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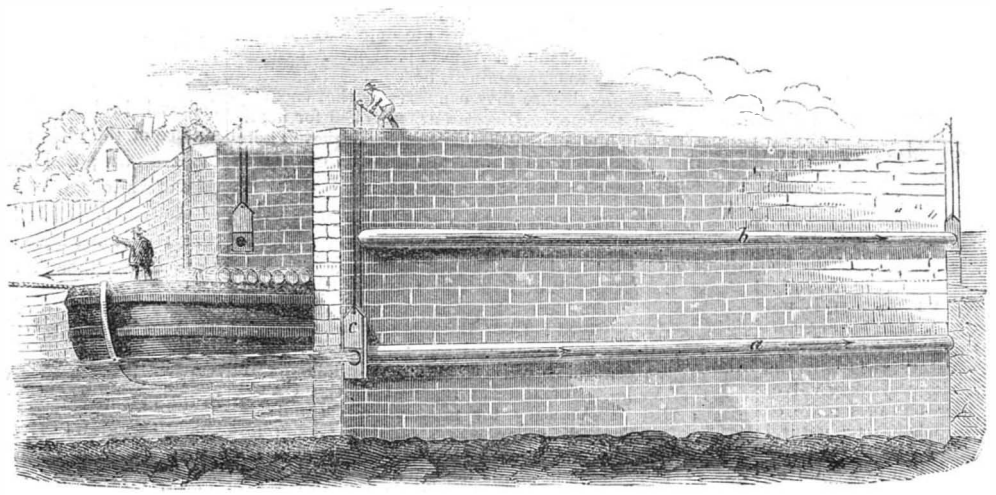
IMPROVEMENT IN CANAL LOCKS

Though railroads are steadily superseding canals, there is still an immense amount of transportation done on the latter, and is doubtless destined to be done for a long time to come. Therefore, any improvements in canals are of great value. The invention which we here illustrate is a device for facilitating the entrance of boats into locks and their exit from them. When a boat enters a lock, it must of course displace water equal to the bulk of its submerged portion, and unless the boat moves very slowly indeed, this water has not time to run back through the narrow space between the sides of the boat and the sides of the lock, but is piled up in front of the bow, retarding the movement of the boat. A similar difficulty is experienced in leaving the lock, and it is customary when a boat leaves a lock from the lower level, to open the gate, and let in a quantity of water at the stern to drive the boat out. This, of course, consumes the feed water, and is objectionable where the supply of water is limited. All of these difficulties are remedied by the simple plan represented in the annexed engraving.



DAVIES' IMPROVEMENT IN CANAL LOCKS.

For the entrance or exit of the boat at the lower level, water ways or passages, *a*, are made on both sides of the lock, leading from the inner end of the lock directly outward through the wall, and communicating with the water in the canal at the lower end of the lock. These passages are closed by gates, *c*, which are opened while a boat is entering or leaving the lock, but are closed while the lock is full of water or is being filled. While a boat is leaving a lock, as represented in the cut, the gate, *c*, being open, the water flows from the canal through the passage, *b*, into the lock at the stern of the boat, and thus fills up the space vacated by the boat, and prevents the water from resisting the outward movement of the boat. On the other hand, while the boat is passing into the lock from the lower level, the water flows outward through the passage, *a*, thus preventing any piling up at the bow. A similar arrangement of the passage, *b*, facilitates the entrance and exit of the boat into and out of the upper level of the lock.

It will be seen that the same plan is applicable to double locks.

The inventor is making arrangements for the general introduction of this improvement during the next season.

The patent for this invention was granted Nov. 6, 1860, and further information in relation to it may be obtained by addressing the inventor, James Davies, at Schuylkill Haven, Pa.

THE space-penetrating power of the Rosse telescope surpasses the comprehensions of the human mind to apprehend in all its vastness. One astronomer remarks that the appearance of Jupiter, as presented in this wonderful instrument, is as if a coach lamp were advanced into the tube; and another declares that the sublimity of the spectacle afforded by some of the large globular clusters of nebulæ is such as no one can express.

HORSEMANSHIP.

In an interesting article on fox-hunting, the London *Quarterly Review* gives some excellent hints on horsemanship, one or two of which will not come amiss to riders who are not fox-hunters.

Four-fifths of the art of horsemanship depends on attaining a proper seat, and one-fifth on possessing a pair of light hands. The generality of riders are apt to sit on their horses in a bent attitude, and when a man rides in this toadlike position he travels always ready, at a moment's notice, to describe a parabolic curve over his horse's head, should the animal take a notion to stumble, and fall, and the result is likely to be a concussion of the brain or a dislocation of his neck—the horse standing by uninjured. On the other hand, when a man sits upright, evenly balanced on his saddle, any sudden jerk or movement forwards throws his shoulders backward.

If the horse falls, the animal is the sole sufferer, the fore part of his body becomes a buffer, preventing the concussion from injuring, in the smallest degree, the rider. If a horse only trips, a rider justly poised in the saddle can easily recover him. The instant he is down, however, the rider should vacate his saddle, as the momentum of the animal will probably cause him to roll over. In leaping a fence, too, if the rider sits properly on his saddle, the horse, and not he, receives the concussion of any fall that may ensue, simply because the spring of the animal, in taking the leap, had thrown his shoulders backward and his head out of danger; whereas if the rider had assumed a bent attitude, his nose would have been seen plowing mother earth the moment the muzzle of his nose, impinged it.

In the year 1848, Major General William Yorke Moore, of the British army, rode over a precipice of two hundred and thirty-seven feet, perpendicular height, on the island of Dominica, and escaped with his life, although every bone in his horse's body was broken. The accident occurred in the evening. Three men had previously been dashed to pieces at the same place, and a fourth met a similar fate subsequently, when the Colonial Assembly took measures to prevent such catastrophes. Had not the General preserved an erect posture and clung to his horse, his life would have paid the forfeit. His recovery from the shock of the fall was nearly as miraculous as his escape from instant death.

If a horse be but properly dealt with, he can gallop down a turf hill with as much rapidity as along a race course. He should be encouraged by a loose rein, to carry his head as low as possible, to enable him to take care of his feet, and in case of treading on a rolling stone to recover the balance by throwing it up. If the rider, following the instinct and example of the horse, throws his weight backward, the descent can be made at considerable speed, without the smallest danger. The horse must not be allowed to descend the slope diagonally, as he will inevitably slip upon his side. His head must be guided straight onward, but care taken not to induce him to raise it up.

Seated in the attitude described, Jack Shirley, whipper-in to the Todworth hunt, was one day observed fixing a piece of whip-cord to his lash while following his hounds at a slapping pace, down hill, with a large open clasp knife in his mouth, his reins lying nearly loose on his horse's neck. Another advantage of riding in an upright position is that after a while the muscles of a rider lose their obstinacy by getting tired, and it becomes impossible for him to prevent his body undulating to the infinite relief of both parties, with every movement of the horse; whereas, if, like an English ockey, he rides like a frog on a shovel, he inflicts upon his whole frame, as well as upon the poor animal that carries him, an amount of unnecessary fatigue which prematurely tires both.

Another qualification of a good horseman—especially in fox hunting, when fields and pastures are to be ridden over—is to allow the horse to carry his head at its natural level, and not to rein it up, as is the general custom, so that he will lose the habit of using his eyes to ascertain the character of the ground over which he is traveling. If given free scope in this respect, the horse will easily avoid holes, stones, and other dangerous obstructions, even in fields and woods, and if not reigned up at a chance stumble, will learn to depend on himself, and rarely falls ir he happens to make a misstep.

THE TWO PRINCIPAL RULES IN HORSEBACK RIDING.

1st. Carrying the hand which holds the reins advanced forward from the body, so that the reins may be pulled up promptly.

2d. Have the stirrup strap of such length as to bring the sole of the boot just level.

The surest sign of an inexperienced rider is the carrying of the rein hand against the body. It of course precludes the possibility of exerting any control over the motions of the horse. The hand should not be carried too far forward, but extended in an easy position, with the reins grasped firmly.

The most common cause of awkward riding is having the stirrup strap too long; this strains the leg down in an uncomfortable position, producing that terrible pain in the groin so often experienced, and it causes the stirrup to slip from the toe up over the instep The strap, however, should not be so short as to turn the toe up and cause the stirrup to slip from the foot, but just right to support the leg easily and bring the toe and heel to the same level. These rules are drawn from thirty years' experience and thousands of miles of horseback riding.

CAUSE OF BOILER EXPLOSIONS.

THEIR PREVENTION—IMPORTANT INFORMATION.

In the month of October last a steam boiler exploded in Liberty-street, Pittsburgh, Pa., and the coroner's jury in the case rendered the following verdict:—"That the explosion of said boiler was caused by a defect in the angle iron of the head, which blew out, and by a scarcity of water in the boiler, thereby creating a pressure within it beyond its strength to resist." Benjamin Crawford, Esq., Supervising Inspector of Steamboats for that district, having been solicited to give his opinion on the explosion, has done so in a communication to M. De Lange, Esq., which has been sent to us, and in which we find some new and very useful information for engineers, owners of steam boilers and the public at large. He states that, in his opinion, the verdict of the jury was a correct one, and says:—

That there was a defect in the head that blew out, and that there was a scarcity of water in the boiler at the time of the explosion, was made clear by the testimony taken in the case. But how much of the disaster is due to each of these causes is more difficult to determine, or whether either was sufficient to produce it without the aid of the other.

The boiler was 40 inches in diameter by 22 feet long, made in the cylindrical form, without flues or tubes. The body of the boiler was said to be of the first quality of iron, one-fourth of an inch in thickness, and the heads were made of "angle" or "gunnell iron," which was half an inch in thickness. Stay rods, seven-eighths of an inch in thickness, were attached to the center of the heads, and extended back some four or five feet, and were secured to the side of the boiler. The head that blew out had one of these rods. If the angle iron in these heads had been sound, it ought to have withstood a pressure within the boiler of 300 lbs. to the square inch without rupture. The testimony before the coroner's jury in regard to the defect was somewhat conflicting, from the circumstance that oxydation had taken place on the ruptured parts before the examination was made, which made it difficult to distinguish between the fresh break and the previous defects. But to allow a diminution of one-third of the strength for the defects (which I think is as much as the testimony would justify), and there was still strength sufficient to bear a pressure of 200 lbs. to the square inch, which would be more than 200 per cent greater than the working pressure used on the boiler. The danger from low water arises from the sides of the boiler, below the fire lines of the furnace, becoming exposed and overheated when unprotected by the water.

In order to comprehend fully the state of a boiler in this condition, we must take into consideration all the circumstances connected with it, which are—

1st. The water in the boiler, when the steam is not passing off to the engine or otherwise, is in a quiescent state—almost as much so as if there was no fire under the boiler at all. But the moment vent is given to the steam, by starting the engine or raising the safety valve, ebullition takes place, and the water becomes more or less agitated, and often violently so, when, as a natural consequence, it would come in contact with the sides of the boiler far above where it was at when in a state of rest.

2d. When the water falls below the fire lines of the furnace, the sides of the boiler are liable to become highly heated, sometimes so much so that the iron loses its tenacity to such a degree (when red hot) that the pressure of the steam will force its way through it, as in the case of the steamer *Hartford*, a few years ago, where no damage was done except to destroy one sheet of the boiler. But a high black heat of the iron is more dangerous, should the water, by its agitation, come in contact with it, as it makes steam when it is in that condition more rapidly than if it were red hot.

3d. The amount of steam that is produced from a given quantity of water—which is, under the pressure of the atmosphere (fifteen pounds to the square inch), 1,700 times it volume; that is, one gallon of water will make 1,700 gallons of steam, at a density of fifteen pounds to the square inch. Of course, the higher the pressure the steam, the less will be the volume; as, for example, when the pressure is at sixty pounds the volume will be 470, and when at two hundred pounds the volume will be 158, and so on.

4th. The quantity of water the sides of the boiler, when overheated, will make into steam. This is a matter, notwithstanding its importance, that seems not to have been investigated to any great extent, as I have been unable to find in any works at my command treating on steam, anything in relation to it. I have, however, lately made some experiments with a view of an approximation to the quantity of water a square foot of boiler iron, one-fourth of an inch in thickness, when brought to a high black heat, will make into steam, and I found it to be about fifty-four cubic inches. I tried it both by measurement and by weight, and the result was about the same. The time occupied was a little over one minute, but a very large amount of it was made into steam in a very few moments.

The boiler that exploded on Liberty-street was of a capacity of about 192 cubic feet, and according to the statement of some of the witnesses who examined the boiler, and who were engineers of large experience, there could not have been more than about 20 cubic feet of water in the boiler at the time of the explosion. To fill the remaining space with steam at 60 lbs. to the square inch—which was about what was in the boiler at the time of the explosion—would require two and seven-tenths gallons of water converted into steam. There was exposed to the heat of the furnace, above the water, about 18 inches of the sides of the boiler, which would make 66 square feet of surface. This, if heated to a high black heat (and there was evidence of some portions of it having been red hot), was capable of converting fifteen and one-third gallons of water into steam; about one-third of this quantity, or five and three-tenths gallons would produce a pressure of 200 lbs. to the square inch. This shows what the heated iron in that boiler was capable of doing, providing the water came in contact with it, which it would do the moment vent was given to the steam by the raising of the safety valve, or in any other way. As the safety valve was loaded to about 60 lbs. to the square inch, and as there was about that amount of steam in the boiler immediately before the explosion took place, I have no doubt but the safety valve did commence blowing off steam, which caused the water to foam over the heated sides of the boiler, and which, in my opinion, produced the explosion.

In regard to the "requisites for the prevention of similar calamities," my opinion is that a well regulated system, enforced by law, similar to the steamboat law passed by Congress in 1852, is the best means to accomplish that object. Before the enactment of that steamboat law, disasters were constantly on the increase. Scarcely a week passed that the community were not shocked by the news of some terrible steamboat disaster on the western rivers or on the lakes. Indeed, I remember of three most direful explosions having occurred in the space of one week (the *Red Stone*, *Glencoe*, and *Saluda*), by which more than two hundred lives were lost. Since the law has been in force, few explosions, comparatively speaking, have occurred. This law requires all steamers carrying passengers to be inspected at least once a year, subjecting their boilers to a hydrostatic test. The pressure of steam is limited in accordance with the thickness of the iron, the diameter of the boiler, and the hydrostatic test applied; and other precautionary measures are required, calculated to guard against danger from explosion. All engineers are required to be examined, licensed and classified by the Inspectors, before they can serve in that capacity on any such steamer. Licenses are revoked for negligence, misconduct, or inattention to their duties. There are other regulations to guard against fire, collisions, and other dangers, and also requiring all pilots to be licensed, &c.

As an example of the working of this law, it may not be out of place for me to make a statement of the operations under it in this supervising district (which embraces Pittsburgh, Wheeling and Cincinnati), for the year ending on the 30th o. September. There were 205 steamboats inspected; 1,024 licenses granted to engineers and pilots; 30 revocations and refusals of licenses (the greater part on account of intemperate habits); 12 cases of violation of the law reported to the United States District Attorney for prosecution (principally steamboats; one, however, was against a person for concealing gunpowder in a box and shipping it as hardware); 11 boilers were found defective upon inspection, some of which were repaired, and others condemned from further use. No explosion has occurred in this district, nor to any boat inspected in this district, nor has any accident of any kind happened to any inspected steamer in this district, by which life has been lost or personal injury sustained.

I have no doubt but a law can be framed, which, if properly enforced, will give almost perfect security against the explosion of stationary boilers, and at the same time will not in the least operate against the interests of proprietors.

ATMOSPHERIC CIRCULATION AND AERIAL NAVIGATION.

MESSRS. EDITORS:—That we have "trade winds" blowing from the northeast in the northern equinoctial belt, and from the southeast in the southern equinoctial belt, is a fact long known to mariners, and equally well known to all students of Nature. That these currents are piled up, rarified and made to rush toward the west by the compound force of the two streams and the calorifying power of the torrid zone, is all rational enough in itself; that is to say, the uprising and westward moving of the atmosphere of this equinoctial belt is a necessary consequence to the inflowing condition of the trade winds. Now, where does this wind, *i. e.* atmosphere, come from? and whither does it go? It has an inlet here, and it must have an outlet here, also. Maury says it goes to the poles in the southwest "passage winds" in the northern hemisphere, and the northwest passage winds in the southern hemisphere. These are facts also known to mariners. But how do they make their circuits back? Mariners cannot tell. They only feel their courses on the surface of the sea. Maury deduces theoretically that they return by upper currents from the northwest in the northern hemisphere, and from the southeast in the southern half of the globe. I shall not, in this brief statement, follow Maury's theory for their return, profound though it may be, because the facts as elicited respecting the upper currents of the atmosphere show the return current in our latitude to come from the northwest. In my twenty-five years' balloon sailing, I have always found two currents of air. One from the southwest; another higher up, from the northwest. Between these two currents, an eddy current is found moving toward the east. This northwest current is drawn into the equatorial vortex, where it becomes the northeast trade wind known to mariners. The reverse is the use in the southern hemisphere.

Having thus far traced the actual courses of the wind, let us examine the cause. Assuming that the equatorial heat and the polar cold are the causes of the currents going to and fro by incessant heating and cooling processes, operating upon the mobile atmosphere, shall we not find in the same cause, though in a modified form, the constant tendency of the atmosphere in one zone moving from east to west; that is to say, will not the warming process of the coming morning sun, rising constantly in the east, have a tendency to draw the atmosphere in that direction, bringing it from the cooling shades of night, also constantly acting upon it on the western side of the daylight? That is the best theory that I can hang upon the fact. I do not pretend to say that it is the true theory, but the facts of the wind's courses are nevertheless established; on the surface of the earth by mariners, and in the upper currents by twenty-five years' sailing among them.

Upon this great circulatory system of the vast atmosphere I base the ultimate success of aerial navigation. By studying the currents and deflections in detail, we will be enabled to move among them to any part of the globe we wish to reach. Maury leaves nothing to be deduced in his outlines of the currents of air on the surface of the globe; they are all elaborated and systemized facts; and these currents on the surface partake of various directions corresponding to the points of the compass. It is therefore a rational deduction that they must have their corresponding counter currents above, though my experience only positively reveals the two spoken of above; one from the southwest, the other overlapping it and coming from the northwest.

There is yet a new world of wonder and happiness in the vast and unexplored region of the atmosphere. Ought this grand subject not be brought under the scrutiny and general investigation of artistic and scientific men by a preliminary experiment of sailing round the globe with a balloon? It can be done at a cost of not over $10,000.

JOHN WISE.

Lancaster, Pa., Dec. 4, 1860.

SULPHUR WATER.

MESSRS. EDITORS:—In perusing your valuable journal, I find on page 178, Vol. III., that a correspondent at Sparta, Ga., asks the question whether sulphur water could have been the cause of his flue boiler exploding.

Sulphur water, as it is commonly called, we are very familiar with; and its effects are very destructive in anthracite coal regions—or, at least, in this and our adjoining counties. The water running out of old mines may be as clear as crystal, and yet, by evaporating it in boilers, it will turn red and rusty in a short time. It is only used when no other can be obtained; for it is so destructive as to render boilers useless in a short time. Our boilers are generally constructed in a cylindrical form, about 31 inches in diameter, of one-faurth inch iron for colleries, and in many instances, where the water is used direct from the mines, they are repaired about every month; and frequently in ten or twelve months rendered entirely useless. Could some of your intelligent writers give us a remedy for this great evil?

D. ZUERN.

Shamokin, Pa., Dec. 5, 1860.

THE world receives now, in a single year, nearly one-tenth as much gold as was obtained in the whole period from the discovery of America down to the year 1848.

IMPROVING THE MISSISSIPPI--ONE HUNDRED MILLION OF DOLLARS ADDED TO THE VALUE OF THE STATE.

MESSRS. EDITORS:—This is a subject of great importance not only to the people of Louisiana, but to all those who are interested in the trade of the Mississippi. We have in this State over two millions of acres of as fertile land as the sun ever shines upon, which is annually overflowed by water from an outlet of the Mississippi during freshets. This renders it unfit for agricultural purposes, and makes it a grand laboratory of poisonous malaria, destructive to health and life for miles beyond its borders.

For several years I have advocated closing this outlet (Bayou Plaquemine), but have been uniformly opposed by the representatives of those parishes situated below it, who believe it would cause an increased hight of the freshets or floods in the river, and prove injurious to the plantations below the bayou, which is 210 miles above the mouth of the river. After a careful examination of the Mississippi river, I came to the conclusion that, by closing the bayou, we would not only reclaim two millions of acres of land from overflow—which would add directly to the wealth of the State over one hundred millions of dollars, and give homes to one hundred thousand inhabitants—but that we would reduce the extreme hight of the floods in the river.

