensions, and the features in their construction also being the same, viz.:

	ft.	in.
Length between perpendiculars	262	4½
Beam	52	6
Depth of hold	23	6
Draught forward	20	9
Draught aft	25	8
Tunnage	3,065.85-90	tuns.
Displacement	5,200	,,
Midship section area	894	sq. ft.
Area at water line	9,900	,,

The plating commences at 4 feet below the water line, extends the whole length of the vessel, and is $5\frac{1}{8}$ inches thick, tapering fore and aft to $3\frac{3}{4}$ inches; the tapering commencing about 25 feet from the stem and the stern; the wood backing is from 12 inches to 14 inches thick. The port sills are 7 feet above the water line.

The bow is formed "tumbling home"; the bowsprit is withdrawable. She has a bow battery or turret on the forecastle, with two heavy guns pivoted, to be used as broadside guns; the forecastle, looking aft, is plated with $1\frac{1}{2}$ inch plate, and provided with boats, guns to sweep the deck, and crenelations for riflemen. The plating at stem allows of the vessel being used as a ram. The coal bunkers are carried up to the lower deck, but a passage is left between them and the ship's sides. The after deck has a suitable deck-house for the accommodation of the captain and officers. The rudder shaft is protected by armor plating $2\frac{1}{2}$ feet below the water line. The vessel is formed very fine aft, being designed for a high speed.

The ventilation of the vessel is provided for by longitudinal passages with vertical openings fore and aft, and having communications with the cabins, &c.

The armanent is proposed to consist of 32 pieces, 130 pounders (23 lbs. charge); but perhaps fewer and heavier guns (muzzle-loading rifled) may be adopted.

The engines are 800 horse-power nominal, the cylinders are horizontal, $82\frac{1}{2}$ inches diameter; 4 feet stroke. The tubular boilers, six in number, proportioned for 1,000 horse-power nominal, have 34 furnaces. The screw proposed is a non-lifting Griffiths, 19 feet, 10 inches in diameter; pitch variable from 26 to 30.

Mowing off Strawberry Vines.

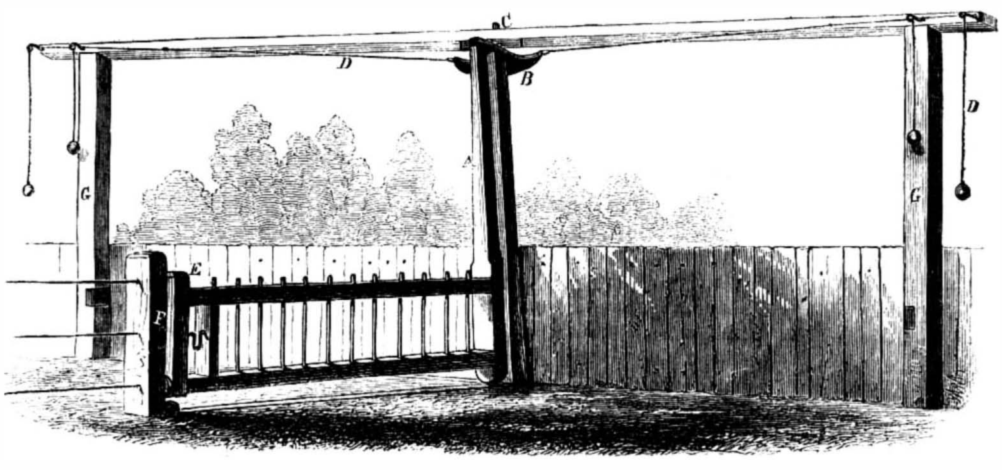
At a late meeting of the Waltham (Mass.) "Farmers' Club," Dr. O. D. Farnsworth said he had been trying a new experiment with his strawberry beds. After his bed had ceased bearing, he mowed it closely and raked off all the vines, put on a little guano, and the result was that the ground was literally covered with the finest fruit. The bed which he experimented with is now five years old, and he intends to continue this course with it. He thought it would not be well to pursue this course if there were many weeds, as in that case it would be easier to set out a new bed. In setting a bed, he would trench $1\frac{1}{2}$ feet deep and manure highly. The rows should be $3\frac{1}{2}$ feet apart, and the plants 8 inches apart in the rows. Paths should be dug from 18 inches to 2 feet apart, and filled with meadow hay.

NEWSPAPER STATISTICS.—There are now published in the United Kingdom, 1,250 newspapers, distributed as follows:—England, 919; Wales 37; Scotland 140; Ireland 140; British Isles, 14. Of these there are 46 daily papers published in England; one ditto Wales; nine ditto Scotland; 14 ditto Ireland; one ditto British Isles.

PREVENTING INCRUSTATION OF STEAM BOILERS.—Mr. John Travis, of Royston, Lancashire, proposes the use of Irish moss, or silicate, arseniate, or phosphate of soda, to prevent incrustation of steam-boilers. From 6 lbs. to 8 lbs. per week, usually suffices for a 40 or 50 horse-power boiler.

Improved Self-opening Gate.

Our engraving illustrates a new and improved method of operating heavy gates; it is intended to dispense with the annoyance of alighting from vehicles or leaving a horse in the road while the gate is being opened. It will be seen, by referring to the engraving that the upper end of the gate post, A, has its bearings in a segment, B, which moves easily on a center at C. This segment has arms to which the cords, D, are fastened, said cords running to the side of the fence or any point conveniently reached by the traveler. It is easy to see that when the cords are drawn the segment is moved on its center; this throws the top of the gate beam out of the perpendicular, and also raises the outer end, E, clear of the sliding catch, F, so that the gate swings quickly around to the side post, G, where it is held fast and leaves the passage way open. The velocity of the movement can be easily controlled by the several cords, as it is only necessary to draw on either one alternately to make the gate move fast or slow. The gate may be made to open from either side, after the traveler has passed through he can close the opening by pulling on the cords on the opposite side. The sliding catch is merely a simple bolt which can be withdrawn by hand, as the outer end of the gate is elevated by pulling the cord; this is unnecessary when it has to be opened from carriage or horseback. There are also two stops near the segment, which prevent it from being drawn over too far. This gate works very well in the model before us, and will doubtless be popular with those who have use for them.

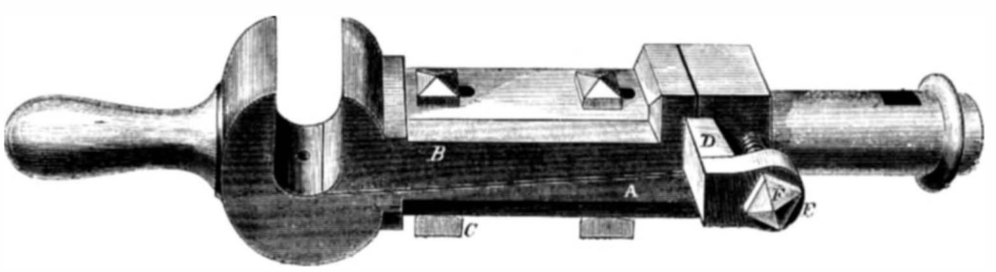


COOL'S SELF-OPENING GATE.

It was patented by Reuben R. Cool, of Millen's Bay, N. Y., through the Scientific American Patent Agency, March 1, 1864. For further information address the inventor as above, or Charles Warren, St. Lawrence, N. Y.

Improved Cam Rod Hook.

This invention is intended to compensate for the wear which takes place in the hooks of eccentric rods of steam engines, &c., and to obviate the bad effects of the lost motion resulting from the same. The engraving explains itself to the mechanical reader, as it may be seen that the body of the hook, A, has a slide, B, fitted to it, said slide being connected by bolts, C, to the hook aforesaid; this slide has slots in it so that it can move back and forth to a certain distance. The key, D, is fitted into a key-way which is cut at the end of the slide and it has a tapering form from one end to the other. There is also a lug, E, on this key, so that when the bolt, F, which passes through it is screwed up, the key will be forced in. By this arrangement it is easy to see that the notch in the rod may be closed up at any time, either when the engine is in motion or not. It is not confined to steam engines alone, but may be used equally well on all other kinds of machinery where this detail is employed.



HAYCOCK'S CAM ROD HOOK.

The invention was patented Jan. 12, 1864, through the Scientific American Patent Agency, by B. A. Haycock, of Richland, Iowa. For further information address the inventor at that place.

Double-Cylinder Expansive Steam-Engines.

This variety of the steam-engine finds much more favor abroad than in this country. English engineers have been and still are experimenting with marine and stationary engines upon this principle, and it is claimed by them that most excellent results are obtained. We append a report of the performance of one ship fitted with these engines. The consumption of coal is stated to be only 1 pound per horse-power per hour; while the figures given make the actual consumption over $2\frac{1}{2}$ pounds per horse-power per hour, which is low enough certainly, if it is correct. The account is taken from the March number of the London *Artizan*:—

"The *Quito*, another of the vessels recently constructed and engined for the Pacific Steam Navigation Company, by Messrs. Randolph, Elder and Co., left the Mersey on the 27th January, on her first outward voyage for her station on the South Pacific, and made a most satisfactory run to St. Vincent's, being the fastest, we believe, for that passage which has yet been recorded, viz., $7\frac{1}{2}$ days from Waterford, which she left on the 28th of January, and where she landed her pilot—and 8 days 4 hours from Holyhead. On the run she averaged from $12\frac{1}{2}$ to $13\frac{1}{2}$ knots, on a consumption of about 2 cwt. per knot, Welsh coal. She arrived at Madeira on the 1st ult., and reached St. Vincent's at 6 A.M. on the 5th ult.

"The engines (Messrs. Randolph, Elder and Co.'s patent double-cylinder) are of 320 horse-power nominal, and appear to have averaged 1,250 horse-power indicated, and to have developed about a horse-power for every pound of coals. The two large cylinders are each 90 inches diameter, and the small cylinders, 45 inches diameter; 5 feet stroke; steam-jacketted; and fitted with surface condensers. The boilers are two in number, tubular, fired from both ends, they are loaded to a pressure of 35 lbs., contain about 4,400 feet of heating surface, and 190 feet of fire-grate surface; the shells are cylindrical, 11 feet diameter, 16 feet long, and $\frac{1}{2}$ inch thick, double-rivetted. The furnaces are twelve in number, each 2 feet 8 inches wide, and there are four superheating up-take chambers."

A Picture of the Solar System.

Herschel says:—"Let the Sun be represented by a globe 3 feet in diameter. The nearest planet, Mercury, will be about as large as a pepper-corn $\frac{1}{8}$th of an inch in thickness, at a distance of 40 yards. Venus will be 78 yards distant and $\frac{1}{3}$d of an inch in diameter—a little larger than a pea. At the distance of 107 yards will be the Earth, very little larger than Venus. About 9 inches from the Earth will be the Moon, the size of a mustard seed. Mars, at a distance of 160 yards, will have about half the diameter of the Earth; and the smaller planets (Vesta, Hebe, Astrea, &c.), at a distance of from 250 to 300 yards from the Sun, will resemble grains of sand. Jupiter and Saturn, 500 and 1,000 yards from the center, will be represented by oranges $4\frac{3}{4}$ inches in diameter. Uranus, the size of a nut of one inch in diameter, will be 2,000 yards distant; and Neptune, as large as an apple $2\frac{1}{4}$ inches in diameter, will be about half a mile away from the Sun. From Neptune to the nearest fixed star will be more than 2,000 miles!"

The First Steamboat.

A recent reference in the London *Times* to a statement that "three centuries ago Blasco de Garay attempted to propel a boat by steam in the harbor of Barcelona," called forth a counter-statement from a correspondent, who has had access to the original letter from Blasco himself, written in A. D. 1543, which contains the evidence often cited by the Spaniards for this assertion. This letter describes minutely a vessel propelled by paddles worked by two hundred men, but there is not a word about steam in the whole document. The first well-authenticated instance of a steamboat actually used is found in the manuscript correspondencce between Leibnitz and Papin, in the Royal Library at Hanover, where Papin relates his experiments with a model steamboat on the river Fulda, in the year 1707. This may all be correct enough; but the "correspondent" should have been more explicit and given his name and *status* when writing about such a subject.

