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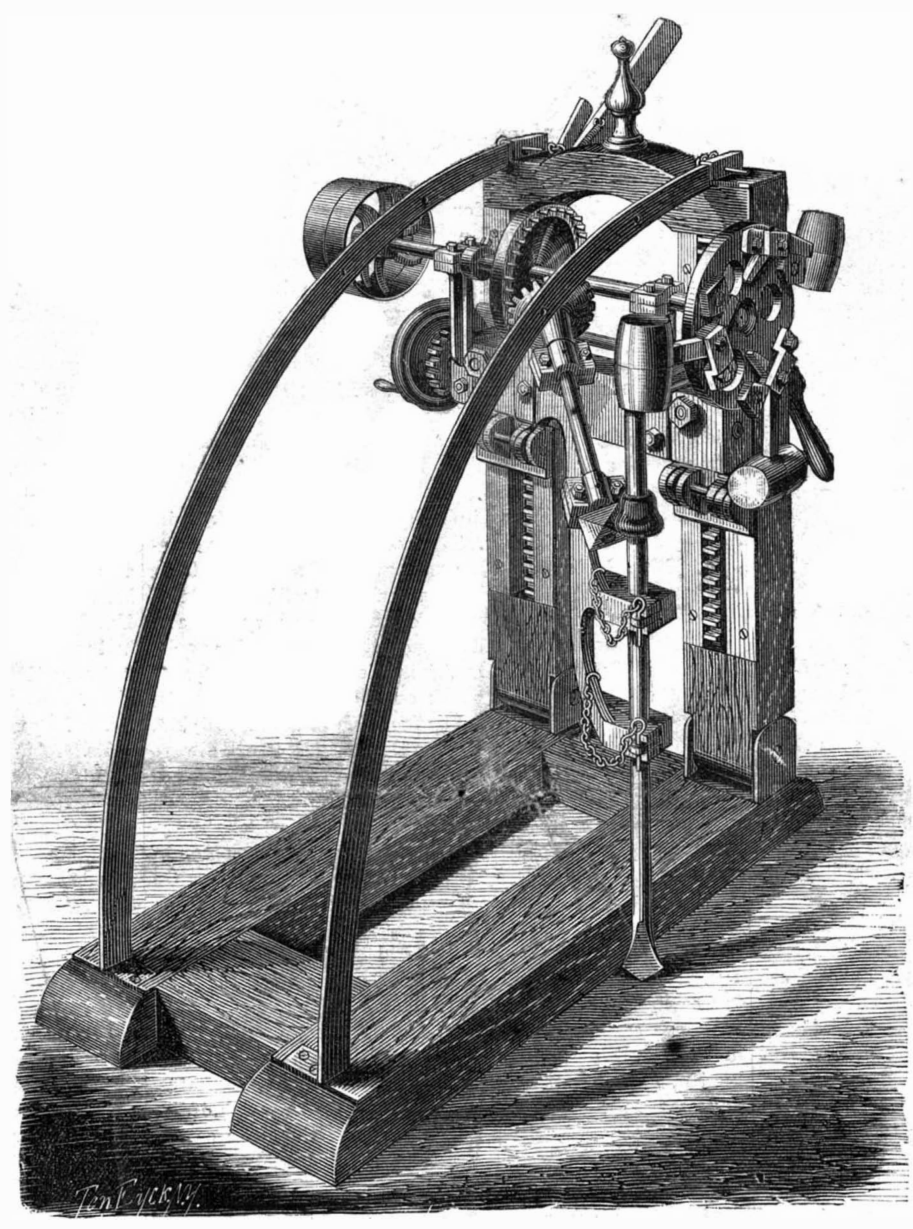
Improved Machine for Drilling Rocks.

The object of the machine represented in the engraving is to facilitate the laborious operation of rock drilling for blasting or splitting, which is frequently done by hand. The machine is portable and may be readily transported from place to place in an ordinary farm wagon. The base is a rectangular frame of timber, to which is hinged at one end a double upright, each side of which is longitudinally slotted and the two parts of which are connected at the top by a cross piece. To the other end of the base two quadrant guides are bolted, the other ends of which pass through ears on the cap of the upright which may with its appurtenances be inclined at any required angle, and held by pins passing through the ears and through corresponding holes in the curved guides.

All the operating machinery is sustained on the upright frame. A hollow headstock extends horizontally across the face of the upright and is held securely in place, at any required point from the ground, by bolts passing through the vertical slots, and clamped by cam levers on the back of the uprights. The headstock may be raised or lowered by turning a shaft passing through and having its bearings in the head stock and carrying two pinions that mesh into fixed racks seated in the uprights. But it may be fed downward by means of a ratchet on the same shaft and a lever and spring pawl, the ends of which are seen in the engraving above the top of the machine. The raising or lowering of the headstock and its connections is aided by friction rollers attached to projections on the lower side and bearing against the faces of the uprights.

Depending from the front of the headstock at a downward angle of about 45°, is an arm, forked at its lower end and formed into two boxes for receiving the drill. These boxes are hinged so as to be readily opened to receive the drill. The arm also carries a shaft on its inclined portion, to the upper end of which is attached a bevel gear meshing with a crown wheel on the driving shaft. At its other end is a block, preferably of an octahedron form, that lifts and partially rotates the drill by impinging on a rubber disk on the drill, thus presenting the lips of the drill at a different angle at each blow. The main shaft carries at one end a crank, or fast and loose pulley, as the machine is worked by hand or power, and at the other end a disk, on which are hung two, three, or four hammers, which in rotation strike the head of the drill, and the tangs of which, when the hammer slides off the drill, strike against rubber buffers, springs, or their equivalent. From the foregoing the construction and operation of this machine are sufficiently apparent. Patent ordered to issue June 15, 1869, through the Scientific American Patent Agency. All communications should be addressed to the inventor, Wm. F. Banks, Brookfield, Conn.



BANK'S AUTOMATIC ROCK DRILL.

Improvement in Car Trucks.

This invention does away with the whole category of friction wheels, plates, rollers, swinging bolsters, heretofore employed in various combinations to allow the car to adapt itself without strain to the curvatures of the track. With all such devices or any combination of them the tendency to spread the track when the truck and car pass curves has never been completely obviated. The rolling stock, as well as the permanent way, has suffered from this defect, which the inventor of this truck claims he has entirely overcome, securing at the same time greater simplicity of construction and consequently diminished friction.

In this truck the car bolster is suspended by swinging links in suitable brackets upon elliptical steel springs, attached to the car bolster as hereinafter to be described. By this arrangement the bolster may have a gentle radial as well as a slight lateral motion, so that easy adaptation to curves, and avoidance of strain and unnecessary friction between permanent way and rolling stock are secured.

A novel form of crown plate is also employed to facilitate lateral play of the car bolster, and a certain device within the axle box placed there to counteract the jar which is caused by the uneveness of the track, which device will be more fully described further on.

Fig. 1 is a perspective view of a four-wheeled freight-car truck. A is the car bolster; B, the upper or female crown-plate; and C, the lower or male crown plate. D is the frame of the truck; a portion being broken away to show fully the nature of the devices by which the car bolster is suspended. The brackets, E, may be made of cast-iron, and the method of applying the links between them and the springs is so plainly shown in the engraving that further description of this portion of the invention is needless. The springs are let into the frame, D, and are kept from lateral motion by stout guide plates, F, rising vertically from the frame between each pair.

Fig. 2, shows the device in the axle box above alluded to, the object of which is to counteract the jar from unevennesses in the road. It consists of spiral springs placed over the brass bearings in the axle boxes and secured between the bearing plates of the axle journals and upper seat-plates by means of flanged side plates, whose edges are turned over to engage with the folded or turned edges of flanges projecting from the bearing-plate and seat plate. The figure shows this part of the device very clearly.

Fig. 3 is a transverse section through the male and female crown-plates. It will be seen that they are oval in form instead of being cylindrical like the crown plates of ordinary car trucks. This allows lateral play or motion of the truck in the line of the axles.

The first thing that will attract the attention of practical men in regard to this truck is its extreme simplicity—the *sine qua non* in a good car truck. The principle of construction may be equally as well applied to six wheeled trucks, as to four-wheeled freight-trucks.

Security from sliding, should cars get off the track, and consequent precipitation down embankments, is secured by limiting the radial motion of the truck—a desideratum, it is claimed, not before attained. In short to those acquainted with the requirements of a good car truck the general and detailed advantages secured by this improvement will become at once apparent upon examination.

A patent was obtained upon this car truck February 16, 1869, by T. L. Wilson, assignor to Gyles Merrill and John W. Hobart. Further information can be obtained by addressing J. W. Hobart, St. Albans, Vt., or T. L. Wilson, Montreal, C.E.

Fig. 1

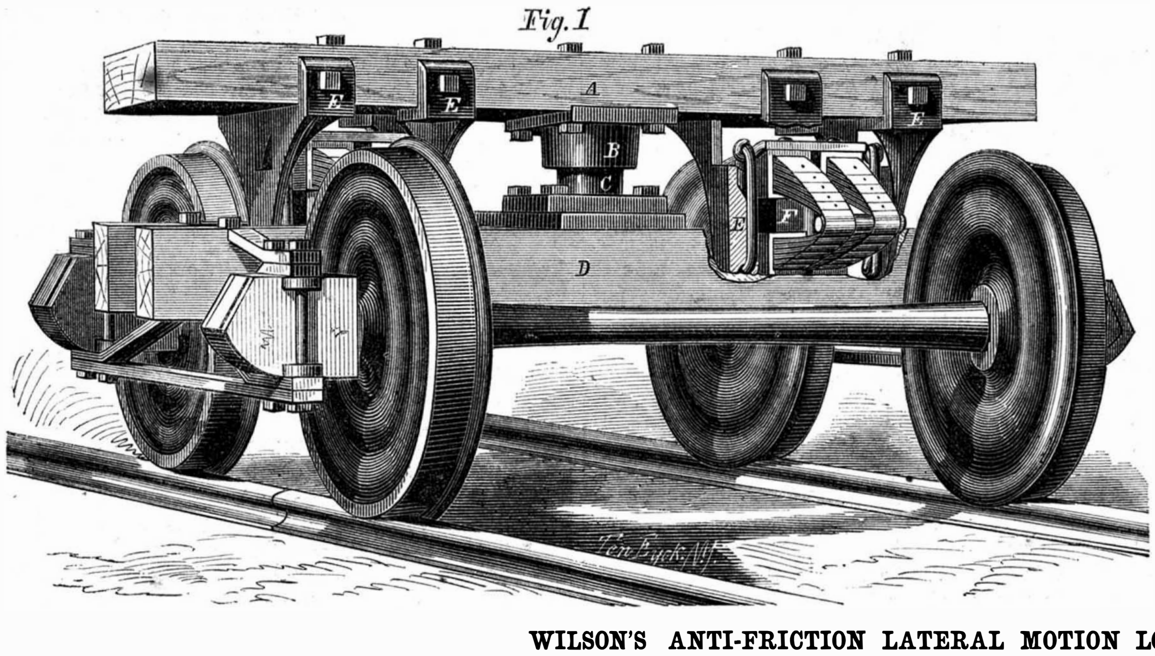


Fig. 2

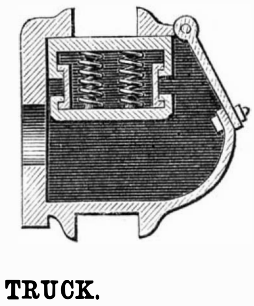
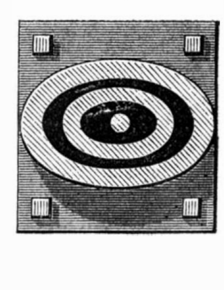


Fig. 3



WILSON'S ANTI-FRICTION LATERAL MOTION LOCK TRUCK.

Herbert Spencer on the Patent Right Question.

One of the ablest thinkers of the age is Mr. Herbert Spencer, whose writings have perhaps had as much influence upon modern opinion as those of any living author. He disposes of the patent-right question as follows:

As already remarked, it is a common notion, and one more especially pervading the operative classes, that the exclusive use by its discoverer of any new or improved mode of production is a species of monopoly, in the sense in which that word is conventionally used. To let a man have the benefit accruing from the employment of some more efficient machine, or better process invented by him; and to allow no other person to adopt and apply for his own advantage the same plan, they hold to be an injustice. Nor are there wanting philanthropic and even thinking men, who considerthat the valuable idea orignated by individuals—ideas which may be of great national advantage—should be taken out of private hands and thrown open to the public at large.

"And pray, gentlemen," an inventor may fairly reply, "why may not I make the same proposal respecting your goods and chattels, your clothing, your houses, your railway shares, and your money in the funds? If you are right in the interpretation you give to the term 'monopoly', I do not see why that term should not be applied to the coats on your backs and the provisions on your dinner-tables. With equal reason I might argue that you unjustly 'monopolize' your furniture, and that you ought not in equity to have the 'exclusive use' of so many apartments If 'national advantage' is to be the supreme rule, why should we not appropriate your wealth, and the wealth of others like you, to the liquidation of the state debt? True, as you say, you came honestly by all this property, but so did I by my invention. True, as you say, this capital, on the interest of which you subsist was acquired by years of toil—is the reward of persevering industry: well, I may say the like of this machine. While you were gathering profits, I was collecting ideas: the time you spent in conning the prices current was employed by me in studying mechanics; your speculations in new articles of merchandise answer to my experiments, many of which were costly and fruitless; when you were writing out your accounts, I was making drawings; and the same perseverance, patience, thought, and toil, which enabled you to make a fortune, have enabled me to complete my invention. Like your wealth, it represents so much accumulated labor; and I am living upon the profits it produces me, just as you are living upon the interest of your invested savings. Beware then, how you question my claim. If I am a monopolist, so also are you; so also is every man. If I have no right to these products of my brain, neither have you to those of your hands; no one can become the sole owner of any article whatever; and 'all property is robbery.'"

ON THE COAL-FIELDS OF THE NORTH PACIFIC COAST.

Abstract of a paper read by Robert Brown, Esq., F.R.G.S., before the Edinburgh Geological Society.

The Pacific Railroad being now nearly ready for traffic, it becomes of importance to inquire what are the fuel supplies —on the Pacific coast—to be relied upon to supply the fleets of steamers and the branch railways which will soon strike off from the main line into almost every valley and to every little mountain town. No doubt, coal might be brought round Cape Horn, as hitherto much of it has been, or across the plains with the railway, but both of these means of supply must necessarily be limited on account of the expense. It behoves us, therefore, to inquire somewhat narrowly what are the extent and nature of the native coal-fields on the North Pacific coast. I must preface what I have to say by telling you that what notes I may have to lay before you, are the result of occasional observations in the course of my wandering in the greater portion of certain regions—explored and unexplored—between California and Alaska during portions of the years 1863, 1864, 1865, and 1866. Though I shall have occasion now and then to refer to general geological questions, yet for the main part what I shall have to say will almost entirely be looked at from a coal-supply point of view, and then as much with the eye of a physical geographer as that of a pure geologist.

