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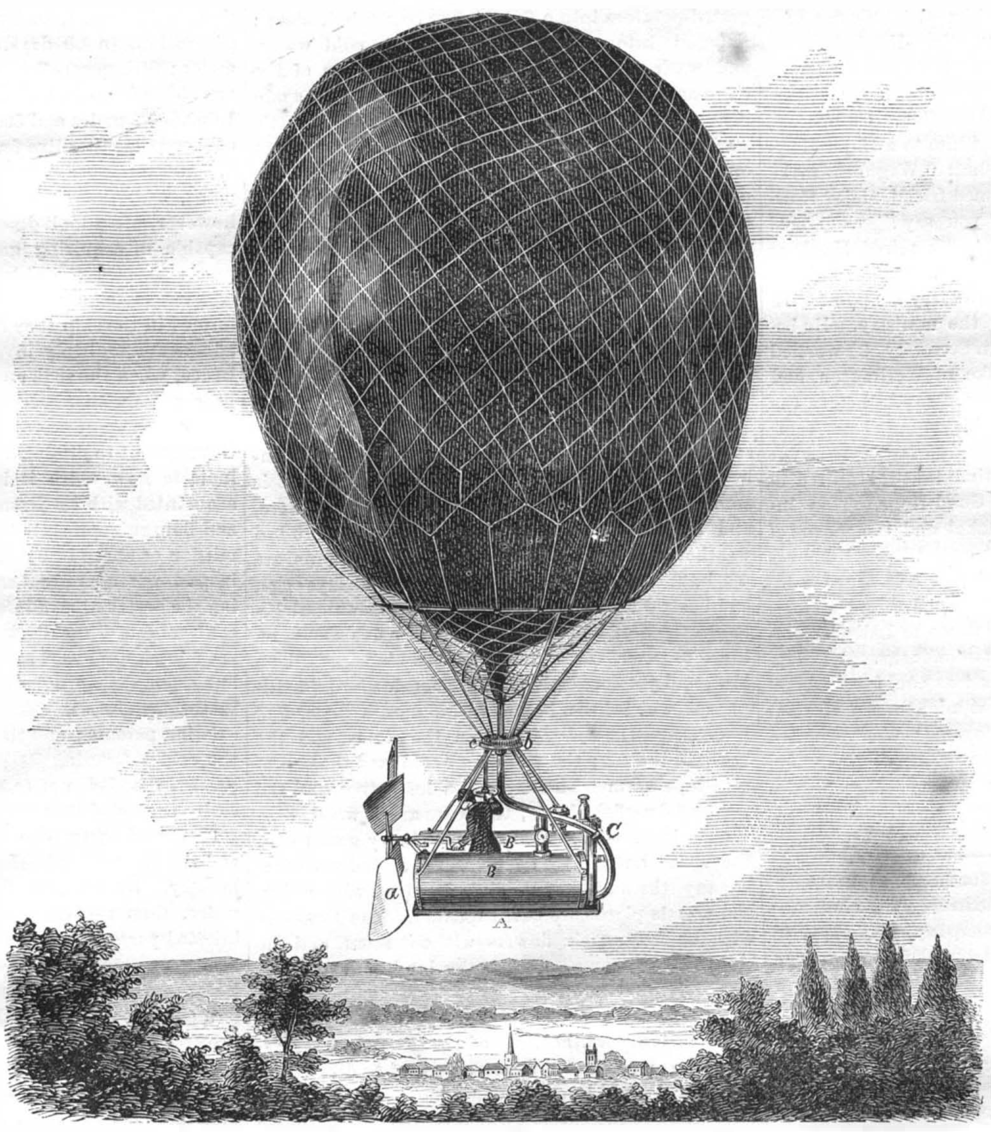
The Science of Aerostation.

Most of the great inventions of the age have been perfected only through patient and elaborate investigation. Successive steps in constructing models or in studying out philosophical laws and principles, have brought the steam engine, the sewing machine and other inventions, to their present condition; and it is only through pursuing a similar course that ideas and plans, which seem at present chimerical, will ever be made useful to man. Aeronauts have for years endeavored to bring the science of ballooning to a practical basis; but, as yet, the only benefits derived from them have been those experiments which Government has instituted in military operations for observing the position or force of the enemy. The difficulties encountered in navigating the air are mainly those arising from the absence of any machinery for controlling the direction of the balloon. Modern science has supplied a gas for inflating the machine sufficiently light to maintain a great altitude above the earth for several hours in succession; but, as before remarked, no control can be exerted on the balloon, and it is wholly dependent for its direction upon the currents of air that blow at certain seasons of the year. Balloonists, indeed, maintain that by rising from one current to another they can move from a stated point and back to it again by taking advantage of this peculiarity in the atmosphere; these assertions are without any practical results; and remain—mere theories.

Mr. Thomas L. Shaw, of Nebraska Territory, has been engaged for some time in making experiments with aerial machines, and thinks he has discovered a method by which he can control the direction of the balloon and move wheresoever he listeth. Our engraving represents his device. It consists of an *oval* balloon, and the platform, A, on which are two light metallic cylinders, B, and a pumping apparatus, C; there is also a fan or propeller at the stern of the balloon, which is to be worked by the aeronaut. At *b* there may be seen a large spur wheel, in which a small pinion, *c*, works; this pinion has a long haft which is provided with a wheel at the lower extremity. The operation of this apparatus is as follows:—The aeronaut having ascended to any desired hight, is impelled by the current of air then blowing; if that direction is the one which he is desirous of taking, he can sail leisurely along to his destination. Let us suppose, however, that celestial business calls an aeronaut to an opposite point, he can then trim his balloon to the opposing current, and *tack to larboard and starboard*, just as a ship on the ocean does. This is done in the following manner:—The balloon, having two flat surfaces (it being oval), is worked up into the wind by the operation of the propeller; the hand wheel is then turned, and the balloon itself moves, by the action of the pinion in the gearing, to any angle required, the car remaining stationary by the action of the propeller on the atmosphere; the machine then sails off diagonally through the atmosphere by the current impinging on the flat surface. When the aeronaut deems that he has journeyed far enough he "trims his sail to the favoring gale," and goes off upon the starboard tack, and so reaches his journey's end; in other words, the apparatus here illustrated, the inventor says, can, by his arrangement, "tack" in the air to the right or left according as the balloon is regulated. The condensing cylinders are used instead of ballast; when the balloon is ascending too rapidly, the gas is pumped out of the flattened sphere into the cylinders; or is discharged from them into the same when the reverse is the case. The inventor of this balloon is a practical mechanic, and he says that a small model, from which this view is taken, answers the expectations formed of it. He is quite sanguine of success, and thinks that ballooning is destined to become one of the greatest of modern inventions for annihilating time and space. Whether his anticipations will ever be realized is more than any one can say. Fulton was derided and Fitch was called a maniac; George Stephenson was held in no higher estimation when he first broached his plans and projects for railway machinery; but time has shown that these men were not fools, although their scoffers were. Who shall say that "The Overland Balloon Company" will not yet be established? The inventor's address is Thos. L. Shaw, Omaha city, N. T. The apparatus was patented on Feb. 10, 1863.



SHAW'S PATENT BALLOON.

A Costly Experiment.

A correspondent informs us that fifty ten-inch columbiads have been selected from the Government stock, by the War Department, to be rifled and then fired until they burst. Twenty-five of them are to be strengthened by the addition of the wrought-iron band upon the exterior of the breech before firing. The firing has been carried on daily for some time past, near Cold Spring, N. Y., and some weeks must still elapse before the experiment is concluded. It is found, that at about the one-thousandth round, the plain rifled gun bursts, while the banded gun, after subjection to the same test, remains apparently as strong as ever. The object of the experiment is to ascertain the comparative strength of the guns, after rifling, with and without the re inforce or strengthening band. The Government is in a fair way to possess itself of the knowledge, but the process is most slow and expensive. It is said to cost $10,000 to burst one of the guns!

The Project of Overland Communication with India.

The triumph of Captain Ericsson, after so many years of hopeless toil in the caloric interest, reminds me of the struggles of the great pioneer of the overland communication with India, poor Thomas Waghorn. It is now upward of thirty years since Waghorn arrived in Bombay, full of a scheme for navigating a steamer round the Cape of Good Hope, which steamer, that it might carry a sufficiency of fuel for the whole trip, was only to take the mails and one passenger. On the day of Waghorn's arrival a meeting was held by the merchants to receive proposals from a Mr. Taylor for the formation of a company which was to open a communication with India *via* the Red Sea. Waghorn's scheme was scouted. Taylor received great encouragement, as far as promises could be relied upon, and he started for Europe with a party of friends, traveling up the Persian Gulf and Euphrates en route to Constantinople; but the whole party was murdered by the Yezedees near Diarbekir. On the receipt of the news in India Waghorn changed his tactics, and declared for the Red Sea route, offering to return to Europe with mercantile letters. But the "Ducks"—as the Bombay people are familiarly called in India—thought him mad or eccentric. Certainly he was afflicted with monomania—he could think, speak, dream of nothing but "steam." It became necessary, when in his company, to avoid all allusion to anything which could supply him with an excuse for bursting out on his favorite topic. Kettles, smoking tureens, condensed vapor, one shunned; for he watched, as a cat watches for a mouse, for an opportunity of bringing in steam navigation. On one unfortunate occasion I introduced him to a Major Hawkins, a military engineer, saying: "Waghorn, make the acquaintance of my esteemed friend, Major Hawkins." "Steamed, sir, did you say?" exclaimed Waghorn; "I am delighted!" He seized Hawkins by the buttons and victimized him. Mad as he was, however, Waghorn contrived to carry his point with the London merchants and the ministry. He besieged the office of the Foreign Secretary, he worried the Premier, tortured the Duke of Wellington, and bullied the public through the press. At length the merchants consented to test his repeated asseverations that letters could be carried to India, *via* Egypt and the Red Sea, in half the time that it required to send them round the Cape of Good Hope. They intrusted him with a large packet and the means of paying his expenses. He set out, traveled express to Marseilles, went on a French vessel to Alexandria, hastened across the desert on a camel, hired a small vessel at Kosseir, and sailed down to India, accomplishing the feat in less than two months. All skepticism now vanished. If this feat could be accomplished by sailing vessels, what might not a steamer achieve? A company was formed; Waghorn was rewarded with a lieutenancy in the Royal Navy, and soon drank himself to death; and thenceforward India was brought 10,000 miles nearer to England. Mighty have been the results!—*Harper's Magazine.*

New Iron Sheers in the Southampton Docks.

A number of gentlemen, including the chairman and other directors of the company, assembled in Southampton Docks one day last week for the purpose of witnessing the tests applied to the monster iron sheers just erected for the company, under contract by Messrs. Day & Co., of the Northam Iron Works. They are of the following dimensions:—Length of the front legs, 110 feet; length of the back leg, 140 feet; power of the engine to work them, 20-horses; the proof strain is to be 100 tuns vertical lift, and 80 tuns with an overhang of 35 feet from the dock wall. The whole of this work has been successfully carried out under the superintendence of Mr. Alfred Giles, the dock company's engineer. The enormous bundles of rail iron, forming the testing weights of 100 tuns, were raised from the railroad trucks, which run under the sheers, and deposited on the quay; after which 80 tuns were lifted and run out 35 feet from the dock wall, and brought back again in a remarkably quick and satisfactory manner. This is effected by an improvement introduced by Thomas Summers, of the above-named Works, in the construction of sheer-legs, which renders them simple and easier to work than those on the ordinary plan. In the new sheers the back leg is made both to act as a prop and a guy to the front legs, and its bottom end slides in an iron groove strongly bolted to its foundation. The movement of the back leg along this groove is effected by a powerful wrought-iron screw, 48 feet long and 8 inches diameter, worked by the same steam-engine as is used to work the hoisting gear. The length of the groove is 48 feet, and the sheers are run either in or out in about four minutes. The rate of hoisting for weights up to 20 tuns is about 12 feet per minute, and for heavier weights a more powerful purchase is used, giving a rate of from four to six feet per minute.—*English Paper.*

To make Potato Starch.

Starch made from the common potato furnishes an excellent substitute for arrowroot, as a wholesome nutritious food for infants. It also makes a good cheap pudding for the table, if cooked like sago; and as it has not the medical properties of arrowroot, it is much to be preferred as an article of daily food, except for children who are subject to diarrhœa or summer complaint. The process of making the starch is simple and the time required so short as to put it into the power of every one having the means at hand. Wash any quantity of potatoes perfectly clean, and grate them into a tub half full of clean cold water; stir it up well; let it settle, and then pour off the foul water; put the grated potatoes into a fine wire or coarse hair sieve; plunge it into another tub full of clean cold water, and wash the starch through the meshes of the sieve and throw the residue away; or wash it again if any starch remains in the pumice; let it settle again, and repeat this process until the water comes off clear; scrape from the top any remains of the pumice; then take the starch out, put it on dishes to dry in a warm room, and it will be fit for use immediately. When wanted for use, mix as much as may be needed in cold water, and stir it into boiling milk, or water if preferred, and it requires no further cooking. It also makes a stiff and beautiful starch for clearing thin muslins and laces.

The Land of Contraries.

In Australia the north is the hot wind, and the south the cool; the westerly wind the most unhealthy, and the east the most salubrious. It is summer with the colony when it is winter here, and the barometer is considered to rise before bad weather and to fall before good. The swans are black, and the eagles are white; the mole lays eggs, and has a duck's bill; the kangaroo (an animal between the deer and the squirrel), has five claws on his fore paws, three talons on his hind legs, like a bird, and yet hops on his tail. There is a bird (meillphaga) which has a broom in its mouth instead of a tongue. The cod is found in the rivers, and the perch in the sea; the valleys are cold, and the mountain-tops warm. The nettle is a lofty tree, and the poplar a dwarfish shrub; the pears are of wood, with the stalks at the broad ends; the cherry grows with the stone outside. The fields are fenced with mahogany, the humblest house is fitted up with cedar, and myrtle plants are burnt for fuel. The trees are without fruit, their flowers without scent, and the birds without song. Such is the land of Australia!

Physiology of Swimming.

The medical authorities of the French army especially recommend that men inclined to diseases of the chest should be continually made to swim. The following are the effects (which M. le Docteur Dudon attributes to swimming) on the organs of respiration:—"A swimmer wishing to proceed from one place to another, is obliged to deploy his arms and legs to cut through the liquid, and to beat the water with them to sustain himself. It is to the chest, as being the central point of sustentation, that every movement of the limbs responds. This irradiation of the movements to the chest, far from being hurtful to it, is beneficial; for, according to a sacred principle of physiology, the more an organ is put into action the more vigor and aptitude it will gain to perform its functions. Applying this principle to natation, it will easily be conceived how the membranes of the chest of a swimmer acquire development—the pulmonary tissues firmness, tone, and energy."

Scab in Sheep.

In all countries where sheep are raised in great numbers, large losses are experienced from the parasitic disease called *scab*. To most of our sheep-raisers, the following information from the *Scottish Farmer* will be useful:—

"The scab insect or mite has been termed *Acarus ovis*, *Sarcoptes ovis*, and lastly, Gerlach has named it *Dermatodectes ovis*. It is a species of mite, not addicted to burrowing in the skin, but fixing itself to the surface and lodged in the deeper parts of the wool. It is very similar to a mite found on horses. The female is from 2-7ths to ⅓d of a line in length, and ⅕th of a line in breadth. It is round, with a harsh skin, yellowish, and bright color. The fore limbs are not so strong as the hind. The head is armed with strong recurved hooks. These parasites propagate very rapidly, and the pregnant females are readily recognized from their size. The period of incubation extends over from three to four days, and the newly-born mites have only the outer pair of hind limbs. The fourth pair form by the third or fourth day after birth. The parasites attain their full dimensions by the eighth day. The rapidity with which scab in sheep spreads need not astonish us if we see how fast the parasites multiply. From one pregnant female—the first generation—in 15 days, 10 females and 5 males are born; second generation in 30 days, 100 females and 50 males; third generation, in 45 days, 1,000 females and 500 males; fourth generation, in 60 days, 10,000 females, and 5,000 males; fifth generation, in 75 days, 100,000 females and 50,000 males; sixth generation, in 90 days, 1,000,000 females and 500,000 males. On the skins of sheep the mites live for a fortnight or three weeks. When the temperature is lowered 7° below freezing point, they die in a couple of hours. These mites, however, often look dead when in reality they are capable of acquiring great activity and power to procreate. On the skins of healthy animals they congregate together, and get surrounded by a scab formed in the skin they irritate. They more readily adhere and multiply in the tender skins of lambs; hence, when the scab appears in a flock of sheep, it propagates with greatest rapidity amongst the lambs. The energetic measures adopted by the Australian Government to diminish the spread of scab in sheep, indicate how much it is dreaded by those who are acquainted with its destructive qualities. Delafond and Bourguignon state that scab annually attacks a million of sheep in France. In Australia, the scab-inspectors render great service to the colony by causing the destruction of infected flocks where they may contaminate large flocks of healthy sheep. It has been justly said that scab is seen in neglected flocks, but often the appearance of neglect is due to this loathsome disease. The mite is a creature of pre-existing parents; and its multiplication is so rapid, the causes favoring its propagation so many and so potent, that it is not to be wondered at if a flock is really neglected that it soon becomes scabby."

Flocks of sheep should be frequently examined, and the diseased animals at once separated from the healthy. By washing infected sheep with soap and water, then rubbing some flour of sulphur on the infected parts, the parasites will be destroyed.

Cutting Piles under Water.

Whenever we call upon the inventive genius of the country to supply machines for any special purpose we meet with a hearty response. This has been especially the case with the pile-cutting machines or apparatus for disposing of like obstructions in the channels of rivers. We have examined a number of these devices and some of them evince inventive talent of a high order. It is out of our power, however, to illustrate these devices, owing to more pressing engagements. That some such machine well-constructed would be a desideratum there is not the slightest doubt, and the demand for it would not cease with the war, as submarine operations are always conducted to a greater or less extent. The chances for inventors of machinery of this class will be good, in our estimation, for some time to come. When the rebellion is crushed, all the Southern harbors and rivers must be re-opened to commerce, and then such tools will come in play, and we doubt not that the inventors of such machines will be rewarded for their labor.

MANGANESE IN STEEL.

In a recent number of the London *Engineer*, Robert Mushet corrects some commonly mistaken views respecting the composition of steel and the nature of the substances used in its manufacture. He states that, at a late meeting of the South Wales Institute of Civil Engineers, a paper had been read on the manufacture of puddled steel, in which the composition of the best German steel was erroneously given as follows :—Iron, 96.84 parts ; carbon, 1.00 parts ; manganese, 2.16 parts. The oxide of manganese is now used in the conversion of iron into steel, and its employment has revolutionized the process of steel-making. It has been called "Heath's process," because Mr. J. M. Heath, of Sheffield—a steel maker—was the first person to apply it in the manufacture of cast steel. Mr. Mushet states that his father first suggested to Mr. Heath the use of manganese in improving steel made from Indian iron, and Mr. Heath afterward applied it to improve all descriptions of cast steel by mixing a small quantity of it with the carbon and iron in the smelting pots. "To this great invention," he says, "the Sheffield manufacturers now owe four-fifths of all their wealth and prosperity." With respect to the office of manganese in the manufacture of steel, Mr. Mushet says :—"The process of Heath does not alloy manganese with steel ; the manganese simply acts as a flux and is never metallized at all. The affinity of manganese for oxygen is most powerful, and even under the most favorable circumstances, closely combined with carbon, it is exceedingly difficult to metalize oxides of manganese.