Curious Detection of a Criminal.

Not long ago there occurred in Prussia, one of those cases of detection of crime by scientific means which interest a large and intelligent class of readers. A quantity of gold, packed in boxes, was dispatched by a railway train. On arrival at its destination it was discovered that the gold had been stolen from some of the boxes, which were refilled with sand to make up for the deficient weight. Measures were at once taken for the discovery of the thief, and that no chance might be lost, Professor Ehrenberg was requested to make a microscopic examination of the sand. The Professor (who is a member of the Academy of Sciences at Berlin, well known for his researches into minute objects, and his comparison of volcanic dust from all parts of the world) asked that a quantity of sand from every station by which the train had passed should be sent to him. Examining these one after another, he at last came to a sand which was identical with that found in the gold boxes. The name of the station whence this sand had been collected was known, inquiries were set on foot at that station, and among the persons there employed the thief was detected. The incident is one which an expert novel-writer might make use of with effect.

Surnames.

The use of surnames was not general in England till after the Reformation. Washington's ancestors settled first at Herbert, and the individuals were known as John de Herbert, that is John of Herbert, Thomas de Herbert, &c. Afterward one branch of the family moved to Wessington, when they were known as "of Wessington," or "*de* Wessington," and this became corrupted into the family name of Washington. So late as the beginning of the 18th century some families of Yorkshire had no fixed surnames. Even at this day it is said that few of the miners of Staffordshire bear their fathers' names, but are only known by some sobriquet. Nicknames are in general use, and a man whose real name is Peter Jones may be known to his neighbors, and even to his wife and children, only as "Soaker," "Nosey," "Lumper," or some similar designation.

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VOL. X. NO. 15..[NEW SERIES.]......*Twentieth Year.*

NEW YORK, SATURDAY, APRIL 9, 1864.

Contents:

(Illustrations are indicated by an Asterisk.)

FAULTY CONSTRUCTION OF STEAM BOILERS.

It is palpable to the close professional observer of the manner in which steam boilers are generally constructed, that there is not only great need of reform in the actual workmanship, but that a large proportion of the accidents arising from the use of steam can be traced directly to faulty construction. It is a truism that "the strength of any structure is exactly that of the weakest part;" but who can say where the weakest part of a steam boiler *is*, as they are ordinarily made? Take a simple cylinder boiler, for instance: the sheets are run through the rolls and bent to the proper radius; when the riveting gang get to work, they close up the rivets with great rapidity, but when the holes come out of line with each other, the drift pin is resorted to, and the sheets are literally stretched until the rivets can be inserted; when the drift pin is knocked out, the sheet goes back to its place, and there is already, without a pound of steam pressure, strain enough to cut the rivets off. Repeat this performance through twenty or thirty feet, the length of an ordinary cylinder boiler, and who can say where the weakest point of the structure is? Suppose such a boiler to be made of silk, for instance, or any flexible material, what shape would it be in? It would be full of puckers, folds, seams, and gathers, and represent most accurately the various trials to which that most abused of all modern engineering apparatuses—the boiler—is exposed.

The case is aggravated, not benefited, when we construct a square boiler, for this shape seems, by general consent, to have been adopted for marine service. When the angles or flanges of the sheets are not broken by the flange turners, they are cracked out by the drift pin of the riveting gang, and it ought to be made a capital offense to have such a tool on the premises of any boiler-works. New boilers burst under the most mysterious circumstances; old boilers are patched and then burst; and we are told gravely that "putting new cloth into old garments" is the solution of the trouble. On each occasion the Coroner examines a host of "experts," who proceed to declare that "the iron was burnt," "the water low," "the stays insufficient," "the water changed into explosive gases," &c.; but it never occurs to these worthies that the actual strength of the boilers was in many cases unknown, and that the boilers may have been at the bursting point for days, weeks, or months, until at length it gave way.

It may be argued against this view of the matter that, if hydrostatic pressure is applied, it makes no difference where the strain comes, for the boiler is, as we have admitted, just as strong as the weakest point. It must be borne in mind, however, that it is natural or only reasonable to infer, in theory at all events, that every square inch of the boiler sustains an equal strain; with faulty construction this is impossible, for there may be, as we have shown, almost a rending force without a pound of steam in the boiler. It is ridiculous to suppose that safety is secured by *neat-looking* rivet heads, handsomely calked seams, and extra heavy iron; the best materials and the finest workmanship in other respects are of no use so long as rivet-holes shut past each other so much that some rivets we once took from a boiler were offset nearly half their diameters. Holes will come out of truth with the utmost care, especially in such hap-hazard work as punching is generally made; and when they do so, the only safe way is to rivet all the true holes first, rim all the faulty ones to one size and then put rivets in that fit, just as a machinist turns bolts to fit true holes in a bed-plate or cylinder. This method is no doubt costly, and will never be adopted, but it has the merit of common sense if no other. There is a great deal of carelessness in caulking seams also; for when the chipper chamfers the edge of the plate, the lower side of his chisel bears on the sheet and leaves a furrow, not very deep, it is true, but sufficient to cut through the skin of the iron, which is the strongest part. Neither are the braces properly set, for some draw all one way while others don't draw or hold at all, and are perfectly loose; thus a portion do all the work, and the rest are idle, they impart no strength and are an element of weakness, for the engineer relies upon them when they are doing no good. We are confident that a great deal of attention can profitably be given to the mere workmanship of steam boilers; they are not tanks or receptacles for boiling water, but great magazines wherein a tremendous power is stored, the safe custody of which is of paramount importance to all in the vicinity.

WASTE.

There must be, of necessity, a per-centage of loss in all the material transactions of every day life, whether these be carried on in the workshop, the counting-room, the kitchen or the laboratory; but this inevitable waste can be so far reduced by good management that it amounts to but little in the course of the year. Recent observation has convinced us that the loss in large workshops must be considerable, for in a great majority of cases we have seen materials lying about under foot—bolts, nuts, washers, kicking around in the mud out in the yard, new work exposed to injury from the elements, tools misplaced, essential articles, or tools necessary to the perfection of certain parts of the work at great distances from each other, and an infinite number of abuses which, although small of themselves, when summed up, make a grand total lost at the end of the year. As the thirty-second part of an inch too little on one piece of a steam engine, a sixty-fourth on another, and as much on still another will result in great derangement of the functions of the machine, so infinitessimal waste, continually occurring, is the representative of hundreds of dollars for which there has been no return. No matter what the nature of the trade or manufacture, it is very certain that a material reduction of the expenses of every department can be made by careful attention to the minor matters, and these remarks are made with the hope that all interested will give them attention.

A NEW METHOD OF LOCOMOTION.

On the fifth of October, 1861, we published an illustration of the enlarged pipe, for the transmission of letters and parcels, which was then being laid down for experiment, in London. This tube is of cast-iron, flat at the bottom, and arched above, in the form of a railroad tunnel. It is 2 feet 6 inches wide and 2 feet 9 inches high, and is furnished with a pair of low rails, on which a light wrought-iron car runs through it. The car is propelled by the pressure of the atmosphere; the air being exhausted from before it by a powerful fan at the further end of the tube. A pressure of from 4 to 6 ounces to the inch is obtained, and this gives a speed of about thirty miles an hour. This tube was laid down from one of the railway stations to the Post-office—a distance of about a third of a mile—for the transmission of the mail bags, and has been constantly employed in this service for more than a year.

By the last number of the London *Engineer*, we see that the success of this exeriment has been so complete as to cause a vigorous effort to be made to apply it to the conveyance of passengers. The *Engineer* says that applications have been made to Parliament by two companies ready to invest their money, for authority to lay down pipes for the conveyance of passengers between different parts of the city, and that engineers are ready to risk their reputations on the success of the undertaking. The *Engineer* also remarks as follows:—

"If a mail truck can be, as it is, whisked at the rate of thirty miles an hour, through a 4½-feet pneumatic tube, it needs no great amount of proof to show that it could be made to run equally well through a tube twice the diameter, or four times the sectional area. Now the mail trucks of the Pneumatic Despatch Company have been working regularly and satisfactorily through their tubes for many months, and although this system of communication is unseen by the multitude it is as much an established fact as railways themselves. Many persons, too, have made the journey in these trucks through the tubes, and it is clear enough that the result would be the same were the trucks filled with mail bags or with human beings. There has been no interruption of the postal traffic in the pneumatic tubes, no collisions, explosions or accidents occasioned by running off the line. The air is being constantly changed, and, as those who have gone through the tubes at the highest speeds well know, the interior is pure and sweet. Yet there is an undefined dread of the pneumatic system, arising simply from the ignorance of those who know nothing of its working. A country correspondent of ours, some time ago, wrote that it was 'of course wholly out of the question to expect passengers to commit themselves to carriages in a pneumatic tube.' On the contrary, passengers will go, even from the motive of idle curiosity, wherever they are assured of safety and comfort, and it is demonstrable that both may be secured in a higher degree in a pneumatic tube than upon any railway in existence."

We published an estimate, some time since, that passengers might be conveyed by this method at a speed of 4 miles per minute, or 240 miles an hour; and the *Engineer* gave an estimate of 6 miles per minute. Most persons naturally shrink at first thought from the idea of being blown through a tube, and, therefore, the scheme is generally regarded as impracticable; but it seems to be moving forward with steady steps towards its accomplishment.

WATER AND STEAM COCKS.

The origin of the invention of these simple appliances is very obscure. As far back as the time of Humphrey Potter, the lazy boy who made the valves of the steam engine self-acting, we find mention of them; and, for aught we know to the contrary, there may be some covered up in the Pyramids of Egypt at this day. The essential principle of the appliance is the same as it always was; and there are few material alterations in the outward form and general construction. The practical work to be accomplished by a cock is to form an absolutely air-tight partition which can be converted into a free passage between certain pipes or parts of an engine. The mechanical difficulties which prevent the accomplishment of this object (for comparatively few cocks are really tight and in good working order) are want of proportion, lightness of important parts, the absence of proper fixtures to retain the plugs or keys of large cocks in their places, and defective workmanship in making the plug tight on its seat. There is comparatively little difficulty in making the plugs of lesser cocks (or "faucets," as they are termed when of a small size) tight; as the great thickness of metal, compared with the diameter of the plug, prevents springing of the casting when it is bored. As the diameter of the shell increases, the difficulty of making the cock tight is augmented, and we believe there are few or none made with keys over five inches in diameter of opening. The costly nature of the work, and the difficulties before mentioned, render larger sizes impracticable, and the globe valve is very generally used in their place for all purposes ; in time the valve may supplant the cock altogether. When the shell of a cock is bored out in the lathe it is not round and can hardly be made so ; because, as the tool crosses the opening, it strikes on the opposite edge and springs; this also occurs in leaving the solid metal so that inaccuracy is inevitable, unless a great expenditure of time be made in running many light cuts through the work. The same observation is true of the key, the thin sides spring under the tool, so that when the plug is put in the shell there is always a great deal of work to be done in making the two fit. Not only this, but even when ground in tightly and put in its place the pressure on the key forces its thin sides in, or springs it enough to allow fluids to find the way past. And it is, therefore, for these reasons that the cock may be considered nearly an obsolete contrivance for the object it is intended to effect. The usual method of grinding in cock plugs is to have them first turned true as possible in the lathe and afterwards scrape and file the parts which bear the hardest, so that a uniform surface is obtained, powdered glass is then applied mixed with oil, which cuts the highest points down and makes the junction of the two perfect. Small faucets are usually tried with the mouth to ascertain if they are air-tight. This is done by simply placing the open side between the lips, exhausting the little air contained within by inhaling the breath and placing the tongue over the orifice before the faucet is taken out of the mouth. If air be admitted by opening the mouth and the faucet still adheres to the tongue it is tight. It it parts readily from the member alluded to, it is leaky. Larger faucets do not admit of this; they must be placed on end, and be tried with water.

CAPT. ERICSSON'S WROUGHT-IRON GUN.