Extending from the borders of California to Alaska are three coal-fields belonging respectively to the tertiary, secondary, and palæozoic ages—the latter being situated, as far as yet known, only in the Queen Charlotte islands, off the northern coast of British Columbia, the exact age being as yet undetermined, though the coal is anthracitic and in all probability palæozoic. The other two coal-fields are situated, as regards each other, from south to north in the order of their age. The tertiary extends from California northwards through Oregon and Washington Territory, impinging the southern end of British Columbia and Vancouver Island, and extending, with some interruptions, right across the Rocky Mountains—the Miocene coals of Missouri being apparently only a continuation of these same beds. The secondary beds, on the other hand, on the North Pacific are confined to the island of Vancouver, though in all probability they are also a continuation of the cretaceous strata of Missouri. The tertiary lignites of the North Pacific are throughout of Miocene age, and are associated with beds of sandstone, shale, etc. It burns freely, but leaves behind much slag and ash. It has been wrought at various places on the coast. 1. Mount Diablo, California. Here 59,257 tuns were mined last year from January to August, the coal selling for eight dollars per tun in San Francisco. At Benicia it was also mined, but has been discontinued. Its analysis is— carbon, 50; volatile bituminous matter, 46; ash, 4. 2. Coose Bay, Oregon. Its analysis shows 46·44 per cent of carbon, 50·27 of volatile matter, and 3·19 of ash. Its percentage of coke is 49·73; but this is dark, friable, and of little value. It produces abundant gas, of low illuminating power. It is used to some extent in San Francisco, 7,759 tuns having been imported from January to August, 1868. 3. Clallam Bay, Washington Territory. Several attempts have been made here to get good coal, but have failed to a great extent owing to the want of a harbor. Analysis—carbon, 46·40; volatile matter, 50·97; ash, 2·63. 4. Bellingham Bay. Here the lignite has been mined for some years with success, though it is of no better quality than the others. From January to August, 1865, 5,680 tuns were imported into San Francisco. Analysis—carbon, 47·63; bitumen, 50·22; ash, 2·15. Coal crops out at various other localities—Fraser River, Burrard Inlet, islands of the Haro Archipelago, Saanetch Peninsula, the northern (Vancouver) shores of De Fucas Strait, etc.—but has not been worked; and I am of opinion that all these outcrops are of tertiary age, the secondary formation not appearing south of the Chemainos River. There are newer (Pleistocene, or perhaps recent) lignites in the cliffs of Useless Bay, Whidby's Island, associated with remains of the mastodon, a tradition of the existence of which animal still lingers among the Indian tribes. This lignite is in small quantity, and quite worthless for fuel. The whole coast of Vancouver on the east coast, north of Chemainos, is bounded by a belt of carboniferous strata, composed of sandstone, shale, and coarse gravelstone conglomerates, interstratified with which are beds of coal of a much superior character to any hitherto described. These beds from the contained fossils appear to be cretaceous. Everywhere the strata named form a characteristic accompaniment of the coal (especially this coarse conglomerate) and nearly everywhere it is underlaid by one or more seams of coal cropping out at some point on the circuit named, though it may reasonably be supposed yet to be found on the opposite shores of British Columbia. Outcrops are seen on some of the coast-lying islands, etc.; but it is only at Nanaimo where it is wrought to any extent, this being the only mine in Vancouver Island (or in the British North Pacific territories) exporting coal. Here is a village of 500 inhabitants and some fifty miners. Last year the company exported 43,778 tuns, and declared a dividend of 15 per cent. The coal is bright, tolerably hard, and not unlike some of the best qualities of English coal. It is used all over the coast for steaming and domestic purposes. It brings eleven dollars per tun in Victoria, and thirteen in San Francisco. An analysis gives carbon, 66·93; hydrogen, 5·32; nitrogen, 1·02; sulphur, 2.20; oxygen, 8·70; ash, 15·83. The fossil remains were then described. North of Nanaimo, on Brown's River, immense seams of coal have been discovered by myself and party; on Salmon River the Indians report coal; at Sukwash, near Fort Rupert, coal appears; and at Koskeemo Sound, on the western shore, are extensive undeveloped fields of what will ultimately, no doubt, prove the best coal in Vancouver Island, both from its quality and easy shipment. The latter, on analysis, gave carbon, 66·15; hydrogen, 4·70; nitrogen, 1·25; sulphur, 0·80; oxygen, 13·59; ash, 13·60. Other coal-fields will no doubt be discovered as exploration proceeds, but the country is so covered with dense forests and undergrowth as to render exploration very difficult. The anthracite is found on the Queen Charlotte Islands, off the north coast of British Columbia. The beds are much broken up by faults, felspathic trap dykes, and other disturbing influences, so that to work it will always be expensive and troublesome. Still, the value of the discovery is of the highest importance to the coast. The coal is associated with conglomerates, a fine hard slate, out of which the Hydah Indians carve the pipes and other ornaments so common in the European museums, and metamorphosed sandstones. On first sight I was inclined to believe it only debituminized cretaceous coal, but from the fossils recently discovered I am induced to change that opinion and to believe it of palæozoic age. An analysis gave—carbon, 71·20; moisture, 5·10; volatile combustible matter, 7·27: ash, 6·43. The only good or extensive coal-fields in the North Pacific are, therefore, within the English colonies of Vancouver Island and British Columbia, and in the possession of these coal-fields these States, at present so depressed, have a mine of wealth which, if judiciously managed, will ultimately render them the seat of busy industry.

From the Century.

SOMETHING ABOUT BELLS.

The origin of bells may be dated from the time of Moses. In the 28th chapter of Exodus, verses 33–35, "a golden bell" is mentioned as upon the hem of the robe of Aaron, in order that "his sound shall be heard when he goeth into the holy place before the Lord." Bells are also mentioned in the 14th chapter of Zechariah, verse 20, as being upon horses; and it is not improbable that Tubal Cain, the sixth in descent from Adam, "an instructor of every artificer in brass and iron," may have known something of the art of making them. The early historians inform us that the Greek warriors had small bells concealed within their shields, and when the captains went their rounds of the camp at night, each soldier was required to ring his bell in order to show that he was watchful at his post. Plutarch also mentions that nets, with small bells attached, were spread across the stream to prevent the inhabitants of Xanthus from escaping by swimming the river when the city was besieged.

Church bells originated in Italy, being formed by degrees out of the cymbals and small tinkling bells used in the religious ceremonies of the East, as a means of honoring the gods. Pliny states that bells were invented long before his time. They were called *tintinnabula*. Among Christians they were first employed to call together religious congregations, for which purpose runners had been employed before. Although first introduced in the fourth century, it was not until the sixth century that they were suspended on the roof of the church in a frame. The hours of the day were first ordered to be struck by Pope Sebastian in 605, to announce to the people the time for singing and praying.

In England large bells were first introduced in churches about the seventh century, and it is supposed that they gave rise to that feature of ecclesiastical architecture known as the Bell Tower.

Bells were often baptized and christened with great pomp and ceremony, and in the middle ages were much used as a part of the ceremonial of the church. The Sanctus bell, which is a small bell still used by one of the attendants of the priests of Roman Catholic Churches just before the elevation of the Host, was formerly a larger bell hung in the outer turret of the church, at the sound of which, all who heard bowed in adoration. The Ave Maria bell announced the hour for offering a supplication to the Virgin, and for beginning and ceasing labor. The Vesper bell was the call to evening prayer. The Passing bell was so named as being tolled when any one was passing from life, and it was ordered that all within hearing should pray for the soul of the dying.

From this custom is doubtless derived that of tolling the church bells at funerals, and also that which is practiced in some localities of tolling the bell immediately after a death, and indicating the age of the deceased by the number of the strokes.

The ringing of the Curfew bell was introduced into England from France by William the Conqueror. It was called the *couvre feu* (cover fire) bell, and when rung at eight or nine o'clock in the evening it was expected that all fire and light would be extinguished. It is to be remembered that at that early period houses were mostly built of inflammable materials, and the law of the Conqueror, though arbitrary, was intended to prevent conflagrations. The custom was enforced for less than fifty years, but there are many localities in England where, even now, "the curfew tolls the knell of parting day."

In olden times it was superstitiously believed that the ringing of bells would disperse evil spirits, check tempests, drive away infections and avert the lightnings. The most common of the old inscriptions upon the Latin bells were to this effect.

The use of bells to sound alarms in the event of dangers from fire, flood, and the enemy dates from an early period. It is related that in the year 610, when Sens was besieged, the Bishop of Orleans ordered the bells of St. Stephen to be rung, and the sound so frightened the assailants that they abandoned the siege.

When Macbeth shut himself in the forest of Dunsinnane, and it was announced to him that Birnam Wood was moving on the castle, he cried out in his desperation:

Ring the alarum bell! Blow wind! Come wrack!
At least we'll die with harness on our back.

In later years, the use of bells has become so systematized as not only to sound the alarm of fire, but to indicate the locality of the danger, and there are several cities in the United States in which, by means of electricity, every fire bell may at once announce this fact. Perhaps the most perfect operation of this system is to be seen in the city of New York.

The largest bell in the world is in Moscow—the City of Bells. It was cast by order of the Empress Anne, in 1653; is twenty-one feet four and a half inches in hight, twenty-two feet five and a half inches in diameter where the clapper strikes, and is believed to weigh from 360,000 to 440,000 lbs. Historians are in doubt whether this giant among bells was ever hung. Dr. Clark, who saw it about the year 1801, says, in his "Travels," "The Russians might as well have attempted to suspend a line-of-battle ship with all its stores and guns." Bayard Taylor, on the other hand, maintains that it was both hung and rung, "it being struck by the clapper," as Korb says in his diary, "fifty men pulling upon it, one half upon each side."

In 1837, the Czar Nicholas caused it to be disinterred from its bed of sand, where it is supposed it was lodged during the conflagration of 1737, and placed it on the granite pedestal where it now rests. It was then consecrated as a chapel, the entrance to the interior being through a large fracture near the mouth, the cause of which is also a subject of controversy.

It is recorded that at the casting of this bell nobles were present from all parts of Europe, who vied with each other in the value of the gold and silver plate, jewelry, and other votive offerings which they cast into the furnace. It is doubtless owing to this practice, which prevailed in olden times, that the existing notion is derived that ancient bells are of better material than the modern ones, on account of the silver in their composition. It may be added, however, that the idea is incorrect, since recent experiments have shown that its introduction causes a positive deterioration of the resonant quality of bell metal. Whoever has been in Russia recalls as chief among his memories the sounds of the great bells which form a part of religious worship, and are regarded by the Russians with superstitious veneration. In Moscow alone there are five thousand, and when they unite on festive occasions in one mighty chime, the effect especially at a distance, is said to be majestically grand.

There is now suspended in the tower of St. Ivan, at Moscow, a bell which weighs 144,000 pounds, and the diameter of which is thirteen feet. It is said that when it sounds, which is but once a year, "a deep, hollow murmur vibrates all over Moscow, like the fullest notes of a vast organ or the rolling of distant thunder."

The bell of Notre Dame Cathedral at Paris, cast in 1680, weighs 30,000 pounds; that of St. Peter's at Rome, weighs 17,000 pounds; that of Notre Dame Cathedral, Montreal—the largest in America—29,000 pounds; and that of the Parliament House in London, 30,000 pounds. When it is remembered that the largest bells heard in our American cities rarely weigh more than three or four thousand pounds, some idea may be had of the volume of tone which belongs to the monster bells above described.

The Chinese have likewise produced bells of colossal size, one of which at Pekin weighs 120,000 pounds, but the tone of their bells is said to be discordant and "panny" like that of their gongs.

Probably the most celebrated bell in this country is that known as the "Liberty Bell," which on the 4th July, 1776, announced the signing of the Declaration of Independence. It was cracked while being rung in honor of the visit of Henry Clay to Philadelphia, and since then has been on exhibition in that city, together with other revolutionary relics. The following inscription, taken from Leviticus xxv., 10, surrounds it near the top: "Proclaim liberty throughout the land, unto all the inhabitants thereof."

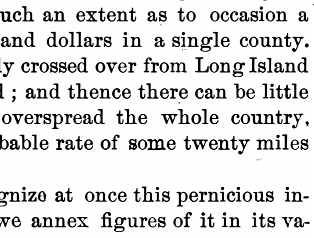
Nor are our own well-known St. Michael's chimes unworthy of notice in this connection. These bells—eight in number—were imported from England in 1764, at a cost of £581. On the evacuation of Charleston in 1782, Major Traille, of the Royal Artillery, took them down under the pretence that they were a military perquisite belonging to the commanding officer. The Vestry applied to Lieutenant-General Leslie to have them restored, on the ground that they were paid for by subscription, and private property was secure under the terms of the capitulation. No answer was returned. Sir Guy Carleton, at New York, however, anticipated the wish of the vestry, and ordered the bells to be restored. Meanwhile they had been shipped to England. The vestry then applied to the Secretary of War of Great Britain, but without success. They were sold; and being purchased by a Mr. Rhineu, were generously reshipped by him to Charleston in 1783. They chimed their hallowed music thenceforward until 1863 or 1864, when, for prudential reasons, they were removed to Columbia, S. C., and deposited in the State House grounds. Here, they were partially destroyed in the great Sherman conflagration of February, 1865. After the war, they were sent again to England, and, strange as it may appear, recast by the descendants of the original founders, and returned to this country. Once more St. Michael's chimes are in their place, marking the footsteps of the hours, and linking us, by every tone, with the tenderest associations of the past.

The Asparagus Beetle.---"Crioceris asparagi."

There is scarcely a vegetable raised in our gardens that is not preyed upon by one or more grubs, caterpillars, or maggots, so that, when we eat it, we have positively no security that we are not mingling animal with vegetable food. Two distinct kinds of maggots, producing two distinct species of two-winged fly, burrow in the bulb of the onion. Scabby potatoes are inhabited by a more elongated maggot, producing a very different kind of two-winged fly, and also by several minute species of mites. Turnips, beets, carrots, and parsnips are each attacked by peculiar larvæ. And as to the multifarious varieties of the cabbage, not only are they often grievously infested by the cabbage-plant louse—a species which has been introduced from Europe into this country—but also by an imported caterpillar producing a small moth, and by several indigenous caterpillars producing much larger moths, some of which caterpillars, when full-grown, are over one inch long.

Up to about eight years ago asparagus formed a notable exception to the above general rule. There was no grub, caterpillar, or maggot peculiar to America that would touch it, and although there are several such that have long been known in Europe, none of them had hitherto found their way into this country. About 1860, however, the asparagus beetle was accidentally introduced into Long Island, N. Y., from the other side of the Atlantic; and in a very few years it had increased and multiplied among the extensive asparagus plantations in that locality, to such an extent as to occasion a dead loss of some fifty thousand dollars in a single county. In the year 1868 it had already crossed over from Long Island on to the adjoining main land; and thence there can be little doubt that it will gradually overspread the whole country, working westward at the probable rate of some twenty miles a year.

That our readers may recognize at once this pernicious insect as soon as they see it, we annex figures of it in its various stages. The perfect beetle, *a*, is of a deep blue-black color, with the thorax brick-red, and some markings of very variable shape and size on the side of its wing-cases. The eggs, (*b*, and magnified at *c*) are generally attached to the leaves of the growing asparagus, and are of a blackish color.