Intelligent Curiosity.

Education alone enables men to apprehend and relish what is new in a thousand directions. Very few persons can receive impressions on subjects upon which they are wholly ignorant, and on which their observation is unpracticed. This is conspicuous in such scenes as the late Exhibition. Not one in a hundred of all those crowds took in a single idea from any object to which the mind had no previous clue. All the strangeness, novelty, and beauty were passed by—were not visible, did not reach the brain, did not even catch any sense of the vacant, bewildered gazer. The artisan studied machinery, the soldier looked at the guns, the rustic at the plows and harrows ; but they could not even see the pictures or the statuary which were ranged before them. The women, as a rule, noticed dress and fabrics to the utter exclusion of other things, not from vanity or frivolity, but because these were the only matters their training qualified them to think about. A veil hung between them and all the art, genius, and wealth crowded around them. It was all too strange for the mind to say of anything, "This is new to me"—which is in fact comparing it with what is old. There was no ground for a comparison. A man sent his cook to spend the day there ; the sole thing that remained on her mind was a kitchen-grate, in which she observed some novelties of construction. The majority of all great crowds are like the woman who emigrated to America with her husband, and, returning after some years to her native village, was asked what she had seen. "I can't say," she replied, "as I see'd anything partick'lar ;" and if she had followed Humboldt over the world, she would have said the same. But who can cast a stone at his neighbor on this point of intelligent curiosity? The desire for what is new, and the power of apprehending it, run in grooves. Nobody is inquisitive on all points deserving of inquiry ; only the largest mind, most thoroughly cultivated, embraces most.—*Saturday Review.*

ACETYLENE.—Berthelot, the French chemist, has found that, when graphite is intensely heated by means of the galvanic current in an atmosphere of hydrogen, acetylene is formed in considerable quantity. The same result is obtained with gas-carbon and with purified wood-charcoal, though, in this last case, with much greater difficulty, perhaps in consequence of the difficulty of heating the very porous mass to the requisite high temperature. Carbon does not combine with chlorine, bromine, or iodine, under the circumstances in which acetylene is formed ; nor can pure carbon be made to combine with pure nitrogen. The spark of Ruhmkorff's apparatus gives no acetylene with pure carbon and hydrogen.

MISCELLANEOUS SUMMARY.

THE Pacific Mills, of Lawrence, are the most extensive in the world, giving employment to over 2,500 operatives, and furnishing exclusive support for nearly 10,000 people. The mill was built in 1854, two years after its incorporation, and with a capital of $2,430,000. The kind of goods manufactured are delaines, cashmeres, challis, calicoes and print lawns. The power is obtained from five turbine water-wheels. In the manufacturing department, which is 800 feet in length, there are 62,000 spindles in operation, 1,600 looms, operated by 950 women, and the average amount of cotton consumed per week is about 4,200 lbs., and of wool 20,000 lbs., all of which when manufactured, makes 360,000 yards of goods. The printing department comprises sixteen machines, and 25,000,000 yards of goods are printed yearly.

FRIGHTFUL BOILER EXPLOSION IN PHILADELPHIA.—A tubular locomotive boiler employed to drive the machinery at the Morris Locomotive Works, Philadelphia, exploded on the 16th inst., killing the engineer instantly, and destroying the building and machinery. The roof was lifted up above the building and then fell almost upon the spot from which it was lifted. The boiler was broken in pieces and blown in all directions. One piece of it weighing about one tun was hurled to a distance of 125 yards. It is supposed that the boiler was short of water, that its plates had been overheated, and that the engineer turned on the feed water when the disaster occurred. Circumstances attending the disaster have led to such conclusions as to its cause.

HOW COAL IS BOUGHT AND SOLD IN LONDON.—In the city of London coal is sent to the consumers in sacks containing one hundred pounds each. These are loaded on large carts drawn by enormous horses, with scales and weights to each cart, and, if desired by the purchaser, the sack is weighed by the driver. When the honesty of the coal merchant and integrity of the driver are well established, the weighing of the sack is seldom required. In the purchase of a cart-load of sacks, some three or four of them, taken promiscuously, are tested by the scales, and if found correct, the weighing of the remainder of the load is dispensed with. This mode of buying and selling coal is the result of many years' experience in the vast city of London.

GAS FROM COMMON AIR.—M. Mongruel is the inventor of a process for making gas from air, and the gas so produced is exhibited on Aldersgate street, London. The air is conveyed through a tube to a vessel containing the matter which is rendered ignitable, and from thence it passes to the lamp. The light is much clearer than that proceeding from the ordinary gas ; it is represented to be much cheaper, and the inventor announces that explosion is impossible.—*Exchange.*

[This illuminator appears to be a revival of Mansfield's air-light.—EDS.

THE *Historical Magazine* states that the first effort at ship-building on this continent resulted in a vessel known as the *Virginia*, of Sagadahoc, which made its first voyage in 1608, and conveyed the Popham colony from the mouth of the Kennebec, Maine, to their homes in the Old World they had so lately left. The governor of this unsuccessful colony, George Popham, had died early in the year, and was the first Englishman who found sepulture in New England soil.

BANVARD, the famous traveler and artist, is now exhibiting at 652 Broadway, this city, four grand panoramas—the original and far-famed panorama of the Mississippi, one of the Ohio, one of the Missouri and one of the war. All the chief points of interest on the Mississippi river are depicted with excellent skill and effect. The whole exhibition is highly entertaining and instructive.

NAVAL AFFAIRS.—Overtures to raise the *Monitor*, lately sunk off Cape Hatteras, have been made to the Government by parties in Washington. For the sum of $75,000 the contractors promise to float the ship, provided the Government ascertains its whereabouts and furnishes tugs for the purpose.

IN 1862 no less than 55,720,160 bushels of grain were exported from Chicago, against 49,363,381 the previous year.

RIFLED CANNON *versus* SMOOTH-BORES.—Trials of new 300-pounder Parrott guns have recently been made at which shells are stated to have been driven through nine inches of iron plates and two feet of wood backing! If this is true it would seem as if at least one of our iron-clads ought to be provided with such guns, for they exceed in destructive power anything hitherto known in modern warfare.

FLAX MACHINERY.—Numerous inquiries are being made of us respecting flax machinery. This branch of industry is rapidly developing in the loyal States, and it seems to us that a wide field is opening for its introduction. Manufacturers will do well, we doubt not, to advertise their machines in the SCIENTIFIC AMERICAN. The information is much needed.

THE London *Mechanics' Magazine* states that a remedy for the poison of strychnine and mushrooms has been discovered, and consists in making a poisoned person eat large quantities of refined sugar, and in desperate cases opening a vein and injecting water in which sugar has been dissolved.

AT Dundee, Scotland, a bark-rigged screw steamer of 400 tuns, with engines of 45 horse-power, named the "*Wolf*," has been completed, intended to prosecute the seal fishery on the Newfoundland coast, and fitted up with every requisite for the dangerous nature of the voyage.

IF a man during fifty years chews every day two inches of solid plug tobacco (and millions do it) it will amount at the end of that time to nine thousand three hundred and sixty-six feet, or a mile and a quarter of tobacco, half an inch thick and two inches broad, and will cost $1,500.

THOSE "coffee-mill" guns—one hundred or more in number, ordered by the President—we are told, have proved to be of no practical value to the army of the Potomac, and are now laid up in a store-house in Washington.

TURKEY has just issued postage-stamps, having long been the only Power in Europe that has not used them. The stamps bear the signature of the Sultan ; the Mahometan religion interdicting the representation of the face or person.

A NEW step in telegraphy is about to be made in the port of Liverpool. The lightships which lie off the harbor are to be furnished with dials and wires to communicate with the shore. The new project will save an immense time in reporting vessels.

PATENT sponge cloths are now used in the factories of Great Britain for cleaning machinery, in preference to cotton-waste. The high cost of the latter—20 cents a pound—should induce manufacturers here to adopt similar substances.

NEW STEAMER FOR THE CONFEDERATES.—The American Confederate Government have contracted for a large vessel of 3,000 tuns to be built in the Tees.—*Liverpool Steam Shipping Journal.*

THERE are vessels now building at the various ports on the Western Lakes, to be ready for the season of 1863, equal to an increase in the tunnage of 30,000.

No less than 800,000 hogs were packed in Chicago, and 600,000 in Cincinnati, in 1862.

Experiments with "Greek Fire."

A few days since, by order of the Secretaries of War and the Navy, a number of experiments were made with the celebrated "Greek Fire," invented by Mr. Levi Short, of this city. The "Greek Fire" is of two kinds, liquid and solidified. The liquid is used by means of force pumps, and the solidified is placed in shells, which, upon exploding, burn with an intense heat. The fire can neither be smothered out nor extinguished with water. The first experiment made was with three and a half pints of liquid, which, upon being thrown into a barrel of water, burned with great intensity for seventeen and a half minutes ; the solidified was tried by throwing a quantity of it among a mass of chips and on a plank. The flame lasted over a minute and a quarter. The experiments were witnessed by all the Navy-yard officials, all of whom expressed great satisfaction at the trial. The "Greek Fire" can be used both by our land and naval forces, and is now being experimented with on board of several of our gunboats.—*Buffalo Republic.*

THE BOILING OF WATER.

Let any one open a work on chemistry and turn to the subject of ebullition, or let him consult any work on the steam engine, and he will find the boiling of water described substantially as follows :—

On applying heat beneath the vessel of glass or metal containing the water, the particles of this latter nearest the fire expand and rise, and their place is taken by the colder water descending from the surface along the sides of the vessel, so that a sort of circulation is thus created in the mass of the water, which continues until the whole has attained the boiling point, when steam begins to be formed, which escapes into the air or is confined above the water if the vessel be closed.

This description would be accepted by almost every one as true. It is, however, very remarkable that so common a process as the boiling of water should be so incorrectly described. Scarcely one detail of the above is strictly accurate. There is no circulation in any such way as above narrated; steam is formed from the very first moment heat is applied, and steam exists below the surface of the water as well as above.

Whoever will see how water boils, let him put a gallon of distilled and perfectly pure water, free from air, specks or motes of any kind, into a perfectly clean glass vessel and apply heat, so as to heat equally every part of the bottom. A wavy appearance soon fills the whole mass without any sign of circulation, and a thermometer previously placed in the water indicates the same temperature throughout—sides, top and bottom. This wavy appearance continues until the temperature reaches 212°, and indeed, much higher, without any appearance of ebullition; 220° even may be attained before it begins to boil, if the above conditions are strictly fulfilled. While at any point above 212°, let a feather be dipped into the quiescent mass or any other substance having a considerable surface, as bread or sand; the ebullition becomes instantly so violent as to amount to almost an explosion. If the vessel be shaken a similar result takes place. How different is this from any description of the boiling of water as found in the books, and how much food for reflection is to be found in these few lines!

Who does not see in this description a striking similarity between water charged with carbonic acid gas—soda water—and water charged with steam—boiling water? Take a bottle of soda water, shake it and the cork will fly into the air; stir it with bread or a feather and, though apparently stale, it will at once begin to foam. The same is true of champagne or beer, and this remark might be extended to other liquids and to other gases.

Considering boiling water, then, to be charged with steam in the same manner that it may be charged with other gases, many consequences of great practical importance will follow, of which we will mention only one. It is this—steam boiler explosions may take place at any stage of the water in the boiler, and are as likely to take place when the boiler is full as when nearly empty. It is more than probable that the numerous explosions taking place immediately on starting the engine are not due to deficiency of water in the boiler, and that many a conscientious and capable engineer has gone to his grave, followed by the regrets of his friends and the reproaches of the public for having, by neglect, allowed the water to get too low in the boilers, but had been guilty of no fault or carelessness whatsoever. He simply did not know, as very few now know, that any considerable agitation in the boiler of the water surcharged with steam will cause the whole steam already formed and existing as a gas in the water, to be suddenly given off, as a cork will fly from a bottle of champagne on shaking it. And this agitation may be produced by the commonest causes, such as suddenly relieving the pressure on the surface by opening the safety valve or starting the engine or pumping in cold water. Nay, it is easy to see that the fuller the boiler is of water, the more danger there may be of explosion; since in this case there will be an accumulation of a greater amount of steam in the water, and a smaller space above it to receive it when it escapes or is jarred out.

A newspaper is no place for the full discussion of such an intricate and important subject. We can only indicate the source of information. Whoever would pursue this question further must procure the treatise, lately published in London, by C. Wye Williams—a name known to engineers throughout the world for his admirable monograph on the combustion of coal.—*Providence Journal.*

Tree Murder.

We have been occupied many years in advising the public on propagating, planting, pruning, preserving and improving trees for use and ornament, and by way of a change we intend now to offer a few observations on the art of killing trees. This must be a very useful art, because it is extensively practiced; and as people like to do as their neighbors, no doubt we shall be counted among the number of our nation's patriots if we endeavor to explain a few of the processes by which trees are commonly crippled, rendered unfruitful, ugly, unhealthy, or killed outright.

We advise, then, that when trees are purchased, it should be as late as possible in the planting season. By this method the purchaser will make pretty sure of obtaining the weakest and most ugly of the stock, left in the nursery after all the foolish people who like to keep their trees alive have had their pick. When the trees arrive home, lay them anywhere, and be sure their roots are not covered. The more the air, frost, and sunshine act on their roots, the better. When they are planted, take care to have the ground in a wet, pasty condition; do not prune them; let all the bruised and jagged parts of the roots remain; plant them very deep, do not tread them firm, and take care not to stake them.

They will certainly begin to grow rather late in the spring, and endeavor to overcome the various impediments to their well-doing which have been imposed upon them by the first conditions. This lengthens out the process of killing, and increases the interest of the task. Dig about their roots frequently all the summer. If they are in the kitchen garden, crop as near to them as possible. You may as well have plenty of cabbages and cauliflowers off the same ground as the apple and pear trees occupy, and so let there be no scruples about using the spade where their roots run, and even quite close to their stems, as the more you destroy their surface fibers the better. It will not kill them quickly, but only cause them to send down tap roots into the cold subsoil, and this will favor disease, which increases the fun. If they are in the border next the grassplot, you have a fine opportunity to practice a little torture. Grow climbers of some sort at the root of every tree—sweet peas will do very well, or honeysuckle, convolvulus, clematis, may be used; and to train them up the stems use wall nails, and nail up the trailing plants with shreds, just as if they were growing on a wall. This will make plenty of wounds in the bark, and cause canker nicely. Then, if any of your rifle-shooting friends want practice, let them aim at the stems of the trees, and see how many bullets they can plant in the wood; and if you want to try one of Saynor's knives at any time, scoop out pieces of wood from the stems. If a branch grows where you do not want it, snap it off; if there is any fruit produced, knock it off with a heavy stick —this will bruise the fruit and the trees at the same time, and serve as healthy exercise.

One very effectual way of killing is largely practiced in suburban gardens. It is slow and sure, and so pays well, because it affords a lasting amusement. It consists in periodically raising the level of the soil about the trees—say, putting on six inches of loam this year to raise the level of a bed or border where trees are planted. Next year, another six inches of old mortar, or sand or coal ashes. Perhaps the next year a high bank for ferns, and so on, to remove the roots of the trees further and further from the atmosphere and sunshine. This causes gouty swellings in the branches, then canker, then barrenness. By-and-by, some of the branches die, the stem dies on one side, more branches perish, and the head of the tree is prettily sprinkled with dead spray and feeble shoots that do not grow at all. Now, ring it near the bottom, and make the ring complete all round, and at least four inches wide. This will hasten the death of the tree, and you may have the pleasure the next year of cutting it down, and obtaining a cartload of firewood as a reward for your perseverance.

There are quicker methods, such as cutting a tree down, and soaking the roots with sulphuric acid, &c., but these are not artistic, and they make an end of the matter too quick to be amusing. Slow processes are to be preferred, such as destroying the surface roots, tearing off the bark, carving your name, and the names of all your friends on the stem, painting the stem and branches with ordinary house-paints in which there is plenty of white lead. Always allow young trees to be used on washing days to tie clotheslines; such a service is worth having, as it tends to bruise the bark, and draw the tree aside out of the perpendicular, which is a nice strain on its roots, and very advantageous. Above all things, when transplanting, make short work of it. Just open the soil around the tree, and chop at its roots freely, and then tear it out of the ground. It is sheer waste of time and strength to loosen every root with a fork, and lift it without injuring a fiber.—*London Gardeners' Weekly Magazine.*

Man and the Forests.

Turning our attention, lastly, to the human race, we see that nations in the lowest stage of development are sometimes closely connected with the forests. In the colder lands, where the trees ordinarily bear no edible or at least no well-flavored or nourishing fruits, it is the game which chiefly furnishes the inhabitants with food and clothing; these races then appear chiefly as hunters, such as the aborigines of North America. In the torrid zone, on the contrary, races in the same stage of culture live principally upon the fruits of the trees or the pith of the trunks, like some of the tribes of Brazil, some of the inhabitants of the Indian Archipelago, and several races of negroes. South America even affords an example of a race who, almost, like monkeys, live upon the trees; whose existence, in fact, is to a great extent bound to a certain specie of tree. These are the Guarauni, at the mouth of the Orinoco, who live by and upon the mauritia plant. When the ground is flooded, mats woven from the leaf-stalks of those palms are suspended between the trunks; these mats are covered with clay, so that fires can be made upon them, and here the Guarauni sleep, and pass a great portion of their lives. The trunk furnishes a fecula; the juice, a palm wine; and the fruits are well flavored, mealy at first, and afterwards sweet. Nomadic races, on the other hand, generally avoid forests; extensive grazing plains, fertile valleys, or the slopes of mountains, affording rich pasture land, are the best fitted for the migratory life which they lead, and for the support of their domestic animals. As soon as a race rises to agriculture, it becomes hostile to the forests. The trees are in the way of the spade and plow, and the wood gives less booty than the field, the garden, or the vine-yard. The forest, therefore, falls beneath the axe, fire consumes the fallen trunks and branches, and the ashes manure the soil, giving for some years an extraordinarily rich harvest, especially in the dense tropical primeval forests. When, after the lapse of some years, the fertility decreases, a new portion of the wood is felled and burnt; and thus man proceeds unsparingly with the destruction of the forests. Sometimes the conflagration spreads further than was intended, and the destruction is thus increased. This is the course pursued by the peasants of Norway and Sweden, as also by the colonists of North America, of Brazil, Mexico, the Cape, Java, and in every place where agriculture first appears or commences its first constant and uninterrupted extension. With the increase of population this destruction of the forests is continued, for it brings with it increased consumption of the products of the forests; wood is required for houses, furniture, wagons and other implements, for bridges, posts, for fences, fuel for cooking, and, where the climate is cold, for warming the dwellings. The consumption of wood increases further with industry, with navigation, and trade. Mining operations require timber, both for the works and for fuel to smelt the metals and ores; artisans and manufacturers use large large quantities of the products of forests; dams against rivers and seas require their share, but, above all, navigation. The trunks of millions of trees are used up in ships and masts, in order to connect the highlands and inland districts with the coasts, and the coasts with each other, even beyond the ocean. In this way civilization comes into hostile contact with the forests, and thus, under like circumstances, the country in which civilization is oldest possesses the fewest woods. Hence forests are more sparingly met with in the countries of the Mediterranean than northward of the Alps, and more sparingly in the center than in the north of Europe, so far as the climate is not an obstacle to the growth of timber. Have not, then, our descendants to expect a great deficiency of timber—a deficiency which may readily become disastrous? Many public economists and philanthropists have assumed this to be the case, and many do still assume it; they depict the future destitution of timber in the darkest colors, they loudly complain of the felling of wood, and they demand that Government should prevent in time the ruinous consequences by limiting the free use of wooded estates. Yet, even as I have striven to demonstrate the groundlessness of the idea of the danger which is feared of alteration of climate, by the diminution of forests in temperate countries, I hope also to be able in some measure to scatter the dark cloud which so many imagine they see hanging over future generations, in regard to the products of forests. That which is true of so many other inconv eniences following in the train of civilization holds also in this; it has its cure, in a great measure, in itself.—*The Earth, Plants and Man, by J. F. Schouw.*

The Sewer of Paris.