I will give some of the most important facts relative to the Mississippi river tributaries, pouring their floods into the main stream for a distance of over 1,200 miles from the ocean. These do not increase the width of the river; on the contrary, it becomes narrower below each addition to its volume; and the difference between high and low water is less after each tributary is added. This holds good without exception. The rise of the freshets are diminished without much increase of velocity in the current. The Mississippi attains its greatest volume about 500 miles from the Gulf of Mexico, and has there a flow, in extreme high tides, of 95 millions of cubic feet of water per minute. Each five hundred feet of water contains one foot of solid earth, which, of course, is precipitated wherever the water becomes still for a considerable time. The velocity of the current is within a fraction of five feet per second, which carries this sediment onward with the water towards the ocean.

At the mouth of the Ohio, the elevation of the surface of the Mississippi is nearly 275 feet above the ocean, and its bottom on the shallow bars about 200 feet above the ocean level. The river has an average descent of four inches per mile, but for the last 250 miles its descent is a fraction less than one inch and a half per mile.

Opposite the outlet which I propose to have closed, the river is 2,500 feet wide and 103 feet deep, and has a velocity of current of four feet per second. The surface, in high water, is 30 feet above the ocean, consequently, the bottom is 73 feet below the ocean level. The velocity of the whole volume is two feet greater than the surface current, and the velocity within five feet of the bottom is 10 feet greater than at the surface; consequently, it has the greater carrying force, and can move particles which the current cannot sustain on the surface. These facts are contrary to popular belief. And although the water at the bottom of the river—over 200 miles from the ocean—is 75 feet below the ocean, and has actually to run up hill over three inches per mile, it flows onward with a velocity far greater than the surface current, which flows down a plane of one inch and a half per mile. This proves that there is another cause for velocity of currents in rivers besides the slope of the plane over which they flow, and that the weights of the volume above and behind have a great forcing power. My conclusion is that the larger the volume, or rather the greater the depth—provided there is a volume of considerable weight behind—the greater will be the discharge, and that the dredging power in the bottom is increased in exact ratio with the depth and velocity of the current, and that the permanent effect of an addition to the volume will be to deepen the channel where there are no rocks, and consequently, will really, in time, diminish the hight of the surface.

The outlet which I wish to have closed in high water takes from the river 28,000 cubic feet per second; consequently, if it were closed in high water, and no change took place in velocity of current and depth of channel, the surface would be raised about 10 inches, which would be a serious addition to the hight of the floods. But to sustain my opinion that that would not be the practical effect, we have the experience of 140 years on this river.

The first levee was built in front of New Orleans in 1717. These structures have been gradually extended until nearly the whole extent has been leveed for 1,000 miles on each side of the river, and we have reclaimed 30 millions of acres of land from inundation that was formerly overflowed annually to an average depth of three feet. The water for the last 50 years has not been one inch higher at New Orleans than it had been before a levee was built. This is a well authenticated fact, and besides this, the average hight of the high water mark has really decreased as levees have been extended. All the early maps show the river to have been much wider than it is now.

As to its depth in early times we have no reliable proof, but the first French commander that entered the river reported to his government that he found 13 feet in the deepest part—on the bar. This is about 10 feet less than we now have.

I have omitted to mention one fact that should have caused the river to rise higher at New Orleans than it did when the city was first laid out, all other circumstances being the same, viz., that it extends its delta into the ocean about one mile in 25 years.

Undoubtedly the Mississippi river is governed by the same immutable laws that govern all rivers, when due allowance is made for the variety of circumstances that attend different streams. The Father of Waters has not any rocks or scarcely a pebble an ounce in weight for 1,000 miles from the ocean, and it flows through a basin which has probably been an extension of the Gulf of Mexico. In past ages this filled up with sediment which formed banks as it extended the land into the ocean. Excavations in every portion of this vast region afford evidence of this. We have the same formation and soil in layers, with logs and remains of trees, as deep as it has been penetrated—say 400 feet.

If we can reclaim the territory alluded to, its equal is not to be found in the State, as it is subdivided by numerous natural canals which traverse every portion, and you can scarcely find an acre in the vast area that is not within two miles of a navigable stream. This question involves over a hundred million dollars' worth of land in the best sugar region of Louisiana.

E. W. FULLER.

St. Martinsville, La., Nov. 28, 1860.

PANS FOR BOILING MAPLE SAP.

MESSRS. EDITORS:—We use sheet iron pans almost entirely, for the purpose of making maple sugar, and I suppose no other population, in this nation, of equal numbers, makes as much and as good maple sugar as we do. Our pans are made of sheet iron, five and a half feet long by three feet wide, turned up all around and only six inches deep. The sheets are riveted together with two rows of rivets, and a ⅜-inch round iron rod is put in the upper edge of the rim, for a stiffener. We put two loops of sheet iron, by rivets, inside on the bottom, and a 2 by 4-inch wooden bar across the top of the pan (the narrow way), projecting far enough at each side, as handles to lift it by. We cut two grooves in the bar, one inch deep, to receive the sides of the pan, and then, with a wire through the loops and over the bar several times, we support the bottom of the pan and keep the sides from spreading or collapsing. Such a pan will last, with good care, a long time. Pans made in that fashion, of common stove pipe iron, have been in use in our "bush" fifteen years, and are good pans yet, not being half worn or rusted out. The acidulous action of the sap is (certainly very) slight. The manner of setting the pans, arches, &c., next week, if you wish for it; the pans are made by our tinsmiths.

CARLOS BAKER.

Allegan, Mich., Nov. 17, 1860.

THE number of artificial water works for supplying cities and villages, in the United States, is 82; in the British Provinces, 7. The entire cost of them all is estimated at $71,172,471. Water stock, as a public debt, is held to be very secure, and there are no water shares found in the market.

LICENSING FOR SELLING PATENT RIGHTS, &C.—LAWS OF VIRGINIA.

MESSRS. EDITORS:—I believe the following will be of interest to all inventors and persons interested in the sale of patents. I have copied it from an act passed by the Legislature of Virginia during the past winter—in January, February or March, 1860:—

CHAPTER II.

Section 1. Nor shall any person, without license, sell or offer to sell or barter patent rights, &c.

Sec. 4. Nor shall a license be required to sell articles manufactured by the seller in this State, or provisions, fruit trees, shrubberies and agricultural commodities, the growth and production of this State.

Sec. 8. Any person who shall offer to sell or barter any patent rights, patent, specific, quack medicines, coaches, carriages, buggies or other vehicles without a license therefor, when such license is required by law, shall pay a fine not less than $20 and not more than $500.

Sec. 19. All license to sell patent rights, patent, specific or quack medicines, to persons obtaining subscriptions to newspapers, books, or to sell books or newspapers, or to sell the same by sample, licenses granted to persons to sell coaches, &c., manufactured without this State, shall expire at the end of the year from the date of granting the same, and shall not be granted for a shorter period than one year, or to be subject to any abatement or apportionment of tax if the privilege be exercised for less than a year, and shall not be construed to extend beyond the limits of the county or corporation for which it was granted. A license granted under this section shall be a personal privilege, and shall not be assigned or transferred so as to authorize any person to sell or act under such a license, except the person to whom it was granted.

CHAPTER III.

Sec. 24. On every license to sell or barter patent rights, $25; patent, specific or quack medicines, if by wholesale, $50; if by retail, only $25.

There are about 140 counties in Virginia. The tax, then, upon a patent right in the State of Virginia amounts to $3,500! which is virtually a prohibition. Is this constitutional? A VIRGINIA INVENTOR.

McGaheysville, Va., Nov. 25, 1860.

PICKING ORE BY ELECTRO-MAGNETISM.

Professor Burci, of the Institute of Superior Studies at Florence, director of the iron and copper mines at Traversella, in Piedmont, and one of the most distinguished geologists and mining engineers of Italy, has just published a highly interesting account of the mines above alluded to, containing a description of a new process for separating copper ore from iron ore, invented by M. Sella, an engineer well known to the scientific world by his "Studies on the Mineralogy of Sardinia." In the mines of Traversella, the horizontal development of their galleries measures 47 English miles, and they belong to different proprietors, one of whom—Chev. Riccardi di Netro—remarking that the iron ore obtained was intermingled with a considerable proportion of copper pyrites, requested M. Sella, in 1854, to examine whether copper might not be extracted as well as iron. After much attention to the subject, M. Sella declared that the copper pyrites were much too thinly disseminated among the magnetite, or magnetic iron ore, to be profitably separated by the common process of picking; that the specific gravity of the two ores was so nearly alike, that they could hardly be separated by washing. At length, however, M. Sella hit upon a plan which has been crowned with complete success. We have several times had occasion to describe electro-magnetic machines, the great principle of which consists in this: that a bar of soft iron can be temporarily magnetised by an electric current, and be made to lose its magnetic power instantly by the cessation of the current. M. Sella had recourse to this principle, and invented an apparatus, consisting of a wheel provided with fifty-four electro-magnets, which being turned over the ore, previously triturated by stampers, attract, when magnetised, all the magnetite which they let fall elsewhere on losing their magnetism. By this highly ingenious method all the copper pyrites, which, of course, cannot be attracted, is duly separated, at a very small cost, from the iron ore, among which it was previously as good as lost.—*London Engineer.*

[Such a machine was in operation in America twelve years ago, and was illustrated and described on page 305, Vol. III. (old series), of the SCIENTIFIC AMERICAN. Theoretically, the machine was constructed upon correct principles to effect objects similar to those set forth in the foregoing extract, but we understand it was used only for a very short period. In our opinion, it might be usefully applied in various mines.

ROMANCE OF THE STEAM ENGINE.

NUMBER II.

PORTA, DECAUS AND KIRCHER.—In our last article, we presented an illustration of Hero, the Grecian's steam engine, and stated that he had left manuscripts behind him that described his inventions. His work was called "Spiritalia," and when learning revived in Europe, in the fourteenth century, it formed the text book for the ingenious men who began to study mechanism. A void of many centuries occurs in the history of the steam engine, which may be accounted for by the turbulence of those ages. Among the most tangible accounts which we have of the application of steam, after Hero, was by Anthemius, an architect and mathematician, who lived in Constantinople in the early part of the sixth century. Having a quarrel with Zeno, a celebrated orator, the latter vanquished him in "tongueology," but the gabbler was ultimately defeated by the master mechanic, who lived in an adjacent house. In a lower room, Anthemius arranged several cauldrons of water, each of which was covered with the wide bottom of a flexible tube which tapered towards the top, and which were craftily conveyed among the joints and rafters of Zeno's house. When the cauldrons were heated, the steam arose through the pipes, and acting upon the confined air, let off several discharges which shook the building and created such horrible sounds that the superstitious inhabitants thought they resembled the groans of suffering ghosts. The orator was made to succumb; so he went to the Senate and in tragic style declared that "mere mortal must yield to the power of an antagonist who shook the earth with the trident of Neptune."

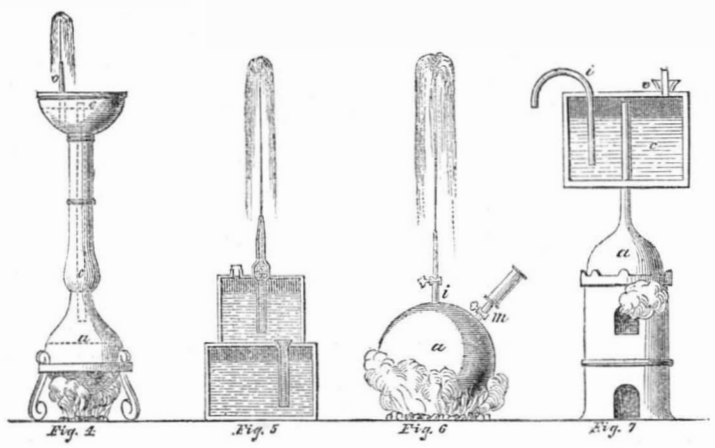


Fig. 4 Fig. 5 Fig. 6 Fig. 7

Again, about 1125, as related by the chronicler, William of Malmsbury, there was in a church at Rheims, in continental Europe, an organ invented by Gerbert, a professor in the schools, which had brazen pipes that emitted modulated tones by air which was expanded by heated water. This was certainly the first Calliope.

The next caloric inventor was Jerome Cardan, of Pavia, who lived in the early part of the sixteenth century. He was one of the most learned men in Europe, but a consummate quack and deeply superstitious. At the same time he was a distinguished mathematician and physician. In the writings which he left behind, he describes how a vacuum may be made in a vessel, by condensing steam; and he left a rude diagram of a machine to be moved by the heated air which escaped from the fire on the hearth—the well-known smoke-jack, and the first hot air engine.

About this time (1540) practical mechanics began to receive greater attention. Besson, who taught philosophy at Orleans, in France, made a number of machines, the operation of which he explained in his lectures. In 1588, Agostino Ramelli published a book in Paris in which several machines were described, and his writings show that he was engaged, like many persons in our day, in efforts to invent a perpetual motion—that *ignis fatuus* of mechanical ignorance.

The next steam inventor is Baptista Porta, a Neapolitan nobleman, who invented the magic lantern, and who was a man of extensive learning and great mechanical attainments for that era—the sixteenth century. In the salubrious and warm clime of southern Europe, the early steam inventors had their attention drawn to the production of artificial fountains, with their cool and sparkling waters adorning the shady grove, the colonnade and piazza. In Fig. 7, we have an illustration of Porta's steam fountain; *a* is a retort or steam vessel, having its neck inserted into the bottom of the cistern, *c*, which is nearly filled with water by the funnel, *e*. A pipe, *o*, passes through the corner; the steam rises into the upper part of the cistern and by its expansive pressure it forces the water, in a silvery shower, up through the pipe, *o*, in its cover.

Figs. 5 and 6 represent the steam fountains of Solomon Decaus, who published a book on mechanics in 1615, at Frankfort, Germany, but who was a native of France, an engineer and architect of great acquisitions. Water is introduced into the copper globe, *a*, by the funnel. A pipe, *i*, is inserted into this globe. When fire is applied to the globe and steam is generated, it forces the water through the tube, *i*, by its expansive pressure, as the bottom of the exit pipe extends down below the surface of the water. The great idea of Decaus, however, was to generate steam without fire by the heat of the sun, so as to make an artificial fountain, as shown in Fig. 5, which represents a cistern partly filled with water, and having a lens inserted in it, for concentrating the rays of the sun to generate vapor in the upper part of the cistern, the elastic pressure of which forced the water up through the tube. The lower cistern has a pipe which leads to the upper one, in which is a valve opening upwards. A lens is made to concentrate the sun's rays upon this cistern; the water flows into the upper one by the pressure of the vapor, and it cannot return owing to the valve in the lower pipe. These contrivances never reached a higher position than curious steam toys.

Fig. 4 represents the steam fountain of Kircher, a Jesuit, and professer of philosophy in Rome, in 1656. *a* is a boiler containing water; it is connected by a pipe, with another close vessel, from which a pipe, *o*, rises into the atmosphere. Fire being applied to the boiler, steam issues from its pipe and fills the upper part of the cistern, where its expansive pressure forces the water it contains in a jet up into the atmosphere. The principle is the same as Porta's apparatus, but is far more elegant in construction, and it was practically applied.

The solar fountain of Decaus exhibits great ingenuity and much reflection. His method of concentrating the heat of the sun by lenses, for generating steam, has been proposed to us quite a number of times within the past few years.

IS HYDROGEN A METAL?

Though hydrogen is the very lightest gas known, and though, when uncombined, it has never been condensed to either the liquid or the solid state, some of its properties have led to the conjecture that it is probably a metal. In combination with nitrogen, as ammonia, it forms an amalgam with mercury, as is the case with most of the metals. The following conclusions from some experiments of Herr Magnus, of Berlin, strengthen the opinion that hydrogen is a metal.

His apparatus consists of a glass tube within which a thermometer is fixed, which can be observed from outside. The tube is filled with gas, more or less condensed, and the upper portion of the glass tube is maintained at the temperature of boiling water, while the ambient air is constantly at 60° Fah. Only the upper part of the tube is heated, in order to avoid, as much as possible, ascending currents. The state of the thermometer in the different gases is compared with that at which it stands in a vacuum. The following are the results obtained:—

1st. The temperature of a thermometer placed in a space heated above, varies with the different gases contained in the space.

2d. It rises higher in hydrogen than in any other gas.

3d. It is much higher in hydrogen than in the vacuum, and much more so if the gas be condensed.

4th. Hydrogen therefore conducts caloric like the metals.

5th. In the other gases the temperature rises less than in the vacuum, and it rises much less when the gases are denser.

6th. It does not follow that these gases have no conducting power, but only that it is so feeble that the diathermancy of the gas disguises and annuls it.

7th. The extraordinary conductibility of hydrogen is evident not only when this gas is freely mobile, but also when it is enclosed in the eider down, or in any other sufficiently porous substance.

8th. This property of hydrogen is a fresh proof of its analogy with the metals.

9th. Hydrogen conducts not only caloric but also electricity better than all other gaseous substances.

STRINGENCY IN THE MONEY MARKET.

Two weeks ago we alluded to the money market as being in an unsettled condition, and, in consequence, we were obliged to allow from 10 to 15 per cent discount on bills of banks located in remote portions of the country to get the currency changed into gold or city money.

We had hoped before two weeks elapsed to have been able to record a better state of affairs; but, at the time of going to press, we regret to state that, instead of a relief in this direction, there exists a greater stringency in the market, and a more general depression of business in mechanical and manufacturing departments than at any period since 1857.

How long this state of affairs may continue, the most sagacious business men in this city do not predict; but we trust that the storm is at its hight, and that very soon the portentous cloud which overhangs the destinies of this country will have passed away. We hear of large manufacturing establishments in this city and vicinity discharging their employés by the hundred; and, while the employer is not too blame for curtailing his expenses, we feel anxious for the poor laborer and his family, who are thus deprived of their resource for sustenance as the frigid winter months wear on.

For the sake of humanity, we hope the workshop of the mechanic may be made to ring, and the shuttle of the manufacturer to traverse again before the pinching cold weather of January is upon us.

In this connection, we would state that inventors seem to enjoy immunity from the severity of the times, and we trust they may never experience such vicissitudes as have so suddenly come over kindred avocations. As an evidence of the activity among inventors, and the prosperity of one department of our government, we would state that from this office alone we paid into the Treasury last week, on account of patent business, nearly $2,500. On Friday, December 7th, we paid $1,480 for fees on cases sent to the Patent Office on that day.

In closing, we would remind our distant patrons of the offer made two weeks ago, to take their bank bills at par for subscriptions or patent business, and, at the same time, would remark that we very much prefer to receive drafts on New York, or bills on banks located in the vicinity of this city; and it is only to those who reside at remote distances that this offer to receive their currency at par is made.

AMERICAN street railroads are highly recommended by the London *Times*. It asserts that they are more safe and far more convenient than cabs or any other common mode of street travel in the British metropolis. It seems that the street railroad in Birkenhead, England, has been quite successful. Our countryman—G. F. Train—has obtained a grant from the Town Council of Birmingham to lay down a street railroad in that city.

THE new steam Fire Department of Boston is fully organized, and there is not a single hand engine in use throughout the entire limits of the city.

AMERICAN ENGINEERS' ASSOCIATION.

[Reported expressly for the Scientific American.]

On Wednesday evening, Nov. 28th., the usual weekly meeting of this association, under the new constitution, was held at its room, No. 24 Cooper Institute, this city—Henry E. Roeder, chairman *pro tem.*; Benj. Garvey, Secretary.

The regular subject—"Ashcroft's Low Water Detector"—was here taken up.

DISCUSSION.

Mr. Koch—During the discussion upon the utility of this instrument on last meeting night, it was asserted that, although sediment or corrosion had collected upon the plug of the one in use at the Cooper Union, it would still melt, and that at the proper time. Since then we have had another opportunity of inspecting this plug, and now beg leave to submit it to the members present. It will be observed that a portion of the plug is full of sediment. Now, the question arises whether this feature will hinder the action of the plug as intended.

Mr. Gray—The representative of Mr. Ashcroft has said he would give a large sum to any one who could procure a plug that would not fuse, after many months use, and that the one now before us would certainly melt. The surface of it is coated to such an extent that, to me, it seems very doubtful. I should like this point settled.

Mr. Koch—I would request that the plug be passed around among the members, that each may decide in his own mind whether the portion thus coated will fuse.