At the works of C. H. Delamater, foot of 13th street, North River, are to be seen the several parts of one of Capt. Ericsson's wrought-iron guns, such as are to be used in arming the *Dictator* and *Puritan*. First is the massive core, forged from the best charcoal iron at Bridgewater, Mass. The diameter of the bore is 13 inches, and the walls of the core are 8 inches thick at the breech; the form being cylindrical about half way up the chase, whence there is a gentle taper to the muzzle.

In another part of the works is a pile of hoops for strengthening the gun at the breech. These are cut from iron plates three-eighths of an inch in thickness, and have a radial depth of 9 inches, giving a total thickness to the walls of 17 inches—4 inches greater than the caliber. The core is to be turned upon the outside, and the hoops are to be forced on by a hydraulic press. These thin hoops will be bounded at the breech and at the upper end of the reinforce on the chase by thick hoops several inches in axial length. The trunnions are forged upon a massive hoop which surrounds the thin hoops of the reinforce. The gun is not to be rifled, but will be used for spherical shot and shell. The solid shot will weigh 276 lbs., and the shell 216 lbs. The gun is expected to bear a regular service charge of at least 50 lbs.

Verification of Olive Oil.

A most interesting paper was recently read at the Society of Arts (London) by Charles Tomlinson, Esq., "On the Verification of Olive Oil by means of its Cohesion Figure." The author of this paper has introduced a new mode of detecting the adulteration of oils, more especially olive oil. It consists simply of depositing a drop of oil on the surface of perfectly clean water, in a chemically clean glass of four inches in diameter at the mouth. Every oil will in the course of half a minute expand, and if pure will, so to speak, write its own name on the water,—that is, it will assume a shape and color that a practical eye could easily detect whether it was pure or a mixture. Mr. Tomlinson stated that "When a drop of pure olive oil is placed on the surface of water, it spreads out slowly into a large disc with a raised edge. The cohesion of the oil soon begins to re-assert itself; the film retreats upon itself; the raised edge at first shows symptoms of the returning force of cohesion; a number of dots appear at the edge, like beads strung upon a thread, the spaces between the beads open, and the edge becomes deeply serrated; separate portions of the film gather themselves up simultaneously, leaving polygonal spaces, bounded by strings of beads or bosses, and filled with an exceedingly minute dew or spray, which requires a sharp eye to detect. All these changes occupy about 35 seconds."

Terrible Calamity at Sheffield.

At a little before midnight, on Friday last, one of those terrific disasters to which nearly all the great towns in the north of England are more or less exposed happened at Sheffield. The great reservoir of the Sheffield Water Company—a reservoir nearly 100 acres in extent, and which held more than a million cubic feet of water—suddenly burst its embankment and swept with the fury of another Deluge down the narrow gorge formed by the Loxley and Stannington hills into Sheffield itself. Almost before warning could be given, the volume of waters began rushing headlong down the valley, sweeping farms and houses, forges and factories, like chaff before it. Never, probably, before has an accident of the same kind occurred so ruinous in its wholesale destruction of property, so lamentably fatal in the loss of human life. Whatever the sudden and tremendous flood could reach it seems to have destroyed, and, calculating only by the number of houses swept away and the persons missing who were known to have been in them on that fatal night, there is every reason to fear that the lives sacrificed by this awful calamity will not be less than 200, if they do not unfortunately exceed even that number. Of the damage done to property it is impossible at this early date to form even a conjecture. The devastation in this respect is unparalleled. A large, populous, and thriving district has been almost obliterated from the earth, scarce more than traces of the houses and factories that once stood there now remaining. The Don, owing to late heavy rains, was unusually high, and the additional water thrown into it has laid hundreds of acres under water, and inflicted incalculable injury to the growing crops. Of the destructive character of the flood there were abundant evidences on every hand. Timber in large quantities, ped-posts, feather-beds, tables, clocks, and various kinds of household furniture passed down, and several carcasses of cattle also.

Large numbers of people have lined the river's banks all the day; but it is now evident that the greatest volume of water has passed by, and further damage here is not apprehended. The water is very thickly impregnated with mud—a proof that it must have swept with terrific violence over the land adjoining the river. Fish—pike in particular—have been left in large quantities on land from which the water has subsided.

Every additional inquiry made into the circumstances of this appalling calamity shows that it has been more disastrous than was at first anticipated. It is now estimated that the loss of life will exceed 250, and that the value of the property destroyed exceeds half a million. From Bradfield, where the reservoir burst, down the course of the rivers for twelve or fourteen miles the country is laid waste. The reservoir covered an area of seventy-six acres, and would hold 114,000,000 cubic feet of water. The embankment, which crossed the end of the valley, was an enormous erection, with an average height of eighty-five feet, and forty feet in thickness. It was three hundred yards long. Between Matlock and Hillsborough, a distance of four miles, the greatest loss of life has been caused. Within this tract, whole rows of houses have been swept entirely away, in three of which alone there were 25 lives lost. In the opposite row the whole of the inhabitants were drowned, and scarcely any of their bodies have been discovered. The flood seems to have swept off everything before it, from the confluence of the Loxley and the Revelin to the Don. Between Wardsend and Sheffield on the Don, the bodies were seen lying in the mills and the mud and ruins. There were fourteen in one place, ten in another, and thirteen in a third. At Neepsend 900 acres of gar dens were devastated, and whole families were swept away. An official report just received states that one hundred and fifty-six dead bodies have been already recovered; seventy have been identified. Large numbers are not yet found. Bodies have been discovered as far down the river as Doncaster. Along the banks of the river, between that town and Sheffield, the scene of the inundation was visited by vast crowds on Sunday; the police and a strong military guard acted for the maintenance of order and the security of property. A movement for a general subscription was immediately commenced, and a meeting will be held to-morrow. The inhabitants of the submerged districts have lost everything, and an appeal for instant help will be made; hundreds have nothing left of their property but their night-dresses. The inquests were opened on Saturday night, and then adjourned for ten days. There were then ninety bodies in the workhouse, and the coroner said he had been informed there had been nearly 200 found. He referred to a statement, which is generally made and believed, that in consequence of the dangerous state of the reservoir, warning was sent to the inhabitants of the valley as far as Darnflask, and that only a few lives were lost there, but that the warning was not sent to the thickly peopled districts below.—*London Times, March* 15.

A Blacksmith Outwitted.

An English paper says that while the Danes were making their preparations for the defense of the Dannewerk, they found it advisable to cover the tops of the palisades with *cheveaux-de-frise*, and the work was just completed when they abandoned the position. In the innocence of his heart, the blacksmith who had taken the contract asked for an interview with Field Marshal Van Wrangel, and presented him with his little bill for the work done; imagining that the Prussians, as the present possessors of the Dannewerk, were responsible for all outstanding liabilities, and he was not a little disconcerted to hear the Field Marshal congratulate him on having accomplished his work so well, and expressed his hopes that he would soon receive payment—from the Danes.

The Armory at Trenton.

Some idea of the perfection to which the manufacture of Government arms has attained can be gathered from the annexed account of the Trenton armory, New Jersey:—The machinery cost about $300,000. There are requisite for each musket 15.83-100 pounds of iron, and 2.46-100 pounds of steel and 7 feet of black walnut. So rigid is the Government inspection, that should 1,000 muskets from all the armories in the United States be taken to pieces, and these parts thrown into a promiscuous pile, so that in selecting components to assemble a complete gun no two parts chosen will be from any one gun of the one thousand as they stood, yet they must come together without recourse to file or alteration, and make as perfect an arm as the model musket.

Is Flax Exhaustive?

It is believed by many that flax is an exhaustive crop, but it is to be doubted if it is more so than most of the small grains. All of them are so if the land is continually cropped and nothing returned to the soil. Experiments of Professor Johnson showed that flax is less exhausting than either wheat or oats, judging from the amount of phosphoric acid given by its ash. Dr. Hodges, of Belfast, Ireland, recommends the application of 48 lbs. muriate of potash, 16 lbs. soda ash, 54 lbs. bone dust, 56 lbs. sulphate magnesia, 34 lbs. gypsum, per acre, as a manure for flax land.

SPECIAL NOTICE.

A. S. Macomber, formerly of Bennington, Vt., and now of Hamilton, N. Y., has petitioned for the extension of a patent granted to him on Nov. 5, 1850, for an improvement in straw-cutters.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Oct. 17, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

Lighthouse illumination produced by a magneto-electric apparatus has been in successful operation at the South Foreland and Dungeness beacon for two years. Currents of air produced by the rotation of masses of iron in the neighborhood of powerful permanent magnets generate the current of electricity, which ignites pieces of carbon intensely, thus producing the light.

RECENT AMERICAN PATENT.

Pianoforte.—This invention consists in the employment of straight bridges throughout the whole scale of a pianoforte, whereby, besides allowing much more freedom of vibration to the board, the strings are enabled to be so arranged in overstrung tiers or sections through the middle of the board, and a more perfect scale as to the proportionate length of strings, and a progressively-increasing distance between the notes on the bridges toward the bass, are obtained. The latter result is of great importance, for as the strings of the lower notes require longer vibrations so they require greater distance or space of bridge uninterfered with by other notes. Another improvement consists in electrically isolating the case, sound-board and all that produces and adds to the tone of the instrument, from the iron frame or plate or mere sustaining portion, whereby the electricity that is generated or attracted by vibration in the strings, and which the inventor considers to be the source of sound, is all forced into and prevented from escaping in any way but through the sound-board. Another feature consists in making the case of the grand pianoforte narrower across the middle than at the rear end, and wider than usual at the rear end, the object being to make the case (which is a mere shell of wood and with a bottom sound-board) of a form approximating to that of the violin or guitar, which is the form best adapted for sound, and to obtain a greater width of sound-board in the lower or bass part of the instrument where greater vibration is necessary. A further improvement consists in providing an opening at the left-hand front corner of the sound-board of a grand pianoforte for the purpose of giving a better opportunity for the sound to come out from the instrument when a bottom sound-board is used. Spencer B. Driggs, of New York city, is the inventor of this improvement.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MARCH 22, 1864.

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.

41,968.—Construction of Explosive Shells.—Wm. B. Aitken, Philadelphia, Pa. Ante-dated March 4, 1864 :

I claim the mode of forming the cores of bomb shells, or other missiles, out of the pieces, a, shaped and arranged relatively to each other, and the outer case, E, substantially as described, the said pieces being held together in the manner specified or by equivalent means.

41,969.—Attachment of Buttons, &c.—Nathan Ames, Saugus Center, Mass.:

I claim as an attachment of buttons, hooks and eyes and other analagous objects, the shank or shanks, d, prong or prongs, e, and shoulder or shoulders, c, substantially as and for the purpose described.

41,970.—Salinometer Case.—Edward H. Ashcroft, Lynn, Mass.:

I claim the arrangement of the spray chamber, C, within the measuring cistern, A, substantially as described.

And with the said arrangement of the spray chamber, C, within the measuring cistern, A, I claim the arrangement of the jet tube, F, of the spray chamber, viz: so as to discharge toward the bottom of the spray chamber, substantially in manner as described.

I also claim my improved arrangement of the spray chamber, C, the measuring cistern, A, the stand pipe, G, the auxiliary conduit, d, and the valve, g, and its stem, h, the whole being substantially as hereinbefore described.

41,971.—Door Spring.—Willard Badger, Jr., North Chelsea, Mass. Ante-dated March 15, 1864 :

I claim, first, The vibrating spring-arm, E, arranged inside of the jamb and casing, and connected with the corner of the door by means of a metallic strip, G, or its equivalent, substantially as set forth, and for the purpose described.

Second, The lever, i, in combination with the spring-strip, G, and vibrating arm, E, arranged and operating substantially as described.

41,972.—Lamp.—Marshall Burnett, South Boston, Mass.:

I claim the connection, C, combined with the reservoir and burner, and made substantially as and for the purpose described.

41,973.—Broom.—Samuel Carpenter, Cedar Rapids, Iowa :

I claim the combination of the handle, c, the braces, a a, and b b, the clasps, e and f, the screwbolts and nuts, g g g g, and the wisps, i, in the manner and for the purpose set forth.