Imagine Paris, taken off like a cover; a birds-eye view of the subterranean net-work of the sewer will represent upon either bank a sort of huge branch engrafted on the river. Upon the right bank, the belt sewer will be the trunk of this branch, the secondary conduits will be the limbs, and the primary drains will be the twigs. This figure is only general, and half exact; the right angle, which is the ordinary angle of this kind of under-ground ramification, being very rare in vegetation. We shall form an image more closely resembling this strange geometric plan by supposing that we see spread out upon a background of darkness, some grotesque alphabet of the East, jumbled as in a medley, the shapeless letters of which are joined to each other, apparently pell-mell, and as if by chance—sometimes by their corners, sometimes by their extremes.

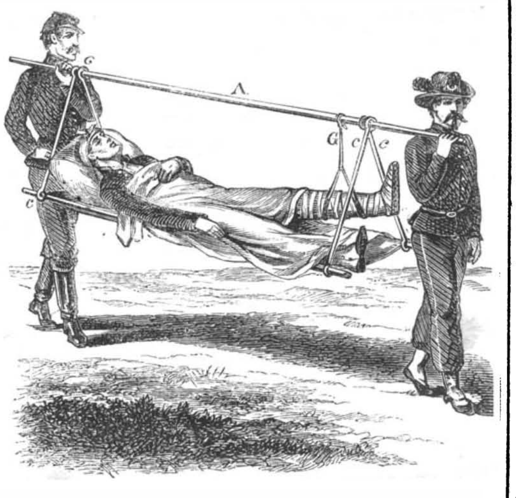
The excavation of the sewer of Paris has been no small work. The last ten centuries have labored upon it, without being able to complete it any more than to finish Paris. The sewer, indeed, receives all the impulsions of the growth of Paris. It is, in the earth, a species of dark polyp with a thousand antennæ, which grows beneath at the same time that the city grows above. The old monarchy had constructed only twenty-five thousand four hundred and eighty yards of sewers; Paris was at that point on the 1st of January, 1806. From that epoch, of which we will speak directly, the work was profitably and energetically resumed and continued; Napoleon built (the figures are interesting) five thousand two hundred and fifty-four yards; Louis XVIII., six thousand two hundred and forty-four; Charles X., eleven thousand eight hundred and fifty-one; Louis Philippe, ninety-seven thousand three hundred and fifty-five; the republic of 1848, twenty-five thousand five hundred and seventy; the existing regime, seventy five thousand one hundred; and at the present hour, two hundred and forty-seven thousand eight hundred and twenty-eight yards—a hundred and forty miles of sewers—the enormous entrails of Paris; obscure ramification always at work; unnoticed and immense construction.

Paris in 1806 was still almost at the figure of sewers published in May, 1663; five thousand three hundred and twenty-eight fathoms. According to Bruneseau, on the 1st of January, 1832, there were forty-four thousand and seventy-three yards. From 1806 to 1831, there were built annually, on an average, eight hundred and twenty yards; since then there have been constructed every year eight and even ten thousand yards of galleries, in masonry of small materials, laid in a foundation of concrete. At thirty-five dollars a yard, the hundred and forty miles of sewers of the present Paris represent nine millions. —*Victor Hugo.*

Correspondence

An Improved Stretcher for Army Use.

Messrs. Editors:—I beg leave to call your attention to an improvement in "stretchers" which I wish to present to our Government; desiring no patent but simply to render to the noble men who may have to suffer on the battle-field this trifling tribute, and I shall feel fully repaid, if you deem it worthy of your attention and direct its use wherever requisite. I have understood that physicians on the battle-field are often compelled to amputate a limb, because there is no convenient means at hand to enable them to transport the patient safely after the limb is set.



Hence, I have invented the "pendent stretcher" described as follows:— A is a pole 10 feet long—the ends borne upon the shoulders of two men—from which hang four iron rods, *c c c c*, each three feet long. The lower ends of the rod may be attached to the handles of any ordinary stretcher. The stretcher thus becomes pendent from the shoulders of the men who carry it, and the main object gained is the support afforded to a broken limb, which can be placed in an anterior splint and supported by the cord, G, upon the pole, not only in much less time than that required for amputation, but with a saving of the limb and often of the life of the patient. Thus a patient could realize as much comfort, as regards ease in the position of the limb, as if at rest upon a stationary bed, I am sure. It remains to be tried.

I have had a pole and four bars made (the bars of three-eighths of an inch iron, with a ring at each end by which they may be readily slipped over the ends of the pole and the hands of the stretcher), and presented them to Dr. C. C. Cox, our medical purveyor, for their introduction into the camp service. As they occupy so little space no regiment could object to so useful an addition to their baggage. The pendent stretcher would be useful in hospitals also. Please understand that I do not propose to make them, but to have the Government make them for the army; while I claim no fee for patent or right of invention. C. H. Keener,

Supt. of Maryland Blind Institution.

Baltimore, Md, March 14, 1863.

[The engraving and letter fully explain the inventor's object, and, while they do honor to his sagacity, are alike an evidence of his patriotism and benevolence toward those men who are suffering all—even death itself—for their country. We most sincerely hope that the stretcher will be adopted in every hospital and be found on every battle-field; it will go far toward ameliorating pain of the severest kind.—Eds.

Twinkling of the Stars.

Messrs. Editors.—The twinkling in the fixed stars and its absence in the planets was noticed in the Scientific American of the 7th inst., but no satisfactory reason assigned for the distinction. If the vibrating undulatory theory be admitted we have a plausible explanation. The wave-like vibrations from a planet are too rapid in succession for separate detection, and, to the vision, become continuous; but the waves from a distant star have appreciable intervals. This action may be compared to the waves caused by a stone falling on a sheet of water, which move at intervals in proportion to the distance from the point where the stone fell. T. W. B.

Cincinnati, Ohio, March 16, 1863.

The Distillery Business—Fermentation.

[Continued from page 182.]

The difference in the effect produced by the two kinds of yeast (sweet hop yeast and lactic-acid yeast) is visible at once in the fermenting beer. Beer set with lactic-acid yeast will commence fermenting in a much shorter time than beer put into fermentation by the use of sweet hop yeast, and by this means the acetous fermentation will be greatly prevented, which always sets in rapidly, if the beer stands more than four hours before the yeast begins the decomposition. Beer set with lactic-acid yeast will never rise to a temperature of 91° Fah.—which is, as well known, the dangerous temperature creating vinegar rapidly on account of the alcohol in the beer—because it must be set at a much lower temperature, while beer set with sweet hop yeast, or any other yeast, must be set at a much higher degree to support the want of its natural power.

In the course of fermentation, the beer should incalesce about 20° to 25° Fah., if the yeast is of a good quality. When the temperature of the beer at the commencement of the fermentation is 76°, the required caloric will be apt to raise the beer to a degree which is very favorable to acetification; hence, great care must be taken to prevent a temperature exceeding 87° to 88° Fah.

In 14 to 16 hours the fermentation of the beer should have arrived at its highest point. From this time "fermentation is falling," and acidification sets in, the degrees of acidification appear with tolerable distinctness, if the fermentation is correctly managed; and whenever these certain degrees of acid in the beer are wanting, no good yield can be expected. Pistorius has constructed a very simple instrument, by means of which the degrees of acidification can be easily ascertained.

The self-raising temperature of fermenting beer during certain periods and the progressing degrees of acidification always indicate the quantity of of whisky to be expected, and both the self-raising temperature and acidification will serve the experienced distiller as signs by which he may judge where he has committed a mistake or been guilty of neglect. For this reason the fermenting room should be so located as to enable the distiller to observe and examine his beer constantly, and to ventilate the room at any time.

The consistency of the beer and the temperature of the fermenting room indicate the temperature required for the setting of the beer. Watery, thin beer must set warmer than thick, consistent beer; the former requiring more and stronger yeast than the latter. The sweeter the beer is, the more yeast it requires. If the fermenting tubs are small, the temperature of the beer, when set, should be lighter than when the reverse is the case. The lower the temperature is in setting beer and less exposed the fermentation to external influences, the better will be the yield, provided the yeast was of a good quality. Hence, the fermenting room should be a dry cellar of a uniform temperature—about 60° or 65° Fah., and not exposed to currents of air. The beer must not be dilute, for then fermentation will sooner cease and the diluted alcohol will be more apt to run into the acetous fermentation. The slop or swill of such dilute beer contains many strong acids which give origin to diseases among hogs or cattle fed with it. If atmospheric air be excluded from fermented beer no acetification will take place.

As already mentioned, carbonic acid gas is developed when sugar is decomposed by fermentation. The gas is always considerably impregnated with alcohol, and if a current of air removes this gas from the surface of the beer, a pretty large portion of alcohol is carried off, and the beer is deprived of part of its alcoholic value. Hence, also it is clear that the fermenting tubs should never be put up out of door, so as to be exposed to the changes of the weather and the currents of air.

In respect to acetous fermentation, so dangerous and frequent in distilleries, the distiller must guard particularly, and if this be overlooked, it will always be extremely detrimental. When a substance combines with oxygen it is said to be oxidized or to undergo oxidation. Burning wood or a lighted candle is an oxidation just as well as rust on iron or verdigris on copper; because oxygen has combined with these substances. So is acetous fermentation nothing but the oxidation of alcohol. This process is very much facilitated when the temperature of the beer is raised to 90° Fah. In many instances, when alcohol or fermented alcoholic liquids are acetified, the principle of the conversion is the combustion of the alcohol of those liquids by combining with oxygen, and oxidation is nothing but combustion—says an eminent chemist—be it by having a perceptible flame or not. The conversion of alcohol into vinegar never takes place, in the common process, without the presence of an albuminous substance and the condition favorable to all fermentations, besides the necessary access of air. Hence, every week spirituous liquid, which contains albuminous matter or any ferment, will, with the access of air and a temperature of from 60° to 70° Fah. produce vinegar. The acetic fermentation requires the presence of ready ferment, alcohol and air; the lactic-acid fermentation, on the contrary, proceeds with starchy or saccharine mixture, without the intervention of alcohol or of atmospheric oxygen. Wort of grain has a much greater tendency to form acetic acids than the malt worts. On account of this liability to acetification it becomes the important business of the distiller to oppose it, which is done by cooling down the mash as speedily as possibly to the temperature at which the beer is to be set. Hence, the most perfect cooling apparatus or arrangement will be always the most advantageous to the distiller, and hence, too, it is clear that where there is a want of cool water the yield will unavoidable sink considerably.

Fermentation, therefore, is the most important stage through which the material has to pass, and one which not only demands considerable skill and attention for the proper management, but also requires extensive knowledge, both of the principles of chemistry and of practical results. Unless the fermentation is governed with due care and dexterity a partial failure will surely ensue.

Lime is generally used to sweeten sour tubs; but lime in lumps (quick-lime) should be always freshly dissolved in water on every occasion of whitewashing the tubs and fermenting cisterns. Lime slacked by the influence of the air, and then dissolved in water, is almost of no effect. A small portion of common soda added to lime is very beneficial, and facilitates the washing down of it, even if it was kept for some time in the tubs. It is a very wrong practice to let the whitewash remain in the fermenting cisterns and run the beer into them, because this acetified lime will give the first impulse to the acetification in the beer.

[To be continued.]

Perpetual Motion.

Messrs. Editors:—I have understood that you had a standing offer of some amount to any man that would bring a machine to your office that would run of itself, or, in other words, a machine that would run until it was worn out, or a perpetual motion. Have you ever had any machine brought to you for that purpose? If you have any, please inform me by letter all about how much the premium is and what the terms of the offer are. If the machine works according to expectation it will be brought to your office before taken to any other place, or applying for a patent. The man that is at work on it is very certain that it will run, and will have it ready in three or four weeks.

——— ———.

Camanche, Iowa, March 20, 1863.

[We print the above communication as there seems to be, from the innumerable letters we receive on the subject, a popular impression that we are desirous of obtaining a perpetual-motion machine, and that a premium has been offered by us for a satisfactory one. We are not particularly anxious to procure a machine for private use, but we will guarantee to find a purchaser for a machine that is what it purports to be—a perpetual mover. When that is found we shall immediately start on a journey to the moon with it.—Eds.

Wholesome Mixed Coffee.

Messrs. Editors:—I have found the following substitute for coffee, in part, very satisfactory and economical. It may be of some value to your numerous readers. Take common peas, whole or split, and soak them in warm water about 12 hours and change the water three times. Now dry them slowly, and then brown them like coffee. Mix about from two-thirds to three-fourths of the peas with one-third or one-fourth of coffee made in the same manner as an infusion of coffee. R. A. Gilman.

American Iron for Musket Barrels.

We lately directed attention to the importance of manufacturing suitable American iron for musket barrels, as we had been informed that Marshall's English iron was the only kind that was adapted and used for this purpose at the Springfield (Mass.) armory. We now learn from the *Sussex* (N. J.) *Herald*, that iron equal in quality to Marshall's is made at Trenton. The *Herald* says:—

"A fact of interest to the people of Sussex and Passaic counties, and of vast importance to the whole nation, is that the Trenton Iron Company have succeeded in producing iron suitable for gun barrels, of the standard required by the Government. Heretofore, during the present war, all iron for this purpose has been imported from England; but, after experimenting more than eighteen months, Messrs. Cooper & Hewitt have finally succeeded in producing an article not only equal, but much superior to the English iron, and it is now being turned out at the rate of twelve tuns per day. The ore is mined at Ringwood, in Passaic county, where the company have recently erected an extensive charcoal blast-furnace, which is necessary for smelting the ore. The national armory at Springfield now uses this iron, and every ounce of iron used in the construction of the celebrated Springfield rifles is mined and manufactured in New Jersey."

The Internal Revenue.

On Wednesday last an honest countryman came to the city and made quite a number of purchases, including hardware, dry goods, a hat, a pair of ready-made pantaloons, and some groceries. He got the things all conveniently packed in his wagon, and as he was about leaving for home he was accosted by a fellow who represented himself as a Government official, and who told the countryman that he must have an internal revenue stamp upon every article he had purchased. The countryman readily believed what was told him with such an air of sincerity, and in company with the self-constituted officer he repaired to a business house and purchased check stamps to the number of a dozen, and got up in his wagon and went about stamping every article he had in the wagon, to the infinite amusement of the crowd which the wag had summoned to witness the operation. Having thus complied with the law, which the countryman had obeyed without a murmur, he drove off towards the rural districts, thanking the wag for what he conceived to have been a kindly and well-meant suggestion. A bystander came near carrying the joke too far, by suggesting the propriety of putting a stamp upon a coon skin which the countryman had not succeeded in selling, and which he was carrying back to his home.—*Wheeling Intelligencer.*

British Navy and Army Estimates.

The sum voted for navy estimates this year by the British Parliament is £10,736,000—about fifty-three and a half million of dollars. This is a reduction of five millions of dollars from the estimates of last year. The total number of steam and sailing ships in the British navy on February 1, 1863, was 669. The number of screw steamers now afloat is 414 paddle steamers 108. Thirteen screw and two paddle steamships are building. The construction of 29 others is suspended. The effective sailing ships afloat are 103. There is also a slight reduction in "the British establishment of the regular forces," of about 4,000 men, and of about 2,000 on the Indian. The effective force of the former is about 148,000 men, and of the latter about 80,000. There is also in Great Britain a volunteer force, well disciplined and equipped, of about 120,000 men.

Tobacco.

Few are aware what a tobacco-loving people we are getting to be, even in New England. We not only smoke it, chew it and snuff it, but we grow the weed also. Ten years ago Massachusetts grew only a trifle over one hundred thousand pounds; now she grows nearly four millions of pounds. In 1850, Connecticut raised something over one million pounds, now she sends six or seven million pounds to market. Thus in ten years the rates of increase in production in Massachusetts was 2,361 per cent, and in Connecticut only 426 per cent. In glancing at the amount raised throughout the whole country, one almost begins to believe Secretary Seward spoke the truth when, in reply to why the luxuries of life should not be taxed, he remarked, tobacco is a necessary not a luxury of life. For in 1850 there were 99,752,655 pounds worth 20 cents a pound or $39,950,531; in 1860, 420,390,771 pounds, worth $5,878,354. In 1860, it cost this nation as much for tobacco as it did to run the national Government. These figures are stupendous, but they are true. We are a fast people, certainly, in the tobacco line. Smoke on, chew on, snuff on, and grow on, O Americans! and in 1870 you may rejoice over a production of a billion pounds of tobacco, and condole yourselves with the thought that $20,000,000 *might* be spent in a more injurious way. Truly this is wisdom.—*Greenfield (Mass.) Gazette.*

A Forest at Night.

Darkness makes the brain giddy. Man needs light. Whoever plunges into the opposite of day, his heart is chilled. When the eye sees blackness the mind sees trouble. In an eclipse, in night, in the sooty darkness there is anxiety even to the strongest. Nobody walks alone at night in the forest without trembling. Darkness and trees, two formidable depths—a reality of chimeras—appear in the indistinct distance. The inconceivable outlines itself a few steps from you with a spectral clearness. You see, floating in space or in your brain, something strangely vague and unsize-able as the dreams of sleeping flowers. There are fierce phantoms in the horizon. You breathe in the odors of the great black void. You are afraid and are tempted to look behind you. The hollowness of night, the haggardness of all things, the silent profiles that fade away as you advance, the obscure dishevelments, angry clumps, livid pools, the gloom reflected in the funereal—the sepulchral—immensity of silence, the possible unknown beings, the swaying of mysterious branches, the frightful twisting of the trees, long spires of shivering grass—against all this you have no defense. There is no bravery which does not shudder and feel the nearness of anguish. You feel something hideous, as if the soul were amalgamating with shadow. This penetration of the darkness is inexpressibly dismal for a child.—*Victor Hugo.*

Short Lines of Railroad.

There is in England a small locomotive which was built to run upon a railroad, the gage of which is only 20 inches. This little machine has cylinders 6 inches in diameter by 12-inch stroke, and has drawn a load of 14 tuns (colliery weight being 2,800 lbs. to the tun) up an incline of one in thirty, attaining a speed of about five miles an hour, although this latter feature is limited on account of the shortness of the road. The machine was built for the purpose of transporting coal from one point to another, and it was thought more feasible and economical for the business than horse-power. The result justified the expectation formed of it, and the engine is much better than any other substitute for it yet found. There are a great many places in this country where just such machines could be employed to good purpose; as, for instance, in quarries, collieries, on long wharves, in fact, in numberless situations, there are openings which would be filled advantageously by the substitution of steam for animal power. Those interested would do well to give the matter attention.