(Here the plug taken from the instrument in use at the Cooper Union was passed among the members by the Secretary. A thick coating of sediment or mud had settled in the branch tube and upon the bottom of the plug.)

Mr. Merriam—The mud being deposited in the branch tube certainly presents a serious fault. The sediment being a poor conductor, it would prevent the plug from fusing at the proper time. I have ascertained, since our late discussion, that the instrument that gave an alarm at the Astor House with the cocks of solid water, could not have whistled, but merely made a hissing noise, easily distinguished from an alarm when made by steam.

Mr. Garvey—The fact was stated it blew, not hissed; that there was sufficient generated steam within the tube to keep the whistle blowing.

Mr. Stetson—It seems hardly fair to judge of the value of the instrument because of the deposit of mud upon this plug. If the sediment prevents the transmission of heat, the metal surrounding it will radiate sufficient to melt the plug.

Mr. Gray—How long a time would that require? Some boilers are so peculiarly constructed that, in the time necessary for the transmission of the heat by radiation, great damage might be done, and perhaps lives lost.

Mr. Merriam—Iron is not such an excellent radiator of heat that it would raise it to such a point necessary to fuse the plug. This feature could never be depended upon.

Mr. Pitt—How long has this plug been in use?

Mr. Gray—But a little while; some five or six times; and the plug was detached from the instrument this evening about eight o'clock.

Mr. Koch—Mr. Ashcroft is not in town; but his representative (Mr. Hart) was requested, upon last meeting night, to be here this evening, and it is curious, to say the least, that he is absent.

Mr. Merriam—Mr. Hart waited upon me last week and signified his intention of being here this evening. He also wrote Mr. Ashcroft, in relation to the proceedings of this society, in reference to his detector.

Mr. Gray—Two months ago, in examining the plug now before the society, I discovered a number of little specks upon it. Yet I am much surprised to see it so nicely coated at this period. I thought it would require years to cover it in such a manner.

An argument then ensued upon the compressed air within the ball, and as to whether, if the warm water at the bottom would not replace the cold at the top, a still thinner fluid, such as steam, would replace it; and did not the tube of the detector partake of the nature of a barometer. The following is the gist of these remarks:—

Mr. Gray—How does cold water find its way to the ball at the top of the instrument?

Mr. Koch—As soon as steam forces the water up to the globe, the inventor contends that it remains there—that there is no circulation of it, and thus, with the tube and ball being exposed, the water becomes cold. At the trials at the Cooper Union, the time that elapsed between letting the water down to the alarm point, and when the whistle blew, when the tube was full of compressed air, was sufficient to blow up the boiler fifty times; but upon the second attempt, when that air was absorbed, the detector started and worked very nicely.

Mr. Babcock—Water will circulate when in such a condition. I have witnessed experiments which have demonstrated this fact. A pipe some three or four feet in hight, with an internal diameter of three-quarters of an inch, connected with a boiler by a horizontal branch piece six inches in length, having a glass top, showed that water and steam would rapidly change their positions, and *vice versa.*

At this period, Mr. Hart entered the room.

Mr. Stetson—One question arises—it is this: What means are adopted to insure the rapid and certain exchange of steam for water when the water falls below the alarm point?

Mr. Hart—The way we know that it does is by experience and practical illustration.

Mr. Pitt—How does the gentleman account for the large collection of sediment upon the plug just handed him?

Mr. Hart—I have understood that the boiler is only occasionally used, and the only reason to which I can attribute it is because of the non-working of the boiler. This would give an opportunity for the presence of a large volume of air in the tube——

Mr. Koch (interrupting)—Is that a deposit of air upon the plug? (Laughter.)

Mr. Hart—No, sir. I should call it rust. I have never seen one like it before.

Mr. Koch—This discussion seems to me to be a very curious one. Mr. Hart attributes this deposit to the non-working of the boiler. Now, sir, this deposit is actually rust, and the more the boiler is used the greater will be the deposit.

Mr. Hart here arose to explain that, having but little experience with the instrument, he was not capacitated to answer all the questions the members asked; that he came there only to explain the operation of the detector, as well as able, during the absence of Mr. Ashcroft, who was in Boston, in attendance upon a sick member of his family.

Mr. Koch—To me, there seem to be two points to consider, viz.: Will the air in the globe really be absorbed by contact with the water, and will the plug be hindered from fusing by the coating it has received? If the air within the tube is not absorbed, it will act as a cushion to the water, and its falling will be so tardy, it will always be a matter of great danger. If the deposit upon the one end of the plug will not hinder the balance of it from fusing, this question may be answered favorably; but if this deposit is corrosion, it will utterly fail to answer the purpose intended.

At this juncture, much discussion arose in relation to the disposition of the subject. The society had taken up two entire evenings in reference to the utility of the detector, but because of the divers opinions of its members, had failed to reach a point where a vote could be taken upon the committee's report. The committee asked to be discharged from the further consideration of this particular question, which was granted. It was decided that a new committee should be appointed, upon whom would devolve the duty of obtaining new facts, new opinions, &c., and to test, by further experiments, its utility for the work intended. To this end, the representative of Messrs. Ashcroft & Co. promised to supply an instrument simplified in its many parts, to allow the committee, by additional experiments, to determine upon the points in issue; further, he promised to do everything in his power to facilitate the investigations.

After several ineffectual attempts to obtain a new committee from the members present, the chairman postponed the entire matter to the subsequent meeting. There was, seemingly, an evident dislike, on the part of the members, to serve upon this committee. The reason of such disinclination was not apparent, except that the respective business of the gentlemen precluded the possibility of their devoting as much time to it as the importance of the case demanded.

The subjects for consideration at the next meeting will be "Warren and Bank's Low Water Detector," and "Shrimpton's High Pressure Condenser."

On motion, the association adjourned.

SLEEP.

Dr. Cornell, of Philadelphia, contributes to the November number of the *Educator* an article on sleep, from which we make the following brief extracts:

No one who wishes to accomplish great things should deny himself the advantages of sleep or exercise. Any student will accomplish more, year by year, if he allows himself seven or eight hours to sleep, and three or four for meals and amusements, than if he labors at his books or with his pen ten or twelve hours a day.

It is true that some few persons are able to perform much mental labor, and to study late at night and yet sleep well. Some require but little sleep. But such individuals are very rare. General Pichegru informed Sir Gilbert Blane that, during a whole year's eompaign, he did not sleep more than one hour in twenty-four. Sleep seemed to be at the command of Napoleon, as he could sleep and awake apparently at will.

M. Guizot, minister of France under Louis Philippe, was a good sleeper. A late writer observes that his facility for going to sleep after extreme excitement and mental exertion was prodigious, and it was fortunate for him that he was so constituted, otherwise his health would materially have suffered. A minister in France ought not to be a nervous man; it is fatal to him if he is. After the most boisterous and tumultuous sittings, at the Chamber, after being *baited* by the opposition in the most savage manner—there is no milder expression for their excessive violence—he arrives home, throws himself upon a couch, and sinks immediately into a profound sleep, from which he is undisturbed till midnight, when proofs of the *Moniteur* are brought to him for inspection.

The most frequent and immediate cause of insanity, and one of the most important to guard against, is the want of sleep. Indeed, so rarely do we see a recent case of insanity that is not preceded by want of sleep, that it is regarded as almost a sure precursor of mental derangement.

Notwithstanding strong hereditary predisposition, ill-health, loss of kindred or property, insanity rarely results, unless the exciting causes are such as to produce a loss of sleep. A mother loses her only child, the merchant his fortune, the politician, the scholar, the enthusiast, may have their minds powerfully excited; yet if they sleep well, they will not become insane. No advice is so good, therefore, to those who have recovered from an attack, or to those who are in delicate health, as that of securing, by all means, sound, regular and refreshing sleep.

To the discoverer of the law of gravitation—Sir Isaac Newton—we also owe the first distinct philosophical elucidation of the great chemical law of affinities. "Sugar," said he, "dissolves in water, alkalies unite with acids, and metals dissolve in acids. Is not this an account of an attraction between their particles? Copper dissolved in aquafortis is thrown down by iron. Is not this because the particles of iron have a stronger attraction for the particles of the acid than those of copper; and do not bodies attract each other with different degrees of force?"

THE MOST IMPORTANT RULE IN SHOOTING A RIFLE.—In shooting a rifle, if you press the trigger gradually, so as not to know the precise second when the piece is to be discharged, you will avoid the nervous start which is the most common cause of failure to hit the mark.

OUR thanks are due to Mr. John C. Merriam, Corresponding Secretary of the American Engineers' Association, for the particulars kindly furnished us in relation to the experiments upon the expansion of steam by the Naval Commission.

PRACTICAL DIRECTIONS TO ENGINEERS.

We continue our extracts from King's work on the Steam Engine, published by F. A. Brady, 24 Ann-st.

The Condenser Heats.

When engines are standing still, it sometimes occurs that the condenser gets so hot, that when it becomes necessary to start again, the pressure has become so great in it, that the injection water will not enter. Leaky steam and exhaust valves will alone cause this, but in no case should it ever be allowed to occur. When an engine begins te get hot, the cracking noise in the condenser, and about the foot valves, will always indicate what is going on, timo enough to check it, which can be done by giving a little injection, and causing the engines to make two or three revolutions back and forth. If, however, the engine should become too hot to take the injection water, the only plan will be to blow through, or pump water into the condenser if there be such an arrangement, or to cool the condenser by external application of cold water.

If when under way it is indicated by the gage that the engine is gradually losing its vacuum, apply the hand to the condenser, in order to ascertain if it be getting hot, and if such be found to be the case give a little more injection; but if that does not help the cause, give more still. If the vacuum continues to grow less, the probability is that the injection pipe has become choked; in which event shut off that injection and put on another. Should both the bottom and side become choked, inject from the bilge. Should the bilge injection also be out of order, the engine will have to be stopped, and the snifting valve secured down (if there be one) while the injections are blown through to clear them. Seaweed, and things of that nature, sometimes get over the strainers of injection pipes, preventing the entrance of water.

Most if not all marine engines of modern construction are fitted with a thermometer to the hot well, to ascertain the temperature of the water, which is usually carried from 100° to 115° Fah. This instrument is very important, in order to maintain an even temperature (the sense of touch of the engineer's hand not being delicate enough for that purpose), for it may often occur that there may start small leaks about the condenser and exhaust pipe joints, which would cause a decrease in the vacuum, and, as without the thermometer, the first impulse would be to give more injection, with it we would turn our attention to finding and stopping the leak. This can be done by holding a lighted candle around the joints, and wherever there is a leak the flame will be drawn in. To stop it, mix a little putty, of white and red lead, and apply it to the crevice; the presence of the atmosphere will force it in.

Getting Under Way.

When lying in port, where the steam will not be required for at least four or five days, it is proper that the water should be blown or pumped out of the boilers, and a portion of the man and hand-hole plates removed, to allow a circulation of air. When, therefore, the order is given to get up steam, the first thing is to see that all these plates are put on, and the joints properly made, and this duty should receive the direct superintendence of the engineer having charge of the same; for should any one of them leak badly after the steam is raised, the departure of the ship might be delayed some hours in consequence. After this duty has been properly attended to, open the blow-off cocks and run the water up in the boilers to the proper level, or, if the boilers are so situated that the water will not run up high enough, finish the supply with the hand pumps, wood the furnaces while the water is entering the boiler, and when the proper height of water is attained start the fires. If it be important to raise steam quickly, start the fires as soon as water is discovered in the gages, continuing the supply while the fires are burning. As a small quantity of finely split wood, with a little shavings or oily waste placed in the mouth of the furnaces, is all that is necessary to start the fires, the back part of the furnaces, particularly in boilers with inferior draft, should be covered with a layer of coal to keep out the cold air.

In raising steam it has been the custom to recommend that the valves of the engine be blocked open, so as to allow the heated air from the boilers to pass in and warm up the engine before steam begins to be generated; but as in many cases this is attended with considerable trouble, and as the advantages to be derived from it are very small, it hardly appears to the author's mind to "pay." The safety or vacuum valve should, however, be kept open until steam begins to form, in order to let the heated air escape. The strain upon boilers being from the inside, they are constructed and braced with the special view of withstanding this strain, many of the braces being entirely useless in sustaining a pressure from without; marine boilers are therefore fitted with a small valve opening inwards, and weighted so as to open and admit air whenever the pressure from within falls to about five pounds per square inch below the atmosphere. These valves are called differently by different parties, as follows: *vacuum valve, air valve,* reverse valve, &c.

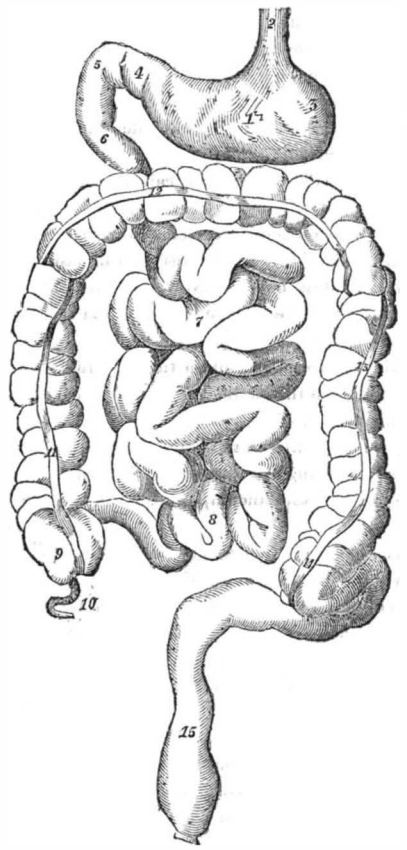
After steam has been raised to 3 or 4 lbs., the engine should then be blown through and warmed up, and after sufficient steam is raised to move the piston, the engine should be turned over two or three times, to see that every thing is right, before reporting ready.

TALK WITH THE BOYS.

No. 9.—A Dispute Settled—The Stomach Again.

"Father, John and I don't agree about what you said of the bile last week; where is it that it is mixed with the food, and what good does it do?"

"I will get a picture and show you exactly how the food moves through the body. Here is the lower end of the esophagus, which leads down from the mouth into the stomach. When you swallow your food, it passes through this moist, limber pipe and falls into the stomach."



1, Stomach; 2, Esophagus; 3 and 4, Stomach; 5 and 6, Duodenum; 7, Jejunum; 8, Ileum; 9, Caecum; 10, Vermiform Appendix; 11, 12, 13, 14, Colon; 15, Rectum.

"As soon as any food enters the stomach, the gastric juice begins to be secreted, and is mixed with the food. It is found that unless the food is properly mixed with saliva, the digestion is very slow and imperfect, hence the importance of eating slowly."

"Why so?"

"The saliva is secreted by numerous glands in the mouth, called salivary glands, and they act, as a general rule, only while we are chewing our food. But while we are chewing, they are constantly pouring out this peculiar liquid, which is by no means pure water, but which has peculiar and powerful properties, acting upon the food and preparing it to be dissolved by the gastric juice. Therefore, the more slowly we eat, and the more thoroughly we masticate our food, the more perfectly is it mixed with the saliva, and thus the more perfectly prepared for complete digestion by the stomach. There is no doubt that a great deal of dispepsia is caused by too rapid eating."

"I have heard that said a good many times, but never understood it before."

"After the food has been mixed with the gastric juice and churned from an hour and a half to five hours in the stomach, and has thus been converted into chyme, it is passed out into the duodenum; here it is, marked 5 and 6, you see, in the cut. It is in the duodenum that the food is mixed with the bile. What the bile does is to change the chyme into chyle. The chyle is a milky liquid. The bile is secreted by the liver. It flows first into a sac called the gall bladder, and then into the duodenum to mix with the chyme and further dissolve it. Sometimes the duct which leads the bile into the duodenum gets choked up, and then the bile is absorbed by the blood and carried all over the system, imparting to the skin and eyes its own yellow color."

"That is the cause of jaundice, is it?"

"Sometimes. But as the liver secretes about two quarts of bile a day, any slight derangement of it is sufficient to give the skin a sallow color. When the bile is thus turned from the duodenum into the blood, of course the digestion is interrupted, and thus indigestion and jaundice are very apt to accompany each other."

"Did you not say something last week about the pancreatic juice?"

"Yes; it is by the action of the bile and the pancreatic juice that the chyme is converted into chyle. The pancreas is what the butchers call 'sweet bread.'"

"Where is it that the food which goes to nourish the system is taken out of the intestines?"

"From the ileum, marked 8, you see, in the cut. It is sucked up into little fine tubes which unite in a larger one that leads up by the side of the back bone and pours the food into a large vein in the left side of neck. The waste matter continues on up the colon, 11, across the body and down 12, 13 and 14, and out of the rectum, 15.

"I understand it now by the aid of this cut, but last week I got no clear idea of it at all."

"I think now you will remember the course of the food, and next week, if nothing new prevents, we will come to the mode in which the fatty parts of the food are burned up and our bodies kept warm."

ENGLISH ROGUES AND THEIR NEW YORK BRETHREN.

According to the judicial statistics of the United Kingdom for 1859, it appears that the number of professional thieves in England and Wales is 39,530; suspicious characters who are constantly under the eyes of the police, 37,633; vagrants, 23,352. Their cost to the public is about one hundred and fifty millions a year. It is related that a gentleman, recently traveling in England, took a lunch at a cheap eating house where the viands were served upon pewter plates screwed to the tables, and provided with knives and forks each secured with a chain. This is a "tall story," and goes to show, if true, that the "professional gentry" are far more numerous and dangerous than they are in this country. It is well known that, except in cases of forgery and embezzlement, few Americans fall into the custody of the police; our pickpockets, burglars, hall thieves, highwaymen, swindlers, and "fancy" generally, are of foreign birth or foreign parentage. They appear to have been educated to their profession, and, like booksellers, have a set of technical terms intelligible only to those familiar with their usages. Many Hebrew and gipsey terms are found in their vocabulary—probably importations from London.

DEATH OF AN INVENTOR.

We learn, by the London *Engineer*, that Mr. J. Condie, of Glasgow, the inventor of the steam hammer illustrated on page 337, Vol. III. (old series), of the Scientific American, died suddenly on the 31st of October last. In company with a friend he had gone into a store to examine a painting, and, while standing at a distance viewing it, he fell backwards, gave two or three convulsive movements, and died without uttering a word. He was a very able engineer, and was respected by all who knew him. At the time of his decease, he was sixty-five years of age.

USEFUL MEDICAL ITEMS.

Inflammation of the Gums.—A skillful French physician—M. Marchal—has recently laid before the Paris Academy of Sciences an account of a disease of the gums, which, although it is rarely or never fatal, yet it causes much suffering, especially at the moment of eating; it gives an offensive odor to the breath, and very often results in the loss of the teeth. It first loosens the teeth, and finally causes them to fall from their sockets; and from this circumstance Dr. Marchal has named the disease "expulsive inflammation of the gums." In most cases, the locality of the disease is the inner dental portion of the gums, but it sometimes appears in the dental sockets. In some instances, it takes the shape of an abscess, opens and leaves the tooth bare; in others, it is a simple inflammation, without any tumor or abscess. It seems to be hereditary, but sometimes arises from exposure to a damp cold, from the presence of tartar around and under the gums, from a foul state of the stomach, or from pregnancy. The remedy is a local application of iodine.

Hydrophobia.—The French have paid great attention to this terrible disease, and their investigations concerning it have just been published in the *Annales d'Hygiene Publique*, of 280 cases; 188 were said to have been produced by the bite of a dog, 26 by a wolf, 13 by that of a cat, and 1 by the bite of a fox. In two cases, in which the bite of a cat produced the disease, one animal is reported to have become rabid in consequence of an extensive burn; another owing to its having been robbed of its young. These cases are of considerable interest, as they tend to resolve the still doubtful question of the spontaneous development of hydrophobia in other species of animals than the canine. Nearly two-thirds of the whole number of cases occurred during hot weather, and only about 60 persons out of 100 who were bitten were subsequently seized with hydrophobia, and the remaining 40 experienced no ill effects. Dr. Tardieu, the eminent French physician who prepared the official report, observes that the fact cannot be too strongly insisted upon, that the only hopes of security from the fatal effects of this dreadful disease consists in immediate cauterization with the red hot iron, and that every other method only compromises the future safety of the patient by the irreparable loss of the only moments during which the preventive treatment is applicable.