41,974.—Apparatus for making Extracts.—Wm. Class & Ernest Rubenon, Cincinnati, Ohio :

We claim the arrangement of the pump, valves, and filtering medium, herein described and represented, between the inlet and exit passages, I D, for the purpose of making coffee, tea, or other extracts, or for the purpose of filtering any liquid, as herein represented and set forth.

41,975.—Vapor Stove.—H. W. Dopp, Buffalo, N. Y.:

I claim mingling tube, L, and conducting tube, K, in combination with perforated distributing plate, A, for the purposes set forth.

41,976.—Match Box.—George Dowler, Birmingham, England. Patented in England Jan. 7, 1863 :

I claim the match box made with or having applied to it, the striker case or plate, x, provided with the opening, w, the same being as and for the purpose as hereinbefore more fully set forth.

41,977.—Pianoforte.—Spencer B. Driggs, New York City :

I claim, first, The employment throughout the scale of a pianoforte of a system of straight bridges of different hights, whereby the strings are brought in overstrung tiers or sections over or as near as possible to the middle portion of the sound-board, substantially as herein described and other results herein-above mentioned are obtained.

Second, Electrically isolating the case, the sound-board, and all that is instrumental in producing or developing the sound from the iron frame or mere sustaining portion of the pianoforte, substantially as and for the purpose herein specified.

Third, Constructing the case of the grand pianoforte of violin form, that is to say with both sides curved and with the rear portion wider than the middle portion, substantially as and for the purpose herein described.

Fourth, In combination with a bottom sound-board, C, in a grand pianoforte, I claim the opening, f f g, at the front left hand corner of the upper sound-board, D, substantially as and for the purpose herein specified.

41,978.—Soluble Silicate.—Samuel P. Duffield, Detroit, Mich.:

I claim the above described silicate of potassa, as a new article of manufacture, the same being made directly from ashes and sand, substantially as described.

41,979.—Manufacture of Common Salt.—Samuel P. Duffield, Detroit, Mich.:

I claim the above-described common salt or chloride of sodium, as a new article of manufacture, the same being made from salines containing the chlorides of calcium or magnesium, or both said salines being purified by the use of a silicate of potash or of soda, substantially as set forth.

41,980.—Manufacture and purifying of Common Salt.—Samuel P. Duffield, Detroit, Mich.:

I claim the use of soluble alkaline silicates for the purpose of purifying brines or salines, or common salt itself, by the precipitation of the chloride of calcium or of magnesium or both, substantially in the manner and for the purposes set forth.

41,981.—Gas Burner.—Whitman S. Dyer, Portland, Maine :

I claim the gas burner constructed and operating in the manner described and represented as an improved new article of manufacture.

41,982.—Manufacture of Paper Pulp from Straw, &c.—A. K. Eaton, New York City :

I claim, first, Preparing paper pulp from straw or other substances by subjecting it to a grinding process commencing with the early stages of the treatment with hot alkalies, and continuing the grinding in connection with the alkaline treatment, in the manner and for the purpose herein described.

Second, I claim purifying the alkali held in solution in the refuse liquor by passing it through a filter constructed substantially as above described, sufficiently to enable me to use it again, and completely reproducing it when necessary by making it into combustible cakes, as set forth.

41,983.—Plane-stock.—George Franklin Evans, Norway, Maine :

I claim as my invention or improvement in the plane made with the spring face plate, the construction of the connecting rods, F F, and their receiving parts of the stock curved, substantially in manner and so as to operate together as specified.

41,984.—Breech-loading Ordnance.—George H. Ferris, Utica, N. Y. Ante-dated March 9, 1864 :

I claim, first, Closing and opening the chamber of a gun from the rear, by means of a screw-actuated and screw-encircled recoil-seat, or breech-piece, F′, when said recoil seat or breech-piece is received into a screw perforation in the breech of the gun and combined exteriorly with a supporting nut, D, or its equivalent, substantially in the manner and for the purpose herein set forth.

Second, When the chamber of a gun is rearwardly opened and closed by means of a screw-actuated recoil seat, E′, I also claim combining a tubular shaped expansible double-flange, N, constructed as described with the inner face of said recoil seat, substantially in the manner and for the purpose herein set forth.

Third, When the chamber of a gun is closed and opened by a screw-encircled recoil-seat, or breech-piece, E′, I also claim forming a longitudinal groove or slot, in the lower portion of the screw-cut portion of the opening to said chamber, to serve as a receptacle for the dirt that may accumulate in the screw-threads of the same, substantially in the manner herein set forth.

41,985.—Sealing Fruit Cans, &c.—Henry S. Fisher, Newburgh, Pa.:

I claim the use of india-rubber or gutta-percha gaskets coated on both sides, or surfaces with a composition such as specified, in combination with a preserve can or jar and cap, e, and retaining device, f, substantially as described.

41,986.—Wash-stand.—Zebina E. Fobes, Troy, N. Y.:

I claim a portable wash-stand having a basin, B, and provided with one or more elevated service water-receivers and one or more waste-water tanks, and with cocks for controlling the supply and escape of the water, substantially as described.

41,987.—Corset Skirt-supporter.—Lavinia H. Foy, Worcester, Mass.:

I claim, first, The mode of fastening the front by means of hooks, b, and eyelets, whereby the article can be either laced or hooked, substantially as set forth.

Second, I also claim making the bosom adjustable by means of the hooks and eyelets, substantially as set forth.

Third, I also claim in combination with the supporting rim, F, of a skirt-supporter, the hoop, E, shielded at its ends by metal caps, g, substantially as set forth.

Fourth, I also claim in combination with the supporting rim of a corset skirt-supporter of a hoop with its ends protected and covered by shields, additional to the case, for the purposes set forth.

41,988.—Nib for Scythe-snaths.--Pinckney Frost, Springfield, Vt.:

I claim the nut fastening, g g′, constructed and applied to the nib, B, substantially as and for the purposes herein described.

41,989.—Furnace for smelting Ores.—Eliza Jane Hall, San Francisco, Cal.:

I claim, first, The combination of parts herein described for the reduction and saving of ores, viz:—

1st, The arrangement for a powerful draught. 2d, The peculiar egged-shaped form of the furnace. 3d, The gradually contracting flue going out from the back of the furnace. 4th, The peculiar construction of the condensing apparatus. 5th, The boiler on top of the furnace for economy of fuel. 6th, Introduction of steam above and near the bottom of the fire, for oxidation. 7th, Small fire-box in the boiler. 8th, Fan-blower or other power to supply the draught. 9th, Simple and cheap fluxes named. 10th, Charcoal for fuel. 11th, The peculiar construction of the bottom of the furnace herein described.

Second, I claim the condenser with the sieve at its top through which a continuous shower of cold water is kept pouring for the purpose of condensing and precipitating the volatile portions of the metals escaping with the draught, arranged and operating substantially as set forth.

Third, I claim the flue, s, within the condenser, and surmounted with the conical cap, to secure the condensation and precipitation of the volatile portions of the metals escaping with the draught.

41,990 —Horse Rake.—O. J. Hardgrove, Massillon, Ohio:

I claim the combination with a vibrating rake, of a vibrating lever, C, constructed with a locking shoulder, 3, pivoted arm, i, and vibrating arm, h, operating substantially as and for the purposes described.

41,991.—Mode of cancelling Revenue and other Stamps. —Emanuel Harmon, Washington, D. C.:

I claim the method of cancelling revenue stamps, in combination with engraving thereon of the initials of the months of the year, and of figures or dots representing the days or a series of days of months, substantially as above described.

41,992.—Dove-tailing Machine.—S. E. Hartwell, New Albany, Ind.:

I claim, first, The arrangement of the gang of conical dovetailing bits, C K K′ k k′, rotating on axes at right angles to the plane of motion of the bed, E, substantially as and for the purposes explained.

Second, The combination of the adjustable dovetailing bits, C K K′ k k′ bed, E e, sliding in a plane at right angles to the axes of the said bits, the clamps, H and I, and gage, G, the whole being arranged and operating substantially as set forth.

Third, I claim the dovetailing cutter, C K K′ k k′, operated as represented in the foregoing specification.

41,993.—Chimney-flue.—Charles T. Harvey, Chicago, Ill.:

I claim the combination and use of two or more longitudinal compartments surrounding (except as before stated) the smoke flue or chimney, when they are divided into distinct air flues and have independent currents of air passing through them for heating and ventilating purposes and as a protection against fire, substantially as shown.

I also claim the branch connection, T T, by which heat can be conveyed to or air drawn from the center or other part of a room or rooms, into and from the upright air flues in combination with the chimney described in the preceding clause of my claim, substantially as shown.

41,994.—Cleaner for Lamp Chimneys.—Ezra S. Hazeltine, Warren, Pa.:

I claim the use of an elastic pad for the cleaning of lamp chimneys, or other glass tubes with curved or irregularly curved inner surfaces.

41,995.—Screw Wrench.—Henry Wheaton Hewet, New York City. Ante-dated Jan. 25, 1864 :

I claim the extending the tube upon which the adjusting male screw is cut, so as to form a part of the handle, with its peculiar bearings or their equivalents, thereby rendering the shank-spindle quite inflexible, and affording an easy and powerful adjustment of the movable jaw, substantially as herein described.

41,996.—Invalid Bedstead.—John R. Hill, Goshen, Ohio :

I claim, first, Suspending the bottom of an invalid cradle by a frame, D, capable of elevation or depression at either or both ends, by windlasses, H I, or their equivalents, substantially as and for the purposes set forth.

Second, In the described combination with the suspended frame, D, of an invalid cradle, I claim the provision of standards, B, and clamps, C, for attachment to a common bedstead, as set forth.

Third, The arrangement of the parts, L O P N n Q Q′, for sustaining and laterally stretching the bottom, R, of an invalid cradle.

41,997.—Plow.—Wm. Hinds, Little Falls, N. Y.:

I claim, first, A plow mold-board when constructed in accordance with the following conditions, viz : all lines on the face of the mold-board which are parallel to a surface upon which the plow rests when in its proper position for operation, to be straight, all said lines to intersect two circular arches described upon vertical planes, transverse to an axis from which said arcs are generated, said axis to be parallel to the before-mentioned horizontal surface. The radius of that arc which is nearest the rear end of the mold-board to be about double the radius of that arc which is nearest the front end of the mold-board. The distance between the vertical transverse planes upon which said arcs are described to be about equal to the radius of the smaller arc.

Second, In combination with a plow mold-board constructed as described in the preceeding claim, a rim or flange, m, for the purpose of rendering the rear edge of the mold-board more durable.

Third, In combination with a plow mold-board constructed as claimed above, a sward cutter, V, attached to the plow-share, and secured to the standard by a removable bolt.

Fourth, In combination with a plow mold-board a cross bar constructed with feet as shown at Fig. 6, for the purpose of more rigidly attaching the rear end of the beam to the rear end of the mold-board.

Fifth, In combination with a plow mold-board a land-side arm, N, constructed in a trough like form and fitted to the land-side with a dovetailed joint, for the purpose of attaining greater security and facility of attachment.

41,998.—Wringing Machine.—G. R. Huntley, Taunton, Mass.:

I claim the stands, N, with legs, L and M, lever, E, rollers, R R, friction wheel, G, box, B, rod, A, flange, K, and spring, C, arranged in the manner described for the purpose set forth.

41,999.—Apparatus for preventing the Loss of Sugar during Evaporation.—Gustavus A. Jasper, Charlestown, Mass.:

I claim the combination of the vessel, D, its float, F, and pipe, E, with the vacuum pan, A, its conduit, C, and the condenser, B, the whole being arranged substantially in manner and so as to operate as and for the purpose hereinbefore specified.

42,000.—Breech-loading Fire-arm.—Benjamin F. Joslyn, Stonington, Conn. Ante-dated March 11, 1864 :

I claim the sliding rod, H, arranged in respect to the metallic cartridge and operated by the movable breech of a breech-loading fire-arm, substantially as and for the purpose herein set forth.