The total receipts of coffee in the United States for the year ending December 31, 1862, were 98,558,680 lbs.; and the total consumption was 88,989,911 lbs., against a consumption in 1861 of 187,045,786 lbs., being a decrease of 98,055,875 lbs., or over 52 per cent.

Culture of Hemp.

A practical hemp-grower writes as follows to the *Country Gentleman*:—"There are two varieties of hemp, the common and China; the China is a later variety, and generally cultivated. When the seed can be had it will yield from 200 to 400 pounds per acre more than the common. I think the common hemp will do better in Central Iowa than the China.

"A deep, rich vegetable mold, new and free from weeds and grass is the best. It is not an exhausting crop, as it is cut before it ripens the seed, and does best on the same land. If corn land is used, it must be cleaned from stalks, trash and litter of all kinds. It grows well on clover sod turned under the fall previous. For seed, prepare the land, plant and cultivate it as you would corn, putting fifteen or twenty seeds in a hill or drill.

"For lint, plow as early in the spring as the land will work well, and sow immediately, and harrow twice or cross plow in, and harrow until the land is smooth and well pulverized. From five to six pecks of seed is the usual quantity sown, according to the land, richer land requiring the most. Old seeds will not grow unless they have been well kept; they should be tried before sowing, by putting a few seeds in a little dirt that is warm and moist; they will sprout in two or three days if good. If you do not get a good stand, and all come up at one time, you cannot make a good crop. From 700 to 1,200 pounds of lint is about the average per acre for good hemp. One man will cut and prepare 8 acres for market."

Mining under the Sea.

Mining can hardly be a pleasant occupation. The absence of sun and all natural light, the dripping sides of the shaft, the danger of explosion from the fire-damp, of the fall of jutting rocks and numerous other perils, invest it with vague terrors to active imaginations. But when the shafts run under the sea, and the swell of the ocean is distinctly audible, it must suggest many fears to the diligent miners. The following graphic description is taken from an English paper:—

"We are now four hundred yards out under the bottom of the sea and twenty feet below the sea level. Coast-trade vessels are sailing over our heads. Two hundred and forty feet below us men are at work, and there are galleries deeper yet below that. The extraordinary position down the face of the cliff, of the engines and other works on the surface, at Bottallie, is now explained. The mine is not excavated like other mines under the earth, but under the sea. Having communicated these particulars, the miner next tells us to keep strict silence and listen. We obey him, sitting speechless and motionless. If the reader could only have beheld us now, dressed in our copper-colored garments, huddled close together in a mere cleft of subterranean rock, with a flame burning on our heads and darkness enveloping our limbs, he must certainly have imagined, without any violent stretch of fancy, that he was looking down upon a conclave of gnomes.

"After listening a few minutes a distant and unearthly noise becomes faintly audible—a long, low, mysterious moaning that never changes, that is fell on the ear as well as heard by it, a sound that might proceed from some incalculable distance—from some far invisible hight—a sound unlike anything that is heard on the upper ground, in the free air of heaven—a sound so sublimely mournful and still, so ghostly and impressive when listened to in the subterranean recesses of the earth, that we continue instinctively to hold our peace, as if enchanted by it, and think not of communicating to each other the strange awe and astonishment which it has inspired in us from the very first.

"At last the miner speaks again and tells us that what we hear is the sound of the surf lashing the rocks a hundred and twenty feet above us, and of the waves that are breaking on the beach beyond. The tide is now at the flow, and the sea is in no extraordinary state of agitation, so the sound is low and distant just at this period. But when storms are at their hight, when the ocean hurls mountain after mountain of water on the cliffs, then the noise is terrific; the roaring heard down here in the mine is so inexpressibly fierce and awful that the boldest men at work are afraid to continue their labor—all ascend to the surface to breathe the upper air and stand on firm earth; dreading—though no catastrophe has ever happened yet—that the sea will break in on them if they remain in the cavern below.

"Hearing this, we got up to look at the rock above us. We are able to stand upright in the position we now occupy; and flaring our candles hither and thither in the darkness, can see the bright, pure copper streaming through the gallery in every direction. Lumps of ooze, of the most lustrous green color, traversed by a natural net-work of thin red veins of iron, appear here and there in large irregular patches, over which water is dripping slowly and incessantly in certain places. This is the salt water percolating through invisible crannies in the rock. On stormy days it spurts out furiously in thin continuous streams. Just over our heads we observe a wooden plug, of the thickness of a man's leg; there is a hole there, and that plug is all that we have to keep out the sea!

"Immense wealth of metal is contained in the roofs of this gallery throughout its entire length, but will always remain untouched; the miners dare not take it, for it is part (and a great part) of the rock which is their only protection against the sea, and which has been so far worked away here that its thickness is limited to an average of three feet only between the water and the gallery in which we now stand. No one knows what might be the consequence of another day's labor with the pick-ax on any part of it."

English and American School Girls.

Anthony Trollope, in his new book on America, thus speaks of our school girls:—"I do not know any contrast that would be more surprising to an Englishman, up to that moment ignorant of the matter, than that which he would find by visiting, first of all, a free school in London and then a free school in New York. The female pupil at a free school in London, as a rule, is either a ragged pauper or a charity girl; if not degraded, at least stigmatized by the badges and dress of the charity. We Englishmen know well the type of each, and have a fairly correct idea of the amount of education which is imparted to them. We see the result afterwards when the same girls become our servants and the wives of our grooms and porters. The female pupil at a free school in New York is neither a pauper nor a charity girl. She is dressed with the utmost decency. She is perfectly cleanly. In speaking to her you cannot in any degree guess whether her father has a dollar a day or three thousand dollars a year; nor will you be able to guess by the manner in which her associates treat her. As regards her own manner to you, it is always the same as though her father were, in all respects, your equal."

Chicory.

Chicory has been considerably cultivated the past season in some portions of Western Canada, as a substitute for coffee. The roots are dug the first autumn after sowing, cleaned, and partially dried, or cut up at once and kiln-dried for market. The manufacturers cut up the roots in small pieces, roast them, and grind them to powder between fluted rollers. The tops are also acceptable food to cows and sheep. Its leaves, blanched, are sold in the markets of the Netherlands, very early in the spring, as salad—long before lettuces are to be had. The roots are taken up on the approach of winter, and packed in cellars in alternate layers of sand, so as to form ridges, with the crowns of the plants on the surface of the ridge. Here, if the frost be excluded, they soon send out leaves in such abundance as to afford a supply of salad during the winter. If light be excluded the leaves are perfectly blanched, and in this state are known under the name of *Barbe de Capucin*. The plant is not without its faults. If all the roots are not taken from the ground at the first season, it springs up and spreads like a thistle the next. It is also very exhaustive of the soil.

ORIGIN OF THE WORD "MUSTARD."—The English word mustard is from the French *moutarde*, the origin of which is said to be as follows:—In 1382, the Duke of Burgundy granted to the town of Dijon the privilege of bearing his armorial ensigns, with the motto, *Moult me tarde* (I wish ardently), in return for a handsome contingent of 1,000 men furnished to him at his expense. Pleased with the ducal condescension, the authorities ordered the device to be affixed over the principal gate of the city. Time or accident at length obliterated the middle word, and the two remaining, *moult tarde*, were printed on the labels which the merchants of Dijon pasted on pots in which they sent this commodity all over the world. They had a way of grinding it up with salt, vinegar, and other ingredients, in order to preserve it, and for a long time almost monopolized the trade in this article of domestic consumption.

Artificial India-rubber.

In the chemical department of the Sheffield Literary and Philosophical Society were shown specimens of a new and valuable invention, patented by Mr. A. Parkes, of Birmingham, and called after him "Parkesine." It is a compound of oil, chloride of sulphur and collodion, and may be used as india-rubber and gutta-percha. In its plastic state it is easily pressed into molds; and when set becomes hard and durable. It may be produced of any color, and also made to imitate ivory. If this latter substance can be successfully imitated, Mr. Parkes will have accomplished what many men have long tried to do, and on which some have in vain sacrificed fortune and health. The inventor only shows the articles as the work of an amateur and to give some idea of the capabilities of the material, which he says can be produced in quantities at 1s. per lb. Allied to this is another substitute for india-rubber, "Campticon," an invention of Mr. Frederick Walton. This remarkable substance is formed by the oxidization of linseed oil. Plates of glass are dipped into linseed oil, and allowed to dry. The plates are again dipped and dried, until a sufficient film has accumulated, and then it is removed. In describing his invention, Mr. Walton says:—"I soon found that by crushing the solid oxidized oil obtained in sheets, as described in my patent, and working it thoroughly in hot mixing rolls, I produced a substance which required only the cohesive nature which exists so strongly in india-rubber. The addition of a small proportion of shellac soon gave that which was wanting; and I found in my power a material singularly like caoutchouc when worked into dough; and which could be rolled on to fabrics in the same manner, and with the same facility. Pigments could easily be added to give color, and the addition of the resins gave other or rather varied proportions of adhesion, useful in affording the means of uniting fabrics as by rubber. Fiber, whether flock or cork, mixed in and rolled into sheets, gave me samples of kamptulicon and other floor-cloths." Not only has this singular product been thus assimilated to rubber for uses on fabrics, or combined with fiber for floor-cloths; but, still more strange, it is capable of being worked with pigment and vulcanized exactly as india-rubber has been described to be, and forms a hard compound like vulcanite and ebonite, excepting that the sulphur is not necessary. It will readily be seen how valuable a substance is here represented; for while it possesses in so great a degree all the qualities of india-rubber, it may be produced at a much less cost. The specimens which Mr. Walton has sent for exhibition show the material in its different stages of manufacture, from the films that are removed from the glass to the masses ready for manufacture into any of the articles above enumerated.—*Sheffield Independent.*

[Some three or four years ago, Dr. R. F. H. Havemann, of New Brunswick, N. J., secured patents in this country and in Europe, for an imitation of ivory, produced by the action of chlorine on india-rubber or allied gums. By his process solid lumps of india-rubber or gutta-percha are dissolved in one of the well-known solvents used for the purpose, and this solution is brought in contact with chlorine by passing streams of gaseous chlorine into the same. When the combination of the gum with the chlorine is perfected, the solvent is removed by evaporation at a low temperature. After removing the liquid by filtering or evaporation, the composition of gum and chlorine is well washed with alcohol and then pressed and dried, when it forms a white hard mass similar to ivory in appearance and elasticity. We have seen billiard balls made of it, but we think they lacked the weight necessary to render them equal to ivory; for many purposes, however, it is an excellent substitute for ivory.—EDS.

Improved Cultivator.

The subjoined engraving represents one of that large class of agricultural machines now so generally used throughout the Western States for cultivating standing crops. The invention consists of the frames, A and B; the former being joined to the latter at *a*. The frame, A, carries the plows or cultivators, attached to the upright legs. The great peculiarity of this cultivator over others that we have seen is comprised in the attachment of an apparatus to the upper frame, whereby the movement and operation of the plows, laterally, can be changed at the will of the driver. This apparatus consists of the upright bars, *d*, fastened to the square timbers, *c*; these timbers have a journal at *b'* which enables them to turn on their axis. There is a cross-bar, *e*, connecting the uprights together at the top, and this bar is furnished with a lever; one end of this lever is grasped by the driver, while the other works in the eye bolt, *f*, on the draught pole. The operation of the cultivator is as follows:—When the team is started, traveling between the hillocks of corn, the plows and shares, *g*, throw up the furrow against either side, the extent of the furrow and the direction of it being controlled by the driver through the apparatus just mentioned. When it is necessary to bring the plows, clear of the ground, the driver throws his weight backwards, which, acting as a force on the leverage afforded by the frame, elevates the excavators so that they no longer enter the soil. This machine appears to be easily controlled, and, if the driver's weight is sufficient to effect the object alluded to, the method is certainly a very simple one. This invention was patented, through the Scientific American Patent Agency, Nov. 18, 1862, by John L. Ellis, of Concord, Ill. Further information may be had by addressing Dangerfield & Ellis as above.

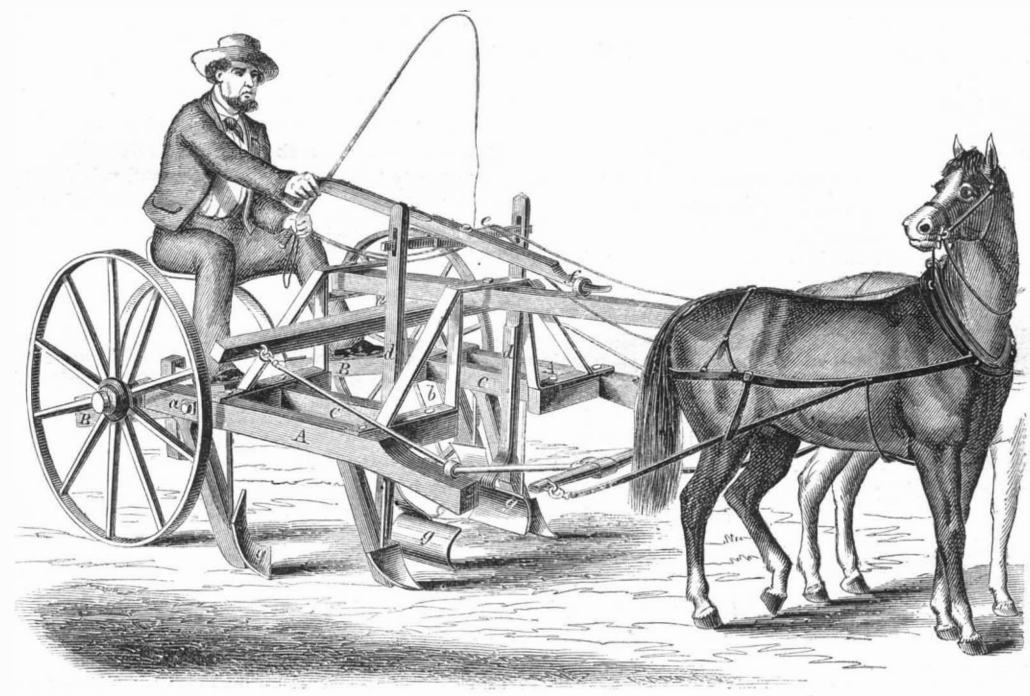
The "Indianola."

The destruction of the gun-boat *Indianola*, seems to be fully confirmed by late dispatches from Admiral Porter. A "turreted monster" was the awful engine of war which accomplished this result. After the rebels had obtained possession of the boat, a coal barge was sent down the river by some of our forces, provided with an old wooden house and the condemned chimneys of a transport. This dreadful affair so worked on the sensibilities of the rebels, that, foreseeing certain destruction, they immediately laid a train to the *Indianola*, and blew her up. The experience of the chivalry with iron-clads is not the least singular feature of the present war. The *Merrimac*, the *Arkansas*, the *Louisiana*, and the *Indianola* have all gone to the bottom. The vaunted prowess and skill of our foes seem to be unequal to the task of managing them properly.

Steam on City Railroads.

Two bills are now pending before the Legislature at Albany, relative to the adoption of the dummy engines on the Brooklyn Central Railroad, and it is reported that the members generally are in favor of the machines. It is to be hoped that the bills will be passed and that the steam cars will come into use forthwith. The advantages arising from them are too palpable and apparent to every intelligent person to be here discussed. A new era of things has been inaugurated by using steam for the fire-engines, and it only remains to extend the principle to the city railroads, to make it extremely popular. It has been proved that cars can be run by steam as safely and much more economically than by horse-power, and should we have such a system as the one here advocated, we may look for a lower fare for the same distance than is now charged.

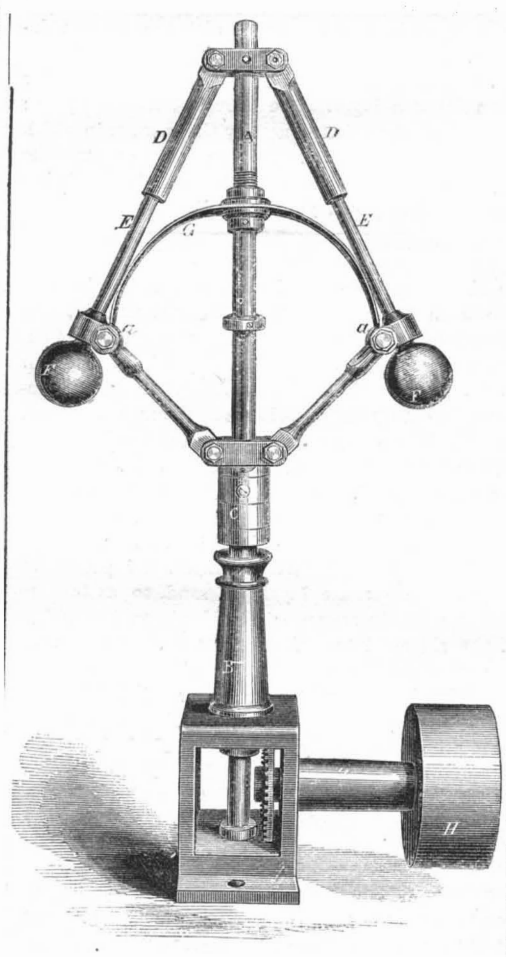
ERRATUM.—In our comments on the letter of Mr. J. M. Cooper, (page 166, current volume of the SCIENTIFIC AMERICAN) on the manufacture of fine steel in this country, the types made us say that we were "gratified to learn that the business of manufacturing *from* steel has obtained a good foothold in this country." It should have read "the business of manufacturing *fine* steel," which makes much better sense. The types are sometimes guilty of making curious work with men's ideas.



ELLIS'S PATENT CULTIVATOR.

CLINE'S PATENT GOVERNOR.

In nearly every motive-power it is essential that the movements should be regular and even. In ma-



chine shops and rolling mills, also in flouring mills, this is of great importance, as the load on the engine or other motor varies greatly. The governor here illustrated is ntended to impart a uniform velocity, by regulating the amount of steam supplied to the cylinder when attached to a steam engine. The following description will render its construction and operation intelligible:—

The spindle, A, runs in the usual step at the bottom, and also in the column, B. The collars, C, are made fast to the spindle, but the one to which the arms are attached moves freely up and down. The upper arms, D, are tubular and have the rods, E, inserted in them; to these rods the balls, F, are fastened. The spring, G, is secured to the spindle by two nuts—one above and one below it, and its ends embrace the joints of the lower arms at *a*. The other features of the governor are not peculiar. The operation of this machine is as follows:—

When the balls are rotated by a belt on the pulley, H, they recede from the center and carry the sliding collars on the spindle with them; to these collars the valve rods are connected by levers, as usual. The motion of the balls to or from the center depends upon the velocity with which the machine moves—if it is not great enough to overcome the gravity of the balls, they remain inert; but on an increase of speed, vary their position accordingly. The sensitiveness of this governor is materially increased by the action of the spring on the arms. As the arms are expanded they slide up in the tubes at the top; shorten the arms and consequently decrease the velocity at which they move; between the combination of centrifugal force and this peculiarity the governor should possess extreme sensitiveness when made so as to slide easily in the upper tubes. This regulator is the invention of J. C. Cline, of Philadelphia, Pa.; and was patented, through the Scientific American Patent Agency, on Feb. 10, 1863. For further information in regard to it address Michiner & Morris, manufacturers, Philadelphia, Pa.