Poisons found in Alcoholic Spirits.—In a communication to the Boston *Medical and Surgical Journal*, Dr. Hays, State Assayer of Massachusetts, states that he has made a somewhat extended series of analytical observations on spirits, and in no case had he found that any deleterious body had been added by manufacturers to distilled liquors. Cases of sudden poisoning by low-priced, common spirits frequently occur, but these are caused by the fusel oil which is produced by the fermentation of mixed grains. American distilled spirits, when allowed to become old, are less deleterious than most of the foreign brandies. In newly distilled spirits, however, there is a source of great danger, which should be publicly known, as it is of special interest to the medical profession. Of these, Dr. Hays says:—"Newly distilled spirits, of the most common kind, often contain salts of copper, of lead or tin, derived from the condensers in which the vapors are reduced to a fluid form. The quantity of copper salt contained in the bulk usually taken as a draught is sufficient to produce the minor effects of metallic poisoning; the cumulative character of these poisons may even lead to fatal consequences." In the "old spirits" examined by Dr. Hays, he found that those metallic salts had all deposited to the bottom of the cask. New spirituous liquors and the dregs at the bottom of the cask may, therefore, be considered highly poisonous.

Blindness by a Carious Tooth.—The *Dental Cosmos* cites the case of a man thirty years of age, and of good constitution, who lost the sight of his left eye by severe pain which commenced shooting upward from his jaw. The pain in his eye was so severe that he ultimately went to a famous oculist in Germany to have his eye removed if no other remedy could be found. This physician closely examined his teeth, and found one of the molars on the left side carious. This was extracted, and at its root was found a very small splinter of wood, which had probably been introduced in picking the teeth. The pain almost immediately ceased, and on the ninth day the patient could see almost as well as ever, after being blind for thirteen months. This is certainly a remarkable case. The *Dental Cosmos* states that many cases of blindness have occurred from dental irritation, which had been relieved by extraction of the teeth.

Arsenic Eating.—A paper was lately read on this subject before the Manchester (England) Philosopical Society, by Dr. H. E. Roscoe, in which the author stated that he had communicated with seventeen medical gentlemen in Styria, and all of these agreed as to the prevalence of the practice of arsenic eating among the peasants of that country. In the presence of Dr. Knappe, of Oberzehring, a man of robust health, thirty years of age, ate, on the 22d day of February last, 4½ grains of arsenious acid; and on the next day, 5½ grains, and went away on the 24th in his usual health. He informed Dr. Knappe that he was in the habit of taking such quantities of arsenic three and four times every week. Dr. Holler, of Hartberg, states that he is acquainted with forty persons who eat arsenic. Dr. Roscoe stated he could not tell for what purpose the Styrian peasants eat arsenic; but that they did so, and in quantities sufficient to produce death in other persons, there could be no doubt; his investigation has proven this conclusively. At the same meeting, Dr. Clay stated that in various diseases arsenic was given with decided benefit; but if taken for other purposes, it was most pernicious in its effects. In some parts of the country the practice prevailed of giving it to horses to render their coats sleek. Mr. Ransome stated that sulphuric acid manufactured from arsenical pyrites always contained arsenic, and he had even found it in some flowers of sulphur.

ELECTRICITY IN WOOLEN MILLS.

MESSRS. EDITORS:—I notice on page 297 of the present volume of the SCIENTIFIC AMERICAN, some remarks upon electric light. Electricity is very troublesome in our works at times, particularly in the worsted department. When the wind is strong in the northwest, with clear sky and windy, it is almost impossible to keep the wool in its place without much open steam to damp the air in the room. The belts that pass through the room are so highly charged that, to stand under a belt 12 inches in width, running 3,500 feet per minute, by holding one hand up within half an inch of the belt and extend the other hand to a gas burner, it will light from the end of the man's fingers as quick as from a lighted torch. Is there any danger from fire through this agency in the mills? In what way can I try experiments in a small way to produce light from this? Please to give me your views upon the above.

WATERMAN SMITH, Agent.

Manchester Print Works, N. H., Nov. 27, 1860.

[We have seen lamps in woolen manufactories kept constantly burning under the rolls, as they came from the cards, to prevent the accumulation of electricity. We do not believe the electricity generated in your mill will be found sufficiently constant to serve for lighting the rooms, but if you wish to try it, the proper plan would be to distribute insulated wires, such as are used for making helices for electro-magnets, with their points near the belts, rolls, &c., where electricity is generated, and then collect them all into one wire to be connected with a mercury hour glass, such as is described on page 297 of our current volume.

THE MINERALS IN OUR BODIES.—In the body of a man weighing 154 pounds, there are about 7½ pounds of mineral matter, consisting of phosphate of lime, 5 pounds, 13 ounces; carbonate of lime, 1 pound; salt, 3 ounces, 376 grains; peroxyd of iron, 150 grains; silica, 3 grains. Making 7 pounds, 5 ounces and 49 grains, with minute quantities of potash, chlorine and several other substances. The rest of the system is composed of oxygen, hydrogen, nitrogen and carbon; 111 pounds of the oxygen and hydrogen being combined in the form of water. Though the quantity of some of these substances is very small, it is found absolutely essential to health that this small quantity should be supplied; hence, the importance of a variety of food. If we furnish Nature with all the material required, she will select such as the system needs, and always just in the proper quantities.

WHAT IS MOMENTUM?

Of all the terms used by writers on mechanics, scarcely one has created more confusion and embarrassment to the young student than the one chosen for the caption of this article. What is momentum? As defined by all writers on mechanics, it is the product of the mass of a body multiplied by its velocity. As understood by a majority of their readers, it conveys a different idea. Long before the youth becomes a student of mechanics, "momentum" is to him a household word. Does the strong tower yield to the heavy cannonade, he is told that the momentum of the cannon ball has done the work. A switch is misplaced, and a lightning express scatters destruction in its pathway; on the fearful momentum of the iron horse is laid all the blame. A millstone bursts its bonds and, with resistless force, crushes to a shapeless mass the engine which but a moment before was the source of its own power; the press itemizes on the wonderful effect of momentum. No wonder then that the youth, thus taught to regard momentum as the measure of the power stored up in a moving body, when he sees momentum defined as the product of mass and velocity (Mv), comes to consider the product as the measure of the power of a moving body. But this (Mv) is no measure of power! The true measure of the power of a moving body is the product of one half its mass multiplied by the square of its velocity ($Mv^2 \div 2$). To this product physicists assign the term "*vis viva*," or living force.

It would be deemed an exaggeration to state that of the popular articles written on the subject of mechanics, not one in ten uses the word "momentum" correctly; yet perhaps it will be believed, when so well known a writer on scientific subjects as Professor Silliman, of Yale, in a recent work, falls into the same error, as is evidenced by the following quotation:—

"It is a fundamental principle of mechanics that the same force, acting upon different bodies, imparts velocities in the inverse ratio of the quantities of matter. If the same force successively projected balls whose masses were as the numbess 1, 2, 3, &c., it would impart to them the velocities 1, ½, ⅓, &c., so that a mass ten times larger would acquire a velocity of only 1-10th. The product of each of these masses into its velocity is the same, for $1 \times 1 = 1$, $2 \times \frac{1}{2} = 1$, &c.; and this product of the mass into the velocity of a body is called its momentum, moving force, or quantity of motion."—*First Principles of Philosophy, Silliman, Philadelphia*, 1859, *p.* 81.

Wrong! all wrong from beginning to end. The same force, acting upon different bodies, imparts velocities in the inverse ratio of the *square roots* of their quantities of matter. If the same force acts successively, during equal portions of time, on two balls whose masses are the numbers 1 and 4, it imparts to them relative velocities of $\sqrt{4}$ and $\sqrt{1}$, or 2 and 1.

What, then, is momentum? Mass is the measure of the resistance which a body offers to a force brought to bear upon it! Velocity is the measure of the rapidity with which a body passes through space! *Vis viva* is the measure of the power stored up in a moving body!! Has not momentum any such physical interpretation? I know of none; know of it only as a conventional term, used by physicists to express a certain product, often occurring in mechanical analysis, but not susceptible of direct interpretation as a measure of any phenomenal action.

It has been the object of this article to point out facts rather than to prove their correctness. Those who feel sufficient interest in the matter to pursue it further will find in the issue of next week argument to prove that *vis viva*, not *momentum*, measures the amount of power stored up in a moving body. JOS. W. SPRAGUE.

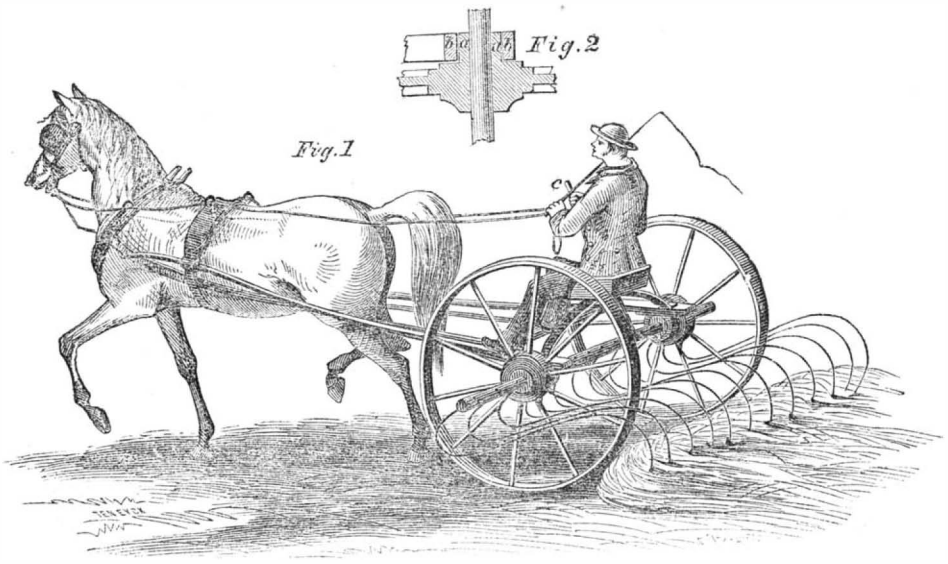
THE Arctic expedition of Dr. Hays has been heard from at Upernavik (North Greenland); all well. This expedition is fitted out for three years. Its object is to enter the polar sea discovered by Dr. Kane, and find out something more about it than has yet been discovered.

THERE are fifty-seven cities in the world which contain from 100,000 to 200,000 inhabitants, twenty-three from 200,000 to 500,000, and twelve which contain above 500,000.

IMPROVED HORSE RAKE.

The object of the invention here illustrated is to make a horse rake of simpler construction than those heretofore in use. This is accomplished by making the axletree serve as the rake head, and by supporting the seat on the shafts which rest upon the hubs of the wheels.

The engraving represents the construction of the rake so plainly as to be intelligible almost without any explanation. The iron teeth properly bent, are inserted into the long axletree which passes through the wheels and extends outward beyond them on both sides of the carriage. The mode of fastening the shafts to the hubs is shown in Fig. 2. The hub is made with a cylindrical portion, *a*, extending on the inner side, which passes through a metallic loop, *b*, secured to the lower side of the shaft. The seat is supported by metallic springs fastened to the shafts. A lever, *c*, Fig. 1, is rigidly secured to the axle for turning up the teeth when the window is reached. Thus a very light, compact and simple hay rake is produced. The patent for this invention was granted (through the Scientific American Patent Agency) on October 2, 1860; and further information in relation to it may be obtained by addressing the inventor, S. J. Homan, at Walden, N. Y.



HOMAN'S IMPROVED HORSE RAKE.

SPONTANEOUS GENERATION OF PLANTS AND ANIMALS.

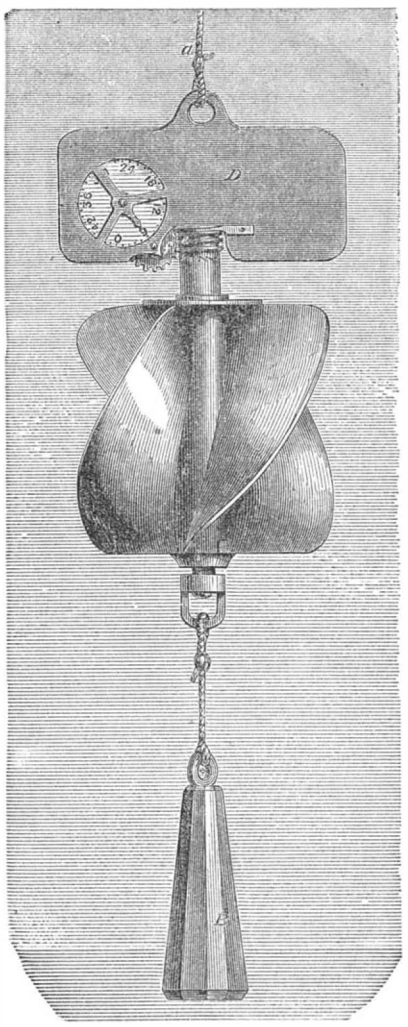
An earnest discussion is going on in the Paris Academy of Sciences in relation to the question whether plants ever grow except from seed, and whether animals are ever created except by the process of being born from parents or hatched from eggs. Mr. Pouchet, a professor at Rouen, and a correspondent of the Academy, contends that he has observed the generation of microscopic plants and animals, under circumstances which precluded the possibility of their coming from either seed, eggs or parents. But the correctness of his conclusions is denied on the ground that eggs or seed may have been floating in the atmosphere, and may thus have entered his solutions in which the organisms which he saw make their appearance. We find in the *Presse Scientifique des Deux Mondes* an account of an experiment tried by M. Pasteur to determine whether these germs come from the air.

He partly filled a number of small, hollow glass globes with putrefiable liquor, such as albuminous water, yeast, sugar-water, to which was added a little white of egg, milk, urine, &c., and then melting the necks of the globes with a blow-pipe, he drew them out into long slender tubes, which he sealed hermetically at the end. He then boiled the contents of the globes to destroy the life of any germs which they might contain, after which he opened them under different circumstances more or less favorable for collecting the dust from the atmosphere. Some of the slender necks of the globes were straight so that the dust from the atmosphere might fall into them freely, while others were bent in numerous curves to obstruct the entrance of the dust. Some of the globes were opened by breaking off the ends of the necks, a portion of them in the deep cellars of the academy, and a portion in the open court where there was a free circulation of air. In those which were not broken there was no growth of mold or other plant, and no appearance of animal life, while in those broken in the open air the organisms were more numerous than those opened in the cellar. From these experiments M. Pasteur concludes that the living plants and animals found in putrefiable liquors come from eggs or germs floating in the air, and are never the product of spontaneous generation.

M. Pouchet, and the other advocates of the doctrine of spontaneous generation, reply that the existence of organic dust in the atmosphere was known a long time ago, and that, consequently, nothing new has been learned from the experiments of M. Pasteur. But they add, that while living beings of inconceivable littleness have been found in the air, there have never been discovered any eggs or any germs, and until such are shown, they shall deny their existence, and shall continue to believe that both plants and animals are produced, under the requisite conditions, without any ancesters. The weight of opinion in the academy is against the idea of spontaneous generation.

VAN DEUSEN'S SOUNDING APPARATUS.

The various sounding instruments that have been invented are divided into two classes; one of which measures the depth of the water by the length of line drawn out by the lead, while those of the other class measure the depth of the water by the number of revolutions made by spiral blades in their vertical descent through the water. The apparatus here illustrated belongs to the latter class, and the improvement in it over those of the same class heretofore in use consists in the plan for connecting the revolving screw with the registering wheels. The former method has been to prevent the screw from turning in its ascent, thus causing a great drag upon the line; but by this invention the screw is detached from the registering apparatus when it reaches the bottom, and is permitted to revolve freely during its ascent, thus diminishing materially the friction and the strain upon the line.



In the cut, *a* represents the sounding line, B, the lead, C, the revolving screw, and D the registering apparatus. The latter is placed in a broad flat box or plate, which is made in this form to prevent it from being turned with the screw. A loose collar, *e*, is placed on the spindle, with a worm upon its surface gearing into the pinion, *f*, of the registering wheels. This collar is allowed to turn freely on the spindle, but is prevented from slipping up and down by a tongue secured to the box, D, which tongue presses into a groove in the collar. Thus: as the screw, D, is dragged by the lead, B, down through the water, its revolutions slowly turn the graduated wheel of the registering apparatus, and the number of fathoms of water which the apparatus passes through in its descent is recorded. When the bottom is reached, and the upward pressure of the water against the blades of the screw ceases, the screw slips down by its own weight on the spindle against the shoulder at its lower end, thus disengaging the ratchet which is attached to the upper end of the screw from its hold upon the corresponding ratchet on the lower end of the collar, *e*, and permitting the screw to revolve as the apparatus is drawn up, without turning the registering wheels.

In using this apparatus, it is not necessary to stop the ship in order to obtain soundings, care being requisite merely to pay out the line with sufficient rapidity to enable the apparatus to sink vertically through the water.

This apparatus seems to us to possess decided advantages over any other of its class that we have examined; all the parts being very simple in their arrangement, and the serious evil of the great drag on the line in recovering the lead being greatly diminished.

The patent for this invention was secured (through the Scientific American Patent Agency) Nov. 27, 1860; and further information in relation to the matter may be obtained by addressing the inventor, J. B. Van Deusen, at No. 246 Seventh-street; or E. & G. W. Blunt, the well-known nautical instrument makers, No. 179 Water-street, this city.

SCIENCE IN CANADA.—We are pleased to acknowledge the receipt, from the Hon. L. A. Dassaulles, Member of the Legislative Council of Canada, of a number of valuable public documents. They consist of Reports of the Superintendent of Education, of the Inspectors of Asylums and Prisons, of the Commissioners of Public Works, of the Board of Railway Commissioners, of the Commissioner of Crown Lands, and of the Geological Exploration. The last is accompanied with large and minute maps which extend westward to the Pacific, and northward to the entrance of the open polar sea discovered by Dr. Kane, and tell, at a glance, the story of an immense amount of labor that has been expended in these geological surveys. All the documents furnish forcible evidence of the rapid material and intellectual progress of Canada.

A SERIES of experiments have recently been completed at the United States Mint at New Orleans, to test the amount of abrasion which coins undergo by wear. It was found that the thin coins underwent less wear than the thick ones; Spanish quarter dollars less than American ones, and the thin one dollar gold pieces most recently issued, less than those older and thicker.

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VOL. III., No. 25....[NEW SERIES.]....*Sixteenth Year.*

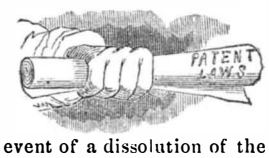
NEW YORK, SATURDAY, DECEMBER 15, 1860.

TO OUR FRIENDS.

NOW IS THE TIME TO FORM CLUBS.

We are now about to close the present volume of our journal, and we appeal to its staunch friends in all sections of the country to endeavor to form clubs for the coming year. We feel justified in asserting that no other journal in this country furnishes the same amount of useful reading. Think of the extraordinarily low price at which it can be obtained. Fifteen persons can club together and get the paper at $1 50 each for one year. Twenty persons clubbing together can have it at the rate of only $1 40. Think of getting a volume of 832 pages of useful reading matter profusely illustrated with between 500 and 600 original engravings for such a small sum of money. Single subscriptions one year, $2; six months, $1. Even though the times may be hard, the long winter evening must be relieved of its dullness, and we must keep reading and thinking, and thus be prepared to overcome temporary difficulties and open new channels of wealth and prosperity. Friends, send in your clubs.

WHAT WILL BE THE EFFECT UPON PATENTS IN CASE OF SECESSION?



WE have recently been solicited by several inventors to give our opinion as to "what would be the effect on patents in the event of a dissolution of the Union?"

Although it is impossible for any person to tell what will assuredly take place in the future, we are able to state what would be the result, and what probably will follow, with respect to patents that issued prior to a separation of the States.

All such patents will undoubtably be considered legal, and held in full force in *all the States* until their terms have expired. Such is the conclusion at which every person must arrive who examines into the history of our legislation on patents, and into the nature of a patent itself.

The nature of a patent consists of a bargain or agreement between an inventor and all the people of the United States, to the effect that, upon the condition of the inventor revealing his invention to the people, they shall protect him in the exclusive use, sale and manufacture of it for a limited term on every foot of land in all the States and Territories. The patent contains a description of the invention, and is a witness to the fulfillment of the inventor's part of the agreement with the people. The seal and certificate of the officer who represents the people is also attached to their bond in the fulfillment of the bargain. As the bargain between these two parties can only be consummated and fulfilled by the people—the whole people—protecting the inventor in his rights until his patent expires, all the people in every State are bound in honor—and no doubt they will consider it so—to carry out the terms of the agreement.