42,001.—Washing Fluid.—Sylvester Kent, Providence, R. I.:

I claim, as a new article of manufacture, with the within written name and title, substantially the within-described combination of potash, sal ammoniac, and salts of tartar, in solution, as and for the purpose specified.

42,002.—Cooking Range.—William M. Kepler, Cincinnati, Ohio :

I claim the arrangement of the hot air chambers, G G, at the sides of the fire box, and connecting them with the ovens, B B, by pipes that first pass out of the stove, and then return back into the ovens, so as to heat said ovens, and offer facilities for connecting with the hot air chambers or passages, and for the purposes specified.

42,003.—Apparatus for shearing Metals.—Isaac Lamplugh, Springfield, Ill.:

I claim, first, A tool-holding machine consisting of a bed, B, curved standards, C c, lever, D, and longitudinal braces, f f, in combination with the diagonal shears, e e′, all arranged and operating substantially as described.

Second, A machine for shearing metal, &c., constructed and operating substantially as described.

42,004.—Apparatus for shearing, punching, and bending Metals.—Isaac Lamplugh, Springfield, Ill.:

I claim, first, The single plate machine, composed of the perpendicular standards, A A′, longitudinal brace, B, stationary jaw, C, and the movable jaw, D, with its guides, d d, all combined, constructed, and arranged, substantially as and for the purposes described.

Second, The application of the punching, shearing, or bending tools to the single plate jaws, C D, in combination with the guides, d d, substantially as set forth

42,005.—Machine for rolling Knife-blades.—William P. Lathrop, Winchester, Conn.:

I claim the combination of mechanism for making knife-blades economically, expeditiously, and in a way not now in use, as herein described, or by any other mode substantially the same.

42,006.—Treating and preparing Navassa Guano.—Gustav Adolph Liebig, Baltimore, Md.:

I claim, first, The separating process herein indicated, for cleansing and purifying navassa guano.

Second, The separate articles herein described as articles of manufacture, trade, or commerce, derivable from navassa guano, in the manner indicated or by other analogous means.

42,007.—Petroleum Stove.—Charles B. Loveless, Syracuse, N. Y.:

I claim, first, The use, in vapor stoves, of a valve-seat and valve made of steel, in the pipes through which the supply of the fluid takes place, in combination with the supplying and vaporizing pipes, substantially as above described.

Second, The retort pipe, g, and vapor pipe, h, constructed, arranged, and operating substantially as set forth, in combination with the retort, N.

Third, The additional vapor pipe, R, and burner, O , in combination with the protected vapor-pipe, h, for the purposes set forth.

Fourth, The deflector-plate, B, constructed and operating substantially as described, for the purpose of forming the hot-air chamber, 1, and of forming the escape-chamber, 2, as specified.

Fifth, The hot-air chamber, 1, around the cylinder, E′, constructed substantially as set forth.

Sixth, The stove-plate, A, constructed substantially as described, with escape holes, a, in combination with the top-casing, C, arranged and operating as set forth.
Seventh, The annular air-heating or hot blast chamber, 4, surrounding the air-mixing chambers, 3, constructed and operating substantially in the manner and for the purposes specified.
Eighth, The cap, F, in combination with rods, b, for the purpose of securing the cylinders, D and E, to the underside of the base-plate.
Ninth, The valve, P, constructed, arranged, and operating, substantially as set forth, when in combination with the vapor-pipe, h, the whole operating substantially in the manner and for the purposes specified.

42,008.—Device for loading and unloading Corn-shocks. —Wm. M. Mason, Polo, Ill.:
I claim the combination of two or more tilting-frames with the horizontal bed-frame of a cart or wagon when constructed and arranged substantially in the manner described, for the purposes set forth.

42,009.—Harvester.—R. W. McClelland, Springfield, Ill.:
I claim, first, In combination with a shoulder at each end of the sickle bar, the square shanked rivets, d, and the sickle sections, B, with their holes and slots, for the purpose of holding said sections to the bar, in a direction transverse, as well as longitudinal, to said bar, and this I claim whether the flange, h, and groove, i, be used or not, substantially as described.
I also claim in combination with a shouldered sickle bar the series of removable blades and the removable head secured thereto, substantially as and for the purpose described.

42,010.—Double-seaming Tin Can.—H. A. Meriam, Titusville, Pa.:
I claim the instrument, B, formed with the head, f, curve, h, and shank, g, substantially as described, when used for seaming a square or rectangular can, A, in the manner herein set forth.

42,011.—Drilling Machine.—William Morton, Woodhull, N. Y.:
I claim the arrangement and combination of the pressing lever, D, the adjustable hanging yoke, a, the regulating screw, f, with its socket, n, and cove point, l, operating substantially in the manner as and for the purposes herein set forth.

42,012.—Paper-ruler.—David Munson, Indianapolis, Ind.:
I claim the adjustable ruler and paper-cutter when combined in one article and constructed substantially as shown and described for the purposes set forth.

42,013.—Barrel Churn.—Lucius H. Muzzey, Springfield, Ohio:
I claim the combination of the curb, the tightening screw-hoops, and the barrel of the churn, when constructed, arranged, and operating, substantially in the manner described and for the purposes set forth.

42,014.—Potato Planter.—William Nevins, Irving, N. Y.:
I claim, first, The combination of a potato planter, E', or equivalent, with a cultivator provided with adjustable angular wings, B B, by which a ridge is formed and the seed planted on the same, substantially as herein set forth.
Second, I also claim the combined construction and arrangement of the potato planter proper, consisting of the roller, K, provided with teeth, u u, the spring, v, endless chain, L, driven by the traction wheel, M, and the shield, z, vibrated by means of the roller teeth, so as to shake down the potatoes in the hopper, the whole operating substantially as herein specified.

42,015.—Saddle.—Barak T. Nichols, Newark, N. J.:
I claim, first, The fender or swinging flap, B, when the stirrup is pendent to the bottom thereof, substantially as described, and thereby dispensing with the long stirrup straps.
Second, I claim the combination of the said fender, B, with the girth, D, in such a manner as that when a downward pressure is applied to the fender it will have the effect to tighten on the girth, substantially as described.

42,016.—Office Desk and Chair combined.—Marcus P. Norton, Troy, N. Y.:
I claim the employment of the track frame, C, hinged to the desk, A, in the manner, substantially as and for the purposes herein described and set forth.
I also claim the combination of an office chair with an office desk by means of the track, D D, or its equivalent, substantially as and for the purposes herein described and set forth.

42,017.—Bee-hive.—Harrison Ogborn, Richmond, Ind.:
I claim, first, The convex pieces, N, in combination with the moth entrance, M, movable bottom board, H and G, moth drawer, E, and protector, J, when arranged together in the manner and for the purposes set forth.
Second, I claim the feed-box, F, entrance, I, and slide, U, in combination with groove, Q, wedge, R, cleat, O, movable bottom, H and G, when arranged, combined, and operated as herein set forth.

42,018.—Burial Case.—John Peak and F. S. Pinkhand, Boston, Mass.:
We claim, first, Combining an outer case of wood with an inner air-tight casing of sheet metal, having a channel for cement projecting from its upper edge to receive a lip on the cover, all as set forth.
We also claim forming the self-sealing joint by means of the groove or channel in the receptacle and the peculiar-shaped lip on the lid or cover, in conjunction with a proper cement, as described.

42,019.—Mode of securing a Desirable Color to Tobacco.—F. M. Pearl, Daviess County, Ky.:
I claim the adaptation of the instrument to the deadening of tobacco in the parts marked A A and B, and the deadening of tobacco in the field, as heretofore described, by belting or cutting around the stalk and piercing the stalk in or near the belt or cut, to secure a desirable color, less en labor, &c.

44,020,—Saddlers' Stitching-horse.—John H. Pitezel, Three Rivers, Mich.:
I claim, first, The combination of fixed and pivoted jaws, C D, with the toggle joints, J J, treadle, N, and strap connection, S, constructed and operating substantially as described.
Second, Hinging the movable jaw, D, to a jaw, C, which has an extension arm, C', in combination with toggle levers constructed and operating substantially as described.
Third, Providing for attaching the two jaws, C D, to the seat by a single fastening, substantially as described.
Fourth, The two extended arms of jaws, C D, in combination with the toggles, J J, strap connection, S, treadle, N, toothed plate, m, catch plate, j, and spring, L, all operating substantially as described.

42,021.—Soap Cup.—Daniel Reed, Derby, Conn.:
I claim the combination and arrangement described of the elastic handle, C, curved adjuster, D, with a cup, A, for the purpose substantially as specified.

42,022.—Pavement-driver.—Henry Sandhop, New York City:
I claim a rammer so constructed as to be alternately raised and dropped by the action of a continuously-revolving shaft, substantially as described and for the purpose set forth, when the whole mechanism is mounted on a carriage, substantially as set forth.
I also claim a conical drum having a movable flange, for the purpose of holding a rope upon the drum, and subsequently permitting it to slip off, substantially as described.

42,023.—Apparatus for regulating the Pressure of Gas. —Warren A. Simonds and Albert H. Silvester, Boston, Mass., and Charles Caldwell, Chelsea, Mass.:
We claim a regulator with a double leverage connected to the rod of the valve, n, as herein described.
We also claim the connection of a chain to the end of lever, 5, near ball 7, also to the center of the oval top, L, to be operated substantially as and for the purpose herein set forth.
We also claim the attachment of a leaden ball to one end of lever, 5, for the purpose as herein specified.
We also claim the attachment of the diaphragm, F, to the rim of top, L, and to the screw ring, a, the same to operate as herein set forth.

42,024.—Indicating Funnel.—John D. Smedley, Chicago, Ill.:
I claim, first, In combination with a fluid-filling funnel, A, and conduit, B, and side passages, C, and floor, s, any air-tight packing, P, at the base of the funnel, as described, and a tube, T, with a contraction at the top or in any part thereof, so constructed as to make a distinct sound when the air from the cask is conducted up through it, as described.
Second, The combination of air-tight packing at the base of a funnel, and a tube through the conduit of a funnel, by which the air displaced by the liquid when entering the cask escapes, substantially as described.

42,025.—Mode of preserving Animal and Vegetable Substances.—Lewis H. Spear, Braintree, Vt.:
I claim the use of sulphite of soda or other alkaline sulphites for preserving vegetables, fruits, jellies, meats, oysters or other fish, substantially as described.

42,026.—Composition for Stove Polish.—Charles M. Spooner, New Bedford, Mass.:
I claim the composition or stove polish, made of the ingredients and in manner substantially as hereinbefore specified.

42,027.—Huller and Screen.—George Stephenson, Zionsville, Ind., and John J. Crider, of Greenfield, Ind.:
We claim, first, The revolving breaker, C, armed with pins, g', in combination with pins, g, projecting from the central shaft b, and slats or bars, c, substantially as described.
Second, Operating the breaker, C, by the fixed sheave, D, core, k, and sheave h, substantially as described.

42,028.—Coal-oil Lamp.—U. D. Taylor, Fort Madison, Iowa:
I claim the use of glass-ground stopple, A, in connection with a glass lamp, as and for the purpose substantially as herein set forth.

42,029.—Churn.—James Thompson, Vevay, Ind.:
I claim, first, The tempering chamber, C, in the described combination with the movable metallic floor, B, wooden bottom, A', and cover, c, all constructed, arranged and applied in the manner and for the purposes herein specified.
Second, The manner of attaching and detaching the metallic floor, B, by means of the devices, a a' b b' D, as herein shown and explained.
Third, The dasher, consisting of an octagonal or other prismatic shaft, G, with chambered straight-sided boards, H H H, applied one to each face of the shaft, and overlapping each other, all as represented and described.
Fourth, The combination with the retractable shaft, M, bridge, S, and stuffing-box, P, of the tapering ring, T, formed and applied in the manner and for the objects specified.
Fifth, The arrangement of a single rotary dasher, G, H, journaled eccentrically within the tub, as described.

42,030.—Barrel Churn.—Pelatiah Thompson, Springfield, Ohio:
I claim the hoop, c, provided at each end with a hook, D, in combination with a cask having a large orifice in its side, substantially as described and for the purpose set forth.
The coaming, F, in combination with the hoop, c, and hook, D, substantially as described.