A Hint to Correspondents.

A correspondent at Washington, D. C., sends us a long account of some recently-patented improvements in firing rockets under water, causing thereby the destruction of any object they may come in contact with. We are always pleased to receive communications of this kind, but we hope that those favoring us in this respect will make their articles as brief as possible. We are often obliged to reject interesting matter solely on account of its being too diffuse and general in statement. Our time and space are both limited and we cannot spend the former in revising and correcting every manuscript that comes to us. Send us brief communications on interesting subjects, but make them as pertinent as possible or they may be consigned to the waste-paper basket.

Wooden Piles versus Iron-clad Ships.

Another grand but ineffective attack on the diminutive rebel sand-battery, called Fort McAllister, on the Ogeechee river (Ga.), has been made by three of our turreted iron-clads. The gun-boats hurled their 15-inch shot and shell at the fort for three days, from a distance of less than a mile, without doing or receiving any particular damage. *That same row of wooden piles* still remains in the river—a standing excuse on the part of our officers for their want of success. None of them appear to have gumption enough to blow up, break down, saw off or otherwise clear out those provoking sticks. Won't some of our inventive readers take pity on the navy, and show them how to get rid of such obstructions?

EXPORTS OF PETROLEUM.—From the first of January to the 5th inst., 4,257,999 gallons of petroleum have been exported from New York.

The Scientific American.

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NEW YORK, SATURDAY, MARCH 28, 1863.

THE BOILING OF WATER.

Under the above heading on another page, we republish an interesting article from the *Providence Journal*. It was forwarded to us by a correspondent in that city, with the request that we would "give our views upon the subject." It states that water deprived entirely of air may be heated above 212° without boiling, and when heated above 220° it will boil with great violence when disturbed. Some steam boiler explosions are thus attributed to water in the boilers being entirely deprived of air. In explanation of this phenomena it is stated in the article that steam is condensed in such water, and confined in it, like carbonic acid gas in soda water. This theory is attributed to Mr. C. Wye Williams (of Liverpool, England), the author of a treatise on heat and steam. We have been somewhat acquainted with the views of Mr. Williams on this subject. The fact that water when deprived of air is capable of resisting ebullition until it has acquired a temperature much about 212° (at which common water boils) was not discovered or first presented by Mr. Williams. His views of the cause belongs to himself, but these may be erroneous. On page 357, Vol. V. (old series), of the SCIENTIFIC AMERICAN, we gave an account of Professor Donney's discovery that pure water devoid of air could be heated without boiling to 300°, then flash into vapor; and we said at the time: "May not this discovery account scientifically for a great number of boiler explosions?" Since that period all good works on chemistry contain remarks on this subject. In Professor Miller's "Elements of Chemistry," published in London, 1860, he says on page 246, Vol. 1: "The experiments of Donney have thrown light upon some of the causes by which ebullition is facilitated. He has found that the presence of air in solution singularly assists the evolution of vapor. From the increased elasticity which the dissolved air acquires by the addition of heat, minute bubbles are thrown off in the interior of the liquid, especially when it is in contact with a rough surface, and into these bubbles the steam dilates and rises. By long boiling of the water, the air becomes nearly all expelled; in such a case the temperature has been observed to rise as high as 360° in an open glass vessel, which was then shattered with a loud report by a sudden explosive burst of vapor. In this case the force of cohesion retains the particles of the liquid throughout the mass in contact with each other in a species of tottering equilibrium, and when this equilibrium is overturned at any one point, the repulsive power of the excess of heat stored up in the mass, suddenly exerts itself and the explosion is the result of the instantaneous dispersion of the liquid."

The explanations of the phenomena by Professor Miller and Mr. Williams are quite different, but this is of minor importance—the fact remains the same. Professor Donney's discovery does indeed afford a plausible explanation of some mysterious boiler explosions. The information is useful to all engineers and other persons who use steam boilers.

SOME 10,000 lbs. of peanuts were raised in Yole and Sacramento counties, Cal., last year.

LEX TALIONIS.

It is almost a work of supererogation to say anything about the inefficient manner in which our navy is conducted; the past has shown the truth of this assertion, and every day is continually adding to its force. In view of the fact that the rebels are now building ten iron-clad war vessels of all classes in England, it seems well to consider what means shall be adopted to prevent them from injuring our trade if not driving us from the ocean. Ten well-built war vessels can do a great deal of mischief provided they are managed like the *Alabama*. That ship would stand a very poor chance with our new-sloops-of-war, if they were able to catch her, but her rebel commander shows commendable prudence in using his heels instead of his guns.

Since the Navy Department seems inadequate to the task of checking the ravages of the pirates, some other method must be tried to preserve our commerce and retain, as far as possible, some show of resistance. These means are letters-of-marque; for from a once great power the navy, through the incompetents who sit at the helm, has lost much of its prestige; and the only reports we receive are of trial trips, or of the loss of new ships almost untried. As we cannot expect that the "old man impotent" will be removed from office, we can only turn in our strait to that saving element—our merchants as represented by the Chamber of Commerce. They can take some action in the matter that will save our traffic and redeem our name. There are daring spirits in the navy who burn with ardor and who possess unquestionable capacity, but being controlled by some influence unseen, although not unknown, they spend their time idling at home cruising on useless expeditions, or riding at anchor, wearing away their patience in blockading duty.

When Washington Irving wrote the *parable* of Rip Van Winkle, he must have known that Secretary Wells would one day be at the head of the navy, and that he would, wrapped in profound unconsciousness, suffer the golden minutes and opportunities for national distinction to pass unimproved, while the time and tide, which might bear him on to renown, were passing away forever. Instead, however, of the rusty fire-lock that the Secretary's prototype was furnished with, there should be a ponderous anchor stock, with a fouled cable attached, as the insignia of a useless incumbent on the shoulders of the people.

Although privateering is not the most desirable system of naval warfare, yet in view of the circumstances, there would seem to be no alternative. When we read in English papers, and receive advices as we do continually, that our disinterested well-wishers in the mother-country are building vessels for the Confederates, we think it about time for the merchants to protect themselves, and try what individual or collective enterprise can do toward ridding the sea of those pests that now prey upon our commerce. It is idle to say that no such vessels are being built —the *Alabama* is a complete refutation of such assertions. It was well known in this country that he was in course of construction, and the Navy Department sent the *Tuscarora* to intercept her; but, through the connivance of our enemies abroad, the mission failed. No such obstacles could hinder the cruisers manned and fitted out by the Chamber of Commerce; and we predict a speedy disappearance of the anglo-rebel pirates, should an efficient vessel and a picked crew be sent to search for them.

PAPER AND CLOTH FROM INDIAN CORN HUSKS.

Among the various substances which have been proposed and tested as good substitutes for cotton and linen rags in the manufacture of paper, a decided measure of success has been achieved in Austria by the use of the husks of maize (Indian corn). We have received from Chevalier Loosey—the Austrian consul for this city—several specimens of paper, fiber and a piece of coarse cloth, all made from the husks of maize at the imperial paper mill, Schlögelmühle, Austria, under the superintendence of Dr. A. Auer von Welsbach. The samples comprise varieties of thin and stout printing, wrapping and other sorts of paper. They are all strong and beautiful and much resemble some kinds of linen paper. The manufacture of these products is now carried on at Schlögelmühle, and Dr. Auer has published an account of its progress which we will present as briefly as possible:—

Paper had been made from maize straw in the last century in two Italian paper mills, but not with profitable success, and further attempts were soon abandoned. In 1856, Moritz Diamant, of Bohemia, took up this subject again and agreed with Baron Bruck, then Minister of the Finances at Vienna, to make a certain quantity of paper from maize straw at the imperial paper mill, and he was successful, excepting in its cost, which was greater than that made of cotton and linen rags. In 1859, he made a second trial, and, although he made various kinds of good writing and printing paper, the cost was still too great, and its manufacture could not be undertaken upon an extensive scale. This was the condition of the case in 1860 when the director of the imperial paper mill at Schlögelmühle, knowing that good paper had been made of maize fiber and believing that improvements might be made to reduce its cost, instituted other experiments, the results of which we now have in the production of the paper, fiber and cloth to which we have alluded. The spinning and weaving of the maize fiber are not yet so far advanced as the manufacturing of paper; but this is easily accounted for by the fact, that the processes for making the paper have been tried for several years, while the spinning and weaving of the fiber have been tried only for a space of six months.

The components of the maize husks are separated into three different parts in the process that is applied to obtain the fiber. These three parts consist of fibers, flour-dough and gluten. The fibers are spun and woven into cloth, the flour-dough is a nutritive substance which will remain fresh in the open air for months and of which good bread has been made by mixing a certain portion of wheat flour with it. The short loose fiber and the gluten, which are precipitated during the process of preparing and cleaning the fiber, are used for manufacturing the paper, and several large documents have been printed on this paper at the imperial printing office in Vienna. The maize or Indian corn plant thus yields corn as food for man and beast, and from its husks cloth and paper may also be made. In these products of the corn plant a new branch of industry appears to be presented to our people, for in no other portion of the world are such immense quantities of maize raised as in the United States, and no where else does the plant attain to such perfection.

Specimens of the Austrian maize paper and fiber may be seen at the office of the SCIENTIFIC AMERICAN.

PATENT OFFICE APPROPRIATIONS.

The last Congress made the following appropriations for the Patent Office Department:—

For expenses of receiving, arranging and taking care of copyright books, charts, and other copyright matter—$1,800.

For preparing illustrations and descriptions for report —$5,000.

For finishing the saloon in the north wing of the Patent Office building, and for furnishing the same with suitable cases and accommodations for the reception and convenient exhibition of models—$50,000.

For repairing and painting the saloon in the old portion of the Patent Office building, and for furnishing the same with suitable cases and accommodations for the reception and convenient exhibition of models—$25,000.

An appropriation was also made for printing 30,000 copies of the Patent Office Reports for the years 1861 and 1862. The plan of illustrating the reports (which rendered them so valuable) was discontinued at the close of 1860; and under an act of Congress the Commissioner of Patents undertook to print ten copies of *each* of the descriptions and claims of all patents and ten copies of each of the drawings. After an expenditure of $50,000 this practice was abandoned as too expensive. Congress has now authorized a continuance of the illustrated reports, as heretofore, which will include those of the years 1861 and 1862. The illustrations for these works will be done at the establishment of E. R. Jewett, of Buffalo, N. Y., who so admirably executed some of the later reports.

THE New Bedford (Mass.) Cordage Company have made a manilla-hemp hawser, 14 inches in girth, 960 feet in length and weighing 5,600 lbs., to be used for hauling off the steamer *Caledonia* which lately went ashore on Cape Cod.

EXPERIMENTS WITH CHINESE SUGAR-CANE.

We have recently received a treatise entitled "Contributions to the Knowledge of the Nature of the Chinese Sugar-cane," by Charles A. Goëssmann, of Syracuse, N. Y. The information furnished in this treatise is scientific and valuable. In 1857, while in Philadelphia, he made several chemical experiments to ascertain the quantity and nature of the juice of the sorghum cane. The results of his investigations, with information regarding sugar-cane obtained while on a recent visit to Cuba, are now given to the public for the benefit of those who may engage in a more complete elaboration of the subject. Mr. Goëssmann's experiments were made with Chinese sugar-cane plants which had been grown on soil consisting of crumbled syenite slate, previously manured with calcareous loam and stable manure. According to his analysis fresh sorghum cane-juice consists of water, 78.94 parts; soluble matter, 10.22 parts (of which 9.5 parts are cane-sugar); celluose, 8.20 parts; cerosine and insoluble earthy compounds, 1.24 parts; albuminous matter, 1.40. It yields about as much sugar as beet-root juice, which consists of water, 83.5 parts; cane-sugar, 10.5 parts; celluose, 0.8 parts; albumen, &c., 1.5 parts; fat acids and saline matter, 3.7 parts. The tropical sugar-cane juice yields about 20 per cent of cane-sugar—double the amount of beet-root and sorghum. According to Dr. Goëssmann a full-grown Chinese cane, deprived of leaves, seed, head and root, weighs about two and a half pounds. In estimating the product of an acre at 18,000 stalks, the yield will be dry seed, 142 pounds; dry leaves, 4,425 pounds; cane stalk, 36,000 pounds, from which 25,200 pounds of juice and 10,800 pounds of moist bagasse will be obtained. J. S. Lovering, of Philadelphia, has made at the rate of 1,466 pounds of sugar and 74 gallons of molasses from 18,000 stalks per acre; more than half the sugar in the juice was thus obtained. When the first Silesian and French beet-root sugar manufactories were started, only about five per cent of the sugar in the beet was extracted and the rest left in unpalatable molasses. Sorghum molasses are sweet and pleasant, and whatever sugar may be left in them is not wasted as in the beet-root sugar manufacture. From such experiments and examinations it is evident that the manufacture of sorghum sugar and molasses affords far more encouragement to our people than the manufacture of beet-root sugar did in Europe when first introduced.

As the juice of sorghum contains several organic and inorganic impurities, these must be removed to obtain the pure saccharine matter—sugar and sirup. According to Dr. Goëssmann, slaked lime added in small quantities to the fresh juice, is about the best substance that can be used for this purpose. It was first applied to beet-root juice and it is equally valuable for sorghum juice. He states that when a small quantity of slaked lime was added to the fresh juice and then heated up to 167° Fah., a bulky coagulum was formed which increased in quantity until the boiling point was reached. When passed through a filter a limpid liquid was obtained, which, when concentrated, yielded crystals of sugar. On the other hand fresh juice which had been concentrated without lime only yielded a dark red sirup, without yielding crystals of sugar after standing for some months. Cautiousness is enjoined upon manufacturers of sorghum sugar in the use of lime. If an excess of it is employed and the boiling of the juice continued too long, the color of the juice will become very dark.

The term "sugar" was formerly applied to all sweet substances, and the acetate of lead was called sugar-of-lead from its taste. At present the term is of more limited application, being confined chiefly to three organic compounds, which resemble one another in their sweet taste and their ability to form alcohol and carbonic acid under fermentation. These three sweets are milk sugar, grape sugar and cane sugar. Grape sugar can be formed artificially from starch and vegetable fiber, with sulphuric acid, but not cane sugar. The latter is the chief sweetening substance used in domestic life. The occurrence of cane sugar in any considerable quantity is limited to a few plants, some palms, the maple and the beet.

The cultivation of sorghum in all sections where it can be raised presents several advantages. It yields a large amount of true cane sugar and sweet sirup, and its leaves afford good food for cattle. Its seed also yields a bright red dye and considerable fatty acid, thus rendering it a valuable cereal for feeding cattle. The expressed cane also yields 3 per cent of a strong flexible fiber well adapted for the manufacture of paper; and by improvements in its preparation, it may yet be profitably employed for making cloth. The hypochlorite of soda bleaches it without injury to its strength.

It is estimated that about 30 pounds of sugar per head are annually consumed in the United States or 900,000,000 pounds for a population of thirty millions. Of this amount, taking the maple sugar product at seventy million pounds and the Louisiana crop at two hundred and fifty millions, there is still left five hundred and eighty million pounds for the imported crop. At six cents per pound in the raw state this costs no less than $34,800,000. Besides this amount of foreign sugar consumed annually, about 25,652,000 gallons of foreign molasses were consumed in 1862. What a large market we have for a cheaper home product! It is well known that the common sugar-cane flourishes best in very warm latitudes; the beet-root in the more northern climates, while the sorghum cane seems best adapted for temperate latitudes—embracing all our Middle and Western States. By the careful selection of seeds and judicious culture the quantity of sugar in this cane may be increased. This has been the case with the sugar beet in Europe. New and improved species, such as the Otaheitan variety, may also be successfully cultivated, as noticed on page 154, current volume of the Scientific American. Viewing this question in all its aspects, it appears to us that very favorable prospects are presented to our people for the extensive cultivation of the sorghum. Every article of common use that can be profitably produced within the boundaries of any country tends to increase its prosperity and strengthen its independence.

HEAVY ARTILLERY.

Should the attack upon the city of Charleston by our iron-clad fleet, now in the vicinity of that place, be strenuously opposed, we may look for some very interesting data in reference to the destructive effect of our new 15-inch guns. As yet no tests of their capacity have taken place at all commensurate with the importance of the subject; at least none that have been made public, and we do not yet know, as a nation, whether we may place implicit reliance upon those ponderous missiles as defensive agents. Fort Sumter is said to be iron-plated, and there are also two or three rams in Charleston harbor, which have their sides or roofs heavily plated; these will make good targets on which to try the smashing powers of the new guns. Emphatic assertions have been made, privately, by professional men, that these weapons are failures; that the range is limited; that the charge is not sufficient to propel the ball at its most destructive velocity; that the gun is not strong enough to withstand larger quantities of powder, and one or two other features which may be passed over. These criticisms may or may not be correct; from lack of positive evidence on some points we are unable to controvert them. We only know that the *Montauk* has been in action several times, and the supposition is that her large guns were used to their fullest capacity, and that the weapons were effective in destroying the *Nashville* at a distance of 700 yards from the turret from which the shells were thrown with great effect. This is not by any means a long range, and is not cited as any test of the capabilities of the gun.

In using artillery there are some questions to be considered which bear directly upon their fitness or inutility as weapons of war; these questions relate to the end it is desired to obtained. If, for example, we are assailed by an iron-clad, we must dispose of the adversary summarily; if at short range it is possible that this may be accomplished by riddling her with shot, thus creating a moral effect upon her crew which will be extremely disastrous. Men who fancy themselves securely sheltered behind iron walls will fight heroically; but let a shot come tearing through their defense and they lose that sense of invulnerability which was their strongest ally. Or, on the contrary, should we think the shortest road to victory lies in so shattering the enemy's hull that she will sink after a few broadsides, we must then dispose our forces to effect this result. In either case disabling the adversary by penetrating his armor or by smashing in his sides, the weapon must be suite to the end in view.

We do not think it is claimed by the Government that the 15-inch guns possess penetrative power in a high degree, but rather that each shot is a ram and produces the same effect that the bow of one vessel in collision with the side of another would. At all events, whether such a qualification—that is, perforation—is asserted for the weapon or not, it is apparent, from well-known laws, that it cannot be attained except limitedly. Whether this detracts from the value of the gun is a question not to be answered until an absolute test has decided the matter for ever. The destructive effect of rams is well known; and if we view our new artillery in that light, we must concede that they possess qualities which our enemies do well to stand in awe of. If, on the contrary, a small rifled shot with a high velocity is the best medium for destroying an assailant, then the new heavy artillery is of no more use than so much old iron. At short range the impact of the huge shot and shell is tremendous, and we have great faith in their ability to place an opponent *hors du combat* in a short time, when the guns from which they are fired are securely housed in turrets. In view then of these facts we shall look for valuable scientific data from the forthcoming attack on Charleston. We have both heavy rifled guns and large and small smooth bores at that port; and the merits or demerits of each will, we hope, have a fair trial.

THE "ONONDAGA."