Some new rules may be adopted by seceding States with respect to certifying to the legality of present patents. They will probably require that all of them must have a supplementary new government seal attached to render them valid within their dominions; but this will be all that is necessary. Each State will consider it an object of wise political action to encourage and protect all patentees and inventions. An opposite course would be detrimental to the material interests of any State. Although there have arisen many jealousies and strifes between different States, respecting commercial regulations and political theories affecting local interests, there has always been perfect unanimity regarding patents, because there is nothing local about them. They are of general benefit, and all reap equal advantages from them. Two of the most profitable patents of the present day have been obtained by citizens living very far removed from one another—the one in the most extreme Southern State, and the other in nearly the most extreme Northeastern. We refer to the patent for the Peeler plow, by a citizen of Florida, who is reported to have made $500,000 by it; the other the patent of E. Howe, Jr., of Massachusetts, for his sewing machine. We could instance a great number of like cases; but it is unnecessary to do so, as it is generally acknowledged that the citizens of all the States are equally and mutually benefited by patents, and it is therefore reasonable to conclude that, upon every consideration, all patents granted by the Federal Government will remain in force and be sustained in all the States, even in the event of a dissolution of the Union.

The history of patent legislation also affords us good grounds for entertaining these opinions. In colonial times, there were no such patent laws as we now have. It was customary for the several Assemblies to grant patents by special acts, and sometimes the King granted patents for all the colonies. No fees were required of the applicants; they simply prayed for all issues of Letters Patent, which petitions were granted by special bills. There were constant conflicts in those days between the dividing lines of patent jurisdiction, and the only way to secure full protection to an invention was to obtain a special act or grant in each colony. When the colonies resolved themselves into sovereign States, they all felt the inconvenience and insufficiency of the old modes of granting patents; and the consequence was that, on the adoption of the present consitution, each State gave up its power of granting patents to the general government with alacrity and pleasure, while it was far otherwise with most of their other sovereign privileges. Virginia took the lead in this great movement, and to Jefferson we owe our present confederate system of patents. He took a great interest in promoting the progress of science and the useful arts, and we believe that American inventors never had a warmer friend.

Viewing this question in the light of history, wisdom, honor and true policy, we believe that all patents which are now in force will be sustained in all the States until their terms expire.

EXPLOSIVE ENGINES.

A few weeks ago we corrected the reports which had been disseminated by many of our daily papers in regard to the novelty and utility of an explosive gas engine which had recently been exhibited in Paris. We stated that an engine, similar in every respect, had been invented long ago by Dr. Drake, of Philadelphia, and was exhibited during two fairs of the American Institute in this city, and finally destroyed by the burning of the Crystal Palace. Although we have done all this, we notice that our cotemporaries are still using their columns in describing the exploits of the Paris gas engine. Explosive gas and explosive powder engines are quite old. Twelve years ago, when gun cotton was first prominently introduced, quite a number of enthusiastic inventors believed that it might be employed as a substitute for steam, and theoretically various advantages may be claimed for a solid and suddenly expansive agent like gunpowder or gun cotton. Thus, with a package of gun cotton and a small galvanic battery, a portable explosive engine may be transported from place to place and operated on mountains or plains, for purposes of peace or purposes of war, for which it would be a most terribly efficient and destructive agent. The gas engine requires that coal be made into gas before it can be operated, and in this respect it is far more complex, troublesome and expensive than the steam engine. The gun cotton engine would require neither boiler nor furnace like steam and hot air engines, but it will be very difficult to give it an equable motion because the expansion of the charges is so sudden that they tend to produce great irregularity of motion in the piston. On page 180 Vol. III. (old series) of the SCIENTIFIC AMERICAN, we illustrated a gun cotton engine, invented by the celebrated W. Fox Talbot, of England—inventor of the Talbottype—the charges of which were ignited by electric sparks, like the gas engine in Paris. It never came into use; it merely reached the condition of an experiment, but some other inventor may yet be able to improve upon the first ideas, and render such an engine useful for many purposes.

WHAT WILL BECOME OF THE PATENT OFFICE IF THE UNION IS DISSOLVED?

The above inquiry we extract from a business letter received from a correspondent residing in Alabama. The idea of a dissolution of the Union has forced upon his mind a painful interest in behalf of one of the noblest institutions of our government. The dissolution of the Union can only be effected by a secession of some of the States. This would not necessarily break up the Federal Government, and, for the present, its seat of power would remain at Washington. Should the government acquiesce in the peaceful secession of the States, then, to all intents and purposes, these seceding States would be regarded as foreign countries, and their citizens treated accordingly. But the business of the Patent Office would still go on, and all applicants for patents would be dealt with according to law.

The citizens of a seceding State would, under such circumstances, be subject to all the legal inabilities imposed upon foreigners, and upon the presentation by one of them of an application for a patent, the government fee would be $300. If an inventor could swear that he was still a citizen of the United States, even though residing temporarily in a foreign country, he would be required to pay a fee of only $30.

We believe we have stated the matter fairly and correctly, without reference to any of the political issues that connect themselves with the subject. Inventors who are desirous of applying for patents, and are apprehensive that the States in which they reside will withdraw from the Union, had better file their applications at once, and thus save themselves $270, being the difference between the present fee and the one to which they would be liable when they could no longer swear that they were citizens of the United States.

OUR STELLAR SYSTEM.

The grandest of all the problems with which science has ever grappled is the relation of the stars to each other. Sir William Herschell, with his great telescope and his comprehensive mind, led the way in this sublime study, and the path which he marked out is now being pursued by able and earnest observers all over the civilized world. The results yet obtained in regard to the position of the fixed stars in relation to each other and their distances apart, are neither as positive nor as definite as our knowledge of our own solar system, still, within certain limits, some facts have been determined which almost overwhelm the mind with their inconceivable grandeur.

First, it has been ascertained that our sun is one of an innumerable multitude of stars which are grouped together in one collection or system, separated from other stars in the universe. The general form of this stellar system, and our position in it, have been roughly determined. It is in the form of an irregular wheel, with a deep notch in one side, and with a portion of another wheel branching out from it. Our sun is situated pretty near the middle of the system, and about where the branch divides. The dimensions of this collection of stars are so vast that if expressed in miles they would require rows of figures of such confusing length as to convey no definite idea to the mind, and the plan has been adopted of stating the time which a ray of light would require to traverse them. It would take a locomotive 500 years to pass from the earth to the sun, while a ray of light makes the journey in eight minutes, and yet a ray of light moving with the same velocity, would require three years to reach

the nearest fixed star! In applying this measuring rod to our stellar system, it is found that, through the thickness of the wheel the distance is such that light would occupy about 1,000 years, and through the diameter not less than 10,000 years, in making the passage! In some directions, indeed, the system stretches away into the depths of space beyond the reach of the most powerful telescope to measure.

If we pass through the inconceivable distances we have been considering, out beyond the boundaries of our stellar system, we find a region of empty space, destitute of stars, at all events of those which are luminous and visible. Traversing this void space through distances which appal the mind by their immensity, we find other systems of stars probably similar to our own. And astronomers are now considering the possible relation of these several clusters to each other—whether there is not a system of systems! This is the most snblime problem which has ever engaged the attention of the human mind.

PATENT LAWS AND THE PATENT OFFICE.

We take the following from the Report of the Secretary of the Interior, and to one of its recommendations we enter a decided protest in the name of every inventor in the United States. Our reasons for so doing we give below:—

"The increase of business in the Patent Office, and the magnitude of its operations, give additional force to the recommendations heretofore made for a re-organization of this bureau. The amount of work devolved upon the Examiners is enormous, and it is difficult to believe that the reiterated appeals in this behalf would have been so entirely disregarded, had Congress realized the actual condition of the business of the office; and as the office is self-sustaining, it is only reasonable that this department should be empowered to graduate the force employed by the work to be done, provided always that the expenditures shall be kept within the receipts.

I take occasion to renew the recommendation of previous reports in regard to the anomaly of allowing appeals from the Commissioner of Patents to one of the three district judges. In addition to the reasons urged in my first annual report for an alteration of the law in this particular, it is to be observed that as each judge acts separately upon the appeal taken, it becomes very difficult, if not impossible to maintain uniformity and certainty in the execution of the patent laws.

The income of the office for the three quarters ending September 30, 1860, was $197,648.40, and its expenditure, $189,672.23, showing a surplus of $7,576.17.

During this period, 5,638 applications for patents have been received, and 841 caveats filed; 3,612 applications have been rejected, and 3,896 patents issued, including re-issues, additional improvements and designs. In addition to this, there have been 49 applications for extensions, and 28 patents have been extended for a period of 7 years from the expiration of their first term."

The recommendation of the Secretary of the Interior to which we object relates to repealing the law which permits applicants for patents to appeal from decisions of the Patent Office to judges in the District of Columbia. Two statements are made as affording causes for the repeal of the statute; to these we will make a brief argument, and we are confident that the Secretary of the Interior himself, by a further examination of the subject, will change his sentiments on this question.

It is stated that the present system of appeals is an anomaly. We consider that it is not so; that it is simply a safeguard against unjust decisions in the Patent Office, and is a very proper method of obtaining redress to inventors. Abolish such a system, and the method of deciding upon all applications for patents would become an *anomaly* indeed, in a free country. In constitutional monarchies and republics, we require checks upon hasty legislation and the decisions of courts; hence our compound houses of legislation and our courts of appeal.

Would it not be unjust, would it not be an *anomaly* in our form of government, were the actions of the Patent Office made an exception to such wise customs and modes of procedure? Certainly this would be the case, and yet this is what the Secretary of the Interior recommends.

Again, the repeal of the statute is recommended because the Secretary states that it is "almost impossible to maintain uniformity and certainty in the execution of the patent laws." We think this statement is unwarranted, but even if the repeal solicited was effected, it would not mend the matter, but rather increase the evil. Justice to inventors and the public is the first object to which we should look in all cases. The right of appeal in the District Courts is for the very purpose of securing this justice, and we do not know of a single reversal of a Patent Office decision which did not secure that object. Surely the Secretary of the Interior does not mean to defeat the means of obtaining justice to inventors, under the guise of obtaining *uniformity* of decisions. If the infallibility of the Patent Office officials could be guaranteed, then the reform solicited might be claimed with a good grace, not otherwise; without such a guarantee, the present system should remain as it is. We are confident that were the present method of appeals abolished, the Patent Office would become a petty despotism.

During the last session of Congress, when the patent bill was up for discussion in the House of Representatives, its further consideration was postponed until the second Wednesday of this month. As this bill contains the provision recommended by the Secretary of the Interior, we trust that the friends of inventors in the House will see that it is struck out and condemned as unnecessary and unjust.

THE PATENT OFFICE DEFENDED.

MESSRS. EDITORS:—After carefully perusing your strictures on the Patent Office, published in your last number, allow me to remind you of the saying that "one story is good until another is told." It is to be hoped that your articles have not left any of your readers in the predicament of the Pennsylvania judge, who was perfectly able to decide the case after hearing one side, but was nonplussed on the presentation of the other side. The ideas put forth are too narrow—not sufficiently comprehensive—just, perhaps, when viewed with an eye single to the interest of one class of individuals, but absolutely unjust when the interest of the whole community is taken in view. This Revisory Board, which you complain of, is, in my judgment, essential to the proper administration of the duties of the Patent Office. As you have taken the other side of the question, and as I take it for granted you are but seeking the enlightenment of your readers, you will not close your columns to a fair discussion of the subject.

It is a well-known fact that, previous, to say, 1853, it was far more difficult to obtain a patent than it is now. Since that time, patents have been issued with more regard to the increase of the revenues of the Office than to the proper validity of the patent itself. Hence it is that so many patents utterly worthless in themselves, are now before the public for sale. There are two kinds of patents taken out in this country (and it may be in others), and the precise merits of each are well-known to the inventors. Class No. 1 is that kind of patent which the inventor not only believes to be good, but is willing to expend his means or procure the assistance of his friends to demonstrate its utility previous to offering it for sale. These are commendable patents. Class No. 2, which in number exceed No. 1 (for the rejected applications may be fairly considered under this class) are those taken out for the express purpose of traffic, the inventor, caring but little for either their originality or usefulness to the public. His object is to procure a patent. He seems to be regardless of the strength of his claim, because his object is only to sell—*not to introduce*. It is quite common that, after having made up a claim that he or his agent supposes *may* pass, to request the Examiner, in case he cannot allow *that* claim, to suggest one that he can. I am not speaking of isolated cases, for I believe that this class predominates. Let any one examine the list of patents passed for the last seven years, and he will be utterly astounded at the barrenness of the claims, and his own inability to understand what they mean to claim as new. As I understand it (and I know nothing save that which is before the public), the object of this abused Revisory Board is to correct this; and its action is therefore commendable. It will reduce the revenues of the Patent Office, but, at the same time, it will lessen the loss in a tenfold degree of those persons who have been induced to embark in the enterprize and invest means in the patent, simply from the fact that it contains the great seal of the country. Many believe that a patent is incontrovertible, while it is notorious that not one in ten will stand the test of a court. The intention ought to be that when the government grants a man a patent, it should be fair to presume at the time that it is giving that which can be maintained, and the object of the Board is to approximate to that point as near as possible. It is no uncommon thing in Europe (Prussia, alone, excepted) for a patent to be granted five and six times over, to as many different individuals, and for one and the same thing. There is some excuse for this on their part. They must have revenue; and my experience teaches me to believe that they will grant a patent for anything, without any regard for its originality, novelty or utility. Thank God, our government is in no such predicament. We can therefore afford to have a Revisory Board—nay, inventors will be benefited by it in the end. The country is flooded with patents now, and the majority are so utterly worthless that they throw discredit upon the good ones. Many a good patent now lays in the drawer of the inventor, for the want of some one to invest means to introduce it. This evil has become so great that a man is thought to be in a failing condition who consents to deal in patents. I am fully aware that I am tramping on the toes of patent agents; but as I am seeking loftier results, let them stand from under. There is no reason why a man should not engage to introduce a patent to the public without being looked upon with suspicion; while it is notorious that such enterprises are viewed as a series of gambling by our business men. This difficulty would vanish if a closer scrutiny was applied to every application, and none passed which had not the stamp of originality on them. There are places in New York where any number of patents can be purchased for amounts ranging from $100 to $1,000. They are, it is true, worthless except for gambling purposes, and never should have, and, in my opinion, never would have been granted if this Revisory Board had been in existence and *done its duty*.

FAIR PLAY.

New York, Nov. 26th, 1860.

REPLY TO "FAIR PLAY"

In a letter accompanying the above communication, the writer informs us that if we should refuse it a place in our columns, he would procure it an insertion elsewhere. If we had treated it as it justly deserves, we should have declined its publication; and no doubt its appearance elsewhere would have subjected its author to the mortification of seeing the word *advertisement* standing at its head.

There is a certain amount of smartness in the communication not unlike that of some rattle-brained attorney who rushes to the rescue of his cause, without regard to truth or candor.

The position assumed by the writer is manifestly so one-sided and unjust that we might have been excused if we had taken the liberty of substituting "Foul Play" as a proper signature for his communication. In the first place, it is a gross libel on inventors generally; and, in the next place, if allowed to pass unrebuked, it would tend to injure the value of useful patented inventions in public estimation: hence our willingness to give "Fair Play" a chance to be heard. The author of this libel on the rights of inventors and their property purports to reside in this great city, where evidences are presented on every hand of the great value of patented inventions; and yet we feel bound to say that he is either the mere echo of some one who has felt the force of our criticisms, or whose mind has become so perverted that an invention seems of not much more importance than a bundle of straw.

If the ideas of "Fair Play" are sound, it would be better for the interests of the people that the Patent Office be abolished at once, as, on his theory, it is simply putting an instrument into the hands of a few for no other purpose than to cheat the multitude—a business which the government, at least, would not sanction. Fortunately, we are enabled to put forth with our own views in contradiction to the above, those of both the Secretary of the Army and the Secretary of the Navy, who, in their late reports, stamp the leading sentiments in the letter as false, and pernicious to the interests of the government and people. Imbued with the very sentiments set forth in the above communication, a United States Senator prepared a bill, and obtained its passage at the last session of Congress; but what has been its effects?

NAVY PATENTS.

The following extract, from the report of Secretary Toucey on the state of the navy, affords a most practical answer:—"The provision in the act of Congress of June 23, 1860, which prohibits the purchase of patented articles for the use of the army and navy, will be found injurious to the latter service. Since the introduction of steam to propel ships of war, a great variety of patented articles have, in the construction and repair of a steamship, become of daily use, and, in many cases, of indispensable necessity. Patented boilers, surface condensers, friction thrusts, governors or speed regulators, steam pumps, capstans, air ports, boat detachers, galleys or cooking stoves, ventilators, steering apparatuses, lanterns, logs and leads, vulcanized rubber, barometers, counters, hydraulic jacks, water gages, and many tools for manufacturing machinery and driving and drawing bolts, are of this description. And what is true of the steam machinery is also, in some measure, true of the armament. A war steamer built now according to the fashion of the past, excluding all modern patented improvements, would be an antiquated object, far behind the present age, and as inefficient as it would be antiquated. The best modern patented improved boiler will make a saving of 18 per cent of steam. To dispense with all patented surface condensers would be wanton extravagance. To arm a ship of war without a modern patented invention would give great advantage to the enemy. To prohibit the sailor the use of his seamless pea jacket and cap would be to deprive him of the comfort of some of his light, warm, most durable and cheap, and nearly waterproof clothing. To withhold from him the use of American patent desiccated vegetables would take from him a portion of his most nutritious and acceptable food. It is impossible to build, equip, arm and provide a steam ship of war, having anything like usual modern efficiency, without trespassing on all sides upon modern patented improvements. Something, also, is due to the inventive genius of our countrymen. It is within the memory of the living when the great inventions and discoveries which have almost revolutionized the world were unknown."

ARMY PATENTS.

The following extract from the report of the Secretary of War is equally pertinent as an answer to the above:—"The law which prohibits the purchase of any arms or military supplies whatever which are of a patented invention, is too general and comprehensive in its terms, embarrasses the operations of the War Department, and is, in some respects, injurious to the military service, both as regards the army and the militia. There are certain arms and military supplies of patented inventions, the merits of which have been so well established as to have caused their introduction regularly into the service. These are frequently embraced in requisitions for supplies coming from the army and from the States; but the few left on hand of those which were purchased before the passage of the prohibitory law constitute the only source from which those requisitions can be met, and that source is now either entirely or very nearly exhausted. It is therefore recommended that the law be so amended as to except from the prohibition such arms or other military supplies as constitute a regular part of the armament or equipment of troops, and also the improved patented mode of casting and cooling for iron cannon. It should be repealed as to all articles used in the Quartermaster's Department."

If the spirit of the author of the above communication were to prevail in administering the affairs of the Patent Office, we have no doubt but that our whole country would soon become as embarrassed in its manufacturing and agricultural improvements as our army and navy have been in theirs. Very few, if any, inventions are useful but those which are patented. It is, indeed, true that all improvements are not of equal value and utility; it is not every day that we can have such a great invention as the steam engine, cotton gin, telegraph, printing press, reaping machine or power loom; but every improvement, however small, deserves a patent, because it is a drop added to the tide of invention, progress and civilization.

The author of the letter is entirely wrong in his statements respecting the difficulty of obtaining patents prior to 1853, and the validity of those issued of recent years. Previous to that year, the decisions of the Patent Office were more proverbial for the rejection of good improvements and the granting of patents for trifling discoveries. Every person who has been long acquainted with the business of the Patent Office knows that vast improvements have been made in the drawings, specifications and models furnished to the Office. Very few of the patents issued prior to 1850 could bear a critical examination in a court of law, because they were prepared by very incompetent persons. Those which are now prepared for the Patent Office are far more accurate and complete in every respect, and are therefore better able "to stand the test of a court." This is a well known fact to us, if it is not to "Fair Play."

We object to the Revisory Board in the Patent Office, because, unless it embodies more wisdom and more knowledge of science and inventions than all the Examiners combined, it must do evil, and not good, to inventors and the public. This requires no argument; it is a self-evident fact. According to law and custom, a patent must issue for every invention that contains *any degree of originality and utility.* Our correspondent seems to be either ignorant or oblivious to numerous legal decisions on this point. His egotism respecting his judgment of what are worthless and what are valid patents, approaches to the ludicrous. The low prices for which patents can sometimes be purchased is not a true test of their inherent merits. We could name a number of patents, which were sold for quite small sums, that afterward became of immense value, and yielded large profits to purchasers; and we have no doubt but that such will be the case in many instances again. The majority of our inventors are mechanics of limited means, who are frequently compelled to sell good patents for small sums, but probably there is not another man in the country, except our correspondent, who would have the audacity to fling their poverty in their teeth, and denounce their patents as useful only for *gambling purposes.* It is a libel upon our inventors and a stigma upon the benefits which they have conferred upon the public.