42,031.—Pocket Knife.—Homer Twitchell, Naugatuck, Conn.:
I claim the combination of the handle, spring and blade, when the whole is constructed and fitted to operate substantially as herein described.

42,032.—Gas Alarm.—Peter H. Vander Weyde, New York City:
I claim the construction of a gas alarm, for the protection of property, in the manner and for the purpose above specified.

42,033.—Wardrobe Hook.—A. J. Walker, New York City:
I claim a series of pendent wardrobe hooks arranged on a sustaining bar or series of sustaining links, forming a portable clothes-hanging apparatus that will take up but little space when packed, as set forth.

42,034.—Saw for felling Trees.—Sheldon Warner, Enfield, Mass.:
I claim the combination of the dogs, D D, the struts, C C, and the hangers, B' B', as arranged and to be applied together and to a saw, and a tree, substantially as and for the purpose as specified.

42,035.—Envelope.—S. Lloyd Wiegand, of Philadelphia, Pa. Ante-dated March 9, 1864:
I claim the form of envelope blank, or the equivalent thereof, when constructed with the extensions, D and D', and used substantially as hereinbefore set forth, represented and described.
I also claim the forming of the narrow lateral flaps, C and C', on the back of envelopes having lapelles formed on the front opposite side thereof, in the manner hereinbefore set forth and described.

42,036.—Sewing Machine.—Charles H. Willcox, New York City. Patented in England May 13, 1862:
I claim, first, The application and use of leather or other sound-deadening material, interposed between those parts of the feed mechanism of sewing machines which strike against or come in contact with each other when at work, with a view to the prevention of noise, as hereinbefore described.
Second, The method herein described of forming the pad or buffer, R, by cutting strips of the form described and introducing the same into the feed-bar slot, substantially as set forth.

42,037.—Axle Box for Railroad Cars.—D. S. Wood, Albany, N. Y.:
I claim the combination of the pressure bolt, i, with the cover, B, and cam, d, arranged and operating substantially in the manner and for the purpose set forth.
I also claim, in combination with the spring pressure bolt, i, and cover, B, the cap or enlargement, g, for protecting the bolt from dirt or other obstructions, substantially as described.

42,038.—Pile-driver.—John Wood, Brooklyn, N. Y.:
I claim a steam cylinder and hammer fitted in slides and connected by ropes or chains with the pile, substantially as specified, so that the cylinder is lowered by the act of driving the pile, and maintains a position sufficiently near the top of the pile to cause the hammer to be operative thereon, as set forth.

42,039.—Street Railroad.—A. Ely Beach, Stratford, Conn.:
I claim, first, Having the rail or track upon which the car-wheels run, so grooved, made or arranged, whether in one or more parts, that the said rail or track shall form a receptacle or protection for the propelling cable, substantially as herein shown and described.
Second, The combination with one or both of the rails of a railroad track, of a propelling cable in the manner substantially as herein shown and described.
Third, The employment between the bottom of the car and the propelling cable, of the connecting device H, or its equivalent mechanism, operating substantially as herein shown and described.
Fourth, The combination of the cable-connecting devices, or their equivalent mechanisms, with the axles or truck parts of the car, so that the said cable-connecting devices will not be affected by the movement of the car body upon its springs, substantially as herein shown and described.
Fifth, The combination of the cable-connecting device with the brake of the car, so that on the movement of the brake, the cable-connecting device will be operated, and *vice versa*, substantially as herein shown and described.
Sixth, The combination of the cable-connecting device with the ordinary brake lever or shaft P, which operates the brake, so that the said shaft will serve the double function of operating the brakes and also the cable-connecting device, substantially as set forth.
Seventh, The employment for the propulsion of street cars of a cable composed of jointed bars, having heads of larger size that the body of the bars, substantially as herein shown and described.
Eighth, The arrangement or construction of the propelling cable with friction rollers in or upon it, substantially as herein shown and described.
Ninth, The construction of the links of the cable in the form of torsion springs, substantially as herein shown and described.

42,040.—Machine for covering Wires for Telegraphs.—J. A. Bailey, Brooklyn, N. Y., and Jno. J. Speed, Gorham, Maine. Patented in England, December 14, 1863:
We claim the compression, longitudinally, in conjunction with the winding spirally upon the wire, of any fibrous material, such as flax, hemp, jute, cotton, or other substance capable of being made into cordage, and whether saturated or unsaturated with any non-conducting substance, for the purposes set forth.
We also claim the screw-shaped cylinder C, in combination with the receiving cylinder D, or their equivalent, for the purpose of winding and compressing the cordage upon the wire for the purposes set forth.

42,041.—Car Coupling.—Henry Blackmore (assignor to himself and Adam Apple), Pittsburgh, Pa.:
I claim the use, in combination with a coupling box, of a hinged pin, so constructed substantially as described, that the draught bar will push the hinge-piece of the pin back when it enters the coupling box, and that so soon as the draught bar has entered the cavity of the coupling box, the movable part of the coupling pin will drop down into the draught bar or link, thus securely locking it in place.

42,042.—Washing Machine.—Leander W. Boynton, Hampton, Conn., (assignor to himself and Levi L. Tower, Cambridgeport, Mass.):
I claim the improved washing and wringing machine, made substantially as described, viz., with two rollers so combined with their tub as to be capable of being moved vertically within the same, so as to enable them to be employed either for washing clothes in the tub, or subsequently expressing their fluid contents from them substantially as specified.

42,043.—Gathering Mechanism for Sewing-machines.—Henry S. Brown, New York City, (assignor to Alfred Arnold, Jersey City, N. J.):
I claim, First, the making of gathers by the action of the needle and thread in the manner and by the devices herein described.
Second, The gathering of a piece of cloth and fastening the gathers in place by the action of the stitching apparatus of a sewing-machine, when the feeding mechanism is arranged and operated relatively to the stitching apparatus, substantially as herein described.
Thirdly, The presser foot or rest D, or its equivalent, substantially as herein described, and for the purpose herein specified.

42,044.—Water Injector.—John B. Collen (assignor to himself, A. Rex, and J. T. Rowand), Philadelphia, Pa.:
I claim, first, The combination of an injector constructed substantially as described with a cock K, or its equivalent for the purpose specified.
Second, The combination of the valve chest F, with a valve I, rod J, and the cock K.

42,045.—Cone and Chimney Elevator.—William R. P. Cross (assignor to himself, Samuel Adams, Jr., and C. H. Breed), Portland, Maine:
I claim, first, The curved sliding, hinged arm g, in combination with a lamp cone d, and hinged supporting arms i, substantially as, and for the purpose described.
Second, So forming and applying the arm g, to the burner and cone that it serves the two-fold purpose of a support and a lifter for the cone substantially as described.

42,046.—Baling Press.—Caleb B. Fleetwood, Edward W. Morten, Vincennes, Ind.:
We claim, first, The arrangement of main frame A, B, C, D, E, removable tramper frame K, and reversible driver Y, the whole contributing a provision for converting a vertical into a horizontal press, and *vica versa*.
Second, The combination of the tramper N, and hooks L, R, with the stirrups O, O, adapted to spring outward so as to be clear of the tramper in the act of beating as set forth.
Third, The provision of the hooked bars or clamps H, H', upon the doors G, G', to keep the press from "spreading" during the pressing action as set forth.

42,047.—Gunpowder, Mining Powder, &c.—H. Hochstatter, Grand Duchy, Germany, assignor to Isaac R. Diller, Springfield, Ill.:
I claim the manufacture of an explosive compound or composition of the materials and in the manner substantially as herein set forth and described.

42,048.—Self-acting Mule.—Robert Lakin, Ardwick, England, John Wain, Manchester, England, assignors to Matthew Curtis, Manchester, England. Patented in England, December 24, 1862:
We claim, in combination with the radial arm B, and screw A', of a mule or twiner, the shaft D, the drum, with the spiral threads D', the screw D2 and skew wheel D4, with working parts for regulating the winding on, substantially as herein described.
Second, We claim the combination, in a mule or twiner, of the loose pulley F, the bevil wheel I', the shaft I2, the bevil wheel I3, the friction box I4, I5, the bevil wheel I6, the shaft J, the bevil wheel J1, the pinion J2, the wheel J3, the shaft G, the scroll shaft H, and wheel H2, substantially as herein described.
Third, We claim the combination of the bracket or instrumental a (on the framing K) and the spring brake b (on the mule carriage) with the wheel or gear d, of the mule carriage, the same being to operate as and for the purpose, substantially as herein described.
Fourthly, We claim the combination and arrangement of the change shaft G, of a mule, the worm M, the shaft O. the wheel P, the clutch box Q, the spring S, the hoop u, the snail R, the plate U, the incline s, the stud x, the plate n, and the brackets V and N, for moving a mule carriage substantially as herein described.

42,049.—Damper.—J. W. Martin, (assignor to himself Jonathan A. Martin), Milton, Mass.:
I claim the improved draft regulator consisting of the pipe B, the damper D, and the screw or helical partition C, as arranged together and within a smoke-pipe substantially as described.

42,050.—Carriage Jack.—Calvin H. Paine (assignor to Charles S. Horton), Providence, R. I.
I claim the above described improved carriage jack, as not only constructed with its notched lifter B, arranged with and applied to its standard, A, so as to be capable of being slid either upward or downward thereon, but as provided with an operating lever C, and a roller D, or their equivalents, arranged together, and with respect to the standard and lifter and applied thereto in manner and so as to operate substantially as explained.
And I also claim the improved jack, as so made and as provided with the series of holes m, m, and the adjustable pin o, (or the mechanical equivalents therefor) arranged or applied to the notched lifter as specified.

42,051.—Machine for straightening Iron Bars.—George H. Sellers, (assignor to Phoenix Iron Company), Phoenixville, Pa.:
I claim the straightening of plates, beams, or bars, as they come hot from the rolls by means of a movable carriage working over, or in connection with a straightening plate, and having vertical or horizontal screw, or both, for forcing the plate, beam, or bar up against or between straight edges, substantially as described.

42,052.—Letter-box.—Joseph H. Springer, (assignor to himself and W. F. Weaver) Philadelphia, Pa. Ante-dated March 9, 1863:
I claim a box furnished with a suitable door and having in the interior the three inclined or curved plates D, E, F, arranged in respect to the opening for the insertion of letters, &c., as and for the purpose herein set forth.

42,053.—Spring for Furniture.—Felix Tylee (assignor to himself and Josiah S. Pond) Cleveland, Ohio:
I claim the tension cords, D, D, the same being secured to the base on which the spiral spring is supported and extending up through, so as to connect with the cap, or disc, B, which by turning the disc, twisting the cords together the elasticity of the spring is varied and regulated in the manner, and for the purposes herein specified.

42,054.—Spike and Nail.—Wm. Watts. Fenn Willcox, and Daniel F. Tompkins, Newark, N. J.:
We claim the combination of the flanges a, a, a, in figure 1, with the twisted spike, figures 1, 2, 3, substantially in the manner and for the purposes described.

42,055.—Clay Mill.—Charles Webster, Wm. Camp, and S. L. Stall, Akron, Ohio:
We claim, first, the application of the entire solid bed plate A, in combination with the reversible crushing rollers E, and F, when arranged and operating in the manner, and for the purpose set forth.
Second, We claim the yokes O, P, and adjustable blades or scrapers, arranged substantially as set forth, in combination with a clay mill for the purpose specified.
Third, We claim the combination of the friction box, u, and key, u', provided with a nut and screw, when arranged and applied to the purpose described.
Fourth, We claim the adjustable gauge rods l, the open corner blocks L', in combination with the cross bar, m'', and springs, n'', substantially as set forth.

42,056.—Gunpowder, &c.—Charles M. Wetherill, Lafayette, Ind., assignor to Isaac R. Diller, Springfield, Ill.:

I claim the invention of a mixture of an oxygen compound of chlorine, capable of giving off its oxygen by heat, with a carbonaceous body or bodies, in such proportion that oxygen given off by the former, shall be to the total carbon contained in the latter, as eight parts by weight, to six parts, with a view of forming carbonic oxide, or as sixteen parts by weight to six parts by weight with a view of forming carbonic acid ; or in some intermediate proportion to form a mixture of the two aforesaid gases.