The iron-clads now building in New York and other ports of this country are approaching completion as rapidly as circumstances will permit; when they are launched we shall have a fleet of batteries and ships that we can point to with pride, and use with great effect against our foes—either foreign or domestic. The *Dunderberg*, *Puritan*, *Dictator*, *Onondaga* and others of the *Monitor* class will form an invincible bulwark on which we can fully rely for protection. We have no desire to embarrass the Government, or to abuse the privileges which have been extended to us of viewing these ships, but inasmuch as the public are not prohibited from looking at or examining them on the stocks, it is not improper to append a few details concerning one of the new iron-clads—the *Onondaga*. This vessel is being built in the yard of the Continental Works, at Greenpoint, by Mr. Rowland; she is constructed wholly of iron, having neither the projecting guards nor some other features of the *Monitor* batteries. The hull is 226 feet in length, and 48 feet in extreme width, the frames are of angle iron, five inches by three, riveted to a central plate or keel at the bottom; there is no keel, properly speaking, only a ribbed or arched plating in the place of it, to which all the frames are joined. The lines of the ship are very easy forward and aft, presenting much less resistance than some other iron-clads now afloat. As previously remarked, there are no projecting armor shelves on the sides of the *Onondaga*. She is protected from shot by single plates 4½ inches in thickness, bolted directly to the hull. There is no wooden backing of any kind to support this armor, but inboard there are a series of iron knees or angle pieces, secured to the deck and hull which strengthen it materially, and enable the weight outboard to be carried without straining the ship, or making her liable to leak. The draught of water will be ten feet; speed not stated.

THE ENGINES AND BOILERS.

There are two propellers or screws, one on each side under the stern, each propeller being driven by two engines built by the Morgan Iron Works, making four in all. The engines are of the horizontal, back-acting variety, and have cylinders 30 inches in diameter by 18 inches stroke; they have slide valves worked by a link motion, and the usual eccentrics. The propellers are 9 feet in diameter, and have an increasing pitch, the same being 11 feet on the forward side, and 13 feet 6 inches aft. There are four main boilers (Martin's patent) and one large donkey boiler for working the auxiliary engines. Sewell's condenser is furnished to the main engines, and a separate smaller one is added into which the turret engines exhaust when the main engines are not working; there is also a circulating pump attached to this last condenser, which is driven by the steam pump that feeds the boilers. Four blowing engines are provided to ventilate the ship in action, and supply the furnaces with draught.

THE TURRETS AND ARMAMENTS.

The turrets are the same as those upon all the *Monitors*—11 inches thick in the walls, 9 feet high, and 21 feet in diameter inside. There will be two fifteen-inch guns, it is stated, in each turret. The quarters for the officers generally are aft, although some of them, the engineers for example, have accommodations forward. A great part of the storage is also aft, including the magazine and spirit room. Neither the bow or stern of the *Onondaga* overhang the hull, although the statement may be qualified by saying that the stern projects slightly, only enough, however, to cover the screws and protect them from damage by shot. The other arrangements of the vessel, internally, are unimportant to the public; we may mention that there are thirteen transverse water-tight compartments, and that the coal bunkers surround the boilers in addition to the protection afforded by the iron plating. A large force of men are employed on the vessel, and Mr. Rowland is putting the work through with his usual vigor. The extraordinary breadth of beam and full model should make the *Onondaga* a very stable ship. The *Onondaga* is known as the "Quintard Battery," having been contracted for by Mr. George Quintard, proprietor of the Morgan Iron Works.

The *Puritan*, near by in the ship-house, is in the first stages of construction; she is to be some 20 feet longer than her consort, the *Dictator*, and 2 feet wider.

A LECTURE ON COAL.

We learn from the Glasgow (Scotland) *Herald* that Professor H. D. Rogers—formerly of Pennsylvania, but now professor of natural science in the Glasgow University—delivered a lecture before the Geographical Society of that city on the 26th of February, on "Coal, its Distribution, Power and Products."

There are three chief peculiarities observable in every seam of coal. First, An invariable stratum of fire-clay—the fire-clay of the Scottish fields—which evidently served as a bed for the roots of trees, and for the over-lying profuse matter of coal vegetation. Second, The vegetation itself, often accumulated in immense thickness, compressed, macerated and, in its upper portion, stratified and laid even by the action of water. Thirdly, The overlying shale, or roof of the coal seam, containing, in the soft mud or fine sand of which it has been composed, beautiful impressions of ferns and other plants of the carboniferous age. Another unfailing characteristic of coal seams is their uniform stratification, especially in the upper layers, showing conclusively that the seams have been subjected to the leveling action of water in the vast bays and lagoons in which the vegetable mass first grew and then subsided. In one instance, that of the American coal fields, this mark of uniform stratification extends over an area of 14,000 square miles, thus showing that the physical geography of the period when the coal was formed must have been of a character and upon a scale of which we can now form but a limited conception.

There are different qualities of coal—anthracite, or compressed coke, semi-bituminous and bituminous—in one great coal-field in Pennsylvania. Subterranean heat acting in one part upon a vast scale distilled the bituminous matter from coal that was once bituminous, and at the center of greatest heat anthracite coal was produced. Gradually, from this center of heat, coal was obtained, varying from anthracite to qualities containing twenty per cent and thirty per cent of bituminous matter, and so on to the unaltered coal containing its full proportion of bitumen. Professor Rogers attributes the petroleum of the oil wells to the distillation of the bituminous coal. He stated that "the subterranean heat which converted the bituminous into anthracite coal had the effect of distilling from that coal the rock oil or petroleum of commerce, which, creeping into the fissures of the strata and impregnating the porous sandstones, remained collected, as it were, in vast underground tanks for the use of the present generation." The theory of Professor Rogers respecting the sources of American petroleum is different from that of most geologists.

With respect to the power of coal in effecting mechanical work by combustion, when applied to operate an engine through steam pressure, one pound is equal to the full day's work of a man, and three tuns of coal is equal to the work of a man for twenty years—almost his entire working life! The productive power of a nation is in direct ratio to the coal at its command. The area of the coal fields in Great Britain is 8,139 square miles of bituminous coal, and 3,720 square miles of anthracite in Great Britain and Ireland. In France, the coal area is 1,719 square miles of inferior coal; Belgium, 518 square miles; Prussia, 500 square miles; Spain, 3,408 square miles, and Russia scarcely 100 square miles. The British coal fields are able to sustain the national prosperity for ages to come. But the American coal-fields embrace an area of no less than 200,000 square miles—about twenty times greater than those of all Europe! "How cheering for the future," said Professor Rogers, "must be the prospect as it regards the material prosperity and industrial development of those vast coal regions of America which, in the course of Providence, must be intended to bestow happiness and comfort upon untold millions of that comparatively virgin country!"

VALUABLE RECEIPTS.

To Dye a Dark Blue on Wool.—We have received several letters recently from persons living in the country, inquiring how to dye a dark blue on wool. To color fast dark blue on wool or woolen cloth, there are only two effective methods practiced by dyers; these consist in using indigo and woad in warm vats. The preparation of these vats and the modes of treating the coloring substances are impracticable to persons who wish to dye small quantities for domestic use. And besides this, it requires much experience that cannot be communicated in a receipt to conduct the processes. We will, therefore, describe more simple modes. Indigo is the only substance which really can be conveniently used to dye a permanent blue on a limited scale, and at the present price of this substance the color is expensive by any mode of dyeing. The best Bengal indigo should be selected. It may be known by its deep blue shade slightly tinged with a copper hue. It must first be reduced to an impalpable powder, then mixed with half urine and soft water in a wooden or stoneware vessel of sufficient size to hold about five pounds of wool for a small batch. The indigo powder is mixed at the rate of eight ounces to ten gallons of urine and placed in a warm situation—about 64° Fah.—and stirred occasionally for five or six days. During the intervals of stirring the vessel should be covered with a thick cloth. The indigo will not dissolve in the liquid or communicate its color to the wool until it is deprived of a certain quantity of oxygen. The urine under fermentation acts upon the indigo chemically, and the liquor gradually becomes deep green in color. This is a sign that the process has proceeded favorably, and the wool to be dyed may now be placed loose in the vessel and stirred occasionally for about an hour, then lifted and the liquor squeezed out into the vessel; none of it must be lost. The wool when lifted will be of a deep green color, but upon exposure to the atmosphere it absorbs a certain quantity of oxygen and becomes a dark blue. It may now be washed in cold water, then dried and prepared for carding. A second batch of wool should be treated in the same manner, but its shade will be lighter than the first. It however, may be carded with the first batch and thus produce a medium shade of blue. To obtain very dark shades of blue two or three vessels made up in the manner described may be used, and the light shades of blue dipped, after being aired, into the stronger blue liquor. This is the only economical way of proceeding when a considerable quantity of wool is to be dyed. The odor of the liquor is very pungent, but the blue thus produced is very permanent and will stand washing and sunshine wthout fading. Wool will not take on the color unless it is perfectly free from grease; it should, therefore, be washed before it is dyed. This is the old-fashioned method of dyeing blue in the rural districts, and is the most simple, though not a very pleasant operation.

A very dark blue may also be dyed on wool with logwood and the bichromate of potash. The wool being perfectly cleaned, is first boiled in a tin, copper or iron vessel—such as a potash kettle—with one ounce of the bichromate of potash to every five pounds of wool. Sufficient water to allow the wool to be stirred freely with a stick should be used, and the bichromate dissolved in the water before the wool is placed in it. After boiling for half an hour the wool is to be lifted out, aired and allowed to drip until it is in a moist state. The spent liquor of the bichromate or *mordant*, as it is called, must be thrown away and replaced with clean water. Two pounds and a half of logwood chips placed in a coarse bag are now to be boiled for one hour in the water, then the five pounds of prepared wool are placed therein and boiled for one hour, then lifted out, aired, washed and dried. A very good blue inclining to a black is thus dyed, but it is not equal in any respect to indigo.

Copperas may be substituted for the bichromate of potash. Blue vitriol (sulphate of copper) is used by many persons in the country to dye a blue-black with logwood, but this color always fades when exposed to sunlight. A little crude tartar is used by many dyers, mixed with the bichromate of potash and with copperas in the preparation; and with the logwood about one-tenth part of camwood is also used to good advantage. Purslain and carrot tops will color blue on wool, but the processes described are the most convenient. Concentrated logwood which is sold by most druggists may be used instead of chip logwood—a very small quantity of it will suffice to dye a dark color. A deep royal blue may also be dyed with the prussiate of potash and logwood, but the process is intricate. The above mode of dyeing may be practiced by any person with limited conveniences.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

Steering Apparatus.—Jesse Reed, of Marshfield, Mass., obtained a patent on June 5, 1849, for an improved steering apparatus; and he has applied to the Commissioner of Patents for the extension of that patent for a term of seven years. The testimony will close on May 4th, and the petition will be heard at the Patent Office on the 18th of that month.

Barrel Machinery.—Reuben Murdock, of Warwarsing, N. Y., obtained a patent on June 12, 1849, for an improvement in barrel machinery; and he has applied to the Commissioner of Patents for the extension of that patent for a term of seven years. The testimony will close on May 11th, and the petition will be heard at the Patent Office on the 25th of that month.

Pressure Gage.—Eugene Bourdon, of Paris, France, obtained a patent on August 3, 1852 (previously granted in France on June 18, 1849), for an improved pressure gage; and he has applied to the Commissioner of Patents for the extension of that patent for a term of seven years. The testimony will close on May 18th, and the petition will be heard at the Patent Office on June 1st.

An Invention Wanted---A Small Cotton Gin.

We have lately received several letters making inquiries respecting "small cotton gins." One of these (from the proprietor of an agricultural warehouse, in Louisville, Ky.) says:—"We have frequent calls for a *small* cotton gin, such as would answer the purpose of small growers of cotton in Kentucky, Indiana and Illinois." Several of the farmers in the southern section of those States intend to cultivate cotton to a moderate extent; and a small cotton gin, that could be operated by a horse-power or by hand, would be suitable for such individual cases, and would, we think, meet with extensive patronage. Our present manufacturers of cotton gins should be able to supply this want.

The "Skedaddlers" to Canada.—The immigration statistics of Canada show that the number of "skedaddlers" from the United States, who became frightend at the prospect of a draft, numbered 1,942. Those persons took with them an average of $1,000 each in American silver, making an aggregate of nearly $2,000,000. This accounts, in part, for the plethora of United States coin, of which the Canadians make such complaint.—*Exchange.*

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Mode of Disabling Ordnance.—The object of this invention is to provide for the certain disabling of ordnance, whenever it becomes necessary in war, by destroying the trunnions; and to this end it consists in making cavities in the trunnions for the reception of charges of gunpowder, by the explosion of which the trunnions may be entirely blown off or broken to such an extent as to prevent the possibility of mounting the piece for service. This improvement is the invention of P. B. Lawson, of Cold Spring, N. Y., and Alfred Berney, of Jersey City, N. J.

Shaking Machine for Separating Ores.—The object of this invention is to separate the different substances contained in a certain ore, according to their specific gravity, simply by the motion of the water and without any attention on the part of the operator. The invention consists in the arrangement of a tube extending through the sieve a short distance up into a cylindrical jacket, in combination with said sieve, and with a suitable agitator, in such a manner that the heaviest particles contained in the ore, which precipitate first to the sieve, close up the access to the tube within the cylindrical jacket, and only such particles are allowed to escape through said tube, the specific gravity of which is equal to that of the first sediment. The inventor of this improvement is A. W. Schell, of Clausthal, Hanover, who has assigned it to Geo. Asmus, of Houghton, Mich., who may be addressed in relation to it.

Molds for Castings.—The success of castings depend greatly on the skill of the molder; and in molding the operation of drawing the pattern or lifting it out of the sand constitutes one of the most important and difficult operations. The sand must be moistened in order to give it the required compactness, and even then, if the operation of drawing the pattern is not performed by a skillful and steady hand, the edges of the cavities produced in the sand by the patterns are liable to break off, and a poor casting is the result. The object of this invention is to facilitate the operation of drawing the pattern or patterns, and it consists in the arrangement of movable legs or pins operated by means of a screw and a hinged lever or by other suitable means, in combination with the match-board and flask, in such a manner that by the action of said legs or pins on the flask, the pattern or patterns secured to the match-board are raised up perfectly steady and drawn from the sand with the greatest ease and facility. John R. Davis, of Racine, Wis., is the inventor of this improvement.

Saw-gummer—The object of this invention is to obtain a device for gumming saws which will admit of a clean, smooth cut of the die without the liability of the saw slipping or springing under the cutting operation, a contingency of frequent occurrence with all saw-gumming devices. To obviate this difficulty the movable die or cutter is fitted within a clamp, which is arranged in such a manner as to operate in connection with the movable die and firmly clamp the saw or hold it in proper position while the movable die is at its work; the clamp, after the cut is made, rising after the die is raised, in order to liberate the saw and admit of its being turned or moved to bring the succeeding space between the teeth in line with the movable and the stationary female die in order to receive the succeeding cut. The inventor of this improvement is T. M. Chapman, of Old Town, Maine.

Breech-loading Fire-arm.—The invention relates to that class of breech-loading fire-arms in which the breech is opened and closed by a movement of the barrel and stock relatively to each other about an axis parallel with the bore of the barrel. It consists of certain improved means of withdrawing the discharged cartridge cases from the barrel in such fire-arms; also in a certain mode of providing for the loading of such fire-arms either by hand or from a cartridge magazine in the stock. The inventor of this improvement is R. F. Cook, of Watertown, N. Y.

Pianoforte Action.—This invention relates to the application, in combination with that kind of pianoforte action known in this country as the French action, of certain novel and simple devices, thereby rendering it perfect as a repeating action without friction. It consists, first, in inserting a spring having a two-fold effect, viz., that of partially raising the hammer when the key is struck, and also of replacing the point of the jack in its normal position on the least upward motion of the playing end of the key, and so providing for a rapid repetition of the stroke by the hammer on the string. Second, the introduction of a regulating screw and button, for the purpose of graduating the power of said spring to the weight of hammer it may have to sustain. Third, the lengthening of the downward projection of the hammer butt, in order to form a connection, horizontally, with the upper end of the spring, and thus giving leverage for the cumulative power of said spring to act on in raising the hammer. Fourth, in the insertion within a cavity provided for it in a hammer butt (of the so-called French action, under the cushion against which the point of the jack falls on returning to its position after each blow of the hammer) of a second cushion, thus giving great elasticity, by which the percussion of the jack against the first cushion is deadened in a greater degree, and the disagreeable thumping, common in the French action, is obviated. T. C. Faulder, of Albany, N. Y., is the inventor of this improvement.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING MARCH 10, 1863.

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.

37,846.—Reducing Long-staple Fiber.—Stephen M. Allen, Woburn, Mass.:

I claim, first, The process of treating long-stapled fiber for the purpose of converting the same into a short-stapled fiber by the application to the fiber to be reduced of successive washings in warm water, increasing in temperature as herein described, in combination with the use of alkaline solution, substantially in the manner and for the purposes herein before set forth.

Second, In combination with the treatment of long-stapled fiber by successive washings in warm water and subsequent boiling, I claim the method of reducing the same mechanically, in the manner and purpose herein described.

37,847.—Stove.—Evans Backus, Coxsackie, N. Y.:

I claim the insertion of mica, i, in a movable band or rim, K, or in an eqvivalent slide, arranged in relation with the openings, d, in the cylinder, E, or body of the stove for the purpose set forth.

[This invention consists in a novel application of mica to a stove, whereby the former is rendered capable of being adjusted so as to expose the fire when desired, and also capable of being adjusted so as to be free from the fire or not in contact with the fire chamber. The object of this arrangement is to protect the mica from the smoke in building fires, the former discoloring the mica and soon rendering it opaque and consequently worthless.]

37,848.—Composition for lining Oil Barrels, &c.—Friedrik Becker, Scranton, Pa.:

I claim the application of the above-mentioned composition, to prevent barrels, boxes, &c., from leaking, even kerosene oil barrels.

37,849.—Securing Shutters and Show-windows.—Friedrik Becker, Scranton, Pa.:

I claim the mode of securing the shutters by means of the peculiar constructed catches, C, governed by the apparatus as above described and shown in the drawings.

37,850.—Machine for leathering Tacks.—Lewis G. Bradford & Charles O. Churchill, Plymouth, Mass.:

We claim, first, The application of the regulator or stop motion, M, by the action of which any obstruction to the free movement of the horizontal reciprocating separator, K, is detected and the motion of the separator stopped.

Second, The combination and arrangement of the tack guide substantially as described, by which the tack is taken from the separator and held in a perpendicular position (causing each tack to be centred alike) while being driven through the leather, and a uniform appearance of the washers insured.

Third, The combination with the bottom of the piston, G, of the plate, p, and elastic piece, q, the whole being arranged to operate in connection with the stationary circular cutter, R, in a tack-leathering machine as and for the purposes set forth.

37,851.—Floor-warmer.—Clarissa Britain, Saint Joseph, Mich.:

I claim the application to the bottom of a stove of a reflector, A, constructed and operating in the manner, and for the purpose specified.

[The object of this invention is to use the heat produced at the bottom of a stove for the purpose of heating the floor around or on the sides and in front of the same, thereby warming the feet of the persons in the room.]

37,852.—Binding Attachment to Harvesters.—H. M. & W. W. Burson, Atkinson, Ill.:

We claim, first, The combination of the arm, C, fore-arm, C', handle piece, D, lever, E, with groove, g, acting substantially as and for the purpose set forth.

Second, The combination of the ratchet pulley, N, with the spring ratchets, L and M, acting substantially as described.