VALUE OF DIFFERENT KINDS OF FUEL

The following table of the comparative value of different kinds of fuel we have collected from various sources, and it embraces the principal results obtained by numerous experimenters, from Count Rumford down to Dana and Johnson. For convenience of comparison we have reduced the several tables all to one common measure, the number of pounds of water heated from the freezing to the boiling point by one pound of the fuel:—

Kinds of Fuel. One pound, when burnt, will heat:	Pounds of water raised from 32° to 212°.
Lime tree, dry wood, 4 years old	34
" slightly dried	38
" strongly dried	40
Beech, dried 4 or 5 years	33
" strongly dried	36
Oak, common firewood, in small shavings	26
" the same in thick shavings	24
Ash, common dry wood	30
Sycamore, strongly dried	36
Bird cherry, common dry wood	33
Fir wood	30
Poplar	34
Hornbeam	31
Charcoal	68
Peat, French	18
" Irish	62
Coke, gas coke, from Paris	50
" from coal of St. Etienne	65
Coal, lignite from Meiszner	43
" brown coal from Meiszner	58
" Newcastle	70
" cannel coal, from Glasgow	56
" anthracite, from Pennsylvania	69
" anthracite, from Laval	74
Rock oil	40
Alcohol	38
Hydrogen	246

Johnson, by his experiments at Washington, in 1844, found that the amount of water evaporated from 212°, by one cubic foot of coal, varied from 440 to 556, with different specimens of anthracite; from 350 to 478, with bituminous coking coal; and from 355, with Scotch, to 459, with English bituminous coal. In the English experiments of De la Beche and Playfair, the Newcastle coal varies from 325 to 559; and Scotch coals, from 352 to 460.

Our review of the patent coal oil suit, noticed in our last number, is necessarily delayed until our next issue.

RENEWED ACTIVITY AT THE PATENT OFFICE.

As usual, immediately previous to the commencement of a new year, the *attachés* of the Patent Office are hard at work, bringing up arrears.

The list of claims on another page faithfully indicates the labors of the Examiners, and we congratulate the inventors generally, and our patrons in particular, that there is one period in a year beyond which their business before the Patent Office is not often delayed.

The list of claims referred to above shows the number of patents issued last week to have been eighty-five; the number issued during the same week in 1859 was seventy-three, thus showing a considerable increase over last year.

It occurs to us that the Revising Board must have been very busy during the past week to have examined carefully *over eighty specifications and drawings and passed them for issue!* The largest class of cases represented in this week's list is the agricultural, which numbers thirty-six.

A New Stimulant.—The decoction of the leaves of the coca—a Peruvian Erythoxylon, recently introduced into Europe, is exciting attention as possessing a peculiar stimulating power and favoring digestion more than any other known beverage. These leaves chewed in moderate doses of from four to six grains, excite the nervous system, and enable those who use them to make great muscular exertion, and to resists the effect of an unhealthy climate, imparting a sense of cheerfulness and happiness. In larger doses coca would occasion fever, hallucinations, delirium. Its exciting power over the heart is twice that of coffee, four times that of tea. It has no equal in its power of stimulation, in cases of forced abstinence. Dr. Mantegazza, of Milan, states that, although he has a weak constitution, he has been enabled, by the use of coca, to follow his usual studies uninterruptedly for forty hours: without taking any other aliment but two ounces of coca chewed during that time. He adds that he felt no fatigue after this experiment. The Indians of Boliva and Peru travel four days at a time without taking food, their only provision consisting in a little bag of coca. It is regulary administered to the men who work in the silver mines, and who, without it, could not resist the hard labor and bad diet to which they are subjected. What a chance this is for a patent medicine man!

The Largest Yield of Corn Yet.—We find the following statement in the *Country Gentleman*, of Albany. It far surpasses anything we ever heard of before in the way of corn crops:—Ellis R. Lake, of Marion county, took premiums on corn at the Indiana State Fair, as follows: For 1 acre, 263 bushels; 5 acres, 247 bushels per acre; 10 acres, 263 bushels per acre. The soil was sand and loam, based on clay, a river bottom; the one acre was plowed ten inches deep and planted in drills three feet apart, and merely plowed out with shovel plow three times; the five acres were plowed six inches deep and planted in hills three and a half feet each way, plowed out with shovel plow four times, hoed once; the ten acre piece was plowed six inches deep and had the same cultivation as the five acres. The corn was measured by weight, and would probably shrink considerably in drying.

There is a greater difference between the New York and the Cincinnati ferry boats than between the former and those on the Mersey, at Liverpool (England). The Ohio ferry boats are very high; their machinery is cumbersome and occupies so much of the middle part as to shut off communication between the two ends. One end contains cattle, the other, foot passengers. These boats land sideways, and two gangways conduct to the decks.

If our larger gold coins were made thinner and broader, it is believed that much fraud would thereby be prevented. Cunning and skillful forgers frequently split our thick gold pieces through the middle, and take out a portion of the gold; then they fill up the interim with inferior metal, press the whole together, and remill the edge. It is very difficult to detect such frauds, but if the coins were made thinner, the rogues would find a barrier to the success of their nefarious practices.

RECENT AMERICAN INVENTIONS.

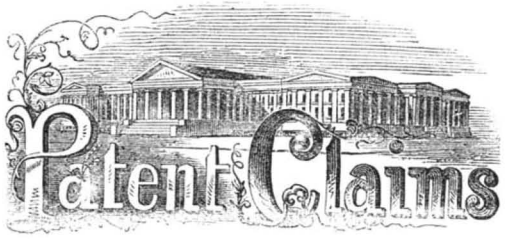
The following inventions are among the most useful improvements lately patented:—

BLASTING ROCKS.

The object of this invention is to prevent accidents which frequently occur in blasting rocks, owing to the tamping of the wadding over the charge of powder in the hole; the metal rod necesarily employed for the purpose, in coming in contact with the side of the hole, developing sparks or fire which cause the ignition of the powder. This invention consists in having the hole which is drilled in the rock to receive the charge, of two different diameters; the lower part of the hole which receives the powder being smaller in diameter than the the upper part which receives the wadding, and using a division plate and spindle so applied and arranged in the hole that the wadding may be placed in the hole and tamped before the insertion of the powder, and all accidents avoided. John Gilleland, of Athens, Ga., is the inventor of this method.

MACHINE FOR TURNING BAGS.

Bags manufactured by sewing are commonly turned inside out to bring to the inside the margins which extend beyond the seams, and thus give the seams a neat appearance on the outside. In the manufacture of such bags, in large quantities, much time is consumed in this process, one establishment now in active operation employing several persons for this purpose alone. W. N. Gee, of New Haven, Conn., has patented an automatic machine by which the bags are taken from a stack or pile, turned, and delivered much more quickly than can be done by hand. It turns from 3,000 to 6,000 an hour, according to size, and the same machine can be set to turn all sizes. From 1,000 to 1,800 per day only can be turned by hand by one person.



ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING DECEMBER 4, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, 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.

30,791.—S. H. Apple, Benj. Lindheim, and H. Baer, of New York City, for an Improved Apparatus for Shaping Hats:

We claim the sliding half rings, g' g', fitted and acting substantially as specified, in combination with the curved part, 1, of the die c, as and for the purposes specified.

30,792.—R. C. Bailey, of Greensboro, N. C., for an Improvement in Machines for Ramming Earth around Railroad Cross Ties:

I claim combining with a movable truck frame, A and D, the reciprocating rammers, E E, as set forth, when the same are actuated by the gearing, J J, and H H, and the springs, a a, substantially as described.

[The object of this invention is to combine with a machine which may be moved about on railroad rails, two reciprocating spring rams, which are operated by gearing, for the purpose of ramming earth about the crossties of railroad rails in a more rapid and efficient manner than can be done by the means hitherto employed for this purpose.]

30,793.—Everett Bass, of Pachitta, Ga., for an Improvement in Plows:

I claim the arrangement of the forked and slotted adjustable bar, D, beam, A, band, E, and hinged serrated adjusting rod, d, with the guide bar, G, all as shown and described for the purposes set forth.

[This invention relates to an improvement in that class of plows which are used in the cultivation of crops, and generally known as shovel and scooter plows. The invention consists in the employment or use of a horizontal guide bar attached to the lower end of the foot, and a peculiar arrangement of means for adjusting the same for giving the plow a greater or less inclination, as may be desired.]

30,794.—Louis Banhoefer, of Philadelphia, Pa., for an Improved Life-Preserving Mattress:

I claim the arrangement and combination of the outer frame, A, inner frame, C, net work cover, b', the cover, d, of oiled canvas or other equivalent, waterproof material, the packing of cork, cuttings or shavings, and the longitudinal and transverse ropes, the whole being constructed as set forth, for the purpose specified.

30,795.—M. L. Bauder, of Cleveland, Ohio, for an Improvement in Rotary Harrows:

I claim the triangular teeth, D E, frame, A, draught beam, C, axle, B, and plates, H I K, when the whole is constructed and arranged for operation conjointly, as and for the purpose set forth.

30,796.—H. M. Belden, of Farmington, Ohio, for an Improvement in Cultivators:

I claim the frame, A, composed of a single iron bar, bent in the form as and for the purpose set forth.

[This invention relates to an improvement in the construction of that class of cultivators which are made of iron. Cultivators of this kind are very durable, but those hitherto introduced have been quite heavy and expensive to construct, and the increased draft, together with the expense, have prevented them from being generally adopted. The object of this invention is to obviate these difficulties.]

30,797.—John Blocher, of Williamsville, N. Y., for an proved Chain:

I claim the combination of the knee, D D', of one knife-edged link, B B', with a slot, C, of another knife-edged link, A A', for the purpose of forming a chain, the links of which cannot detach themselves from each other, substantially as set forth.

30,798.—George Buchanan, of Hickory, Pa., for an Improved Compensating Pendulum:

I claim the continuation of the pendulum wire to a point above the axis of oscillation, there forming a bow, thence descending through a fixed plate, or its equivalent, to a fixed block below on a lever with the pendulum ball, substantially in the manner and for the purpose specified.

30,799.—W. R. Center, of Athens, Ill., for an Improvement in Corn Planters:

I claim the arrangement of the guard, F, coverers, G, plow, F, and roller, H, with the seed box, D, slide, b, beam, A, lever, J, springs, J', rods, K g, bent lever, L, and handles, B, all as shown and described, for the purposes set forth.

[This invention consists in the arrangement of a guard in front of the seed box, and between an opener and two coverers, for keeping the loosened earth from falling into the furrow before the seed is dropped. The invention further consists in the several combination seed arrangement of teeth for opening the earth, guard coverers, seed hopper, and a means for operating the seed slide which is controlled by the driver.]

30,800.—S. S. Chandler, of Chelsea, Mass., for an Improvement in the Striking Mechanism for Gongs:

I claim the arrangement of spring, k, the peculiarly shaped latch piece, n, slotted guide, j, and the guide, i, when combined and made to operate with the pall, m, spring, d, hammer, c, and stop, f, of a gong or bell striking apparatus, in the manner substantially as described.

30,801.—E. C. Cleveland, of Worcester, Mass., for an Improvement in Machines for Stretching Cloth:

I claim the arrangement of the slotted sleeves, C C, and screws, g g, with the blocks, D, stretching rollers, B B, and shaft, A, as and or the purpose set forth and described.

[This invention consists in certain novel means of providing for the adjustment of the stretching rollers, at various angles to the axle or shaft which supports them, for the purpose of making them produce a greater or less degree of stretching action on the cloth.]

30,802.—G. J. Colby, of Waterbury, Vt., for an Improved Clothes' Wringer:

I claim the construction of the clothes' wringer with tanks, E E, pivoted arms, I I, and rollers, J C, or their equivalents, arranged so that the act of passing the clothes between the rollers will cause the device to clamp itself firmly to the tube or other article, substantially as shown and described.

[This invention relates to an improvement in that class of clothes wringing devices which are composed of pressure rollers. The object of the invention is to facilitate the application of the device washing machines, or to any tub or receptacle, by rendering the device self-clamping or holding.]

30,803.—C. M. Daboll, of New London, Conn., for an Improved Pressure Gage:

I claim the combination of the rock shaft, l, and its toes, p m, the lifter, i, and its guide rod, j, and spring, n, and the rod, h, connecting the said lifter with the sector, H, which gears with the pinion on the index shaft, the whole being applied and arranged in combination with the diaphragm and index, substantially as specified.

[This invention consists in a certain improved combination and arrangement of parts for combining the diaphragm with the index, whereby advantages are obtained.]

30,804.—Byron Densmore, of Brockport, N. Y., for an Improved Feathering Paddle Wheel:

I claim the eccentric wheel with its radiating arms, and the attachment to the buckets sliding on the arms, substantially as and for the purposes described.

Also, in combination with the above, the arrangement of the friction rollers with the eccentric wheel by which the wheel is supported, substantially as and for the purposes described.

Also, the connection of the buckets and paddle arms by the two series of brackets and hinges, substantially as and for the purposes described, used in a feathering paddle wheel, substantially as described.

30,805.—C. H. Edwards, of Vergennes, Vt., for an Improved Tuyere:

I claim the employment or use of the ball, E, attached to a suitable shaft, F, provided with openings or passages one or more, which extend entirely through it and placed in the relation with the bed or plate, B, and wind chamber, D, as shown, to operate as and for the purpose set forth.

I further claim arranging the shaft, F, of the ball, E, in such a way that a weight, G, may be placed on said shaft to operate as and for the purpose specified.

30,806.—Thomas Evans, of Watkins, N. Y., for an Improvement in Wiring Tin Cans:

I claim the described method of strengthening and improving tin cans and other articles formed of sheet metal, by turning the wire upon the inside of the top, whereby the outer surface is left on a plane with the body or neck thereof, substantially in the manner and for the purposes set forth.

30,807.—Oscar Falke, of College Point, N. Y., and A. C. Richard, of Newtown, Conn., for an Improvement in Vulcanizing Caoutchouc:

We claim the use of the combination of the sulphuret of antimony and sulphate of soda, for the purpose of vulcanizing caoutchouc, gutta-percha and other vulcanizable gums, substantially in the manner described.

30,808.—W. V. Gee, of New Haven, Conn., for an Improvement in Machinery for Turning Bags:

I claim, first, A machine for turning bags, composed of or containing the following three principal elements, viz.—1st. A device for opening the mouth of the bag: 2d. A device for extending and keeping extended the mouth of the bag; 3d. A device for entering and seizing the bottom while the mouth is extended, and drawing the bottom through the entire length of the bag—the whole operating in combination with each other substantially as described.

Second, The use of smootheners, applied and operating substantially as described, in combination with the devices for extending the mouth and the device for drawing the bottom through the interior of the bag, for the purpose of taking the wrinkles out of the bag as it is turned.

Third, The arrangement of the nipper frame, G, and the nippers, c d c d, in combination with the rising table, B, and the plate, F, substantially as described.

Fourth, The arrangement of the extender bar, N, and extenders, P P, to operate in combination with the nipper frame, G, and nippers, c d c d, substantially as specified.

Fifth, The arrangement of the turning gripers, l m l m, to operate in combination with the extender bar, N, and extenders, P P, substantially as set forth.

Sixth, The plate, E, applied in combination with the turning gripers, substantially as and for the purpose specified.

Seventh, The wedges, V V, applied in combination with the wiring gripers, substantially as and for the purpose set forth.

30,809.—John Gilleland, of Athens, Ga., for an Improved Mode of Blasting Rocks:

I claim blasting rocks by having the hole which receives the charge of two different diameters, the smaller one, b, to receive the powder, and the larger one, a, to receive the wadding, and using in connection therewith a plate, C, and spindle, D, respectively applied and manipulated, substantially as set forth.

30,810.—N. A. H. Goddin, of Wilson, N. C., for an Improvement in Cotton Cultivators:

I claim the combination of the curved triangular plate, E, or plate, F, with the main casting, D, pieces, I J, and wings, G H, substantially as and for the purposes set forth.

30,811.—Edmund Greenlee, of Summer Hill, Pa., for an Improved Machine for Finishing the Inside of Barrels:

I claim having a mandrel so as to admit of a rest through the inside, with tools to howel, bevel, cut the croze, and turn the inside, in the manner described, or any other substantially the same, and which produces the same result.

30,812.—Wm. D. Grimshaw, of New York City, for an Improved Mangle:

I claim the combination of the rollers, P F and D, and table, E, when the parts are arranged and operate in the manner and for the purposes specified.

30,813.—J. S. Hall, of Manchester, Pa., for an Improvement in Plow Clevises:

I claim the making of a clevis by bending down and around the piece of metal, so as to inclose and rigidly hold a strengthening plate in its bends or folds, substantially as described.

30,814.—Origin Hall and G. Hall, of Willington, Conn., for an Improvement in Machines for Dressing Thread:

We claim, first, An automatic apparatus, substantially such as described, for traversing thread, in combination with rotating polishing felt clothed cylinders, or their equivalents, and with a size vat, when so arranged, substantially as specified, that each thread passes singly over the polishers, so that threads may be sized, traversed and polished, substantially in the manner described.

Second, We claim, in combination with a size vat and with rotating polishers, substantially such as described, an automatic apparatus, substantially such as is specified, for imparting to thread a combined traversing and rolling motion; and,

Third, We claim, in combination with rotating polishers, substantially such as described, a combined apparatus, substantially such as is described, one part of which gives to the thread a traversing motion and the other part of which imparts to the thread a combined rolling and traversing motion, substantially in the manner specified.

30,815.—John Hardick and C. B. Hardick, of Brooklyn, N. Y., for an Improvement in Valves:

We claim the valve, f, provided with wings, 1 2 and 3, and arranged relatively to the ports, c d d' and e, and operating substantially as and for the purposes specified.

30,816.—R. E. Harte, of Marietta, Ohio, for an Improved Ellipsograph:

I claim the construction and arrangement of a drawing instrument having the ruler or rulers, or parts designed for holding or directing the pencil, attached by means of a universal joint, or joints or pivots equivalent thereto, to a bar which is movable around and along a rod or spindle held at any required angle to the plane surface upon which the drawing is to be made, and also the combination therewith of the joint or pivot, g, the adjustable stem, F, the indices, g4 and h6, the graduated tangent bar, J, and protractor, L, constructed and operating substantially as described and for the purposes set forth.

30,817.—G. W. Hathaway, of Tioga, Pa., for an Improvement in Feed Cutters:

I claim, first, The combination, in the manner specified, of the roller, h, and adjustable arch, g, with the knives, k, arranged and operated as set forth.

Second, The combination of the rockshaft, f, its arm, d, head, m, spring, s, and pall, l, with the cam, n—they all being constructed, arranged and operating in the manner and for the purpose specified.

[This invention consists in the combination of a friction roller attached to an adjustable arch, and arranged above the throat piece, with the knives in feed cutters; and also in the peculiar construction and arrangement of the feeding apparatus.]

30,818.—John Haven, of Boston, Mass., for an Improvement in Insect Shields for the Head:

I claim the described mosquito guard, constructed to operate as described and for the purposes explained.

30,819.—J. P. Hayes, of Hennepin, Ill., for an Improvement in Excavators:

I claim the manner of suspending, adjusting, attaching and propelling plow, driven by steam, and used in the bed of rivers, for the purpose of removing sandbars therefrom.

30,820.—H. St. J. Hilsman, of Madison, Ga., for an Improved Peach Parer and Cutter:

I claim, first, The double knife, G—the same being constructed and operated substantially as and for the purpose set forth.

Second, I claim the arrangement of a slide, a, serrated spring, f, holders, d and e, and spring, g, when all shall be used conjointly in the manner described.

30,821.—S. F. Hodge, of Detroit, Mich., for an Improvement in Stamping Mills for Crushing Quartz:

I claim the combination of the eccentric cams, H H, wedge or V-shaped frame, E, and stamper shaft, D—the whole being constructed substantially as and for the purposes set forth.

[This invention relates to a novel and improved means employed for elevating the plunger or pestle, and liberating the same at the desired point, whereby a rising and falling movement is given the plunger or pestle with a moderate application of power, and without any undue friction and consequent wear and tear of the working parts. Also, to an improvement in the screen arrangement connected with the mortar, whereby several advantages are obtained.]