The larva (*d* and *e*, and magnified at *f*,) is of a dull ash color, with a black head and six black legs placed at the forward end of the body, the tail being used as a proleg in walking, as with the larvæ of most of the allied beetles. The species passes the winter under loose bark and in other such sheltered situations, in the perfect or beetle state; and in May, or soon after the season for cutting the asparagus for table use has commenced, it comes forth from its winter quarters and lays the first brood of eggs. These hatch out in about eight days, and by the middle of June the first brood of larvæ is large enough to be noticed, eating the bark off the more tender part of the young stems first, and in default of this consuming the tougher and harder bark off the main stalks. About the end of June they descend to the ground, and either going under the surface of the earth or hiding under any rubbish that may have accumulated there, form slight cocoons, and pass into the pupa state. From these pupæ there bursts forth, the same season, a second brood of beetles which lays its eggs as before; and produces about the middle of August a second brood of larvæ or grubs, whence in the same manner as before there comes forth, in September, the brood of beetles which is destined to pass the winter in the beetle state and reproduce the species in the following spring. Thus, as will be seen, the economy of this species is nearly the same as that of the three-lined leaf beetle, which preys so extensively on the potato plant in the Eastern States, except that our larva does not cover itself with its own dung, and instead of the asparagus beetle passing the winter under ground in the larva state, it passes the winter above ground in the perfect or beetle state. Entomologically, the two species are closely allied, belonging to different genera of the same small subgroup of the great group of leaf-feeding beetles (*Phytophaga*), and both are what are commonly called "double-brooded" insects: that is, there are two distinct broods every year, the one generated by the other.

According to Dr. Fitch, who published an excellent account of the depredations of this insect on Long Island up to the year 1862, one asparagus grower there had three acres out of seven "almost ruined;" and four others had asparagus beds so badly injured that they plowed them up. Throughout this entire region the general idea up to 1862 seems to have been, that if this beetle was not soon destroyed the asparagus would be; for every year the insect appeared to spread further and further, extending already for a distance of at least forty miles along the northern side of Long Island, and every year it got to be more numerous and more destructive. Lime, salt, potash, and a variety of other such applications, had all been tried and found ineffectual as remedies; domestic fowls, which as Dr. Fitch ascertained, feed greedily upon the beetles, could scarcely be used in sufficient numbers to clear fields of ten and twenty acres in extent; and as to hand-picking twenty acre fields, especially where the insect is so small, that would be too discouraging an idea to be entertained for a moment by any one.

But in the year 1863 a deliverer appeared in the form of a small shining black parasitic fly, probably belonging either to the *Chalcis* or to the *Proctotrupes* family. Whether this fly lays its eggs in the eggs of the asparagus beetle or in the larva of that insect, does not seem to be at present clearly ascertained; but if the accounts that we have received of it be correct, it must do either one or the other. In the former case the larva that hatches out from the parasitic egg will consume the egg of the asparagus beetle and entirely prevent it from hatching; in the latter case it will destroy the larva before it has time to pass into the perfect state. The result, in either event, will be equally destructive to the bug and beneficial to the gardener. Thus, as we are told, "although the asparagus beetle has not entirely ceased to trouble them upon Long Island since 1863, it yet has never since that year been of any very material damage there.

But the diminution in the numbers of the asparagus beetle is probably due in part to artificial as well as to natural causes. The asparagus growers upon Long Island have introduced a method of fighting the insect, which is founded upon correct principles, and seems to be followed by very gratifying results. Early in the spring, when the beetle has made its appearance and is ready to lay its eggs, "they destroy," as we are informed, "all the plants upon the farm except the large plants for market, hoeing up all the young seedlings that, as is well known, start from the last year's seed every spring upon the beds." Thus the mother-beetle is forced to lay her eggs upon the large shoots from the old stools; and as these are cut and sent to market every few days, there are no eggs left to hatch out into larvæ for the second brood of beetles.

At first sight we might suppose that it would be possible, by carrying out the above system rigidly to its utmost extent, to extirpate the insect entirely. But unfortunately this cannot be done. Asparagus, according to Dr. Fitch, has run wild to a considerable extent upon Long Island, "and slender spindling stalks of it may be seen growing in all situations there, by the roadsides, in the fields, and in the woods. Thus the asparagus beetle has such an abundance of food everywhere presented to it, and the insect is already occupying such an extent of territory, that there seems to be no mode by which it is now possible for us to effect its extermination."

To many persons, perhaps, such a crop as asparagus may seem of but very trifling importance, in a pecuniary point of view. But we have already seen upon how large a scale it is cultivated on Long Island, in the State of New York; and a writer in the *American Journal of Horticulture*, who hails from New Jersey, remarks as follows: "We plant asparagus in great fields of ten to twenty acres. Well planted, it will cost a hundred dollars to set an acre; but it will continue productive for twenty years: and if properly cared for each acre will clear two hundred dollars annually. There are men all around me who have made small fortunes out of this single article."—*The American Entomologist.*

WOOD ENGRAVING---IMPROVEMENTS IN THE ART.

The origin of wood engraving, the former processes employed in accomplishing the work, and in taking impressions therefrom, have been fully treated in a former number of this journal. To trace the various improvements in the art, and follow it in its progressive stages down to the present time, will be the main object of this article.

Wood engraving, or "Xylography," as it is technically termed, reached its various stages of perfection in Europe through the instrumentality of a few celebrated painters, who, it may be said, were the pioneers in giving to the civilized world, faithful copies of their own and the works of the great masters. Among the most prominent of these artists were Mark Antonio Raimondi, Titian, Caracci, Salvator Rosa, Claude, Guercino, and Canaletti, of the Italian school; Albert Durer, Holbein, Bloemart, Muller, Rubens, Vosterman, Rembrandt, Vandyke, Jacob Ruysdael, and Paul Potter, of the Dutch and Flemish schools; Garnier, Edelinck, Audran, LeClerc, Wille, and Vivares, of the French school; Woollett, Sir Robert Strange, Sir Christopher Wren, Vertue, and Hogarth, of the English school. The works of these artists, who all became celebrated as engravers on copper and wood, offered an incentive to hundreds of others to engage in the art, many of whom from time to time, added new improvements upon the style and execution of their predecessors. Still as the foundation was laid by the painters, it was comparatively an easy task for those who succeeded them, to rear the superstructure and thus perfect the work.

A great deal of time and labor were expended in completing fine wood engraving during the period to which we refer, which necessarily made the prices demanded for such beyond the reach of the masses, the demand being thus extremely limited. The gradual spread of education, and the general diffusion of knowledge, rendered further improvements necessary, among the foremost of which was a method by which the work could be facilitated, both in the engraving of the block and in the impressions taken therefrom. This was essentially necessary in illustrated books, as the impulse created by the increased demand for reading, as a sequence, intimately associated itself with the business of wood-cutting. To effect a large circulation of these works among all classes of people, it became necessary that a style of engraving should be adopted peculiarly applicable to cheap publications, with the view of placing these books, and other illustrated works, within the reach of all. To England belongs the honor of first introducing the improvement which ultimately led to this much desired result.

The principal feature in this improved style of xylography, was a bold method of cross hatching, first adopted by Sylvanus Jackson, of London, in 1833, at which time the *Penny Magazine* and the *Penny Encyclopedia*, afforded the people at large, through the auspices of The Society for Diffusion of Useful Knowledge, the opportunity of buying a valuable publication, in serial numbers, for the low price of one penny. After repeated experiments this artist succeeded in imitating, on wooden blocks, at one tithe the labor and cost, the admirable cross hatchings of the fine old copper plate engravings of Raffaelle Morgan, and other distinguished artists, whose copies of the works of the old masters are to this day considered models of artistic excellence. These cross hatchings require an entirely different mode of manipulation on wooden blocks compared to metal plates. It is the business of the wood engraver to leave all the lines upon the block which the draftsman has traced with his pencil, and to accomplish this he cuts away all the parts which form the spaces between the various lines of the drawing. The lines thus stand up in relief, and when ink is applied to the block by the printer, in the same way he applies it to metal types, the impression on the paper is taken by subjecting it to an adequate pressure.

Engraving on copper is performed by cutting away the lines representing the subject and leaving the intermediate spaces. When the ink, which is of a different kind from that used on wooden blocks, is applied to the plate, the lines, which represent so many gutters, become filled with it. The surface is then wiped off and cleaned with a roller, and the impression afterwards made on a graver's press, that portion being padded which comes in contact with the plate. When it is known that the plate has to be cleaned and polished after it is inked, at every impression, it will not be difficult to comprehend that, with the facilities afforded in steam printing, one hundred impressions can be taken from the wooden blocks in the same time it would take to print five from the metal plates.

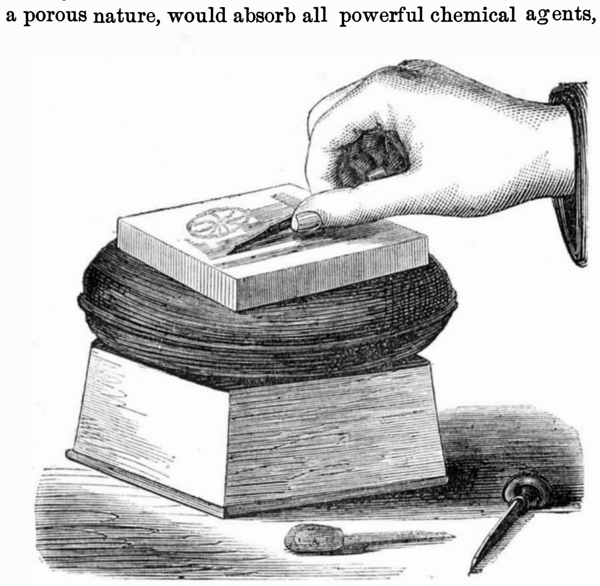
The reference to steam printing brings us forward to a still later improvement in xylography; namely, the process of adapting the engraved blocks to the uniform printing, to be effected by the revolutions of a rotary or cylinder press—the latest and most approved style of press for expediting the work of printing now in use. This process consists in lowering the surface of the wood wherever light tints are required to be produced. This is effected by scooping out the wood, like an inclined or shelving trench, from the edges of the shadows, and afterwards engraving the hatched lines upon the lowered surface, the surface of the block thus being accommodated to the action of the revolving cylinder. This process is technically termed scooping (or scauping) and trenching. By this mode of lowering the lights upon the block, the artist is sure that if ordinary care is used, at every impression of his performance on a cylinder press, the lights and shadows will be equally perfect. This great improvement, which has progressively been pursued of late years in wood engraving, and the immense reduction of the cost of their manufacture, are mainly attributable to this process. In connection with the appliances above named for taking the impression, this feature of mechanical art, which is based solely upon scientific principles, will not only lead ultimately to a high state of perfection in wood engraving, but will readily adapt itself to the continually-increasing demand for cheap illustrated literature.

We have already shown that through its means an immense number of any illustrated work can be executed with the greatest rapidity at a comparatively small cost. We will now refer to still further improvements, which have so far elevated the business of wood engraving as a branch of art, that it has at length, by common consent, been dignified as one of the fine arts. We look upon a finely executed engraving with evident pleasure, and, as connoisseurs, we know certain requisites are necessary to enable the artist to produce it. For example: correctness of drawing and design, vigor, freedom and facility of execution, clearness in the lights and transparency in the shadows, texture, and mechanical skill. In limning the human form, animals, etc., a knowledge of anatomy is superadded. In a landscape the engraver must also possess a creative talent, first, to conceive his composition, second, to imitate nature to that degree that his lines, produced by the graver, become capable of expressing character, quality, sunshine, moonlight, storm, morning, evening, distance, chairoscuro, grace, beauty, and the most difficult of all, color. In producing the latter the engraver uses his brain and his burin, while the painter is greatly assisted by the use of various pigments, which of themselves resemble the natural hues perceptible in a landscape. To be able to invest his work with these several requisites the engraver must be a thorough artist, and, as the art has now reached this stage of perfection, it is properly classified among the *fine arts*. We come now to

THE PRACTICE OF THE WOOD ENGRAVER.

To describe in detail everything connected with the business of wood engraving, and to follow the artist from the beginning to the completion of a picture, would occupy more time and space than can be devoted to a newspaper article. All, therefore, the readers can reasonably expect in this treatise is an outline of the *modus operandi*.

The wood which is chiefly used for the purpose of engraving is that of the box tree, a considerable quantity of which is imported into this country, the best being obtained from Odessa. The blocks for engraving are cut directly across the grain, few logs furnishing pieces sufficiently large for wood cuts of any size, in which case two or more pieces are fitted together with great exactness. Other woods are also used for commoner work, such as pear, bay, mahogany, maple, and white pine. Box is invariably preferred for fine work from the fact of its being less porous, and its adaptability to the finest lines that a graver is capable of executing. Cut into blocks, it is the dearest of all the woods used in the business the price being from two and a half to ten cents per square inch. Maple is worth from two to three cents; mahogany, one cent; pear, one and a half, and white pine one dollar and twenty-five cents per slab of twenty-eight to thirty-two inches. Blocks for illustrated newspapers and books correspond in thickness to the length of the metal types used in printing. For separate engravings they are proportioned to the size of the work. It is a popular fallacy to suppose that chemicals are resorted to, to corrode the spaces between the hatched lines of a wood engraving; aquafortis and other chemical agents are only used in etching and in mezzo tint and aqua tint engravings. The art of xylography consists simply in producing a design upon a wooden block by incision only. Early writers upon the subject, many of whom never saw an artist at work, entertained certain pet theories which they ventilated in their histories, corrosion applied to wooden blocks being the most culpably fallacious among them. In the process of wood engraving the use of corrosive agents is strictly interdicted for the obvious reason that wood, being of a porous nature, would absorb all powerful chemical agents,



and however often the surface of a block might be cleansed after the parts to be removed are eaten away, such is the insidious nature of the chemicals employed that the lines left standing would be also affected, the fiber of the wood thereby weakened, and the engraving in time destroyed by a slow but sure decay. Even with the box wood, the least porous of all the kinds used, the chemical acid, secreted in the pores, would eat into the softest part of the fiber, leaving the harder parts for a time intact, thus rendering the lines unequal and imperfect.

The design is drawn upon a block, which presents a perfectly smooth surface, with a fine pointed black lead pencil. This part of the work is done by a draftsman, whose profession is distinct from the engraver. The drawing upon the block, like that of any other kind of engraving, is the reverse of the impression made from it, in the same way that a mirror reflects a reversed view of any object in front of it.

The engraver rests his block upon a flat circular cushion filled with sand; this is about seven inches in diameter, controlling the block with his left hand as he operates with his right. For very fine work he uses a magnifying glass for the minute lines, even with the aid of this a true eye, a steady hand, and the utmost care are indispensable.

The tools used in wood engraving, under the general name of gravers, are thus classified: First, *square tools*, for cross hatching; second, *lozenge tools*, for foliage and ground work; third, *tinting tools*, for producing the various tints; fourth, *gouges*, or *scawpers*, for cutting out the dead wood; fifth, *flat chisels* for lowering the edges.

These tools vary in size and shape; some have a triangular point and edges; some are pyramidal with irregular sides, others sharp pointed, square, and oval. They are all made of the finest steel, and when occasion requires it, are sharpened on an oil stone. The best tools now in use are those manufactured by Rénard, of Paris, the Messrs. Stubbs, of London, and Nixon, of this city.