Third, Extending the arm, C, back of its bearing, a, and placing thereon the reel, G, and pulley, k, for the purposes herein set forth.

Fourth, The combination of the handle-piece, D, slide, F, lever, E, and cord, I, acting substantially as and for the purpose set forth.

37,853.—Device for gumming Saws.—T. M. Chapman, Old Town, Maine:

I claim the male die, C, clamp, I, and female die, e, combined and arranged to operate as and for the purpose herein set forth.

I further claim the combination of the levers, D G, bar H, and screw-rod, F, arranged with or applied to the stock, A, as a particular means for operating the die, C, and clamp, L, as herein described.

37,854.—Breech-loading Fire-arm.—Roswell F. Cook, Watertown, N. Y.:

I claim, first, The lever, k, spring, m, slide, n, and spring, p, the whole applied in combination with each other and with the hooked slide, I i, the chamber piece, E, or barrel, and the breech, B, and operating substantially as and for the purpose herein specified.

Second, In combination with the arrangement of the magazine below the axis about which the barrel and stock move relatively to each other, I claim so constructing the frame, A B, that at a certain position between that proper for firing, and that proper for loading from the magazine, the rear end of the barrel or chamber is exposed in an open condition, thereby providing for loading by hand, or from the magazine as may be convenient, substantially as herein described.

37,855.—Wagon Body.—N. B. Cooper, Gratis. Ohio:

I claim the ends of the wagon body as herein fully set forth and described, in combination with the frame, D, and the side pieces, H, and O, as and for the purpose specified.

37,856.—Jointed Scull Propeller.—C. Dann, Rushford, Minn.:

I claim, first, The arrangement of the jointed blades, A A', in combination with the beams, C, suspended eccentrically from a pivot, c, in the loose ends of oscillating arms, D, all constructed and operating substantially as and for the purpose shown and described.

Second, The arrangement of the slots, c', in the beams, C, in combination with the pivot, c, on the oscillating arms, D, and with the sculling blades, A A', constructed and operating substantially in the manner and for the purpose herein specified.

[The object of this invention is an improvement in that class of propellers, in which an oscillating blade, suspended from a rising and falling rod and operating within a tube or channel or submerged under water, is employed, and which are commonly designated scull propellers.]

37,857.—Mold for Castings.—John R. Davis, Racine, Wis.

I claim the application of movable legs, H, operated by means o a screw, D, and hinged levers, F, or their equivalents, in combination with the match-board or pattern, A, and flask, B, substantially as and for the purpose herein shown and described.

37,858.—Saw Stave-jointer.—William H. Doane, Cincin nati, Ohio:

I claim, first, Springing or bending the stave in the carriage during any stage of its progress between the saws or at any point on the bedplate, by the actuation of simply a lever connected with bending mechanism, and without adjusting the carriage to a certain position relatively to a bending bar, substantially as set forth.

Second, The cam gear and rack, or their equivalents, arranged to move with the carriage and operating substantially as herein described, for the purpose set forth.

Third, The combination of the curved spring stop, hand lever, sliding rack and bender, substantially as and for the purposes described.

Fourth, Adjusting the pitch of the saws by means of a combination of a horizontal axis, with a vertical sliding post, substantially as and for the purpose described.

Fifth, The combination of the horizontal lever, vertical double hinging post and saw arbor frames or yokes substantially as described.

Sixth, The angular slotted spring lever, R, curved stop-plate and vertically acting lever, Q, in combination with the double hinging vertical post for maintaining the desired pitch of the saws, substantially as described.

37,859.—Pulley Block.—Joseph M. Drake, Amityville, N. Y.:

I claim as an improved article of manufacture, a pulley block made with its wheel, B, grooved centrally and provided with balls, C, all as herein shown and described.

[This invention relates to a new and improved anti-friction device applied to the wheel or pulley of the block in such a manner as to greatly diminish friction in the rotation of the wheel or pulley on its axle and at the same time form a strong and durable bushing for th same.]

37,860.—Piano-forte Action.—T. C. Faulder, Albany, N. Y.:

I claim, first, The spring, b, attached to the jack, and connected with the lower part of the hammer-butt substantially as and for the purpose herein specified.

Second, The regulating screw, d, applied in combination with the jack, and with the spring, b, substantially as and for the purpose herein specified.

Third, Arranging the connection of the spring, b, and the hammer-butt between the top of the spring and an elongation of the lower portion of the hammer butt substantially as herein set forth.

Fourth, I claim the second cushion, g, applied at the back of the cushion, h, within a hole bored for its reception in the hammer-butt as shown in Figure 2, and herein described for the purpose set forth.

37,861.—Straw-cutter.—Wm. B. Frederick, Pontiac, Mich.:

I claim the arrangement together of the apron, f, knife, F, gate, D, box, A, treadle, E, weight, G', spring, J, pulley, I, and connecting cord, H, all in the manner herein shown and described.

I also claim the combination of the weight, G, with the spring, J, for the purpose described.

[This invention relates to an improvement in that class of straw, hay and stalk cutters in which a reciprocating knife is used and arranged to operate over the mouth of the feed-box. The invention consists in applying a weight and spring to the knife-frame, whereby the knife-frame is counterpoised and an impetus given it at the commencement of its upward movement, thereby greatly facilitating the operation of the knife and admitting of the machine being operated with ease by the foot of the operator.]

37,862.—Railroad Car Spring.—Perry G. Gardiner, New York City:

I claim, first, The manner of applying the wool (or other fibrous materials), within a spiral or circular steel-spring, so as to hold the wool in a columnar formed and compressed to a sufficient degree of compactness to act as a spring itself and also aid and strengthen the spiral spring at the same time and hold it in a straight line.

Second, I claim the peculiar construction of the followers, b' b', in being composed of a wooden plug within the hollow cylinder, thereby producing lightness and economy.

Third, I claim in combination with the other parts of the spring, the manner of giving a progressive or increased elastic resistance according to the increase of the load, by making the columns constituting the springs of different hights as described.

37,863.—Door Bell.—Melvin A. Genung, Gransville, Ohio:

I claim the combination of the chains, X, brackets, D, springs, F and G, and supporting hinge, S, when all are arranged as and for the purpose specified.

37,864.—Folding Chair.—Henry S. Golightly and Charles S. Twitchell, New Haven, Conn.:

I claim the combination and arrangement described of the legs, A A, back or arms, B B, legs, C C, and seat bars, S, when the same operate to fold and lock in the manner substantially as herein specified.

37,865.—Wrench.—G. W. Griswold, Logansport, Ind. :
I claim making the notches or openings of a bar wrench of two sizes or capacities, so that, by turning it over, it will present different areas of openings, substantially as herein represented.

37,866.—Caoutchouc or India-rubber.—Liveras Hull, Charlestown, Mass. :
I claim the improved product, manufacture or composition herein-above explained, it consisting of caoutchouc, as described, combined with or having applied to it the carbon spirits and chloride of sulphur by means or in manner substantially as specified.

37,867.—Lamp.—Carl A. Kleeman, Erfurt, Prussia :
I claim the notch, i, in the cylinder, f, for the purposes and as specified.
I claim the interior air-tube, k, of the burner, formed of thin sheet metal, with the screw thread made by bending said sheet metal, as specified.
I also claim the arrangement of the wick tube, o, cylinder, p, and cup, 3, at the upper end of said cylinder, p, to return any overflow of oil to the inside of the cylinder, h, as specified.

37,868.—Lamp and Lantern Burner.—C. W. T. Krausch, Chicago, Ill. :
I claim heating and supplying air to the flame of a lamp or lantern in a space included within a spiral coil, substantially as and for the purpose described.

37,869.—Grain-dryer.—C. W. T. Krausch, Chicago, Ill. :
I claim the combination of an agitating cleaning and conducting device or devices, with the carrier belt or belts of a grain-dryer, substantially as and for the purpose set forth.
Second, The arrangement of mechanism for vibrating a series of agitating and cleaning sieve shutes, arranged at opposite ends of a series of endless grain-carriers or belts of a grain-dryer, substantially as described.
Third, Producing a circulation of air through the chambers of a grain-dryer, and expelling the same therefrom, for the purposes set forth, by means of one or more fans, applied with respect to the endless grain-carriers, the air-heating chambers, and the drying chamber, and operating substantially as described.
Fourth, The arrangement of the fire-furnace, hot-air chambers, e e, adjustable valve or valves, f f, and drying chamber, B, or their equivalents, substantially as and for the purposes set forth.
Fifth, The valves, j j', in combination with the fan cases and the drying chamber and its valves, f f, substantially as and for the purposes set forth.
Sixth, The air-chambers, k k' l l, in combination with the fan cases and the drying chamber, substantially as described.
Seventh, The combination of the scourer with the drying apparatus substantially as described.
Eighth, The combination of the separator with the grain-dryer, substantially as described.
Ninth, An organization, substantially as described, whereby the grain is dried, agitated, dusted, scoured, separated and cooled, as set forth.

37,870.—Chambered Trunnion for disabling Ordnance.—Peter B. Lawson, Cold Spring, N. Y., and Alfred Berney, Jersey City, N. J. :
I claim providing cavities in the trunnions of ordnance for the reception of charges of gunpowder by the explosion of which the trunnions may be broken off or destroyed, substantially as herein specified.

37,871.—Coal Scuttle.—William Miller, New York City :
I claim the application of a corrugated cast-iron bottom, D, to a coal-scuttle, A, as and for the purpose herein shown and described.

[This invention consists in the application to a coal scuttle of a corrugated cast-iron bottom in such a manner that, by its corrugated shape, said bottom, however thin it may be made, will preserve considerable strength and durability, much superior in this respect to the ordinary plain or concave cast-iron bottom.]

37,872.—Mast Hoop.—David R. Procter, Gloucester, Mass. :
I claim a mast hoop having the ends that abut against each other closed and held firmly together by the wedge-shaped brace or tie secured to the hoop by the two iron rings or bands, I I'.
In combination with the above, I also claim the attached concave piece, K, that holds the leach rope and prevents the friction of the opposite side of the hoop upon the mast.

37,873.—Hay Press.—William Ridonour, Springfield, Ohio :
I claim, first, The end-discharging-horizontal trunk, B, made widest horizontally, and having its band grooves in vertical planes longitudinal of said trunk, the whole being combined and operating substantially as set forth.
Second, The end-discharging-horizontal trunk, B, whose sides, b b', toward its discharging end, are disconnected from the frame, and are confined by cams, I I', for the pressing of the bale, and are adapted to spread for the release of the bale substantially as set forth.
Third, Constructing the follower of an end-discharging horizontal hay or cotton press with side wings, H H', which project forward and embrace the hay or cotton on two opposite sides during the advance of the follower, in the manner set forth.
Fourth, The rear upper door, C, hinged at back, and having the sliding panel, c, adapted to close the rear end of the trunk until the passage of the follower, as herein explained.
Fifth, The provision, in an end-discharging-horizontal press, of an expelling block or blocks, X, attachable to the front of the follower and operating as described.
Sixth, The described arrangement of pressing and retracting windlasses, N and P, sweep, T Q q, gearing S S', treadle, P, cords, O and K, pulleys, L, toggle, M, and follower, G, as and for the object stated.

37,874.—Curry-comb.—John W. Rockwell, Ridgefield, Conn. :
I claim the combination of a card and curry-comb by fastening the card and the bars of the comb to either side of a wood or metal stock, or back, being either flat or triangular.
I claim the mode of fastening the bars of the comb, the stock and the card together by extending the ends of the bars of the comb over the ends of the stock and bending them on to the ends of the card, thereby securing all together and saving the labor and expense of riveting.
Second, I claim providing the blank, D, with the points, i i, as herein described and for the purpose set forth.
Third, I claim attaching the blank, D, to the block H, by means of the points, i i, in the manner above set forth.
Fourth, I also claim an adjustable handle held in its socket by set screw or spring, or by a joint, or any device by which, in using a flat stock or back, the handle can be adjusted for using either comb or card, as desired.

37,875.—Fire Alarm and Heat Detector.—Alexander Ross, Brooklyn, N. Y. :
I claim the combination with the compound strip of an index movable on a scale to complete the circuit at any degree of heat corresponding with the point on the scale at which the index may have been set, and for the purpose described.

[This invention consists in the application of a compound strip of two or more different metals, or other suitable materials, to complete or close the electric circuit by the increase or decrease of heat, and in combination with a movable index on a suitable scale to close the electric circuit at any degree of heat corresponding with the point on the scale at which the index may have been set, in such a manner that, by inserting into the electric circuit an alarm bell, or other suitable device, the alarm is sounded automatically at any increase or decrease of the temperature beyond the desired limits.]

37,876.—Die for turning Flanges.—Amos W. Sangster, Buffalo, N. Y. :
I claim the dies, B and G, constructed and operated as and for the purpose set forth.

37,877.—Lining Lead Pipes with Tin.—W. A. Shaw, New York City :
I claim the manufacture of lead pipe with a lining of tin by forcing an ingot of tin and an ingot of lead, while over a core, out of a cylinder through a die by hydraulic pressure, as specified.

37,878.—Excavating and Ditching Machine.—B. F. Stowell, Quincy, Ill. :
I claim the employment or use of an adjustable yoke, M, applied to the end of the swinging or adjustable frame L, and provided with a wheel, N, in combination with the side cutter, B, cutter, G, and endless aprons, H K, the latter being placed in the swinging or adjustable frames, F L, and all arranged substantially as and for the purpose set forth.

[This invention relates to an improved arrangement pertaining to the discharging apron, whereby the same is allowed to adjust itself to suit the varying hight of the embankment or deposit made by the machine. The invention also relates to the employment of a side cutter applied to the machine and arranged in a novel way.]

37,879.—Fid.—Samuel H. Sugett, Eden, Maine :
I claim a fid made in two pieces or sections, so as to hold a thimble between said sections while a cringle is being driven over or on to it, and over or on to the thimble, and then capable of removal therefrom, substantially as described.

37,880.—Spur.—Tappen Townsend, Brooklyn, N. Y. :
I claim, first, The use of the socket, g, as described, and capable of receiving the dove-tails on the ends of the branches, f, in combination with the conical screw, or its equivalent, which perfects the joint, while it causes the clamping of the sides of the heel.
Second, I further claim the flanged heel-plate moved by the screw, c, in combination with the flanges, i i, the three flanges preventing in their use the depression of the spur.
Third, I further claim the heel-plate, e, with its screw, in combination with the flat hooks, j, on the ends of the branches, by the joint functions of which the spur is clamped on and to the heel in the direction of its length.
Fourth, I further claim the combination of the conical screw-nut, d, or its equivalent, the heel-plate, e, flanged at its lower edge with its screw, and the flanges, i i, as affording a practicable method of attaching spurs.
Fifth, I further claim the combination of d e and i i with the socket g, and branches, f, substantially as described.

37,881.—Harvester.—Jesse Urmy, Wilmington, Del. :
I claim, first, The raking attachment, or its equivalent, as a substitute for one of the bars of an ordinary reel, when such attachment is capable of sliding in and out, and also of swinging around in the arc of a horizontal circle, substantially as and for the purpose set forth.
Second, The loop-pivot, N, on one of the arms of the reel, for the purpose set forth.
Third, The manner, substantially as described, of fitting the reel standards, C C', to the platform, draft frame and adjusting lever, H, for the purpose set forth.
Fourth, The spring rod, R, and eye-bracket, T, in combination with a rake attachment, M2, which operates substantially as described for the purpose set forth.
Fifth, The trip, W2, constructed and applied and operating substantially as and for the purpose set forth.
Sixth, The manner of combining the slide, O, and rake bar, M2, so that they move in and out together while the rake bar can turn independent of the slide, substantially as and for the purpose set forth.
Seventh, Providing the holes, V Z, in the cam, reel, arm and rake attachment, in combination with having the rake teeth and friction roller, Q, removable, for the purpose set forth in the manner described.
Eighth, The manner, substantially as described, of fitting the cam, L, and the reel shaft bearing for operation together, with a view of having them adjustable, as set forth.
Ninth, In combination with the nests of pulleys for operating the rake reel at varying speeds, I claim the chain-tightener, applied and operating substantially as described.
Tenth, The single bar grain guard, applied on the front end of the draft frame, through the agency of a swivel-slotted device, J, substantially as and for the purpose set forth.
Eleventh, So applying the grain side wheel to a lever-hanger, which is connected to the reel standards and to the draft frame, substantially as described, that both the platform, with the cutting apparatus, and the reel, with the rake attachment, are elevated by the lever, H, substantially as set forth.

37,882.—Gun Carriage.—Maximilian Wappich, Sacramento, Cal. :
I claim, first, Elevating and depressing guns by their trunnions, through the agency of a folding and expanding carriage, or its equivalent, substantially as and for the purpose set forth.
Second, The construction of the cheek plates of a gun carriage so that they operate as levers, substantially as set forth.
Third, The application of the screw or screws, S, in the manner and for the purpose substantially as set forth.
Fourth, The training of the gun horizontally by a combination of circular and straight movements, substantially as and for the purpose set forth.
Fifth, Adapting a gun which requires elevation and depression and horizontal training, for use, in connection with a porthole which is in size very little greater than the muzzle of the gun, substantially as set forth.

37,883.—Rat Trap.—I. M. Watson, Grand Rapids, Mich. :
I claim the reacting spring, G, in combination with the guides, b and d, operated in the manner and for the purpose herein fully set forth and described.

37,884.—Self-inking Stamp.—J. D. Billings (assignor to himself and G. R. Weed), Rutland, Vt. :
I claim the slide, B, having the stamp, D, and apron, E, attached and operated through the medium of the wheel, F, rack, C, and groove rod, G, provided with the spring, O, in combination with the roller, L, and the pressure pad, K, operated from the rod, G, by means of the lever, H, all arranged as shown, or in an equivalent way, for the purpose herein set forth.

[This invention consists in having the stamp or the raised surface which is to be printed from, attached to a slide which has an ink apron connected to it, the slide being provided with a rack into which a toothed wheel, operated by a grooved plunger rod, works. the above-named parts being arranged in connection with an ink roller and a pressure pad, in such a manner that the stamp or raised surface to be printed from will be properly inked and the impression given by a simple blow of the hand on the plunger rod.]

37,885.—Machine for sawing Barrel-heads, Shingles, &c. J. B. Dougherty (assignor to himself and Mary Ann Lawler), Rochester, N. Y. :
I claim, first, The combination of the rack and pinions, P P R R, and movable bar, N, with the frame carrying the bolt, the whole operating in the manner and for the purpose substantially as described.
Second, I claim the arrangement of the rods, l l, and bar, N, as herein described, whereby the latter may be adjusted so as to grasp a bolt of any shape.
Third, I claim the combination of the bent lever, K, with the frame, V V, said frame being made to rock on the shaft, f, so as to allow a bolt to be entirely cut into shingles, in the manner set forth.
Fourth, I claim the combination of the rod, H, with the frame, C, C, and shaft, B, said rod being so arranged as to allow the weight resting upon the rollers, r r, to be accurately adjusted.

37,886.—Apparatus for holding and supporting Boots and Shoes for use with Machines for screwing on Soles and Heels.—Eugene Lemercier, Paris, France, assignor to Amasa B. Howe, New York City :
I claim, first, The combination of the movable, vertical and beak-shaped anvils or supports, so that either may be moved into or out of action, as the case may require, substantially as and for the purpose set forth.
Second, Arranging the anvil, d, on a frame or arm, g, that turns around the axis of the other anvil, a, so that the face of either of the anvils, that is, for the time being in use, shall be in the line of the axis of the screw that is being fed in, substantially as described.