30,822.—S. F. Hodge, of Detroit, Mich., for an Improvement in Machines for Breaking Quartz Rock, &c.:

I claim, first, Operating or elevating the pestle rod, D, through the medium of the wheels or rollers, H H', the former one (H) being on a stationary rotating shaft, E, and the latter (H') on an adjustable shaft, I, which is actuated by means of a lever, M, with any convenient power applied to it, in connection with the springs, J J', or their equivalents.

Second, The construction of the mortar, R, with a central or

ceiving hopper, a*, anvil, T, and descending discharge ports, c*, in combination with a pestle, S, working within the hopper, a*, and operating in connection with the anvil, T, and discharge ports, c*, substantially as and for the purposes set forth.

[This invention relates to a novel and improved means for operating the pestle or hammer, whereby the same may, at the will of the operator, be elevated to a greater or less hight before being liberated and allowed to fall, as circumstances may require; also, to an improvement in the construction of the mortar and pestle, whereby the breaking operation is greatly facilitated.]

30,823.—George Hunzinger, of Brooklyn, N. Y., for an Improved Extension Table:

1 claim, first, Constructing the leaves of an extension table so as to slide out horizontally from the center and stationary part of the table, as the ends of the said table are extended, substantially as specified.

Second, I claim the arrangement of the cross screw, d, and arms, e', combined with the cross pieces, k k, whereby the act of extending the table elevates the leaves ready to be drawn off, as set forth.

Third, I claim the arrangement of the center table top, l, spring, m, and wedges, 12 12, in the manner and for the purposes set forth.

Fourth, I claim the arrangement of the cross screw, d, nuts, e e, and cross bars, f f, in connection with the guide bars, g' g', that preserve the parallelism of the table in its extension or contraction, as set forth.

30,824.—Hezekiah Conant, of Willimantic, Conn., and L. C. Ives, of Hartford, Conn., for an Improvement in Machines for Dressing Thread:

We claim, first, In combination with a size vat, swinging wipers for making tension and laying fiber, substantially such as described, and this we also claim when the wipers are fitted with adjustable weights, substantially as specified.

Second, We claim, in combination with a size vat and a rapidly rotating brush and nippers, or any proper device for preventing the too rapid withdrawal of thread, a constant take-up motion, consisting of friction rollers, or their equivalents, from which thread passes on to the bobbins, or their equivalents, substantially as specified.

Third, We claim, in combination, when arranged in the order described:—1st. A vat for size; 2d. Nippers or wipers, or their equivalents, for removing surplus size and laying fiber; 3d. A steam apparatus, or any equivalent thereof, for the purpose of drying size; and, 4th. A rapidly revolving brush—all acting in combination under a mode of operation substantially such as is described; and we also claim these four elements or parts of a whole apparatus, arranged in the order as described, in combination with a traverse apparatus and a constant take-up motion, or either of them.

30,825.—J. B. Johnson, of Boston, Mass., assignor to John Sparrow, of Portland, Maine, for an Improvement in Pumps:

I claim having the outside cylinder divided into three compartments, G G F, separated by the abutments, D D', which entirely surrounds the moving barrel, A, as shown and described, so that the said cylinder, A, will work in equilibrio.

I also claim the extension of the moving barrel, A, beyond its outer cylinder, so that said cylinder may be operated by the application of proper force to said exterior end—all as shown and described.

I also claim the arrangement of the chamber, N, directly over the suction chamber, F, so as to conduct the water in a direct line to the vacuum chamber—all as shown and described.

I also claim the combination of the barrel, A, with the valve rod, R, as shown and described, so that the same eccentric that drives the slide valve will also operate the barrel, A—all as set forth.

I also claim the employment, within the moving barrel, of the stationary piston head, J, when constructed and operating as and for the purpose shown and described.

30,826.—L. W. Langdon, of Northampton, Mass., for an Improvement in Valves for Oscillating Engines:

I claim the combination of a valve, r, with passages, i i' and j j', arranged so as to operate interchangeably, simply by altering the position of r, to conduct either full or exhaust steam, substantially as described, for the purpose of changing the direction of the rotation of the crank.

Also, the combination of the flange, l, when it is made to oscillate with the cylinder, with the stationary chest, f, having ports, i i' j j', substantially as described, operating to relieve the cylinder and chest joints from lateral pressure.

30,827.—Thos. Mahoney, of Knoxville, Tenn., for an Improvement in Slide Valves:

I claim the screw threaded sleeve or elongated nut, F, operating in connection with the valve, B, valve rod, D, and stuffing box, G, substantially as and for the purpose set forth.

30,828.—Ebenezer Mathers, of Fairmount, Va., for an Improvement in Fountain Pens:

I claim the use of a hair pencil brush, or other similar arrangement of hair, in contact with a metallic or other writing pen, for the purpose of securing a continous and spontaneous flow of ink to the pen while writing, arranged and operating in the manner as above, substantially as set forth.

30,829.—A. D. Merritt and Cornelius Kemplen, of Woodstock, Ill., for an Improvement in Supplying Locomotive Engines with Water:

We claim the employment of the inverted truck, D, placed beneath the truck and made adjustable, as described, by means of which truck the engine drivers are raised from the rails, as and for the purpose specified, substantially as described.

30,830.—J. H. Morse, of Peoria, Ill., for an Improved Combination Lock:

I claim the balls, x, or their equivalent, in connection with the slotted wheel, E, and slide, B, working in the manner and for the purpose specified.

30,831.—Andrew Murtaugh, of New York City, for an Improved Dumb Waiters:

I claim the arrangement of the rope, a, and cord, d, in combination with the dumb waiter, B, and tightening arbor, m', constructed and operating as and for the purpose described.

I also claim the arrangement of the spring dog, m, to operate in combination with the weight, G, and cord, d, substantially in the manner and for the purpose described.

And I further claim the arrangement of two or more pulleys, f, on the top, and two or more pulleys, i, on the bottom of the dumb waiter, B, said pulleys being placed in a position at right angles to each other, in the manner described, to operate in combination with the cord, d, and rope, a, substantially as and for the purpose specified.

[The object of this invention is to facilitate the raising and lowering of the dumb waiter, and to lessen the danger arising from a breakage of the rope from which the dumb waiter is suspended.]

30,832.—F. H. Naylor and Armstid Ward, of Niles Township, Ind., for an Improvement in Seeding Machines:

We claim the arrangement and combination of the above described drill roller and planter, the whole being constructed and operating substantially as set forth.

30,833.—T. L. Nickols, of Alexandria, Va., for an Improvement in Constructing Railroad Car Frames with Metallic Joints:

I claim connecting the sills, bolsters, joints, and cross pieces of a locomotive car body or truck frame by metallic joints and bearings, to save the mortising and consequent weakening of said timbers, as described and represented, said bearings having, as their general characteristics, horizontal flanges on top to catch over the pieces with which they are to connect, horizontal ledges below to support the vertical strain and vertical grooves or gains in their sides to prevent lateral movement, and for the purposes set forth.

30,834.—J. G. Popp, of Vienna, Austria, for an Improvement in Medicated Lotions:

I claim the employment or use of the composition which I term "anatherin water," and which consists of the described ingredients mixed together in about the proportion and for the purpose specified.

[This composition is of peculiar value for cleaning the teeth; it serves in all cases where a tartareous deposit begins to form; it restores the teeth to their primitive color; it preserves artificial teeth; it soothes and removes rheumatic pains, and, in short, it can be used with advantage for the cure of all afflictions of the mouth and teeth.]

30,835.—Adam Pritz, of Dayton, Ohio, for an Improvement in Rakes for Harvesters:

I claim, first, The peculiar manner described of arranging the hinged independent reel arms, G, for operation in connection with the centrally pivoted rake arm, A A B, and undulating cam, H, substantially as and for the purposes set forth.

Second, By combining with the ordinary set screw, W, and slotted brace, Y Y, an auxilliary adjustable slotted wing, U, and a set screw, X, substantially as and for the purposes set forth.

Third, The arrangement (with the centrally pivoted rake arm, A A B, center shaft, C, cam, H, and flanged hub, I J, independent reel arms, G G, circular platform, K, pivoted reel bar, T, and rakes, o, and adjusting braces, Y) of the slotted wings, U, and set screws, X, substantially as and for the purposes set forth.

30,836.—J. H. Rankin, of Versailles, Mo., for an Improvement in Corn Planters:

I claim the valves, j k, spring, n, shaft, K, and arms, g g', when arranged and operating together, substantially in the manner and for the purpose described.

30,837.—J. G. Robinson, of Biddeford, Maine, for an Improvement in Plows:

I claim the arrangement of the arm, b, slotted pendant, C, and axle, A, with the plow frame, G, adjustable bar, J, and adjustable lever, K, as and for the purposes shown and described.

[This invention consists in a peculiar manner of attaching a plow frame to an axle tree, whereby the former may be adjusted so as to gage the depth of the furrows as may be required, and also admit of the plow frame having a self-adjusting movement, so that the plows may conform to the inequalities of the surface of the ground, and also be capable of being thrown out of the ground when required. The invention also consists in the employment or use of an adjustable axle, so arranged that the arms of the two wheels may be adjusted in different planes, and one wheel allowed to pass over the land and the other in the furrow, and still preserve the horizontality of the machine or the proper position of the parts.]

30,838.—D. G. Rollin, of New York City, for an Improvement in Spiral Hoop Skirts:

I claim making a spiral hoop skirt in sections with any suitable number of successive hoops, each section placed right and left to the other, substantially in the manner and for the purpose described.

30,839.—C. A. Rose, of Columbia, Ala., for an Improvement in Cotton Seed Planters:

I claim the described arrangement of the share, E, bent arms, F, axle, G, wheels, H, bars, b, hopper, I, hinged coverer, L M, and seed box, N, the said parts being constructed and combined in the manner and for the purposes set forth.

[This invention consists in the employment or use of a bi-conical seed barrel, provided with a perforated strap, in connection with a swinging or rising and falling coverer and a furrow share, all being attached to a suitable beam, to form a simple and efficient implement for the desired purpose.]

30,840.—Anson Rowe, of Atallissa, Iowa, for an Improvement in Grain Riddles:

I claim the construction of the riddle with a reclining board, D, and rests, B, arranged longitudinally with the course of the grain, and the wires sunk into the edges of said rests and into the face of the frame, and otherwise made as shown and described, for the purposes set forth.

30,841.—Robert Schone, of New York City, for an Improvement in Time Registers:

I claim the arrangement of the lip, e', on the spout, c, in combination with the cavities, d e, notched movable disk, G, inclined circular channel, H, and drawer, I, constructed and operating as and for the purpose specified.

30,842.—S. J. Shaw, of Marlborough, Mass., for an Improvement in Shirt Bosom Expanders:

I claim a shirt bosom expander, constructed substantially as described, and its arrangement and combination with a shirt bosom, in manner and for the purpose specified.

30,843.—Eben F. Starr, of New York City, for an Improvement in Revolvers:

I claim, first, The construction of the upper piece, A, with the two cheeks, i i, to hook or lap over the back of the piece, B, on opposite sides of a tenon, e, provided on the latter, and to receive a pin, g, passing also through said tenon, substantially as described.

Second, I claim the arrangement of the ratchet wheel, H, with the cylinder, G, arbor, l, and screw, k, as and for the purposes shown and described.

Third, I claim the arrangement of a collar, m, with the arbor, l, barrel, C, and cylinder, G, as and for the purposes shown and described.

Fourth, I claim applying the springs, 14 and 16, of the cocking and revolving dogs within a circular groove, 17, in one side of the hammer butt, substantially as described.

Fifth, I claim constructing the cocking lever with two teeth or projections, 20 and 21, arranged substantially as described, the one to lock the cylinder while the firing is effected by the trigger, and the other to lock the cylinder while it is fired by the said lever, as described.

Sixth, I claim making the channel guide with two distinct depressions or concaves, 25 26, one within the other, so as to guide the fingers in capping, all as set forth.

[This invention relates to revolvers having their chambers or bores arranged parallel with each other and with the axis about which they revolve. It consists in an improved construction of the frame which contains the chambered cylinder, whereby provision is made for opening it for the purpose of removing and replacing the cylinder, and whereby, when it is closed, it is made very strong and rigid. It also consists in a certain construction and mode of applying the central shaft of the chambered cylinder for the purpose of preventing the said cylinder from coming into contact with the rear end of the fixed barrel in its revolution, and of securing the said shaft in place. It also consists in an improved mode of combining the cocking lever with the hammer to effect the cocking only, or the cocking and firing, by means of the said lever. It also consists in applying the springs of the cocking and revolving dogs within a circular groove in one side of the hammer butt, where they occupy no other available room in the lock. It also consists in so constructing the cocking lever that the said lever may be capable of locking the cylinder by its backward movement when firing is effected by the said lever, and of locking it by its forward movement when firing is effected by the trigger. And it further consists in providing for the easy application of the percussion caps to the nipples by making, in the stationary recoil plate or shield on that side of the piece where the caps are to be applied, a double guide channel, that is to say, a wide channel to guide the forefinger, and a narrower one to guide the caps to the nipples.]

30,844.—Enoch Thomas, of Beverly, Va., and W. K. Hall, of Phillippa, Va., for an Improvement in Hydraulic Engines:

We claim the arrangement of a swinging gate, A B, and concentric seat, D, in combination with a swinging valve, F F', and curved abutment faces, E E' H H', all being arranged and operated substantially in the manner and for the purpose set forth

30,845.—Horace Tupper, of Buffalo, N. Y., for an Improvement in Railroad Switches:

I claim the arrangement of the guards, D D, made reversible and with one point fitting in a V-groove in the rail with the shells, H H, and the rails, A A', the several parts being constructed in the manner and for the purpose specified.

30,846.—F. J. Vittum, of Chelsea, Mass., for an Improved Hand Machine for Pegging Boots and Shoes:

I claim a movable "center," in combination with the awl and peg driver, operating as described, for the purpose specified.

30,847.—A. J. Watts, of Utica, N. Y., for an Improvement in the Manufacture of Dentists' Crystalline Gold:

I claim the crystal gold described, obtained by a process substantially as specified,

30,848.—Luther Wentworth, of Burlington, Iowa, for an Improved Apparatus for Elevating Water:

I claim supporting the vertical shaft, E, of the wind wheel of said apparatus upon the dish-shaped turn table, D, when the said table is made to close an opening in the base plate, A, which is surrounded by the annular trough, g, and when the endless series of connected buckets, s s, are made to pass up and down through apertures in the said dish-shaped turn table, all substantially as set forth.

I also claim combining the shaft, h, of the described wind wheel with the hinged vanes, v v, when the springs d d, and the weight, q, are combined with the said hinged vanes, and when the said wind wheel is made to operate the series of connected buckets, s s, substantially in the manner set forth.

30,849.—Smithwick Whitley, of Tallahassee, Fla., for an Improvement in Plows:

I claim the arrangement of the circular pivoted adjustable share foot, D, with the beam, A, pivoted adjustable bar, F, and standard, C, as and for the purposes shown and described.

[This invention relates to an improvement in that class of plows which are used for the cultivation of crops grown in hills or drills, and are commonly termed shovel plows. The invention consists in attaching the share to a curved foot which is fitted in the beam, and has an adjustable bar attached to its lower end and to the standard of the beam, whereby the "set" of the share may be altered to penetrate the earth at a greater or less depth, as may be desired.]

30,850.—Simon Wing, of Waterville, Maine, for an Improvement in Photographic Cameras:

I claim a mechanism for moving the plate holder, H, in combination with an index for defining its position, operating substantially in the manner described.

Second, I claim the mechanical means described, or its substantial equivalent, for varying the position of the lens tubes, a b c d.

30,851.—G. W. Woolley, of Philadelphia, Pa., for an Improvement in Fountain Pens:

I claim an ink-holding and controlling reservoir, v', for writing pens, constructed and applied within the concave of the pen, substantially in the manner and for the purpose set forth.

30,852.—J. R. Byler, of Salisbury township, Pa., assignor to himself and H. W. Black, of Lancaster county, Pa., for an Improvement in Rakes for Reaping Machines:

I claim the arrangement of the upright slide, B, with its lever arm, E, peg, M, and headed pins, b, in connection with the lever arm, R I, and turning shaft, H, and operated by the rod, G, and cam, N, in the manner described, for the purpose specified.

30,853.—J. S. Gallaher, Jr., of Washington, D. C., assignor to Edwin Chambers and Cyrus Chambers, Jr., of Philadelphia, Pa., for an Improvement in Machines for Folding Paper:

I claim, first, The construction and use of traversing gripes or their equivalents, connected with moving endless belts, for the purpose described, irrespective of any special arrangement or combination of the same or mode of operating them.

Second, I claim the use of the traversing cams or their equivalents, in combination with moving endless tapes or bands, whether arranged as fixtures or as adjustable devices, for the purposes set forth.

Third, I claim the vibrating pendent counterpoised folding blades or their equivalents, irrespective of any special manner of arranging or operating the same, as described and shown.

Fourth, I claim the creasing collars on the rollers or cylinders constructed and operating substantially as and for the purpose specified.

Fifth, I claim the adjustable graduating fork device, W W X X X X, or its equivalent, for the purpose as set forth, constructed and operating substantially as described.

Sixth, I also claim the invention of the automatic packing box or paper receptacle, b2, when constructed and operated substantially in the manner set forth and shown.

30,854.—J. W. Hardie (assignor to J. H. Stevens), of New York City, for an Improvement in Sewing Machines:

I claim the method of communicating the vibratory or swinging movement to the thread guide, G, by means of the bent elastic rod, E, in combination with the cam, f, on the driving shaft, substantially as set forth.

30,855.—Edmund Maher (assignor to himself and M. M. Wilcox), of New York City, for an Improved Harness Trace:

I claim the described new and improved article of manufacture—the same being an elastic harness trace formed of a textile fabric composed of the materials and substantially in the manner set forth.

30,856.—J. J. Marcy (assignor to Edward Miller), of Meriden, Conn., for an Improved Device for Securing Lamp Chimnies:

I claim the combination of the two simultaneously-acting hooked levers, C D, with each other and with the lamp top, in the manner shown and described.

[The object of this invention is to obtain a simple and efficient device for securing the chimney on the lamp top, so that the former cannot be casually detached from the latter, and at the same time be readily secured on the lamp top and removed therefrom. The invention consists in having two or more hooks formed at the ends of levers secured to the under side of the upper part of the lamp top, and arranged in such relation to a spring as to effect the desired object.]

30,857.—James Martin, of Toronto, Canada, assignor to himself and J. E. Thomson, of Buffalo, N. Y., for an Improvement for Superheating Steam for Locomotive Engines:

I claim, first, The combination and arrangement of the flues, R, with the steam chambers, A, for the purposes and substantially as described.

Second, I claim the annular chamber, S, in combination with the steam chambers, A, flues, R, and pipes, B, for the purposes and substantially as set forth.

30,858.—H. T .Pratt, of Fitchburg, Mass., assignor to himself, A. Davis and C. E. Pratt, of same place, and H. C. Crehore and C. T. Rogers, of New York City, for an Improved Folding Chair:

I claim the legs, A A B B, and seat, D; the latter being attached to the former by hinges or joints, b b c c, and the legs, A, provided with slots, d, to receive pins, e, of the legs, B B, substantially as and for the purpose set forth.

[The object of this invention is to obtain a chair that may be folded compactly and be provided with a cane or other stiff bottom. There are chairs constructed to fold quite compactly, but these chairs have a flexible seat composed of webbing, carpet, or other textile fabric. By this invention, a chair may be folded equally as compact as those provided with flexible bottoms, and they have all the advantage of an ordinary cane-seated chair or one upholstered in any of the known ways.]

30,859.—Henry Warren (assignor to Henry Beebe), of Hoboken, N. J., for an Improved Foot Scraper and Brush:

I claim the arrangement of the laterally-sliding, curved brushes, F F, and springs, g g, with the brackets, D, scraping blades, B B, and fixed brushes, C C, as and for the purposes shown and described.

[This invention consists in a novel form and arrangement of brushes for the heel, toe, and both sides of the shoes, in combination with scraping blades for the soles of the shoes.]

30,860.—John Wind (assignor to himself and T. I. Bottom), of Thomasville, Ga., for an Improvement in Machines for Husking and Shelling Corn:

I claim the arrangement of the circular saw, a, auger saw, b, and spiral revolving husker, C, in combination with the conveyor band, c, and sheller, E, substantially in the manner described and for the purposes specified.

RE-ISSUES.