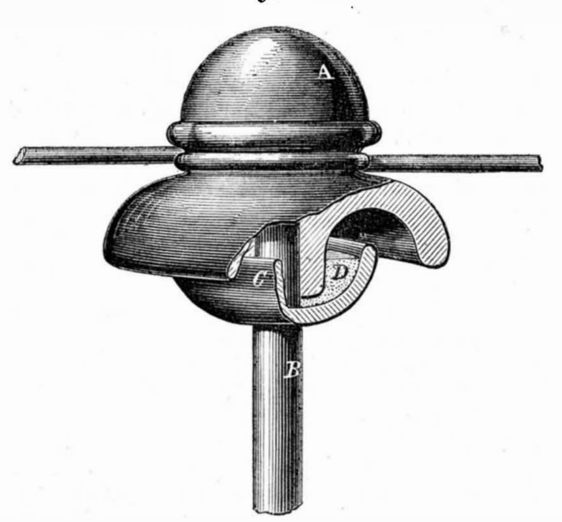
Where wood engravings are to be introduced in books or newspapers, they are incorporated in the form with the metal types, and, presenting a like flat surface, receive the ink from the roller, when impressions on paper, dampened previously for the purpose, are thrown off with the same rapidity as any ordinary printed matter from the type alone.

In conclusion, we cannot too highly commend the efforts of Linton, and a few other celebrated engravers of the present day, for their indefatigable zeal in advancing the art of wood engraving to the pre-eminence it now enjoys. They have not alone labored long and faithfully to improve and perfect the art, but they have taught us its great utility and importance, and we are now made to perceive that xylography bears the same relations to design and painting that typography bears to written language.

A NEW TELEGRAPHIC INSULATOR.

It has long been settled that insulation does not depend upon the mass of the non-conducting material as much as upon extent of surface, and the protection of the surface from

Fig. 1



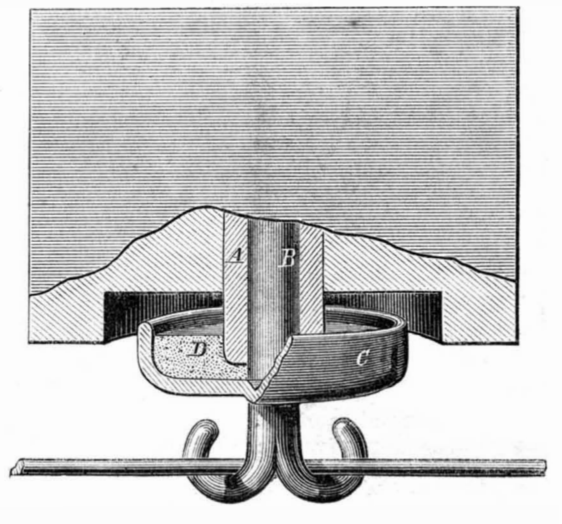
deposition of moisture, or any substance calculated to decrease its insulating power. That insulator will therefore prove the most efficient that takes most fully into account these acknowledged facts.

The invention herein described and illustrated, has for its object the attainment of such an insulator, by simple means, and to produce not only as near as may be a perfect insulator, but a cheap and durable one. There are two classes of insulators in common use. The first is supported on a standard or peg, Fig. 1, and the second, Fig. 2, often called the hook insulator supports the wire by means of a hook, the shanks of which is screwed or otherwise fastened into the insulator proper which in its turn is fastened into a wooden block or iron casing or some substitute therefor.

In the description of this insulator, we shall letter corresponding parts in both forms of the insulator similarly and describe them together. A is the insulator proper, made of glass, hard rubber or other suitable material; a section of the hook insulator and a sectional elevation of the other variety being presented.

To these insulators the wire is attached in the ordinary manner. B is, in Fig. 1, the peg or standard supporting the insulator proper, A, and in Fig. 2, the shank of the hook screwed into the insulator proper, A; these supports being preferably made of malleable iron. Each of these supports

Fig. 2



has cast upon it or otherwise attached a cup, C. The insulator, A, is screwed down on the standard, B, Fig. 1, or the shank, B, Fig. 2, so that it either touches, or nearly touches the bottom of the cup, C. The top of the cup, C, is shielded by the peculiar form of the insulator proper, A, Fig. 1, or by a recess cut in the under side of the block which sustains it Fig 2. The cup, C, extends out towards, but does not touch with its upper edge, either the insulator proper, A in Fig. 1, or the exterior of the recess cut in the supporting block, Fig. 2. Into the cup, C, is poured either melted paraffine, D, or any other insulating substance, paraffine being preferred as being both well suited to the purpose and cheap.

Thus a large extent of insulating surface is obtained between the line and the metallic supports, while at the same time the surface of the paraffine contained in the cups is protected from deleterious atmospheric influences.

This insulator has claimed for it the following advantages over those hitherto employing paraffine, as well as those not employing this insulating material:

First a greater surface of paraffine can be presented, thereby securing more perfect insulation.

Second, the dispensing with outside iron caps which invite lightning discharges.

Third, the placing of the paraffine in a cup right side up instead of bottom side up, and thus preventing all danger of the running out of the paraffine when melted by the heat of the sun, in hot weather.

Fourth, greater protection from atmospheric influences.

Fifth, general applicability to all common insulators.

Sixth, this insulator does not sensibly increase the cost over the ordinary insulator.

Should experience prove that these advantages are obtained as claimed, at no expense of other valuable principles such as strength, durability, etc., this improvement will be one of great scientific interest and practical value.

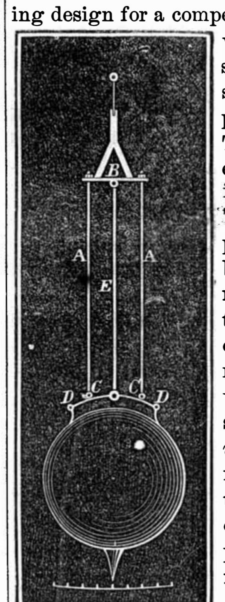
This invention was patented June 29, 1869, by W. E. Simonds, whom address for further information, at 345 Main st. Hartford, Conn.

Industrial Production of Hydrogen Gas.

MM. Tessie du Motay and Marechal have lately indicated a new and interesting process for the industrial production of hydrogen gas. Alkaline and alkalino-earthy hydrates, such as hydrate of potash, of soda, of strontia, of barytes, of lime, etc., mixed with charcoal, coke, anthracite, coal, peat, etc., and, heated with these fuels to a red heat, are decomposed into carbonic acid and hydrogen gas without any further loss of heat than what is required to produce the carbonic acid and hydrogen. During this operation the hydrogen is developed without the production of steam, and may be manufactured without the use of boilers, and within simple retorts, which, not being acted on by the vapor of water, are not liable to corrosion or accidents. The hydrogen gas may thus be made cheaply and quite as practically as is now done by the distillation of coal or other hydrocarbons.

Compensating Pendulum Rod.

Mr. S. T. Mason, of Sumpter, S. C., sends us the accompanying design for a compensating pendulum rod, which is a form



we have not seen, and seems at once simple and effective. Two bars, A, of steel are attached to a cross bar, B, and pivoted at C, to two curved arms, D. The arms, D, are pivoted in their inner ends to a central rod of brass, E, having its upper end fixed to the cross bar, B. The exterior ends of the bars, D, are pivoted to supports arising from the bob of the pendulum. As brass expands more by heat and contracts more by cold than steel, it follows that an adjustment can be made so that when the three rods expand, the supports of the bob will be relatively raised as much as the steel rods are lengthened, and *vice versa*, so that the center of oscillation may be maintained in a constant position for all temperatures. This form of pendulum rod may have been employed before, but if so we have not met with it.

Preservation of Wine by Heating.

A long memoir, first published in the *Annales de Chimie et de Physique*, for September, 1868, and which is condensed in the last number of Dingler's *Polytechnic Journal*, furnishes the report of a committee named by the French government to examine into the merits of a method proposed by Mr. Pasteur, for the preservation of wines, especially for such qualities as are destined for distant markets or for embarkation on board of vessels of war.

The elaborate report in question is very favorable to the efficiency of the process.

We present a short summary of the final results.

1. Wine may be kept without altering in quality for an indefinite period of time, in all climates, after having been first submitted to the action of artificial heat.

2. The temperature to which it must be raised is from 131° to 140° Fah.

3. If the wine does not contain naturally more than 10 or 12 per cent of alcohol, it is best to add 1½ per cent more before the shipping of it.

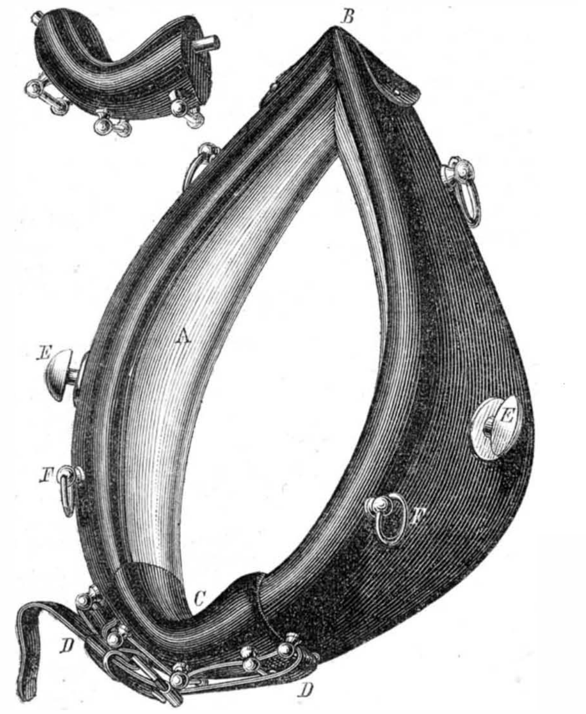
4. The wine is to be heated by steam, and artificially cooled.

Production of the White Pine Mines.

Official figures of the production of the White Pine mines for three months show how largely the richness of the mines has been over-rated, as well as their capacity for production. Only twenty mines were worked, only 960 tuns of ore were reduced, and the aggregate yield was less than $275,000. The average was just about $275 a tun. The rate of yield from the larger mines was from $390 a tun down to $57·50 a tun. One mine returned its yield at the rate of $6,847 a tun, but it took out only 548 pounds, and there seem to be good grounds for doubting the entire accuracy of the return. It is now said that the White Pine district is not extraordinarily rich, but the fact that its ores are simple chlorides and easy to be worked, makes them specially valuable.

IMPROVEMENT IN HORSE COLLARS.

The collar shown in the engraving is made of wood, cushioned or upholstered on its inner surface, A. At B is a stout leathern hinge, which, in connection with a piece shown at C, and in detail at the upper left-hand corner of the engraving, renders the collar adjustable to suit the form and size of



the horse's neck. The collar can be made larger or smaller by using a larger or smaller piece of this kind, and a fit is thus obtained. This piece is held in place by dowels and strap, D, buckled and attached, as shown in the engraving. The traces are attached at E, and the hold-back straps at F in the usual manner.

A strong adjustable and easy collar is thus obtained without hames. The exterior of the collar may be covered with leather, and otherwise ornamented to present a tasteful appearance, and if proper materials are used a very durable collar can be made in this manner.

Patented through Scientific American Patent Agency, July 20, 1869. Address, for further information, Jacques Meyers, 90 Columbia street, New York city.

On the Glass Used for Light-Houses.

The special composition of the crown glass used for the light apparatus for light-houses was, until quite recently, kept a secret by the manufacturers of Saint Gobain, in France, and some firms in Birmingham, which had the monopoly of this branch of trade.

From the researches of David M. Henderson, C. E., published in *Dingler's Journal*, we are able to furnish the recipes for both of these.

The French glass is composed of:

Silicic acid	72·1	parts
Soda	12·2	"
Lime	15·7	"

Alumina and oxide of iron, traces.

In Birmingham it is made from the following mixture:

	cwts.	qrs.	lbs.
French sand	5	—	—
Carbonate of soda	1	3	7
Lime	0	2	7
Nitrate of soda	0	1	0
Arsenious acid	0	0	3

The best qualities of this glass are at present produced in the Siemens furnace.

Wire Grass Brooms and Brushes.

M. Heuzé, inspector general of agriculture for the French Government, read a paper before the last meeting of the "Société d'Encouragement" on the plants used for manufacturing what are known as wire grass brooms and brushes. The substance employed is collected in Italy, and grows in the sandy soil of the shores of the Adriatic, between Ancona and Venice, and principally about Reggio. It is cultivated and harvested in a similar manner to madder. Two distinct plants, the *Chrysopogon grillus*, which gives fine white filaments, and the *Andropogon ichnëum*, which produces the coarser material, are the producers of this substance. The root alone is employed, after having been barked and boiled in water. It is shipped to market in small bundles. The quantity sent annually to France alone is about 400,000 pounds, the cost of which varies, according to quality, from one fourth to one half of a dollar in gold per pound.

No doubt can be entertained that these plants might be profitably cultivated in the deep sandy regions of our Southern States.

Heavy Modern Machinery.

A mass of metal of a tun weight was unknown before the Christian era. Now those in cast iron up to 150 tuns, in wrought iron to 40 tuns, and in steel or bronze to 25 tuns, are made in any desired form, and turned or bored with the most perfect accuracy. Two years ago I saw the largest lathe in England, which swings 22 feet, and will take in a shaft 45 feet long. Six months ago I saw one in this country which swings 30 feet, and will take in a shaft of 50 feet. There are planers which will plane iron 50 feet in length; others of 18 feet in width; others of 14 feet in hight, taking off metal shavings of two and a half inches in width and a quarter thick.—*W. J. McAlpine.*

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Coal Tar and its Products as Preservatives for Wood.

MESSRS. EDITORS:—In referring to an article with the above heading, in your issue of June 12th, it is not my intention to enter into a history of the various trials with the products of the destructive distillation of carboniferous bodies belonging to the coal series. Your correspondent's paper is very elaborate in this respect. My purpose is simply to relate some experiments not recorded by him, and which were undertaken by Mr. Rottier, Professor of Chemistry at the University in Ghent, Belgium, in order to determine what ingredients of coal tar are most effectual in protecting wood from rot. An account of these experiments may be found in the *Breslauer Gewerbeblatt*, of 1865, page 152. Rottiers' experiments extend over the following constituents of coal tar: 1, The light oil; 2, the oil containing phenic or carbolic acid; 3, the oil containing aniline; 4, the naphthalized oils; 5, the solid residue; 6, the green fluorescent oil distilling between 275 and 320 Centigrade, containing pyren and paranaphthalin.

The light oil was found to be of no avail, for the wood treated with it decayed within the same period of time as wood that was not treated at all. The delay in time in the decomposition produced by the aniline oil amounted only to 6·66 per cent, which, indeed, is a very insignificant period.

It is well-known that carbolic acid affords an excellent means for preserving animal matter from putrefaction. This fact has led to the conclusion that the heavy tar oils would be as excellent for preserving wood, they being the chemists source for carbolic acid. Rottier found this hypothesis not confirmed. Decomposition set in after the usual period of time, whether the acid was employed in solution, in benzine, or otherwise. Tar oils which contained not a trace of carbolic acid proved to be just as ineffectual as oil to which a considerable portion of the acid had been added. Naphthalin has proved to be very powerful in protecting collections of natural objects against the ravages of insects. It might, therefore, appear that it was the proper agent for preserving wood. This is not the case, it being too volatile to be adapted for the purpose in question where time and external agencies play such an important part. However, quite favorable results were obtained with the greenish fluorescent oil that comes over at the last stage of the distillation. Direct trials with pyren and paranaphthalin did not yield successful results. It must, therefore, be concluded that it is the green fluorescent oil to which the preserving action of coal-tar must be attributed. "Is the same contained in sufficient quantities in the latter as to justify its employment for preservative properties?" I am inclined to answer this question in the negative rather than in the affirmative sense. ADOLPH OTT.