I also claim by the proper selection of the kind of carbonaceous matter, or by the addition of the peroxide of manganese, or its equivalent to obtain at pleasure a quicker or slower burning powder.

Furthermore I claim by the addition of a sufficient amount of dextrine or other equivalent gum and with or without the subsequent operations of pounding, or pressing and granulating the manufacture of a grained powder having valuable properties.

And I claim by the use of oil of vitrol or any body acting similarly upon the aforesaid chlorine compound, and brought in contact with it by appropriate devices at the proper moment, to effect the explosion of the powder in shells at, or soon after striking an object; or by similar devices, the explosion of mines, torpedoes or the like under or against an enemy.

42,057.—Apparatus for the Manufacture of Gunpowder.—Charles M. Wetherill, Lafayette, Ind., assignor to Isaac R. Diller, Springfield, Ill.:

I claim the use of this drying apparatus for completing, if it be needed, the desiccation of the aforesaid explosive or deflagrating compound after it shall have left the aforesaid boiling or evaporating pan.

42,058.—Fastening for Dock and Side Lights of Vessels.—Herman Winter, Boston, Mass., assignor to James Gregory, New York City :

I claim the collar, g, applied to the shank of the fastening screw of a deck or side light in combination with the recess, h, in the frame carrying the glass for the purpose and as specified.

42,059.—Petroleum Stove.—George L. Witsil (assignor to himself, Charles M. Rhodes and C. W. Oldenberg), Philadelphia, Pa.:

I claim, first, the combination of the disk C, base plate A, its openngs, h, and plate, E, or its equivalents.

Second, The combination of the disk C, dome, D, and disk D′, constructed and arranged within a stove or heater substantially as and for the purpose herein set forth.

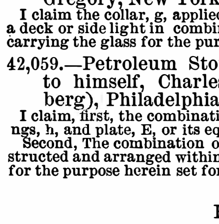
RE-ISSUE.

1,640.—Horse Rake.—Gideon Pierce, Ercildoun, Pa. Patented November 29, 1859 :

I claim the arrangement and combination of the axle a, cog wheel b, rack c, lever I, frame d, bar G, standard g, and teeth f, operating substantially as and for the purpose set forth.

DESIGN.

1,925.—Carpet Pattern.—Elemir J. Ney (assignor to the Lowell Manufacturing Company), Lowell, Mass.



PATENTS

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MESSRS. MUNN & CO. :—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO. :—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO. :—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents ; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows :—

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

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat ; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London ; 29 Boulevard St. Martin, Paris ; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances ; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is so licited. For further particulars address MUNN & CO., No. 37 Park Row New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

Notes & Queries

H. A. C., of Pa.—We know of no work which contains statements of the amount of friction of air in passing through pipes. We have seen some brief mention of experiments to determine this having recently been made by the accomplished engineer of the Philadelphia gas works, and should be pleased to obtain the results for publication. A pneumatic tube for the transmission of the mails has been in practical operation in London for two years or more. It has proved so successful that it is to be extended. For currents of air without much pressure a centrifugal fan, like that of winnowing mills, is in general use, but where any considerable pressure is required a cylinder and piston must be employed.

J. J. S., of Mass.—You say that in your experiment in boiling potatoes, those which were boiled fast were cooked in 28 minutes, and those that were boiled slow were cooked in 38. When you put a large quantity of cold potatoes into a small quantity of boiling water, the temperature of the water will be considerably reduced, and a hot fire will raise it again to the boiling point more quickly than a slow fire If you try the experiment fairly, you will find that water boiling slowly will cook any kind of food just as quickly as water boiling with the greatest fury.

C. H. W., of N. Y.—There is no way at present known of protecting india-rubber from the action of oil if the two substances are brought in contact; nor are we acquainted with any substance possessing the properties of india-rubber which will resist the action of oil.

C. W., of Mass.—We know of no better plan for preventing stoves from rusting when not in use than to oil them with the heaviest portion of petroleum. As petroleum contains no oxygen and absorbs none, it is peculiarly adapted for preserving iron from rust. But as the light portion soon evaporates, the heavy portion only is suitable for this purpose.

A. S., of Nova Scotia.—We give but a small portion of our space to agricultural matters, and in making selections for this space we prefer to take the facts established by experience rather than to enter upon the discussion of unsettled questions,

J. F. T., of Pa.—Septimus Piesse's work is the best yet published on perfumery. It is an English work, but you may be able to get it at some of your bookstores.

C. Bradley, of Ohio.—The long-stroke engine would not require so much repair as the one with a short stroke. Engines that run at high speeds are generally costly to keep in order.

J. B. W., of Pa.—The "American Railway Times" is still published in Boston. The part between the eye of the crank and the shaft is called the "web." We do not know what you mean by "the duplex steam boiler and duplex safety valve."

Subscriber, of Pa.—You will find the best treatise on steam in Lardner's treatise on the Steam Engine. There is no other more lucid or intelligible.

L. R. F., of Ind.—You will find the information you reqnire in "Notes and Queries," No. 14, current volume, under the initials "M. A. A." If correspondents would look in the paper first, and then write to us for what they cannot find, it would save time and trouble to all concerned. We have published the receipts for making black japan varnish an infinite number of times.

E. C., of Mich.—After eighteen centuries had passed the nineteenth century began. As soon as a man is 65 years old his 66th year begins.

J. O. L., of Ill.—The trouble you refer to in your pump is a very common one with the class it belongs to, and is an objection to its use. You should inject a little oil once in a while. Impure water and sand or grit also get in and cause the plunger to cut and scratch.

C. B., of N. Y.—Your alleged improvement in artificial ivory appears to be new, and we should think a patent might be obtained for it.

E. A. J., of N. B.—Address H. C. Baird, 406 Walnut street, Philadelphia, for a work on distilling.

D. McD., of Jamaica.—It will cost you $40 to have an engraving of your steam carriage prepared and published in our paper.

W. B., of C. W.—We do not know of any firm in this city that buys old coins. Bangs, Merwin & Co., auctioneers, sell such coins at public sale.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, March 23, 1864, to Wednesday, March 30, 1864 :—

B. G. M., of N. Y., $20; B. B. B., of Conn., $25; S. B , of N. Y., $22; W. R., of N. Y., $20; J. P., of N. Y., $45; H. B. B., of England, $140 59; M. W., of Vt., $41; R. E. & A. G., of N. Y., $45; A. J. C., of N. Y., $16; O. C., of N. Y., $45; L. & B., of Ohio, $115; A. G. S., of Conn., $31; S. Z., of N. Y., $20; E. B., of N. Y., $55; T. B., of N. Y., $20; L. B., of N. Y., $45; C. D. H., of Colorado Territory, $20; F. A M., of Pa., $20; F. W. D., of N. Y., $20; H. P. K., of Vt., $20; J. F., of Ill., $20; C. M. M., of N. J., $20; R. D. C., of Canada, $41; H. C. C., of Ohio, $20; J. T., of Wis., $20; P. & W., of Iowa, $20; R. F., of Ind., $20; H. & P., of Cal., $30; J. F. C., of N. Y., $80; H. & B., of N. J., $45; M. N., of N. Y., $16; N. H. R., of N. Y., $56; J. F. D., of N. Y., $20; A. S. L., of N. Y., $41; E. D. S., of Mass., $16; W. B. W., of N. Y., $45; H. W., of Ohio, $20; N. H. McM., of N. Y., $20; W. F., of Mass., $20; S. A. T., of Ohio, $20; C. K., of Ill., $40; T. G., of N. Y., $45; H. & L., of Conn., $20; J. J., of N. Y., $44; W. D., of N. Y., $20; G. H. S., of Conn., $20; K. & S., of N. Y., $16; H. H., of Ill., $41; F. G. F., of Ill., $16; R. M., of N. Y., $25; F. O. W., of Mass., $28; A. G. W., of Cal., $15; A. H. W., of N. Y., $25; J. G. F., of Mass., $21; A. E. W., of Ill., $25; K. & R., of Pa., $35; S. F. W., of Iowa, $25; W. A., of Wis., $25; D. B. L., of N. Y., $25; H. & R., of Ohio, $15; A. W., of N. Y., $16; B. F. C., of Wis., $16; F. & T., of Del., $16; F. B. H., of Ind., $405; J. C., of N. Y., $16; S. S. H., of N. Y., $16; S. Z. H., of N. J., $16; E. H. M., of N. Y., $16; T. B. McC., of Del., $16; W. M. S., of Mich., $25; E. B. C., of R. I., $16; W. H., of Iowa, $25; K. & S., of Ill., $25; S. W., of Pa., $16; J. L., of Pa., $16; J. P., of Pa., $16; A. A. S., of Iowa, $25; C. L., of Canada, $25; B. F. M., of Ill., $15; J. W. R., of N. J., $25; B. F., of Maine, $16; W. A. S., of N. J., $16; P. C. P., of Ill., $16; J. B., of Mass., $16; J. A. K., of Mo., $20; C. H. H., of N. Y., $26; T. C., of Mass., $16; A. W., of Vt., $17; J. R. B., of Pa., $25; J. H., of Pa., $25; B. F. T., of Mich., $25; E. T. J., of Vt., $16; S. L. S., of Ohio, $25; H. T. S., of Mass., $10; D. H. S., of Iowa, $16; T. S., of N. Y., $15; J. Y., of Maine, $16; W. V., of Mich., $26; P. P., of N. H., $25; H. K. T., of Wis., $25; W. C. N., of Conn., $16; C. B. G., of Iowa, $25; W. H. P., of Ohio, $50; J. A. D., of Ill., $16; J. T. P. H., of N. H., $25; D. B. T., of Wis., $15; A. C. S., of Ind., $10; W. D. B., of Mich., $16; E. R. C., of N. J., $16; J. B., of Ky., $25; B. M., of Ohio, $25; J. S., of Ohio, $16; A. W., of Scotland, $16; J. S. B., of N. J., $16; A. & S., of N. Y., $16; J. C. J., of Mass., $25; F. G., of Pa., $12; G. B. P., of N. Y., $25; J. & H., of N. Y., $10; S. D., of Canada, $16; W. B., of Mass., $15; J. W. of Mass., $25; R. E. B., of Mich., $30; E. C. G., of Brit. Columbia, $60; N. S. W., of Conn., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, March 23, 1864, to Wednesday, March 30, 1864 :—

F. G., of Pa.; J. E., of N. Y.; H. H., of Ill.; R. E. B., of Mich.; F O. W., of Mass.; J. H., of Pa.; H. K. T., of Wis.; J. R. B., of Pa.; B. F. T., of Mich.; W. M. S., of Mich.; S. C. K., of Mass.; W. H. of Iowa; P. W. K., of Ill.; F. R. W., of Ill.; S. F. W., of Iowa; J. G. F, of Mass.; A. H. W., of N. Y.; R. M., of N. Y.; A. G. W. of Cal.; W. A., of Wis.; D. B. L., of N. Y.; R. D. C., of Canada; J. A. K., of Mo.; G. B. P., of N. Y.; J. W., of Mass.; J. B., of Ky.; W. V., of Mich.; P. P., of N. H.; C. B. G., of Iowa; J. T. P. H., of N. H.; B. M. of Ohio; J. W. R., of N. J.; W. & V., of N. J.; A. E. W., of Ill.; A A. S., of Iowa; H. & S., of Ill.; J. C., of Pa.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Back Numbers and Volumes of the "Scientific American."

VOLUMES I., III., IV., VII., VIII. AND IX.,(NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOLS. II., V. and VI. are out of print and cannot be supplied. We are unable to supply any of the first six numbers of the current volume. Therefore all new subscriptions will begin hereafter with the time the money is received

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

BAIRD'S REVISED CATALOGUE OF PRACTICAL and Scientific Books, complete to date, will be ready for delivery this week. This will contain the titles and full particulars of the contents of several new books, and will be the most complete catalogue of this character yet issued by me. It will be sent free of postage to every reader of the SCIENTIFIC AMERICAN who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut street, Philadelphia.