37,887.—Lamp.—John J. Miller (assignor to himself and Ernst Prussing), Chicago, Ill. :
I claim the combination of the perforated supporting cone, G', with the perforated conical deflector, G, the latter converging upward in straight lines at an angle of 45°, or thereabout, with the perpendicular, and this I claim either with or without the coronal flange, H, and the spring clasp or socket, F, by which the cap may be adjusted vertically upon the wick tube.

[In this invention the cone or deflector is formed into a perforated retort, within which gas is generated from oil introduced either with or without a wick, and producing a brilliant flame without the use of a chimney.]

37,888.—Shaking Machine for separating Ores.—Aug. Wilh. Schell, Clausthal, Hanover, assignor to Geo. Asmus, Houghton, Mich. :
I claim the employment or use of the tube, a, and cylindrical jacket, b, in combination with the sieve, A, of a shaking machine constructed and operating substantially as and for the purpose herein shown and described.

37,889.—Applying Cars to Railroad Tracks of Different Gages.—C. D. Tisdale (assignor to himself and B. W. Tisdale), East Boston, Mass. :
I claim the wheel-changing rails, C C, and the locking mechanism or their equivalents, in combination with the two tracks, A A B B, of different gages and with the wheels applied to the axles of the carriage, substantially as specified ; and in combination therewith I claim the guard rails, D D, for the purpose and to operate as described.
I also claim the combination of the switch, E E, and the extra broad gage, track rail, F, with the wheel-changing rails and locking mechanism and the two tracks, A A B B, of different gages, combined with wheels applied to the axles of the carriage, in manner and so as to operate therewith substantially as specified.
I also claim the peculiar wheel-locking mechanism, the same consisting of the two yokes, G G, and the wheel tubes made and applied to the axles, substantially in manner and so as to operate therewith as hereinbefore specified.

37,890.—Bending and setting Tire.—I. C. Singer, Ebensburg, Pa. :
I claim the arrangement and combination of the rack plates, B, the movable upright, I, the fluted roller, J, the portable rollers, E, with movable collars, G, as operated by gear wheels, M and N, and gaged by figures, as described and for the purposes herein set forth.

RE-ISSUES.

1,428.—Metallic Cartridge for Breech-loading Fire-arms. (Div. A.)—The Burnside Rifle Co., Providence, R. I., assignees of Ambrose E. Burnside. Patented March 5, 1856 :
I claim a metallic cartridge case so constructed as to pack the joint between the movable cartridge block and the barrel, as set forth.
I also claim a conical cartridge case, operating as described, for the purpose of facilitating its withdrawal from the cartridge chamber after the discharge of the gun.
I also claim the enlargement upon the forward end of the cartridge case, operating as described.

1,429.—Breech-loading Fire-arm. (Div. B.)—The Burnside Rifle Co., Providence, R. I., assignees of Ambrose E. Burnside. Patented March 5, 1856 :
I claim the movable cartridge block so arranged that it may be brought up to abut against the end of the gun barrel, with the orifice of its chamber coincident with that in the rear of the barrel, and carried away from the barrel for the purpose of loading, substantially as set forth.
And I also claim, in combination with the movable cartridge block abutting against the end of the barrel, enlarging the ends of the barrel and the cartridge chamber, as described, for the purpose set forth.
And I also claim the conical cartridge chamber, operating as set forth, for the purpose described.
I also claim the sliding breech pin operating as set forth, for the purpose described.
I also claim the projection in the rear of the breech pin for the purpose of starting the pin forward as the cartridge block is withdrawn.

1,430.—Silicated Soap.—G. E. Vanderburgh, New York City. Patented March 5, 1861 :
I claim the use of a dissolved alkaline silicate as an ingredient in and component of soap, but this I only claim when the dissolved alkaline silicate thus employed contains, by chemical analysis, less than one-third as much soda, or less than one half as much potash or silica.

DESIGNS.

1,732.—Pump.—B. C. Cromwell (assignor to himself, S. D. Greenleaf, C. F. Douglass and R. C. Douglass), Skowhegan, Maine.

1,733.—Pump.—B. C. Cromwell (assignor to himself, S. D. Greenleaf, C. F. Douglass and R. C. Douglass), Skowhegan, Maine.

EXTENSIONS.

Method of manufacturing Drop Shot.—David Smith, New York City. Patented May 22, 1849 :
I claim the application of an ascending artificial current of air to cool the descending metal in the manufacture of drop shot.

Loom for weaving Brussels Carpets, &c.—Erastus Bigelow, Mass. Patented March 10, 1849. Re-issued Oct. 9th, 1849 ; again re-issued May 5, 1857 :
First, I claim, in combination with the pile wire or wires for weaving piled fabrics, a grooved receptacle or trough for holding said pile wire or wires in position whilst being pushed into the shed of the warp, substantially as specified.
Second, I claim pushing said pile wire or wires into the shed of the warp, by a driver or pusher, substantially as specified.
Third, I claim guiding and supporting the pile wires as they are inserted into the shed of the warp, by a guide or guides, through, over or on which said wires slide, substantially as specified.

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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 draft on New York, payable to the order of 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.

The revised 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 duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from $30 down to $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 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 (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least 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 we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

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, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are 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 inventors or patentees 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.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our 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 us on the subject, giving a brief story of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

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 our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

Notes & Queries

R. R. H., of Cal.—We have safely received the little block of wood cut from an ancient California tree, but your interesting letter is unavoidably "crowded out" until our next number.

W. W. T. of S. C.—You say you are an engineer and ask us if water can be forced into a boiler through a vacuum by Giffard's injector. If you will consider the nature of a vacuum you will see that your question is meaningless. If you fill the condenser with water there will be no vacuum, consequently you cannot force water through it to the boiler. The atmosphere supplies all the injector necessary toget fluids into a vacuum.

B. D. H., of L. I.—Professor Donney's experiments with boiling water deprived of air and made to burst instantaneously into vapor at about 360° have been mentioned several times by us, as explaining the cause of some boiler explosions. Such experiments are overlooked by most writers on boiler explosions.

A. C. R., of Mass.—The frigate *Minnesota* carries 32 9-inch Dahlgren guns on the gun-deck and 14 of 9-inch and 2 of 11-inch on the spar-deck. You will find a description of the armament of several frigates on page 265, Vol. IV (new series), of the SCIENTIFIC AMERICAN. No reliance can be placed on floating paragraphs giving the armament of foreign war vessels, more especially as naval gunnery is in a transition state. Old guns are being frequently changed for new cannon of greater caliber.

H. M., of N. Y.—You may dissolve platinum in a hot mixture of two parts of concentrated muriatic acid and one part of concentrated nitric acid. You can probably obtain some of this metal from the chemists in Buffalo—the city where you reside.

A. H., of Pa.—So far as we know, there is not a linen factory in operation in the United States. Perhaps the best way for you to do, in obtaining first-class machines for manufacturing linen, would be to import them from P. Fairbairn's Works, Leeds, England.

C. C. P., of Ohio.—The specimen of ore which you have sent us is iron pyrites of very little value.

J. W. and M., of Mass.—We are not acquainted with a more safe method of using petroleum in rosin gas retorts for making gas than with the siphon—the same that is used to feed the rosin-oil to the retort.

J. W., of Ohio.—You cannot obtain an available motive-power from permanent steel magnets, but you may spin a copper disk on an axis situated between two electro-magnets, by breaking and closing the circuit alternately. A hood of india-rubber or glass will not protect a piece of steel from the influence of a steel magnet placed adjacent to it. If a magnet is rotated rapidly beneath a copper disk freely suspended, the disk will soon turn and follow the magnet.

C. C. L., of Fla.—Nitrogen is not a product of perfect combustion. The nitrogen of the air which passes into a furnace during combustion passes off unaltered in character, at a high heat and cannot be justly called a product of combustion. The oxygen of the air combines, chemically, with the carbon of the anthracite, forming carbonic acid and it is a product of combustion. If bituminous coal or wood is the fuel, the hydrogen of the fuel also combines with an equivalent of oxygen and forms water, and thus two different products of combustion—carbonic acid and water—are obtained.

J. W. B., of N. Y.—Your article on steam boiler explosions does not suggest anything new on the subject; we have therefore decided not to publish it.

J. D., of Ill.—We have already given you all the information we possess respecting the method of melting large masses of steel in France. A reverberatory furnace is used, and the steel to be melted is covered with pulverized iron slag.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, March 11, to Wednesday, March 18, 1863:—

H. T., of N. Y., $42; H. and D., of N. J., $26; A. C. F., of N. Y., $25; A. J., of N. Y., $26; A. B. T., of N. Y., $26; W. M. J., of Cal., $213; R. L., of N. Y., $20; A. A. W., of Mich., $40; J. K., of Conn., $40; T. H. C., of N. H., $20; C. T. B., of N. J., $16; J. F. J., of N. Y., $41; E. J. M., of N. Y., $20; O. H. K., of Saxony, $44; J. A. T., of Mass., $41; O. R. H., of Ohio, $40; W. S. P., of Mich., $20; A. T. H., of N. Y., $22; G. W., of N. Y., $16; B. D., of N. Y., $46; C. R. of N. J., $16; H. M., of N. Y., $20; W. D. S., of N. Y., $20; R. H., of Vt.. $20; S. S. W., of Pa., $40; E. T. S., of Ohio, $20; L. B., of N. Y., $20; A. W., of N. Y., $44; P. D., of Mass., $20; J. A. Van R., of N. Y., $16; H. L. B., of N. Y., $16; E. G. H., of Mass., $20; L. R., of N. Y., $41; T. W., of Mass,, 16; G. F. C., of Mass., $31; J. I., of Ohio, $16; S. C. K., of Mass., $25; C. W., of Mass., $25; J. W. P., of Minn., $16; G. G. H., of Ill., $26; J. M. A., of Mass., $12; J. H., of N. Y., $25; C. O. L., of Vt., $10; R. S. H., of Ill., $15; C. H. H., of Ill., $16; T. C., of R. I., $35; W. K. L., of Mass., $16; J. W., of Mich.; $16; H. S., of Pa., $10; D. C. G., of Pa., $10; J. P., of N. Y., $16; G. H., of R. I., $26; S. C. of N. Y., $16; R. C., of N. Y., $15; J. H. S., of Ill., $25; L. D., of Mass., $15; G. B. F., of Ill., $10; A. B., of Conn., $16; H. U., of Conn., $40; L. and E., of Ill., $25; M. V. D., of N. J., $12; C. M. L., of Mass., $40; G. S., of Mass., $16; J. B. T., of N. Y., $16; G. B. D., of Ill., $15; S. and N., of Ind., $15; J. K. H., of Ind., $15; C. H. H., of C. W., $26; L. C., of Mass., $16; D. M. S., of Vt., $25; J. B. S., of Conn., $25; S. T., of Mass., $25; W. D. R., of Pa., $10; S. L. H., of Wis., $20; W. H. F., of Mass., $15; H. H. E., of Conn., $16; J. P. H., of Iowa, $15; N. P. B., of N. Y., $25; D. J. O., of Pa., $25; J. A. B., of Ohio, $25; R. W. S., of Mass., $25; S. P. McC., of Iowa, $15; L. M. Van S., of N. J., $26; B. D. S., of N.Y., $26.

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, and inform us the amount, and how it was sent, whether by mail or express.

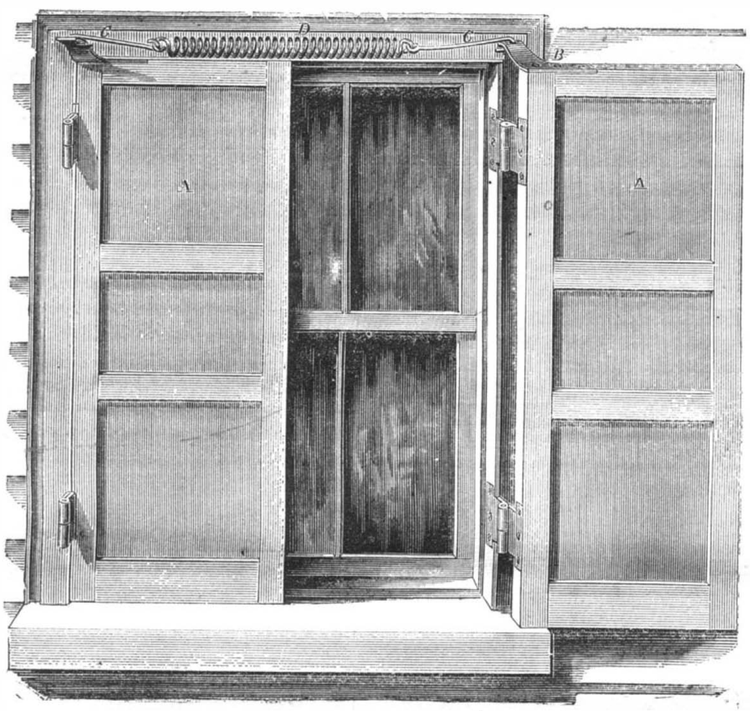
Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Wednesday, March 11, to Wednesday, March 18, 1863:—

H. T., of N. J.; A. J., of N.Y.; M. V. D., of N. J.; D. M. S., of Vt.; J. B. S., of Conn.; L. M. Van S., of N. J.; E. E., of Ill.; H. U., of Conn.; J. H. S., of Ill.; S. C. K., of Mass; C. O. L., of Vt.; H. & D., of N.J.; A. B. T., of N. Y.; O. H. K., of Saxony; T. C., of R.I.; L. R., of N.Y.; A. T. W., of Iowa; D. J. O., of Pa.; N. P. B., of N.Y.; L. & E., of Ill.; A. A. G., of N. Y.; J. H., of N. Y.; J. M. A., of Mass.; A. C. F., of N. Y.; J. F. J., of N. Y.; A. W., of N. Y.; C. H. H., of N. Y.; S. T., of Mass.; B. D. S., of N.Y.; J. A. B., of Ohio; R. W. S. of Mass.; G. H.. of R. I.; G. F. C., of Mass.; G. G. H., of Ill.

Improved Patent Blind Fastening.

Nearly all housekeepers must have experienced, at one time or another, the personal annoyance and injury to the windows which results from the violent slamming of the blinds to and fro in high winds. Many a sleepless night has been passed from the impossibility of keeping the shutters in a fixed position—they persisting in banging to and fro with every adverse blast. These discomforts have been overcome by the device herewith illustrated. The shutters, A, have a small iron arm, B, screwed to the top of them, which is provided with a hole in one end; into this hole one end of the small wire link, C, is passed, the other extremity of the same being connected with the spiral spring, D. This comprises the whole of the invention, and it is both simple and effective; no other fixtures or attachments are required. There are many advantages which this fastening possesses over others in common use, and the principal ones may be here enumerated:—In brick or stone houses this fastening is entirely out of sight, being under the window heads, and protected by them from being clogged with ice or snow. The top of the blinds are drawn together by it, and thus prevented from sagging or bearing too heavily on the upper hinges. It also dispenses with all staples or hooks in the house or window sill; such parts are generally the first to get out of order, and they disfigure the appearance of the building. These blind fastenings are made of the best materials and are very durable. In still sunny weather the shutters can be partially closed, so as to exclude the rays and heat of old Sol, and yet admit the light and air—a very desirable feature not possessed by other fasteners.

The patent for this invention was procured on May 2, 1861, by W. Cleveland Hicks, of 105 Hicks street, Brooklyn; further information respecting them can be had by addressing him, at that place, or C. D. Kellogg, Boston, Mass.



HICKS'S PATENT BLIND FASTENING.

Collodion and Gun Cotton.

Collodion is a viscid semi-transparent fluid formed by dissolving pyroxyline (gun cotton) in a mixture of ether and alcohol. Pyroxyline is prepared by immersing cotton, flax, unsized paper, or any substance composed of lignine in a mixture of nitric and sulphuric acid. In 1833 M. Braconnot discovered that, when starch was submitted to the action of nitric acid it became converted into a peculiar substance, which dissolved in the acid, and was precipitated upon the addition of water. This substance, which was named xyloidine, was found to explode when dry, at a temperature of 356°. The subsequent researches of M. Pelouze proved this substance to be starch, in which one equivalent of hydrogen was replaced by one of peroxide of nitrogen. In 1846 M. Schönbein discovered gun cotton or pyroxyline, an explosive material, soluble in ether and alcohol. His method of making it was by immersing cotton in a mixture consisting of one part of nitric acid added to three of sulphuric acid. After being immersed for five minutes the cotton was washed repeatedly in water and dried. The sulphuric acid contained in the mixture was simply to absorb the water formed in the process, which would otherwise weaken the nitric acid and cause it to dissolve the pyroxyline. Chemists soon recognized the analogy of these two compounds, starch and lignine being similar in composition, and cotton fiber being nearly pure lignine. Further research proved that there were three principal varieties of pyroxyline, depending on the strength of the nitro-sulphuric acid used. By employing the strongest mixed acids the most explosive gun cotton was produced; it contained the largest amount of peroxide of nitrogen, and was only soluble in acetic ether. This was the quality most adapted for blasting operations. The second kind, made with a slightly weaker acid than the last, contained less peroxide of nitrogen, was not so explosive, dissolved readily in ether and alcohol, and is now used for making collodion. The third form, made from still weaker acids, contained still less peroxide of nitrogen and was only combustible.

The Manufacture of Steel Petticoats.

The report of the French jury at the London Exhibition gives the following particulars on the importance of the trade to which the fashion of crinolines has given rise:—"The cotton required for covering the springs is worth, under certain circumstances, 30 francs for every hundred kilogrammes of steel, making a total of 1,260,000 francs for the 4,200,000 kilogrammes of that metal used for this purpose. The value of the raw material used is about 4,830,000 francs yearly, and the cost of the labor is 5,670,000 francs, without including the making of the petticoats. The steel springs for skirts made yearly in France weigh 2,400,000 kilogrammes, in England 1,200,000 kilogrammes, and in other countries 600,000 kilogrammes—in all, 4,200,000 kilogrammes. These springs are covered with cotton at 2 francs 50 centimes per kilogramme on an average, which makes the total proceeds 10,500,000 francs. Taking the steel in bars to be worth on the average 85 francs per 100 kilogrammes, its total value is 570,000 francs."

Cotton from China.

The *European Times* says:—"Strange events have been produced by the civil war in America. We are now receiving cotton, in driblets, it is true, from the most likely and unlikely places in the world. A ship has just arrived in the Mersey from China with a full cargo of this invaluable staple, and hardly a week passes without the receipt of some of the same material from quarters where, before the war, it was hardly ever heard of, much less grown. But the most extraordinary revulsion in the cotton trade is the large exportation which is now taking place *to* the Federal States. During the last few days several cargoes of cotton have been sent from Liverpool to New York at full prices, the cost of which must be largely increased by the cost of shipment. This reversal of the ordinary laws of trade will doubtless continue as long as the war lasts."

A Cornelian containing a globule of water was recently found on the coast of Tuscany. These pebbles exhibit a crystalline cavity, which, when broken, is about one-third filled with water.

FROM THE STEAM PRESS OF JOHN A. GRAY