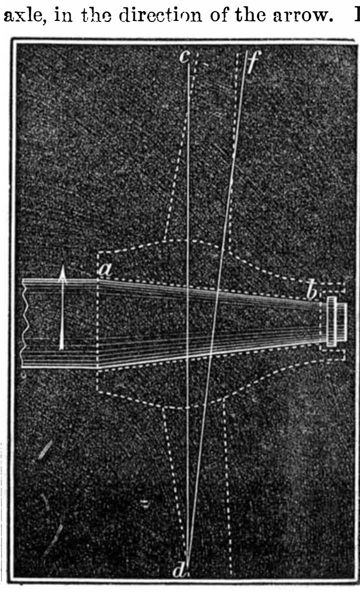
New York city.

"Gather" in Wagon Wheels no Fallacy.

MESSRS. EDITORS:—I notice that some one, in a recent number of the SCIENTIFIC AMERICAN, expresses the belief that what is usually called "gather," in the position of wagon wheels, is a fallacy.

The following diagram will, I think, show that the inward inclination given to the front part of the wagon wheel, is required by correct mechanical principles. The diagram shows a tapered spindle without "gather," as seen from above.

Suppose the wagon to be drawn by force applied to the axle, in the direction of the arrow. It will then be seen that



the propelling power and the resisting force meet upon the line, *a*, *b*, in the direction of *c*, *d*. Now let us consider abstractly, the action of these positive and negative forces. Here, although these meet in a direct line, they bring together oblique surfaces, so that the line of contact, *a*, *b*, and direction of the forces, *c*, *d*, form oblique angles. Hence, the surfaces incline to slip upon each other, each in the direction of the obtuse angle, and to drive the wheel in the direction of the line, *d*, *f*. Or, to be less scientific, the bevel on the front of the spindle, when pressed against the opposite bevel on the inside of the hub, tends to work the axle out of the wheel and the wheel off the axle.

If the spindles have no taper, or if the wagon can be propelled without forward pressure upon the axles, then we require no "gather." But so long as wagons are made with tapered spindles, and drawn by force applied through the axle, the wheels should have "gather" just in proportion to the taper of spindles.

The "gather" makes the angle of contact of wheel and axle less oblique, and, by the inclination it gives the wheel to the line of travel, it causes it to "crowd on," and thus counteracts the effect of what bevel still remains on the front of the spindle. E. S. WICKLIN.

Keokuk, Iowa.

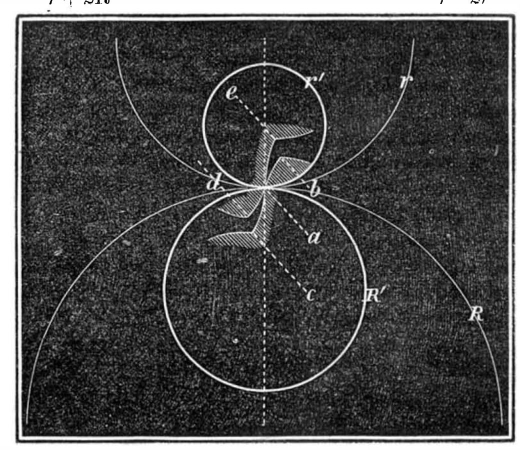
Laying Out the Teeth of Wheels.

MESSRS. EDITORS:—The laying out of gear teeth has somewhat been discussed by correspondents on pages 165 and 229 last volume, SCIENTIFIC AMERICAN, but neither has given a definite rule determining the proper epicycloidal and hypocycloidal curves of teeth for wheels of different diameters.

The following formula I have found to be correct in practice, particularly so when the difference in diameters of two wheels working in each other is great:

$$ab \ldots \frac{R+r'}{R+2r'}P \qquad ac \ldots \frac{R-R'}{R-2R'}P$$

$$ad \ldots \frac{r+R'}{r+2R'}P \qquad ae \ldots \frac{r-r'}{r-2r'}P$$



In the diagram let *R r* represent the radii of pitch lines of the wheels.

P, the pitch.

R' r', the radii of two circles attached in which *R'* is indefinitely less than ½ *R* and also *r'* indefinitely less than *r*.

c a b, tooth of wheel *R*.

e a d, tooth of wheel *r*.

a b and *a d* are epicycloidal curves, and *a e* and *a c* hypocycloidal curves. The center of these curves are on the pitch line of the wheel to which they are attached.

Newport, Ky. GEORGE HORNING.

Bone Flour.

MESSRS. EDITORS:—Why not use bone flour as an article of diet? There can be no possible prejudice against it when manufactured expressly for culinary purposes, and not kept too long before using. We all eat more or less bone sawdust in the meat we get from the butcher without a thought of prejudice; and we need bones as well as muscles. I know the doctors raise considerable cry now-a-days about the phosphates being all sifted out of our fine flour and left in the shorts and bran.

In Europe, and even in the older settled portions of this country, where land has been long in pasture, the cattle fed there will chew old pieces of bone by the hour.

The scientific say that in such cases the bone material is fed out of the soil, and recommend sprinkling the food of such animals with bone flour, which is said to answer the purpose. So we see the article is digestible, even by vegetable-eating animals. How often we hear the expression "The sweetest meat lies nearest the bone."

I have tried some experiments. Nice bone flour spinkled on beefsteak, sufficient to make a thin crust when fried, certainly improves the flavor. Also, in making biscuit in which saleratus was used, I mixed about three or four parts of bone flour to one part of the saleratus used, mixing the bone with the saleratus in hot water. The bone was well dissolved in the biscuit (if I may use such a phrase) giving it a brownish tinge and somewhat altering the flavor. Though I am not prepared to say that it was decidedly improved, yet the flavor was certainly not injured. I am, however, of opinion that I did not use enough bone by half at least.

I see no reason why, by proper experiment in cooking, bone flour could not be made a profitable and palatable article of diet.

Any one wishing to experiment can get the bone flour by sawing a nice fresh bone (beef bone preferably) in thin slices, with a fine-toothed saw, until sufficient sawdust is obtained for the purpose. M. W. G.

La Salle, Ill.

Serrated Edges of Sickles.

MESSRS. EDITORS:—In the volume just closed, appeared several articles on the bad workmanship on farm implements. There is one thing not mentioned therein to which I would like to call attention, namely, the serrated or barbed-edge sickle of reaping machines. Why are they not found in mowing machines? Simply because they will not cut fine grass at all, especially after being ground a few times, so that the edge of sickle and face of guard tooth are separated one sixteenth to one eighth of an inch. That such a sickle cuts off the stalk of grain I deny. It tears them off, I admit. A merchant tears off shirtings and calico; why does he do it? Because he can do it easier and quicker than to cut them off. Is this the reason that the barbed-edge sickle is generally found in reaping machines? No; grain can neither be torn off quicker nor easier than it can be cut off. Then why are they made? Why are they the exception among all instruments intended as cutting instruments? The barber, even the poorest to be found, aims to have a smooth edge on his razor, the butcher aims at a smooth edge for his knife, the backwoodsman knows that his axe chops far better with a smooth edge, and the shoemaker, after whetting his knife on a rough stone, whets it on his bench in order to give it a smooth edge. It is an insult to every American mechanic that such an absurdity should exist, except in a museum, to show the folly of by-gone generations. If the papers generally would take up the subject and ridicule it as it deserves, or at least to the extent of driving it out of the country, they would receive the heartfelt thanks of a large class of the community. I have conversed with numerous farmers in regard to the barbed-edge sickle, and have never found one that said he preferred it, showing conclusively that they were bought from necessity instead of choice. After the subject is fairly brought to the notice of parties manufacturing such sickles, and they continue such manufacture, their friends ought to see that they are either put into a lunatic or an idiot asylum.

Nebraska, Ohio. A. K. SMITH.

[If our correspondent will take the trouble to examine the finest edge of a razor or lancet through a microscope, he will find that the chief, though of course not the only difference between it and that of a mill saw, is in the size of the teeth. All cutting edges are, strictly speaking, saws, and the question to be decided in regard to the selection of a proper cutting edge for any kind of work, is whether a fine edge is better than a coarse one for the work. Saws do not tear if they are properly filed and set, the smoothness of the cut being determined by the fineness and sharpness of the teeth. Our correspondent may be right, however, in his view that a fine edge is better than a very coarse one for cutting grain. —EDS.

Curious Phenomena.

MESSRS. EDITORS:—I have a glass jar that will hold about half a pint that has an almost imperceptible crack across the bottom. In this jar I keep sweet oil. Now, when the jar is placed upon a black-walnut bench, the oil exudes from the jar, and in the course of a few hours there is quite a quantity of the oil on the bench, say one half to a whole teaspoonful; but, on the contrary, if the jar is placed on a painted board, or on a hard pine board, no oil will escape! I have tried it several times, consequently I know the above to be a fact.

J. F.

[Can any one give a reason for this peculiarity?—EDS.

Steam Lead.

MESSRS. EDITORS:—Among all the various points in practical steam engineering, perhaps there is none more talked and written about than the proper lead to give the induction valve, and none upon which there is a greater diversity of practice and opinion.

Nor is it at all singular that there should be this diversity of opinion and practice, since the condition, structure, weight of reciprocating parts, speed, strength of bed-plates, and foundations, are as diverse as are individual engines, and the care and qualifications of persons in charge of them.

The writers on the subject are obscure, usually giving their directions in algebraic signs and formulæ, keeping others from knowing how little they know themselves.

Again, this diversity of opinion and practice does not surprise us, when we know that steam lead, *per se*, is a fallacy. Here we will say that a properly-constructed engine does not require it, on the contrary it tends to its destruction, and is a cormorant of fuel.

This broad assertion, however, is only worth its value as an assertion. Let us see if we can show data to confirm it. Now why do we require steam lead? The reason given is, to arrest the momentum of the reciprocating parts of the machine, take up the lost motion of the joints, thereby preventing a shock or thumping when the direction of the reciprocating parts is brought to a state of momentary rest, and started on a reverse direction. The amount of lead to effect this is, as before stated, dependent on speed, condition, weight of reciprocating parts, curve, etc.—very nice points, seldom if ever capable of being fully complied with in practice.

Suppose, then, we discard steam lead; what shall we substitute for it, when we concede the necessity of some mode to arrest and reverse motion?

We will substitute a cushion by closing the exhaust sufficiently early to fill the passage ways and clearance with the exhaust steam, by compressing it to, or nearly to, the initial pressure in the cylinder at the commencement of the return stroke. By this cushioning we gradually arrest the momentum of the reciprocating parts and store it for the return stroke. We do more; we fill the space between the closed steam valve and the piston with the exhaust steam, and consequently do not have to call on the boiler for it. We do more still, the piston, instead of meeting near the termination of the stroke a force equal to the initial pressure, *plus* its momentum, suddenly, like the impact of a battering ram, meets the thin vapor and compresses it gradually without a shock, thereby saving oil, heating, pounding, wearing of brasses, breaking of cranks, connections, and all their concomitant evils, of which many owners of steam engines and others interested have had *quantum sufficit*.

The important saving effected by filling the steam passages from the valve to the piston with the exhaust steam, will be shown by the following circumstances: We indicated an engine which had a cylinder 24″ diam × 60″ stroke, making 30 revolutions (60 strokes) per minute. The area of the passage ways from the closed valve to the piston, when on the dead center, was equal to 3·7″—equal to 1-16th and 0·21 of 1-16th of the stroke; then every 16·21 strokes we make, if we call on the boiler to supply the steam to fill this clearance, we lose (unless we use expansion) one cylinder full of steam or two cylinders full per minute.

The engine spoken of is a beam engine of the marine pattern, and notwithstanding its great percentage of clearance, is working very economically in consequence of its superior cut-off and cushioning on the exhaust. It has no steam lead, on the contrary the piston moves a short distance on the return stroke before it gets steam.

The ordinary three-ported slide valve cannot so well be managed to get compression on the exhaust without interfering with the induction. In this case a compromise may be made by giving sufficient length to lap, say at three-quarter stroke, and close the exhaust the same, more or less, according to the pressure of steam in the cylinder, always being careful that the compression is not greater than the cylinder pressure. The indicator alone reveals this.

New York city. F. W. BACON.

SPIDERS' SILK.

If you can picture to yourself a mass of pure and yellow gold, which not only reflects the light as from a smooth and polished surface, but which has all the depth and softness of liquid amber, you may realize in some degree the wonderful appearance of a sheet of spiders' silk as seen in the sunshine; and even in the shade its luster is greater than that of gold. But to compare the silk with gold is to tell only one half of the story; for the same spider yields silver as well, so that you may draw from its body a thread of gold or a thread of silver, or both threads together; their union giving silk of a light yellow color.

These two differently-colored silks are drawn from two different parts of the spinning organ, which will be described hereafter; and not only are their colors thus distinct, but also their other physical properties; for the yellow is elastic, and may be stretched slightly and regain its former length, while the white is inelastic, and at once crinkles up when tension is removed during the process of drawing it from the spider. The two kinds of silk are employed also in the construction of different parts of the web; but that has been sufficiently described elsewhere.

Beauty and strength are natural partners, and we do not look in vain for the latter quality in spiders' silk. It is indeed something prodigious as compared with even the strength of metals. A bar of iron one inch in diameter will sustain a weight of twenty-eight tuns; a bar of steel fifty-eight tuns, and, according to computation based upon the fact that a fiber only one four-thousandth of an inch in diameter will sustain fifty-four grains, a bar of spiders' silk an inch in diameter would support a weight of *seventy-four tuns.*

DISADVANTAGES OF SPIDERS' SILK.

Aside from its excessive fineness, the only thing to be said against the silk is the small quantity which a single spider will yield, as compared with the production of a silk-worm. And when it is admitted that the latter spins a big cocoon which yields, upon an average, three hundred yards of silk, weighing about three grains, while the average length which can be reeled from a spider at one time is only one hundred and fifty yards, which is so much finer as to weigh but one-twentieth of a grain, our quantitative comparison looks rather discouraging and lessens the satisfaction we had derived from the previous comparison of quality.

But there are several other facts to be considered which tend to greatly reduce this discrepancy between the production of the two insects; some of these relate directly to the one and some to the other.

Let us first reduce the silk furnished by the worm from its apparent to its real amount. Three grains represents the average gross weight of silk yielded by one cocoon; but the fiber is so covered with gum which would materially interfere with its manufacture that it has to be cleansed by prolonged boiling in soap and water, which process costs each cocoon one quarter of its weight, leaving the real amount of available silk supplied by each worm, two and a quarter grains; but even this is forty-five times the yield of a single spider, and any practical inquirer will not gain much comfort from the comparison. Having now placed the worm's production in its true light, what can we say of the spider to increase the statement of its yield? So far from being destroyed, as is the worm, for the sake of one cocoon, and thereby being prevented from further service in way of laying its eggs, the spider is not at all injured by the reeling process and after a day or two of rest, is ready to yield us a second hundred and fifty yards, more or less, and then a third and a fourth, until it has been reeled from, say twenty times in the course of a month, nor is this probably the limit of their capacity, under favorable conditions, but it will be seen that, even granting it to be so, and its season to be limited to a month, the spider of a whole season is twenty times as valuable as the spider of a single day, and the total yield would be about three thousand yards weighing just one grain. Now, the worm yields only two and a quarter times as much as this, and that is the end of it. Like the swan, it expends all its life in a last effort; but the spider, like the canary, does something every day, and when no longer able to produce silk, can provide for future generations by laying five hundred or more eggs.