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AGENCY FOR THE INTRODUCTION AND SALE OF PATENT INVENTIONS.—Inventors and manufacturers desirous of having their inventions introduced into this country and abroad, will find it to their interest to send descriptive, illustrated pamphlets or circulars to A. SCHELLER, 370 Bowery, New York. 11 3*

ANTI-INCRUSTATION.—BEWARE OF COUNTERFEITS. Winan's Anti-Incrustation Powder—so long a success—is being pirated. Cost 10 cents a day or less. A certain remedy without injury. Apply for circular to H. N. WINANS, 11 Wall street, New York. 14 4*

HACKLE, GILL, COMB CARD PINS, &c., &c., promptly supplied by J. W. BARTLETT, 442 Broadway, New York. Refers to leading Flax, Linen and Cordage Mach'y Manuf'rs 12 tf

OLIVER'S PATENT DRYING KILN, FOR SEASONING and Drying Lumber, the only process that will season thoroughly without checking. Carpenters, Carriage Makers, Coopers, Cabinet Makers, Car Builders, Gun Stock Manufacturers, Sash and Blind Manufacturers, Agricultural Machine Manufacturers, and all Workers in Wood should own a right to use this invention, which consists in the application of a certain process within a kiln for subjecting the lumber to heat in such a manner as to effectually prevent it from checking. H. W. OLIVER, Patentee, Box 934, New Haven, Conn.; or S. C. LEWIS, Whitneyville, Conn. 14 2*

BAIRD'S REVISED CATALOGUE OF PRACTICAL and Scientific Books, complete to date, will be ready for delivery this week. This will contain the titles and full particulars of the contents of several new books, and will be the most complete catalogue of this character yet issued by me. It will be sent free of postage to every reader of the SCIENTIFIC AMERICAN who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut street, Philadelphia.

REGENERATING GAS FURNACE.—WE UNDERSTAND that Messrs. TUTTLE, GAFFIELD & CO., of Boston, Mass., are the interested parties and agents for the United States for the very valuable Patent Regenerating Gas Furnaces, noticed in the SCIENTIFIC AMERICAN of March 19th, and numbered 41,788. At some future time we shall give a full account of this invention of the Messrs. Siemens, of London, which has been very extensively introduced in England and on the Continent, and is applicable to the manufacture of iron, gas, glass, &c. Address as above. 1*

TO MANUFACTURERS OR ANY ONE HAVING AN article of manufacture they wish to introduce in the West. Having a large country acquaintance in Illinois, Iowa, Wisconsin, Minnesota, Michigan, and Indiana, and also a large store in the best street in Chicago, we would like such an agency. Best of references as to character and ability given in Boston, New York, Philadelphia, and Chicago. Address Drawer 5,908, Chicago Post-office, Ill. 15 2*

TURBINE WHEELS.—J. E. STEVENSON & CO., Engineers, 200 Broadway, New York, are now manufacturing STEVENSON'S HELICAL TURBINE (the Jonval principle) on horizontal shaft with driving pulley all mounted complete, ready to attach the belt. Suitable for heads of water from 10 to 200 feet, wheels from 4 inches to 42 inches diameter, and from one-half horse power up to 200. 14 3*

NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON, Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 14 12*

AMERICAN NEEDLE COMPANY, 442 BROADWAY, New York, J. W. Bartlett, Needle manufacturers for all the Sewing Machines. Bartlett's Burnished Hand Needles, Hackle pins, &c. 12 tf

TO DEALERS AND BROKERS IN PATENTS.—$2,000 will buy twenty States (New England States included) in a first-class patent, entirely new, and of daily use in every family. If applied for soon, all inquiries promptly and satisfactorily answered. JOHN JACOBS & CO., Shirleysburg, Pa. 14 2*

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Guaranteed to effect a great saving in fuel and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms of flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 5 Park Place, New York 24 26*

FOR SALE.—MY WHOLE RIGHT TO MY SACCHARINE Liquid Evaporator. The best out. See illustration in No. 14, current volume, SCIENTIFIC AMERICAN. Address J. C. CHESNEY, Abingdon, Ill. 14 4*

25 HORSE STEAM BOILER, JUST FINISHED, 40½ feet long and 40 inches diameter, for sale at 8 cents a lb. Address EAGLE WORKS, Harrisburg, Pa. 14 2*

VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents :—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them——Importance of the Specification—Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

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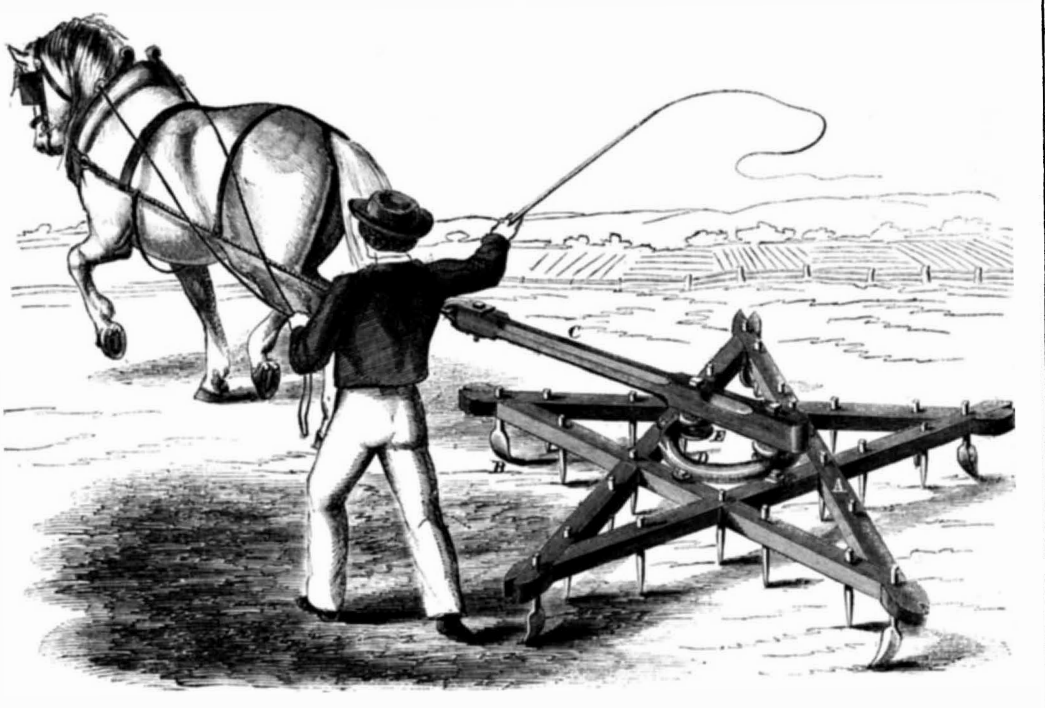
The frame explains itself; the gages are curved in form, and longer than the other teeth, and cause the frame to revolve, each being turned in the same direction, or all facing one way. The central metallic ring D, is fixed to the star frame and has grooved rollers E, working easily in it; said rollers being screwed, or

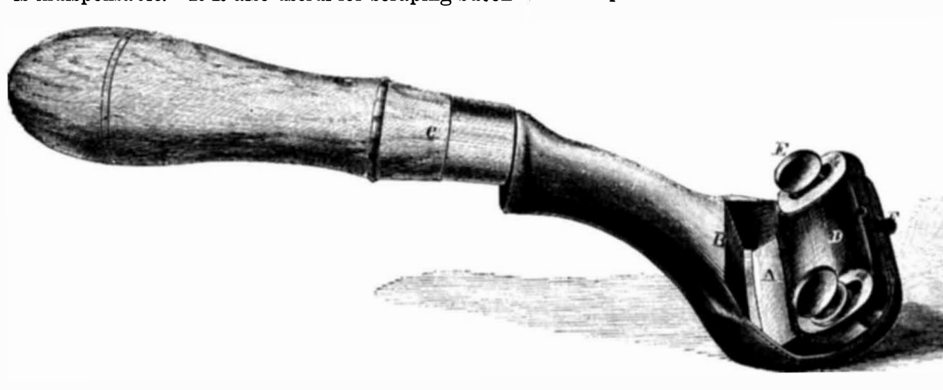


DANIEL'S ROTARY HARROW.

otherwise tightly fastened to the pole, so that as the harrow is drawn along and revolved by the action of the teeth, or gages, the draft pole maintains a direct pull upon the machine at all times. The rotation of the harrow thoroughly pulverizes the soil and causes it to be reduced to the proper condition in a short time. This excellent harrow was patented through the Scientific American Patent Agency, on December 1st, 1863, by Charles Daniel, of Sigel, Mo.; for further information address the inventor at that place.

Improved Box Plane.

For erasing marks or directions upon boxes, a handy little implement like the one here illustrated is indispensable. It is also useful for scraping butch-



CUSHMAN'S BOX PLANE

ers' benches, and for similar purposes where it is merely desired to renew the surface of wood without regard to very fine workmanship. The engraving represents this box plane very clearly; it is simply a steel cutter, A, set in a cast iron stock, B, which is furnished with a handle, C. There is further a clamp D, which is secured by thumb-screws, E, tapped into the bottom plate; this clamp has a square jog on the under side which fits into a square hole in the cutter, there is also a groove, as at F, which receives the part of the shoulder which projects through the cutter. By this arrangement the cutter is firmly held in its place with very slight pressure of the screws, and can be readily adjusted by slacking the screws and tapping lightly on the clamp. This is a very useful and well arranged implement for the purpose, and was patented through the Scientific American Patent Agency, on February 9, 1864, by A. F. Cushman; for further information address the assignee, H. B. Langdon, 13 Park Place, New York, or R. J. Ives, Bristol, Conn.

Marked Articles for the Soldiers.

Some of the marks which are fastened on the blankets, shirts, &c., sent to the Sanitary Commission for the soldiers, show the thought and feeling at home. Thus, on a home-spun blanket, worn, but washed as clean as snow, was pinned a bit of paper, which said: "This blanket was carried by Milly Aldrich (who is 93 years old) down hill and up hill, one and a half miles, to be given to some soldier."

On a bed-quilt was pinned a card saying—"My son is in the army. Whoever is made warm by this quilt, which I have worked on for six days and most all of six nights, let him remember his own mother's love."

On another blanket was this—"This blanket was used by a soldier in the war of 1812—may it keep some soldier warm in this war against traitors!"

On a pillow was written—"This pillow belonged to my little boy, who died resting on it: it is a precious treasure to me, but I give it for the soldiers."

On a pair of woolen socks was written—"These stockings were knit by a little girl five years old, and she is going to knit some more, for mother says it will help some poor soldier."

On a box of beautiful lint was this mark—"Made in a sick room, where the sunlight has not entered for 9 years, but where God has entered, and where two sons have bid their mother good bye, as they have gone out to the war."

On a bundle containing bandages was written—"This is a poor gift, but it is all I had; I have given my husband and my boy, and only wish I had more to give."

On some eye-shades were marked—"Made by one who is blind. Oh, how I long to see the *dear old flag* that you are fighting for!"

Petroleum as Fuel.

In the neighborhood of the Caspian Sea, where petroleum springs are abundant, the inhabitants manufacture fuel by impregnating clay with the combustible fluid; the clods are afterward burned on an ordinary hearth. The Norwegians have long economized the saw-dust of their mills, by incorporating with it a little clay and tar, and moulding it into the form of bricks. Of late years, in England, much attention has been given to artificial fuel in many districts, but not with much success, owing to the want of a suitable combustible, which petroleum is, above all others, best adapted to supply. In France, charcoal is prepared from the refuse of the charcoal furnaces, by mixing it with charred peat or spent tar, and then adding tar or pitch. The materials are ground together and subjected to heat in close vessels, to expel volatile gases. From seven to nine gallons of tar are mixed with two hundred-weight of charcoal powder.

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