H. A. Burr, of New York City, assignee, through mesne assignments, of H. A. Wells, deceased, for an Improvement in Manufacturing Hat Bodies. Patented April 25, 1846. Re-issued October 7, 1856. Extended for 7 years from and after April 25, 1860, and again re-issued December 4, 1860:

I claim the mode of operation, substantially as herein described, of forming bats of fur fibers of the required varying thickness from the bum to the tip, which mode or operation results from the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former and its exhausting mechanism, or the equivalent thereof, and the means for directing the fur-bearing current, or the equivalent thereof, as set forth.

I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism, and the lower deflector, substantially as described, to regulate the deposit of the fur fibers on the lower part of the former, as described.

I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism and the lower deflector, substantially as described, to regulate the deposit of the fur fibers on the tip of the pervious former, as set forth.

And, finally, I claim the combination of the rotating picking mechanism, the pervious former, with its exhausting mechanism, and the means described, or the equivalent thereof, for inducing a current of air to aid in carrying and giving direction to the fur, and insuring its proper deposit on the surface of the pervious former, as required, as set forth.

H. A. Burr, of New York City, assignee, through mesne assignments, of H. A. Wells, deceased, for an Improvement in Machinery for Making Hat Bodies. Patented April 25, 1846. Re-issued September 30, 1856. Extended for 7 years from and after April 25, 1860, and again re-issued December 4, 1860:

I claim the combined process of forming fur hat bodies by depositing fur fibers to a suitable thickness on the surface of a pervious former of the required shape, and holding them thereon by the pressure of the surrounding air as they are deposited and then hardening or partially felting the bat so formed, and while it is held by suitable pressure on to the surface of the former to give it the required consistency to admit of removing it therefrom in a suitable condition for the after process of sizing by felting, as set forth.

Joseph Jordan, Jr., and Henry Keney, of Hartford, Conn., and Grant, Warren & Co., of Boston, Mass., assignees of Joseph Jordan, Jr., and Thomas Eustice, of said Hartford, for an Improvement in Machines for Grinding and Sizing Paper Pulp. Patented May 18, 1858:

What we claim as our improved machine for the manufacture and sizing of pulp, that is as constructed of a single conical grinder and outer shell, and with pipes for the introduction of the rags and the size, and the eduction of both, arranged with reference to the axis and ends of the grinder substantially in manner and so as to operate to reduce the rags to pulp and mix the sizing therewith, as hereinbefore explained.

We also claim the introduction of the sizing into the grinder case and directly between the reducing surfaces when employed as specified in the grinding of pulp or material used in making paper.

Jesse Reed, of Marshfield, Mass., assignor to Catharine M. Hunt, of Boston, Mass., for an Improvement in Steering Apparatuses. Patented March 6, 1855:

I claim the arrangement and combination of the adjustable guide, and gaurd rails, MM, with the screw shaft or its mechanical equivalent and its slides or two divisions of the nut, I.

I also claim the application of the pedestals to their stancheons by means substantially as described, for enabling the pedestals and parts supported by them to move either fore and aftwise or up and down under the action of the rudder, as specified.

ADDITIONAL IMPROVEMENTS.

William Sims, of New York City, for an Improvement in Refrigerators. Patented February 8, 1859:

I claim the induction pipe, B, in combination with the escape pipe, C, and fan, E, when applied to a refrigerator, to operate essentially as and for the purpose set forth.

[The object of this invention is to augment or increase a circulation of air through the refrigerator, and thereby render the same more efficient than hitherto.]

Asbury Wilkinson, of Shelbyville, Ind., for an Improved Washing Machine. Patented September 20, 1859:

I claim sliding bar, c, attaching thereto spiral springs, b b b b, and cord, D, circular board, B, suspended by spiral springs, b b b, &c., with a rotary corrugated roller, in combination with pulleys, i i, &c., ketch, F, ratchet wheel, m, segment, H, cog wheel, N, as set forth and described.

DESIGNS.

Zebulon Hunt, of Hudson, N. Y., for a Design for a Stove.

C. J. Woolson, of Cleveland, Ohio, for a Design for Doors of Cooking Stoves.

C. J. Woolson, of Cleveland, Ohio, for a Design for a Stove Plate.

Isaac De Zouche (assignor to Bridge, Beach & Co.), of St. Louis, Mo., for a Design for Stoves.

C. T. Meyer, of Boston, Mass., assignor to Alden Sampson, of Manchester, Maine, for a Design for Floor Cloths.

Notes and Queries

G. P., of N. B.—Hollow grate bars are now being employed in several locomotives, and no difficulty is experienced, we have been told, in maintaining the circulation in them. You will find the illustration of hollow grate bars for furnaces on page 204, Vol. III. (old series), of the SCIENTIFIC AMERICAN.

P. B. C., of Va.—"Morfitt on the Art of Tanning" was published by H. C. Baird, of Philadelphia, in 1852. It does not contain the latest American patents.

J. B., of Ill.—Parchment requires to have all the grease extracted from it, for the purpose of writing. It is therefore steeped in milk of lime during its preparation, to effect this object. The bright red color on morocco is dyed with cochineal, a little muriate of tin and cream of tartar. Carmine dissolved in aqua ammonia makes a beautiful red on leather, when applied with a sponge. Red Russia morocco is imported.

O. C. S., of N. Y.—If B knows that A was a previous purchaser, then B has no claim upon A's territory. In view of such knowledge, the fact of the non-recording of A's assignments gives B no right to A's territory. The papers have been forwarded to W. D.

H. B. M., of N. Y.—The pressure on the bottom of a vertical pipe one inch in diameter and 25 feet long, filled with water, will be 8.5 lbs. A 2-inch column of water will exert precisely four times the pressure of a 1-inch column, both being of the same hight. The pressure of the atmosphere on the surface of a 1-inch circle is 11.78 lbs, which, added to the pressure of the water in the 1-inch pipe, makes 20.28 lbs. A brick wall will be preserved from the effects of the heat of a fire, when the same is kept well wet all the time during the fire.

J. H. N., of Tenn.—You are correct in stating that the cause of difficulty in telegraphing during wet weather is owing to the absorption of electricity by the moisture; but insulated wires (those coated with gutta-percha) are not patentable as a preventive of the evil, because such conductors have been frequently used already. You are mistaken in supposing water to be the best conductor of electricity. Pure rain water is a very poor conductor; it is to copper wire as 1 to 40,653,000, according to Mr. Farmer, of Boston, who has made many experiments on the resistance of substances to the electric fluid.

S. & Co., of Conn.—You can obtain all kinds of steel from Sanderson, No. 16 Cliff-street, this city—a Sheffield house.

F. A. W., of Ky.—There will be no difference in the quality of corn for feeding hogs, whether it be first ground and then boiled, or whether it is first boiled and then crushed between rollers. The employment of a tank with a false bottom, placed above a steaming kettle, for cooking food for animals, is an old and useful arrangement, and should be more generally used by farmers. You cannot obtain a patent for your arrangement of boilers and crushing rollers, as the system is old.

G. H., of N. Y.—The best varnish known to us for coating bright iron, to prevent it from rusting, is clear copal; it contains oil and is not liable to crack. The metal cadmium is rare but may be obtained in this city. Sheet copper cannot be welded into a mass, like iron. We are much obliged to you for your kindness in sending us a club of subscribers.

D. N. T., of Ga.—Instead of "awaiting the turn of events," as you term it, we think your apprehensions should stimulate you to make an application for a patent immediately, while you are required to pay only $30 for government fee. You need not fear but that the rights of a patentee will be ever respected, let the inventor reside where he will. The rights of French and English citizens and all other foreigners who have taken patents in this country are just as much protected under our laws as the rights of the patentee who resides in Washington city. To be sure, the right to this protection has cost the Englishman and Frenchman more than it has the resident of Washington city (the government fee being, in the first case, $500, in the next, $300, and in the last, only $30), but the law that protects the one in the peaceable enjoyment of his property—patent—protects all, and after the patent is granted, all are on an equal footing.

H. C., of N. C.—Our new volume will commence in two weeks. We are glad to know that you are forming a club in your town. In a few days we shall issue an edition of the Patent laws and information upon all subjects connected therewith. Inventors, patentees and assignees will find it an indispensable work for their use.

S. H., of Ga.—You can procure such brass castings as you want, of George Pollock, of this city. We can recommend S. C. Hills, No. 12 Platt street, this city, as a reliable dealer in machinery.

A. T., of N. Y.—The plan of steaming wood to season it has been long practiced in this country. By calling at this office, you will be able to learn all you want to know about our patent laws and about the patentability of your inventions.

H., of Pa.—You ask:—"Would a shaft support a greater weight, hung on the middle, when rapidly than when slowly revolving?" Answer.—"It would not."

N. T., of N. J.—There is no single work known to us which contains illustrations of all kinds of machinery. Ure's Dictionary of Arts and Manufactures will, perhaps, come nearest the kind of book which you want.

J. L., of Pa.—Your article on Pittsburgh and its steel manufactures has been received and will meet with attention.

P. J. K., of Wis.—It is well known, according to the discovery of Sir Humphrey Davy, that a piece of zinc soldered to a piece of iron prevents the latter from rusting. The zinc corrodes, and in doing so establishes an electric action which protects the iron, as you have described. You could not obtain a patent for such a discovery.

C. C., of Ohio.—We do not think there is any chance for a patent on your grain separator. The same device is covered by Sanders' patent. We advise you to make a model of your grain dryer and send it to us, as we think it contains patentable features. Snead's patent does not embrace the same elements.

D. F., of N. Y.—We are afraid that india-rubber balls would not answer for the valves of pumps in tanneries. The tanning liquors would be liable to affect the india-rubber by coating its surface. Some of the rubber companies, however, might agree to make suitable valves for you.

W. O. H., of Pa.—We do not know of any better mode of pulverizing rosin than to pound it in a mortar and screen it through a sieve. The blows should be light, so as not to make the rosin stick to the crusher. In grinding it between stones, the stones should be light and have a rapid rotation.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Dec. 8, 1860:—

J. C. G., of Cal., $272; E. M., of N. Y., $45; H. H. R., of N. Y., $25; W. W., of Ala., $30; H. H., of Pa., $30; A. F. F., of Vt., $25; C. H. D., of Ill., $30; J. B. C., of N. Y., $20; C. J., of N. Y., $30; W. R., of Mo., $25; H. V., of Texas, $30; A. A., of N. Y., $20; B. & C., of Ohio, $30; F. M. B., of Wis., $30; E. & H., of N. J., $25; T. S. W., of Pa., $55; A. J. G., of Mass., $30, W. W. H., of N. Y., $30; P. P. S., of N. J., $25; G. J. C., of Vt., $25; O. S., of Conn., $30; I. W., of Mass., $62; J. W. F., of Pa., $55; L. J. W., of S. C., $30; T. J. F., of Ill., $28; J. H. W., of N. Y., $30; H. P. G., of Pa., $50; E. L. G., of Conn., $30; W. F. G., of N. Y., $30; N. McC., of N. Y., $12; A. R., of N. Y., $30; A. F., of Ill., $32; J. R. B., of R. I., $25; B. & M., of Ill., $25; C. T., of Va., $25; J. S., of Texas, $30; E. M., of N. Y., $55; J. N. P., of N. Y., $25; G. C., of N. Y., $35; A. B. A., of Pa., $25; L. A. B., of France, $335; F. B. P., of Mo., $25; C. O. L., of Vt., $30; W. H. G., of N. Y., $30; W. Y., of Ind., $25; O. C. T., of Pa., $30; E. C., of Mass., $275; D. C. S., of N. Y., $30; C. A., of Ill., $25; F. B., of Mass., $32; J. T. S., of Wis., $30; G. F. J. C., of N. J., $30; E. B. B., of N. Y., $25; J. H. D., of Mich., $25; J. E., of Cal., $10; C. S. H., of N. Y., $25; R. B. B., of Pa., $25; P. R., of Ill., $15; C. H. S., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Dec. 8, 1860:—

L. A. B., of France; W. W., of Ala.; H. H. R., of N. Y.; W. W. H., of N. Y.; J. W. G., of Pa.; J. N. P., of N. Y.; T. B. J., of Ill.; J. H., of England; S. H. D., of Mich.; T. J. F., of Ill.; J. R. B., of R. I.; C. C., of N. Y.; A. G. M., of N. Y.; E. M., of N. Y.; F. B. P., of Mo.; T. K., of N. Y.; W. R., of Mo., N. McC., of N. Y.; J. J. D., of N. Y.; S. & J. H. B., of Mo.; C. B., of France; E. B. B., of N. Y.; B. & M., of Ill.; P. P. S., of N. J.; F. B., of Mass.; J. P. S., of N. Y.; I. W., of Mass.; W. H. S., of Pa.; C. H. S., of N, Y.; C. A., of Ill.; W. Y., of Ind.; J. H. W., A. F. F., of Vt.; H. & M., of Ohio; C. T., of Va.; C. S. H., of N. Y.; G. C., of Maine; P. R., of Ill.

NEW BOOKS AND PERIODICALS RECEIVED.

MESSRS. APPLETON & CO., the well known publishers, Nos. 443 and 445 Broadway, this city, have just issued "New Fairy Stories for My Grandchildren," by George Keil: "A Year with Maggie and Emma;" "A True Story," by Mary J. McIntosh; and "The Young American Picture Gallery," containing 500 beautiful engravings. All who love to make children happy, and delight to see their eyes sparkle with joyous glee, will find the above books exactly suited to produce these results.

FRANK LESLIE, publisher of the "Illustrated Newspaper," publishes also "Frank Leslie's Monthly," a magazine of literature, art and fashion; profusely illustrated.

HOUSEHOLD JOURNAL. Monthly part. By Alex. Harthill & Co., No. 20 North William-street, this city. This enterprizing firm are now issuing two useful journals, and are evidently prospering in their business. The "Household Journal" is an interesting family paper, at $1.50 a year. Monthly parts, 12 cents.

ATLANTIC MONTHLY. By Ticknor & Field. Boston. The number for December is full of able contributions. This magazine has a high rank.

AGRICULTURE must not be overlooked. Our neighbor, Charles V. Mapes, has issued a splendidly illustrated catalogue of all sorts of agricultural implements. It is a work of interest to all who are engaged in this noble pursuit.

CENTRAL PARK. C. M. Saxton Barker & Co., Parkrow, have published a cheap, yet beautiful guide to the most remarkable enterprize of the kind ever undertaken in America, viz., the Central Park, in this city. Our neighbor, Saxton, who loves to make people happy, will be most happy to sell everybody a guide book. He has also a large stock of all sorts of agricultural works always on hand.

USEFUL HINTS TO OUR READERS.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—New subscribers to the SCIENTIFIC AMERICAN can be furnished with the back numbers of this volume by signifying their wish to receive them, otherwise their paper will be sent from the date of receiving the subscription. Vols. I. and II. (bound or unbound) may be had at this office and from all periodical dealers' Price, bound, $1 50 per volume; by mail, $2, which includes postage. Price in sheets, $1. Every mechanic, inventor, or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

SUBSCRIBERS TO THE SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

GIVE INTELLIGIBLE DIRECTIONS.—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the Post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the Post-office at which they wish to receive their paper, and the State in which the Post-office is located.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was prepaid has expired; and the publishers will not deviate from that standing rule in any instance.

RATES OF ADVERTISING.

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

THE RISE AND PROGRESS OF INVENTIONS

During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,538; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

We may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining thereto.

FREE EXAMINATION OF INVENTIONS.

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

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. 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 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.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

TESTIMONIALS.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

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

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

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

Your obedient servant, J. HOLT.

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

Your obedient servant, WM. D. BISHOP.

JERROLD & BEGGS' STEEL SPRINGS.

In addition to the spiral, the elliptic and the volute steel springs, we have in the invention here illustrated an entirely novel form, which may be called the flat coil, and which is said to be superior in all respects to any other form of steel spring; sustaining, with the same weight of metal, a larger load. It was invented by J. E. Jerrold and Eugene Beggs, of Paterson, N. J., who have secured patents in the United States and Great Britain through the Scientific American Patent Agency.

The mode of placing this spring is shown in Fig. 1 of the annexed cuts, and its construction is represented in Figs. 2 and 3. A flat ribbon or plate of tempered cast steel is wound in a circular ring, as shown in Fig. 2, and two stiff clasps, *a a*, of metal, are secured to opposite sides of the coil. In use, one of these clasps

Fig. 1

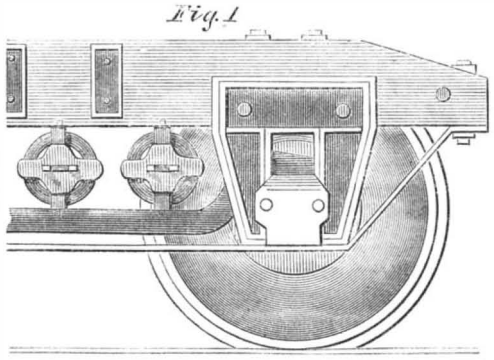


Fig. 2

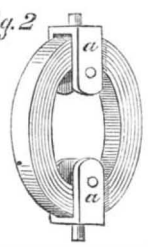
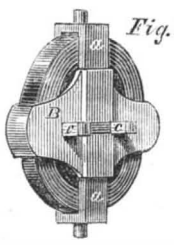


Fig. 3



is secured to the sustaining bar or table, while the body of the carriage rests upon the other, as shown in Fig. 1. To stiffen the spring and prevent its yielding too far to the load, a strong metal clasp, B, Fig. 3, is made to embrace it at right angles to the clasps, *a a*, thus causing it, under pressure, to yield outward at four parts of the circle. The clasp, B, may be secured in place by keys, *c c*, Fig. 3.

The patentees say that this spring will support 400 lbs. of load to 1 lb. of steel in the spring, while the elliptic springs sustain only about 80 lbs. It is especially adapted to strengthening elliptic springs, by being placed between the two halves at the middle of the opening. As rubber costs about 70 cents per pound and these springs can be made for about 25 cents, they will probably supersede that costly material in many situations. In short, these light, simple and durable springs seem destined to go into very extensive use.

The United States patent was issued on July 17, 1860, and further information in relation to the invention may be obtained by addressing Jerrold & Beggs, at Paterson, N. J.

A UNIVERSAL LANGUAGE.

We find in the October number of *Presse Scientifique des Deux Mondes*, the following extract from a pamphlet by Mr. Figuier:—

They occupy themselves much in Spain with a project of a universal language, project renewed of the celebrated Raymond Lulle, and of some philosophers of the eighteenth century. The most important men of Spain in letters, in science and in politics have taken a deep interest in this humanitary enterprise, the initiative of which belongs to Mr. Sotos Ochando. The Society of the Universal Language is constituted at Madrid, and has already held several sessions. A commission has been established to direct the labors. By means of an assessment on all the members, national and foreign, the grammar and dictionary of the future universal language will be printed and published. Many persons of distinguished ability have much faith in the success of the project. Do not discourage them. The utopias of one century are often the common place familiarities of the following century.

SEVENTEENTH YEAR!!!

On the 5th of January next, the FOURTH VOLUME of the "NEW SERIES" of the SCIENTIFIC AMERICAN will be commenced.

In announcing the above fact, the publishers embrace the opportunity to thank their old patrons and subscribers for the very liberal support they have hitherto extended to this journal; placing it, as they have, far beyond that of any other publication of the kind in the world, in point of circulation.

The extent of the circulation evinces the popularity of the paper; and while our readers seem satisfied with the quantity and quality of matter they get in one year's numbers (comprising 832 pages and costing only $2), the publishers are determined to still improve the paper during the coming year.

The SCIENTIFIC AMERICAN has the reputation, at home and abroad, of being the best weekly publication devoted to mechanical and industrial pursuits now published, and the publishers are determined (if labor and enterprise will do it) to keep up the reputation they have earned during the SIXTEEN YEARS they have been connected with its publication.

TO THE INVENTOR!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come out, but each number contains an official list of the claims of all the patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in those old countries. We shall continue to transfer to our columns copious extracts from these journals of whatever we may deem of interest to our readers.

TO THE MECHANIC AND MACHINIST!

No person engaged in any of the mechanical pursuits should think of "doing without" the SCIENTIFIC AMERICAN. It costs but four cents per week; every number contains from six to ten engravings of new machines and inventions, which cannot be found in any other publication. It is an established rule of the publishers to insert none but original engravings, and those of the first class in the art, drawn and engraved by experienced persons under their own supervision.

TO THE CHEMIST AND ARCHITECT!

Chemists and architects will find the SCIENTIFIC AMERICAN a useful journal to them. All the new discoveries in the science of chemistry are given in its columns, and the interests of the architect and carpenter are not overlooked; but all the new inventions and discoveries appertaining to these pursuits are published from week to week.

TO THE MILLWRIGHT AND MILL-OWNER!

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