Admitting then that a worm yields two and a quarter times as much as a spider, what is the number of each required for a piece of woven silk? A yard of silk varies greatly in weight, and somewhat too in quality, and of course in cost; the quality we cannot here consider, but as to weight and cost, a cheap silk at two dollars and fifty cents weight from one half to three fourths of an ounce per yard. A rich silk at from six dollars to ten dollars weighs two ounces or a little over. And between these two, the ordinary grades in which the majority of people are interested cost from three dollars to five dollars per yard, and weigh from one to one and a quarter ounces.

An ounce is four hundred and thirty-seven and a half grains (avoirdupois), and as each spider yields one grain, it will require, in round numbers, four hundred and fifty to produce a yard of silk; or fifty-four hundred for an ordinary dress-pattern of twelve yards. The number of worms required for the same is to be ascertained by dividing those figures by two and a quarter, which makes, in round numbers, two hundred worms for a yard, and twenty-four hundred for a dress.

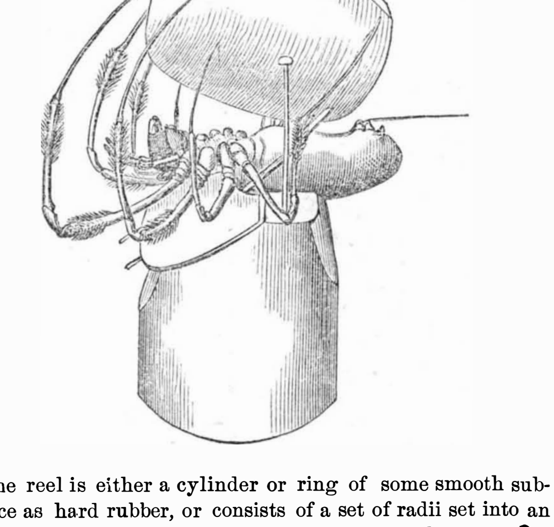
And now supposing (for the sake of comparison) that each spider costs as much time and trouble and money as a worm, and that, therefore, a fabric of spiders' silk costs two and a quarter times as much as one of ordinary silk, that fact by no means indicates that the former is not worth having.

Honey costs more than molasses, but every body of taste thinks it worth the difference; a steel knife is all very well, but a silver one is worth the difference in cost to all who can afford to pay it. A cotton or woolen dress is not to be despised by any one, but every woman prefers a silken gown, and counts the increased price as small compared to the greater satisfaction it affords; and now, so far at least, as we can judge, as honey is to molasses, as silver to steel, as silk to cotton, so is the product of our spider to that of the worm; and the superior beauty, and elegance, and delicacy of the fabric will, no doubt, more than compensate for the difference in its cost.

MACHINERY.

First catch your spider, is a necessary preliminary, and although this matter properly belongs to the last division of our subject, it may be well to quiet the apprehensions of any one who suddenly recollects the big body, and long legs, and sharp jaws of the *Nephila plumipes*, as elsewhere figured, and fears that it is an untamable creature which will resist an attempt to abstract its silken stores. I will leave the complete removal of this apparent obstacle until we come to consider the spider itself in all its relations, and merely say now that it seldom tries to escape or to bite; that you have only to get its body between thumb and finger so that two legs are turned backward, to be perfectly safe from injury by its jaws.

After many trials, the contrivance which I have adopted consists of two large corks, a bent hair-pin, two large common pins, a bit of card and a bit of lead. One cork serves as a base. Its bottom is loaded with the lead, and one half its top is beveled off at an angle of forty-five degrees; upon the oblique surface so formed is fixed the piece of card, its upper edge projecting an eighth of an inch; into the remaining half of the upper end is cut a broad and shallow groove, and upon each side of this groove, at the middle of its length, the two pins are stuck into the cork, so as to be about an inch apart; and now when the insect is held with the legs behind the back and laid upside down into the groove, the projecting shoulders of the abdomen bring up against the edge of the card, and the legs are kept in front of the two pins. The upper cork is rounded and smoothed at its smaller end, and a hair-pin is pushed obliquely through the lower corner of the larger end so as to form an angle of forty-five degrees with the lower side; one or two tacks will retain the pin in its place; at the distance of a quarter or third of an inch from the cork, the pin is bent outward on both sides so as to double its width, and then straightened. Now push the ends of the pin down between the card and the first cork, with the rounded end of the second cork projecting over the card. This may be done with the left forefinger, while the first cork is held between the second finger and thumb; the spider's abdomen is now put through the opening formed by the pin on each side, the cork above, and the cork below; its abdomen rests in the groove, the shoulders come against the card, the upper cork is pressed down so that the narrow part of the pin embraces the pedicle; the legs being set free, fly up and embrace the rounded upper cork, the lower one is fixed upon a screw, turned around so that the abdomen of the spider points to the right; and we are ready to begin the reeling process.



The reel is either a cylinder or ring of some smooth substance as hard rubber, or consists of a set of radii set into an axle, and having their ends bent at a right angle and enameled so as to present an even surface to the delicate silk. The reel I used had radii about three inches in length; this made the whole diameter six inches, and of course at every revolution eighteen inches of silk were reeled upon it; the motion could be quite rapid, and if steady, one or even two feet of silk could be drawn each second, so that a very few minutes would suffice to exhaust the day's supply of a spider.

The thread of a single spider cannot be drawn from a reel In order to obtain a compound thread of such size as to permit us to unwind it from the reel, we have only to arrange a large number of spiders, and carry their combined threads upon the reel; by well-known mechanical contrivances the reel itself (which must not be a slender spindle) may be made to revolve in two directions, so as to twist the thread properly, and then there seems to be nothing to hinder carrying the silk directly from the spider's body to the sewing machine or the loom, for there is no gum to be removed, and its natural colors are beyond the capability of art.

The spider can retard the flow of silk from its spinners by strongly pressing them against each other, but if the reeling is regular it cannot wholly prevent it.

Under the head of disadvantages we must include two very unpleasant facts; 1st, that the young devour each other to such an extent that, as a rule, only a very few out of the several hundred hatched in every cocoon ever reach the age when they separate and build isolated webs; and, 2d, that the female spider is apt to devour her partner sometimes before, but more often after the impregnation of the eggs.

The latter fact is not of so much consequence; for the females are the spinners, and are always in the majority, not only in the number but also in the size of the individuals (the female being about 125 times as large as the male), and the males can be easily protected.

But the terrible destruction which, in a state of nature, seems necessary in order that a portion shall grow at all, is a very serious obstacle in the way of any increase of the species. This killing of each other, however, is not, apparently, from malice but from hunger, and both experiment and inference indicate that it may be almost entirely prevented by supplying the young and growing spiders with suitable food. Each cocoon spun by the parent spider contains from five hundred to a thousand eggs, all of which hatch, generally in the course of a month. For several days, and even weeks, they remain huddled together in the cocoon, and whatever growth they have during that time, aside from absorption of moisture from the air, must be at the expense of the community; nor can it be well prevented. But after this time has passed, and they begin to come forth, either singly or in parties, and spin their little lines over the leaf to which the cocoon is attached, they may be in a great measure prevented from further cannibalism by putting in their reach drops of blood or crushed flies, or very minute flies, or bugs of almost any kind.

If large numbers of them are to be reared, a special apartment should be arranged for them; each cocoon should be attached to the top of a wire frame of, say a foot in hight and nearly the same diameter, which must stand in a shallow dish of water, lest the spiders travel about the room and collect in great numbers at the top, where they could not be cared for. They will spin at first an irregular common web, and eat together from whatever food falls upon it. As they grow larger they may be separated by inverting another frame over the first; for they always ascend.

After several weeks, they suddenly change their instincts; and from living together in some sort of fellowship, which really does not seem to be imcompatible with their peculiar style of eating each other up, they attempt to isolate themselves, and to make each for itself its own web, which is now geometrical, like that of the full-grown spiders; and as they now need more room, and will jealousy resent any trespassing upon their particular territory, it is time to remove them to the frames, which will be described in the following section.

It is impossible to say how large a percentage may by this plan be reared from one cocoon; but the fact that two or three out of every hundred have been saved at a first trial, under very favorable conditions, show what may be expected of a plan like the above systematically conducted upon a large scale.

As to the food of the young, there are some substances which breed the smaller kinds of flies, and which could be kept in a place communicating with the outer air in another room; but covered with fine wire netting. This would exclude the larger species, but would admit the little ones to deposit their eggs upon the meat, etc.; and the flies produced therefrom could enter the apartment.

The growing spider, like the worm, casts its skin several times before reaching its full size, and in both the operation is attended by some danger.

It is, no doubt, a disadvantage, that the spider, in moulting, is obliged to draw eight such very long legs from their old skins; but although the legs may be occasionally pulled off in the process, yet they generally separate at the second joint from the body, and thereby no blood is lost; and, moreover, although each pair of legs has its appointed office, they act vicariously. To offset the liability to injury in consequence of their more complicated structure, the spiders are not known to be subject to diseases, such as have so terribly destroyed the worms of late years; but we cannot be sure that some maladies will not follow their domestication.—*B. G. Wilder, M. D., in the Galaxy for July.*

The Ixtle Fiber.

The following is a letter from Hon. J. McLeod Murphy to the Commissioner of Agriculture, accompanied with three skeins of the ixtle fiber, *Bromelia sylvestris*, each produced from a single leaf, of which a single plant might average twenty. We extract the substance of this letter from the "Report of Department of Agriculture" for May and June.

"First of all, before I describe the plant and the method of its cultivation, I beg to call your attention to the extraordinary length and strength of the individual fibers, their susceptibility of being divided almost infinitesimally without breaking, their flexibility without kinking, and the readiness with which they receive and hold vegetable or chemical dyes without being impaired. Since my return from Mexico, I have had little or no opportunity of testing this plant practically; but some samples, such as I send you, were given to an old and experienced maker of fishing tackle, and he does not hesitate to pronounce the ixtle fiber as superior, in every respect, for the manufacture of trout and other fishing lines, not only account of the readiness with which it can be spun, its extraordinary strength, but its perfect freedom from kinks when wet. The only secret, if there is one, consists in the preliminary precaution of boiling the fiber (as you have it here) before twisting it. In this one respect it will supersede the use of silk.

"Apart, however, from its use as a thread, I hazard nothing in saying that it forms the best paper stock that can be obtained. I speak now in reference to the imperfect, withered, rejected, and dried leaves, from which the fiber cannot be conveniently extracted by the indifferent mechanical means that the Indians employ. Although I have no samples of paper made from this source just now at hand, yet I can assure the department that several magnificent samples of paper for banking and commercial purposes have been made by manufacturers in the Eastern States, from the dried leaves of the ixtle plant, brought from the neighborhood of Tabasco.

"The samples of fiber I send with this were obtained by the most primitive means, viz., by beating, and at the same time scraping, the leaf of the plant (in a green state) with a dull machete. Then, after the removal of the glutinous vegetable matter, it is combed out and rubbed between the knuckles of the hand until the fibers are separated. The next step is to wash it in tepid water and bleach the skeins on the grass. This is the method pursued by the Indians on the isthmus of Tehuantepec; and the average product for the labor of a man is from four to five pounds per day.

"It is scarcely necessary to tell one so well informed as yourself, that this spontaneous product is the *Bromelia sylvestris*, which differs, in some respects, from the *Agave Americana*, the *pulque de maguey*, and *Agave sisalana*, of Campeche; a difference arising solely from soil and climatic influences. The name *ixtle* is given to that species which is characterized by the production of the long fiber; and chiefly because the leaf, being shaped like a sword, has its edges armed with prickles, similar, in fact, to the weapon formed from *itzli*, or obsidian, used by the Aztecs. Hence the term. The *pita*, on the other hand, although obtained from a variety of the same plant, is a coarser and shorter fiber, which grows in the *tierras templadas*. The name comes from the word *pittes*, which is given to the plantations of the pulque plant in the uplands of Mexico. But the peculiarity of the ixtle is, that it grows almost exclusively on the southern shore of the Mexican gulf, or in what is known as the 'sota vento,' that is to say, between Alvarado and Tabasco, and extending as far inland as the northern slopes of the dividing ridge which separates the Atlantic from the Pacific. The points generally selected for its cultivation are the edges of a thick forest, for which the small undergrowth is removed by cutting and burning. The roots of the plants are then set out at a distance of five or six feet apart; and at the end of a year the leaves are cut and 'scraped.' The chief object is to obtain a constant shelter from the rays of the sun, which would otherwise absorb the moisture and so gum the fibers together as to make them inseparable.

"The average length of the leaf is six feet, and the time to cut it is clearly indicated by the upward inclination it makes. In other words, the radical leaves cease to form curved lines with their points downward, but stiffen themselves out at an angle, as if to guard the source of efflorescence. When the ixtle is young its fibers are fine and white, but as it grows in age they become longer and coarser; and in a wild state the thorns are very numerous, but by cultivation they are diminished both in size and number, and in many instances there are none at all. Where any quantity of leaves require to be handled, a pitchfork would be very useful, especially if gathered for paper stock. A few days after cutting, the sun would dry them out, the thorns would drop off, and then they could be easily baled. Independent of the great value which the ixtle has for textile fabrics, and for paper, it possesses many valuable medicinal properties, to which I need not allude. It requires no labor to cultivate it, and no insect is known to feed upon it. It grows everywhere in the primeval forests of the Gulf coasts, and, in my opinion, is far superior to any of the textile fabrics. But as yet no mechanic has succeeded in devising a means of effectually extracting the fiber, and until this is done, I presume that its real commercial value will remain unappreciated.

"You will readily discover the superiority of the ixtle over the *jenequin* of Cuba, or the hemp which comes from Sisal and Campeche."

Ocean Telegraphy.

Telegraphy may, with propriety, be considered one of the branches of engineering, and is peculiarly of modern development. A clever writer says that it may be read by each of the five senses. On land lines each signal is made by suspending the flow of the electric current for two different intervals of time, called "dots and dashes"—the use of which in different orders, constitutes the alphabet of the telegraph. When they are printed they are read by sight, but ordinarily the operator reads them by sound, as easily as the musician reads the letters of the scale by the same sense. If the operator has no instrument he will grasp the wire in his hands, and read the signals by feeling the intermissions of the flow of the electric current. In like manner, by placing the wire across his tongue, he can "taste" the same intermission (but this is a dangerous experiment). And it is said that the electricity can be made to dissolve a chemical and produce a pungent odor in the telegraphic alphabet, which can be read by "smelling," but for this I do not vouch. I believe that the method of signaling through the Atlantic cable is known in detail to but few persons. The operation is exactly reversed from that on the land lines. The gutta-percha covering of the copper wires, under the pressure of a great depth of water, becomes an absorbent of the electricity which is being sent through them to the extent of 90 per cent. The first portion of the electric wave of 10 per cent crosses the ocean (1,700 miles) in two seconds, and it would be followed by a succession of waves, from the restoration of that portion of the electricity which has been absorbed by the gutta-percha in impulses, and the signal would be repeated like echoes, and produce not only confusion but great delay. To remedy this, Proffessor Varley introduced a key, which sends alternate currets, positive and negative, at such intervals as allow the first wave of 10 per cent to pass forward, and then that portion absorbed by the covering is neutralized by its opposite, and the cable is cleared for the transmission of a second pair of currents. The battery used is a very small one (three of Daniells cups), and the signal being only 10 per cent of this small current, is powerless to move any of the other instruments in use on land. The instrument used consists of a minute polarized needle, suspended on a single strand of a spider's web, or one from the silk worm. In the middle of this minute needle is placed an almost microscopic mirror, which reflects a single ray of light from a powerful lamp. The currents of electricity effect this needle alternately to the right and left, for a space of time corresponding to that occupied in the signal on the land line, the same kind of alphabet being used in both cases. The receiver (not operator) sits in a dark room, and the small mirror reflects the ray of light upon a piece of white paper before him, on which a black line is drawn, to the right and left of which the light is alternately reflected. The receiver reads these signals by "sight," and transmits them to another person, placed outside of the dark room, by means of an ordinary instrument. A short time since, General Reynolds told me that he had sent a message, without either wire or cable, ninety-two miles, across an arm of Lake Superior, by means of the Heliotrope or mirror, and on the return of his messenger (who had been sent with a written copy) he found that the Heliotrope message had been received, understood and obeyed. He had two assistants, who had been telegraphic operators, who had for a whole summer been amusing themselves in talking to each other with these instruments, though they were stationed ten, twenty or thirty miles apart. When the rebel General Morgan made his great raid through Indiana and Ohio he captured one of my operators, and compelled him to telegraph in Gen. Lew Wallace's name, to Cincinnati, asking how many regular troops there were in that city. Morgan read by "sound," and therefore the operator did not dare to intimate that he was under duress, and could only venture to add an extra initial to his own signature. The receiving operator at Cincinnati knew that Morgan was in that neighborhood and suspecting, from the extra initial letter, that all was not right replied, greatly exaggerating the force of regulars; and the consequence was that Morgan changed his route to a circuit of twenty miles beyond the city, and thus saved it from a sack, and the probable loss of millions of dollars.—*W. J. McAlpine.*

Moving Machinery Represented by Photographic Projection.

All persons who have recently attended the higher classes in our public schools know how much teaching has been facilitated by the frequent use of photographic projections with the electric, or Drummond, light. Thanks to this process, says *Appleton's Journal*, the most delicate objects, whether microscopic or telescopic, can be faithfully represented to an entire audience; and it was supposed, in arriving at these results, that perfection was certainly attained. M. Bourbouze, however, in explaining the gas machine of M. Hugon, experienced many difficulties not before anticipated, while demonstrating the relative movements of the slide and pistons; and was obliged to repeat, several times, the same design, with the organs in different positions, with only a partial degree of success. In studying to remedy this defect, we are glad to say he has entirely succeeded, having invented a process that will completely revolutionize the art of projection. He constructs his photographs in movable parts: but turning a small winch, the whole design is correctly demonstrated; the pistons and slides repeat successively the different relative positions taken by the real machine, and consequently all difficulties in explaining disappear. This elegant result has been obtained by the ingenious inventor by means of a very simple arrangement; each movable organ is photographed on a special glass, and these different glasses are arranged in a frame which contains, on a fixed glass, the photography of the fixed parts of the apparatus represented. The movable glasses are each fixed to a connecting rod moved by a single winch; the length of each connecting rod being calculated in such a way as to produce accurately the movement required.

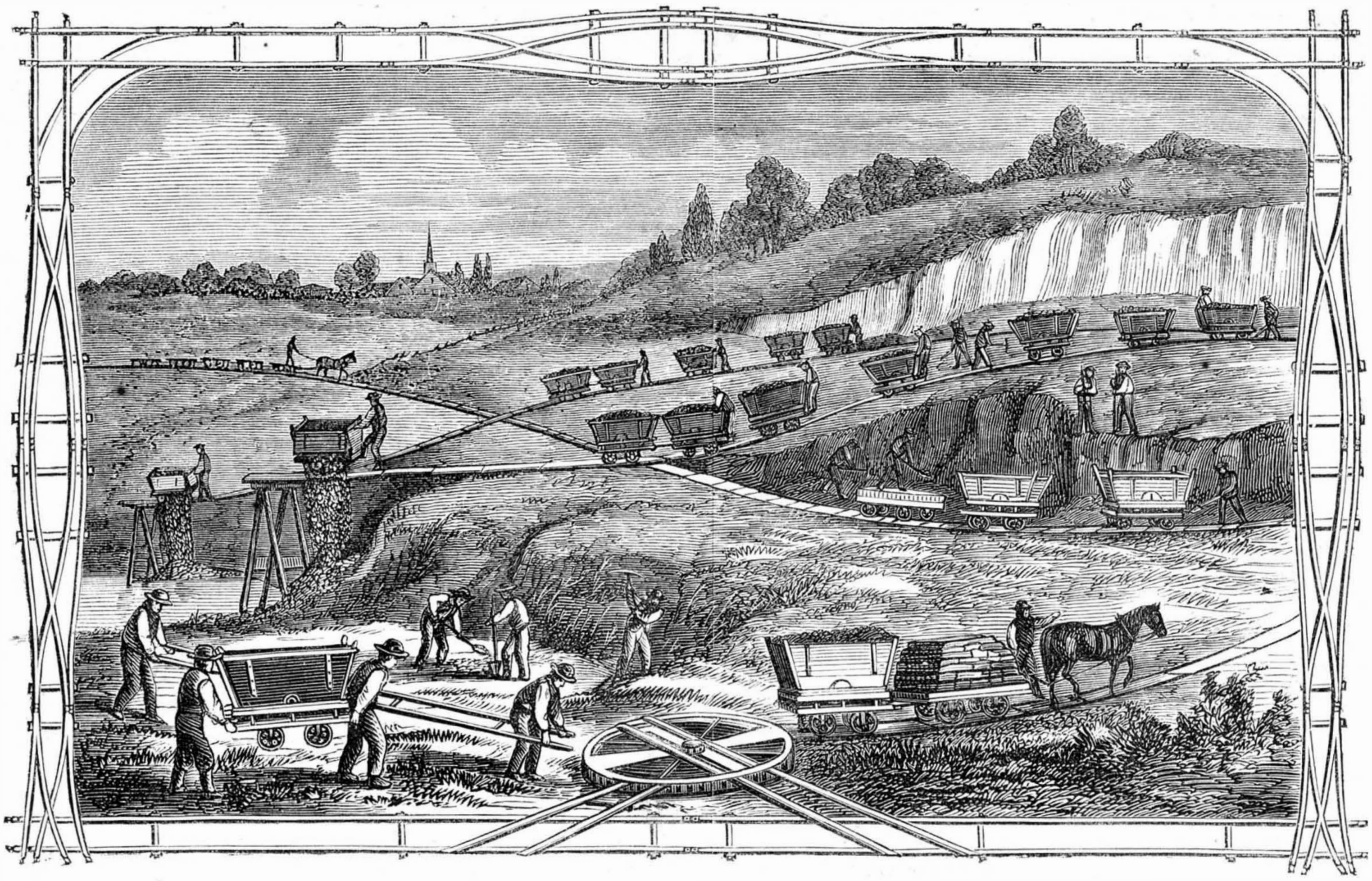
A RECENT discovery in the Département de la Dordogne, France, of human skeletons coeval with the mammoths, and undeniably appertaining to the earliest quaternary period, presents features of such unusual interest that the French government has sent M. Larter, the palæontologist, to make a report on the subject. He reports that the bones of five skeletons have been discovered, and that they belong to some gigantic race whose limbs, both in size and form, must have resembled those of the gorilla. But the similar origin of man must not be inferred from these analogies, as the skulls, of which only three are perfect, afford testimony fatal to this theory, having evidently contained very voluminous brains. The skulls are now in the hands of a committee of savants, who are preparing an exhaustive craniological report.

SOME dentists recommend silk floss for cleaning the spaces between teeth, but we know from experience, that No. 8 gum rings are superior. The rings are not only more convenient to handle but they slip through the spaces easier.

Improved Portable Railroad.

The invention herewith presented is so simple that at first sight it might strike the mind as puerile. Its practical value is, however, second to few inventions claiming the attention of the public at this time, as has been demonstrated in the large saving effected by its use.

It consists of a series of wooden rails connected together in pairs at suitable distances apart to form sections. These sections are connected to each other by simple fastenings, such as hook catches and eyes, so that they can be readily taken apart or connected as desired.



PETELERS' PORTABLE RAILROAD.

With these wooden rail sections are connected turn-outs, turn-tables, switches, frogs, bridges, and other parts necessary to form a complete railroad. All these parts are made principally of wood, and so light that they can be readily handled by a few men. The sections are twenty feet long with iron straps riveted upon them.

The bridges and rafts are composed of ordinary wooden rail sections supported by boards laid crosswise or lengthwise, so that such sections or bridges, when laid on marshy or soft ground, will be prevented from sinking in, and will be capable of sustaining the weight of the cars passing over them.

The cars are so constructed that their contents can be readily dumped, and are so low that the operation of loading them is materially facilitated.

The track thus constructed readily adapts itself to the formation of the ground on which it is laid, as indicated in the engraving, and the great advantage of the invention will be best understood from a case where it has been applied.

In Prospect Park, in Brooklyn, N. Y., large quantities of earth have been moved to fill up sunken places, in excavating lakes, etc. The cost of moving by this method was thirteen cents per cubic yard, against twenty-seven cents by carts, for even a short distance. In Greenpoint, N. Y., 2,500 feet of the portable railroad was laid, and over this road twenty-three trips were made in ten hours by each horse, three horses being employed, each drawing five cars, so that three hundred and forty-five loads of earth were dumped in ten hours, each load being equal to one cubic yard. Twenty men and only three horses were employed, and the saving was over fifty per cent. From this example the great advantage of this portable railroad will be apparent in all operations, such as leveling streets, filling in sunken lots, constructing docks, making excavations, building ordinary railroads, mining, brick manufacture, etc.

We take pleasure in calling the attention of the public to this meritorious and labor-saving invention. It will be found of great service in making a road quickly over soft and marshy ground, and so convenient is it to handle that one thousand feet have been laid in a single hour, by a small force of laborers.

For military purposes, as well as for the objects already mentioned, it must prove valuable. Over $60,000 worth of rights have been already sold.

Patented through the Scientific American Patent Agency, Sept. 4, 1866, by A. Peteler, New Brighton, N. Y. For further particulars address A. Peteler & Co., at the same place.

Shad Propagation.

Intelligence from the Hudson received daily is most encouraging as to the propagation of shad there, under the direction of Seth Green. Mr. Green has lately returned to Rochester and left the work under the direction of his brother, Munroe A. Green who is also very successful. The nets are hauled some two miles from Coeyman's, and the propagating party are fortunate in finding as many of the kind they require as they can well use. They are hatching millions of fishes, which are put into the river. The spawn of these fish would of course be otherwise wasted. The success in this operation has far exceeded the expectations of the Fishing Commissioners and of Mr. Green. M. A. Green is now in charge of ninety of Seth Green's patent boxes, in which the process of hatching takes place. These boxes are floating in the current, and each of them turn out its thousands of young shad every three or four days. Next year the little shad will be seen quite plentiful in the Hudson, and on the third year they will be fit for the table. Shad fishing in the Connecticut has been excellent this year—the fish that Mr. Green hatched there three years ago having matured.

IMPROVEMENT IN COAL SCUTTLES.

Our engraving shows a very neat and convenient form of coal scuttle adapted to secure freedom from dust and to direct the coal when supplying grates, stoves, etc., with fuel, so that the scattering of coal often occurring in the use of the old form of scuttle, will be wholly prevented. The sides of this scuttle in front are double, and the lid, or hood, A, has side pieces, B, which play between the plates of metal which form the double sides. The hood is pivoted at C, so that

when the scuttle is canted forward in the act of filling a grate, the pressure of the contained coal throws the hood out in the position shown in the engraving, where it is held by a stop. When the scuttle is set down, the hood readily falls back and excludes the efflux of dust. The scuttle is supplied, back of the handle with a second lid, which, when raised, allows it to be filled with coal, when the lid is closed, and the dust confined. The scuttle is strengthened and stiffened by an arch of metal, D, passing across under the handle, and firmly attached to the sides as shown.

We consider this one of the most useful and tasteful forms for a coal scuttle that we have seen.

Patented May 25, 1869, by John L. Ellithorp and Peter Sloan, whom address, at Canajoharie, N. Y.

Drying Effect of Fir Trees upon Soil.

A remarkable instance of the effect of pine trees on the soil in which they grow has been published in the "Woods and Waters Reports" of the north of France. A forest near Valenciennes, comprising about eighteen hundred acres of scrub and stunted oak and birch, was grubbed up in 1843, and replaced by Scotch firs. The soil, composed of silicious sands mingled with a very small quantity of clay, was in some places very wet; it contained two or three springs, from one of which flowed a small stream. The firs succeeded beyond expectation, and large handsome stems now grow vigorously over the whole ground. It was in the early stages of their growth that the remarkable effect above referred to was noticed. The soil began to dry; the snipes that once frequented the place migrated to a more congenial locality: the ground became drier and drier, until at last the springs and the stream ceased to flow. Deep trenches were dug to lay open the source of the springs, and discover the cause of the drying up; but nothing was found except that the roots of the firs had penetrated the earth to a depth of five or six feet. Borings were then made, and six feet below the source of the spring, a bed of water was met with of considerable depth. from which it was inferred, the spring had formerly been fed. But in what way its level had been lowered by the action of the firs could not be determined, and is still a matter of speculation. But the fact remains and may be utilized by any one interested in tree culture. For years it has been turned to account in Gascony, where the lagoons that intersect the sandy *dunes* have been dryed up by planting the *Pinus maritimus* along their margin. Hence we may arrive at the conclusion that while leafy trees feed springs, and maintain the moisture of the soil, the contrary function is reserved for spine or needle bearing trees, which dry the soil and improve its quality.

Nocturnal Hailstorms--Hailstones of Singular Form.

A correspondent from Pittsburgh, Pa., gives an account of a nocturnal hailstorm which occurred in August, 1851 or 1852, at 11 P. M. The hail fell in great abundance, covering the ground to the depth of several inches. The stones were of enormous size, some of them being two inches in diameter. They were shaped like an unripe tomato, slightly concave on one side, and considerably flattened. This storm occurred in Alleghany county, Pa., about eighteen miles from Pittsburgh.

Another correspondent writes us from Germantown, Ind., that on the evening of the 8th inst., a violent hailstorm occurred at that point, commencing about 9 P. M., doing much damage to buildings and crops. The stones were the size of hickory nuts, and round, with the exception of a little sunken hole on one side.

Another correspondent writes us from Illinois, stating that although he has never witnessed a nocturnal hailstorm, he has seen three hailstorms in that State remarkable on account of the size and peculiar shape of the stones. These stones killed chickens, pigs, and other small animals. In one of the storms the hailstones were, as he represents it, "square chunks," or approximate cubes—a form of hailstones we have never seen described before. These communications settle all doubts of the occurrence of nocturnal hailstorms.

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NEW YORK, SATURDAY, JULY 31, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

ON CIRCULATION IN BOILERS.

Certain communications, lately received, in reference to boiler construction, lead to the inference that the importance of securing proper circulation in boilers is imperfectly comprehended on the part of some of our readers. In order to make this subject comprehensible to those unskilled in boiler construction, we will briefly state what will take place when water is boiled.

First, the heating of water to 212° Fah., its boiling point under atmospheric pressure, at the sea level, is not synonymous with boiling, for if water be taken to lower levels, as in deep mines, it will not boil, on account of increased atmospheric pressure, till a higher temperature has been reached. In all steam boilers, when condensation is not employed to remove atmospheric pressure from the exhaust, a greater pressure than that of the atmosphere must be maintained, to give an effective pressure in the cylinder. It follows that in such boilers the temperature at which steam escapes from the surface of the water in such force as to cause ebullition or boiling must be higher than 212° Fah., by an amount corresponding to the pressure maintained.

The violence with which the boiling of water takes place, when the proper temperature is attained, depends not only very much upon the shape of the containing vessel, but in an almost equal degree upon the point at which the heat is applied to it. Water, contained in a long, straight, and narrow tube, closed at the bottom, may be quietly and entirely evaporated if the tube be held in a gas flame, obliquely, so that the heat shall be applied successively to the uppermost strata as evaporation proceeds. If, on the contrary, the tube be so held that the bottom stratum receives the heat first, the water will either be thrown out of the tube, or the bottom will be blown out. But a tube might be so formed and adjusted that heat applied at the highest point would also force out the water. A tube, bent into the form of the letter *U*, filled with and having its lower ends immersed in water, would be such a tube.

All violent ebullition in a boiler not only tends to render it unsafe, but also uneconomical from foaming or priming. If we were addressing our remarks to experts, we should not need to say that the amount of water required to feed a boiler is no index of its evaporative power. Water thrown out unconverted into steam is not evaporated. It performs no work in the cylinder of the steam engine unless converted into steam by what is called superheating.

As water does not boil until steam is generated in sufficient volume, and as this event depends, all other things being equal, upon the amount of surface pressure, it follows that in high-pressure boilers a much greater increment of heat must first be imparted to the water than in low-pressure boilers,and that priming is more likely to occur in them on account of the higher temperature and greater activity of the steam. Previous to boiling, the contained water circulates quietly, the heated particles rising as fast as heated, and giving place to colder ones, until the temperature of the mass is raised to the point at which steam is rapidly generated. When this takes place, every particle of water converted into steam occupies some three hundred times the space which it filled in the liquid state, so that, in escaping to and through the surface, it requires a very much larger and freer passage than before. If this is not provided, the water will be violently upheaved, and dashed about, spray will be produced, and wet steam become a certain result.

Such was the case in the now discarded suspended tubes employed some years since in the earlier forms of portable engines. These tubes, suspended in the fire box, made no adequate provision for circulation, and, of course, were found to be inefficient as well as dangerous.

The form of boiler which, of course, will give the freest circulation of any, is the plain cylinder, without tubes or flues. But such boilers give only a small heating surface in proportion to the amount of water they carry, and on other accounts are not economical. It will be found generally better to pass the fire through tubes or flues surrounded by water, than the converse. And it is also necessary that a proper distance between such flues should be maintained. In any tubular boiler the tubes ought not to be too small. It is safer and more economical to err on the other side, if slight error is unavoidable, and to provide for a free and perfect circulation.

Circumstances which determine the proper proportions, are very numerous, and ought to be well considered, in the construction of every flue or tubular boiler. He who, without posting himself upon the results of modern experience and investigation, expects to achieve much success, will be doomed to disappointment.

THE PROPOSED POSTAL TELEGRAPH.

Our able and spirited cotemporary, *The Telegrapher*, has from the first looked with disfavor upon the proposition to establish a Government postal telegraph in this country. In its issue of the 3rd of July it devotes a leading article to the subject. It says:

"By recent telegraphic advices by cable, we are informed that the cost to the British Government for the purchase of the telegraph lines of the country, will be £6,500,000, equivalent to $32,000,000 in gold. For this enormous expenditure the government gets only the lines and equipments as at present established and in use. An additional large amount will be required to extend the wires, and establish offices as proposed by the postal telegraph advocates. When this is done the system cannot be as cheaply worked as by private enterprise, and there is no doubt but that for some years to come there must be an annual loss, not only of the interest on the capital invested, but also on the actual working expenses. These facts are having a decided effect on the minds of the members of Parliament, and they seem to be in no hurry to appropriate the money necessary to carry out the bargains of the Disraeli Government, and it is by no means certain but that the schemes of the postal telegraphers in England may yet come to grief from the disinclination of any government to take the responsibility of wasting such a sum as is required to carry out the postal telegraph project.

"We commend these facts and figures to the serious consideration of those in this country who have been inclined to favor the schemes for a Government telegraph, advanced and directed by B. Gratz Brown, E. B. Washburne, Gardiner G. Hubbard, and the *New York Herald*. Mr. Hubbard's scheme of a Postal Telegraph Company is an absurdity and can never be carried out."

Now, as we are one of those inclined to favor a Government telegraph, we have looked at these figures with attention and we do not accept the inferences that *The Telegrapher* thinks must be drawn from them. We agree that "if the Government is going into the telegraph business it must do it boldly and unequivocally," but we do not agree that *it is necessary* to make it a "Government monopoly" although we think that, after a short time, it would be wise to do so, to the extent which the present postal system may be so called. The postal system now competes in the carrying of small parcels and newspapers with the express lines throughout the country. It also permits the carrying of letters by those not appointed specially for that purpose, if they are stamped. If it is thought best to purchase existing lines, upon honest appraisal, the property purchased would be worth the money paid for it.

The Telegrapher does not seem to take into account the effect likely to be produced by the large reduction in rates proposed. Such reduction would render the telegram an ordinary means of communication, rather than an exception, as is now the case, and consequently for a given extent of line the aggregate returns would be greatly increased without a corresponding increase of expense in the working of the lines, and the profits would be greater.

Having said this much we are ready to admit that although there is something to be said in favor of a Government telegraph, there is also much to be said against it.

The way in which the business of the Government is now transacted, does not greatly encourage the wish to place in its hands any wider patronage than it now possesses. The chances are that were the telegraph property of the entire country to be bought up, a series of jobbing would be inaugurated which would enrich the present holders of the property, and rob the people.

The interests of the different lines as well as the public would, we believe, be so greatly enhanced by a large reduction in present rates of transmission, that all thought of change would be at least for a considerable period, banished from the public mind. The present rates over many lines are preposterously exorbitant, and of course their business is limited by them. Give any one of these lines all the business it can do, and the rates might be made extremely small, compared to current charges. We believe the converse would also be found true; and that were the prices of transmission very much reduced, both business and profits would be enormously increased.

Whether competition brings this about or not, one thing is certain, the public will not long be deprived of cheap telegraphic communication.

HEAT never performs work except in passing from one body to another. It is then only partially converted into work.

LITTLE KNOWN FIBROUS PLANTS.

There has been of late a considerable search after plants producing fibers that could be advantageously used in the arts of paper making, rope making, and the manufacture of textile fabrics. Some of these materials have been discovered in North and South America, but a large majority of those claiming the attention of manufacturers are found in Southern Asia, more particularly in India.

Among these stands most prominently a plant of the nettle family called by the natives "*Tchuma*," the botanical name of which is *Urtica nivea*. In Assam both a cultivated and wild variety is found, and in the Malayan peninsula, Panang, and Singapore, another variety grows wild, the fiber of which is unusually strong. This has a Malay name, "*Ramee*," and is in botany known as the *Urtica tenacissima*. This plant is identical with the ramie, now cultivated in the Southern States, brought originally, we believe, from Java.

Mr. Leonard Wray, in a paper read before the Society of Arts, in London, describes the beautiful fiber of the "Rheea" as being worth in England two shillings and four pence per lb., and says, "the fabrics made from it are of so strong and so lustrous a character as to be in universal demand. Pity, indeed, is it that this splendid fiber can be obtained only in such small quantities. No other supplies can be looked for, except from China, nor can we expect much from that country either. Its growth and preparation have been tried by most intelligent Englishmen in India, but they found, first, that the separation of the fibers from the plants was a most difficult and laborious operation; and, secondly, that the yield per acre per annum was exceedingly small. Indeed it is said to yield only one to one and a half cwt. of fiber to the acre—a fact which forbids any European from entertaining hope of cultivating it at a profit, which is much to be regretted."

Mr. Wray also believes the plants called *Pederia fœtida*, the "*Jettee*," "*Moorva*, and the pine apple, each and all of them, hold out the promise of amply remunerating any European who will attempt in a judicious manner to utilize the beautiful fibers they contain. Their fibers are fine, silken, and strong. He says, "The *Pederia fœtida* certainly has the most silky and lustrous fiber any one can desire, and its being only in lengths from joint to joint seems the sole objection to it. Still, these joints are often 12 inches apart, while the finest Sea Island cotton is not more than one inch to an inch and a half in staple. Attention ought, therefore, to be directed to this lustrous fiber-yielding plant.

"The Jettee, again, is jointed, but the joints are sometimes two feet apart, and the fiber proportionably long. It is a most excellent fiber, and will be sure to make its way.

"The pine apple, with its beautiful fiber, exists in thousands of acres in the Straits of Malacca, and may be had at Singapore in any quantity for the trouble of gathering, yet no one seems to regard it."

Another important fiber-producing plant is the *Bromelia penguin*, from which the surprisingly beautiful Manilla handkerchiefs are made, as well as the celebrated "Pigna" cloth, an Indian fabric commanding always an extreme fancy price. This is a kind of wild pine-apple said to be exceedingly abundant.

The late Mr. Temple, formerly Chief Justice of British Honduras, some years since exhibited a quantity of this fiber to the Society of Arts, calling it silk grass.

Mr. Wray says we may search the world through and not find another plant capable of yielding so rich, so abundant a supply of a fiber which in quality cannot be excelled, and that it is a plant which we may look to, to provide us with a large amount of the very best quality of fiber.

The fiber alluded to can be grown exceedingly cheap, and it is asserted that the manufacture involves no difficulty. The fiber is said to be separated by a machine constructed somewhat on the principle of the thrashing machine, the plant being passed at a slow rate along a platform having a yielding surface, through rollers and beaters; and, when this is done with the plant in a green state, it comes out at the other end of the machine very good fiber, which is improved by repeating the operation. A stream of water is used to wash the pulp away as it is expressed from the fiber.

Among cordage fibers there is the nettle and the canna; the latter often growing fourteen feet high. The whole stalk and leaf are said to be one mass of fiber, and the root furnishes a species of arrowroot said to be the most nutritious of all the starches.

It is thought that some if not all of these plants can be grown in Europe, and if so they ought to thrive in parts of the United States. It is not a just inference that because a plant is a native of a tropical clime it will not thrive in temperate climates. Though this may be the rule, there are numerous exceptions. Our Commissioner of Agriculture would do the country a service by obtaining and distributing the seeds of these plants in sections most favorable to their growth, if he has not already done so. We are far from believing the vegetable kingdom contributes to the wealth of mankind all, or nearly all, it is capable of doing. It is within the memory of yet young men, that the tomato was considered a useless vegetable, yet to-day there is probably no fruit grown in this country, if we except the apple, more generally used and esteemed. It is quite probable that many plants indigenous to our soil, possess fiber which would be of great service, if properly worked. Among those which seem most promising are some of the "*Asclepias*" family, popularly known as "milkweeds," "silkweeds," and so forth. The plants are large, rapid, and thrifty growers, and their pods contain a large amount of cotton-like fiber, which, though it might not be sufficiently strong for textile fabrics would make, we think, excellent paper stock. We are not aware that any experiments have been made with this fiber, although we have often heard it spoken of by manufacturers, as likely to prove serviceable, could it be produced at a cheap rate. We cannot of course say what amount of fiber could be produced upon a given quantity of land, but as it grows wild with great luxuriance, it would seem that a large crop might be expected on rich soil under cultivation.

THE FORTHCOMING ECLIPSE.

On the 7th of Aug. next a total eclipse of the sun will occur, visible in the United States, at the following points:

BEGINNING AND ENDING OF THE TOTAL PHASE.

	Begins. h. m. s.	Ends. h. m. s.
Lincoln, Iowa	4.29 3	4.32 3
Des Moins, Iowa	4.44 1	4.47 0
Iowa City, Iowa	4.53 8	4.66 2
Burlington, Iowa	4.56 9	4.59 9
Keokuk, Iowa	4.56 3	4.59 0
Rock Island, Ill	4.63 3	5.00 8
Peoria, Ill	5.04 0	5.06 1
Quincy, Ill	4.57 4	4.59 7
Springfield, Ill	5.04 8	5.07 6
Alton, Ill	5.05 5	5.06 2
Terre Haute, Ind	5.15 1	5.17 4
Vincennes, Ind	5.15 9	5.18 6
Louisville, Ky	5.25 1	5.27 6
Frankfort, Ky	5.28 8	5.31 0
Lexington, Ky	5.40 5	5.32 7
Abingdon, Va	5.42 4	5.44 3
Wytheville, Tenn	5.45 7	5.47 3
Greeneville, Tenn	5.39 5	5.41 3
Knoxville, Tenn	5.36 4	5.39 4
Raleigh, N. C	5.57 4	5.58 5
Wilmington, N. C	6.01 7	6.04 6
Newbern, N. C	6.05 8	6.08 0

The average duration of the total phase will be about two minutes. Some of the prominent central points will be Springfield and Rock Island, in Illinois; Terre Haute, in Indiana; Louisville and Frankfort, in Kentucky; Abington, in Virginia; and Raleigh and Wilmington, in North Carolina; and Des Moines, Iowa.

Coming, as it does, so to speak, on the heels of the great discoveries of last year, this eclipse will attract unusual interest, and be observed with great care.

We learn that the Government has ordered three astronomers, from the Naval Observatory, to proceed to Des Moines, and two others to Behring Straits. The Coast Survey, also, will send a detachment of observers to Des Moines, and another to the Missouri River, five hundred miles beyond Sioux City. Observations will be made at Burlington, Iowa, by the Superintendent of the Nautical Almanac, and Louisville, Ky., will be visited by Prof. Wilson, of Cambridge. Prof. Hough, Director of the Dudley Observatory, at Albany, will, we understand, go to Des Moines; and Prof. Peters, of Hamilton College will also make his observations at the latter place. He will be accompanied by Prof. William A. Rogers, of Alfred Center, N. Y., and Isaac H. Hall, of New York.

The *Post* informs us that ample preparations have been made by Prof. Peters, at an expense of about twelve hundred dollars, the funds being provided by Mr. Edwin C. Litchfield, of New York the liberal founder of the Astronomical Department of Hamilton College. It states that the theory of the constitution of the sun has been for years a special object of study at the Hamilton Observatory, and many special points bearing upon that theory will be determined by observations of the coming eclipse.

The extreme rarity of this event, also, adds much to its interest, there having been only two total eclipses, visible in any large part of the United States during the present century: those of 1806 and 1834. Annular eclipses are far more frequent, but their observation is not likely to be so fruitful of discovery as that of total eclipses.

We wish the observers, each and all, a cloudless sky, and success in their arduous undertaking.

THE ART OF PYROTECHNY.

We have often been puzzled to account for the delight with which popping, and frizzing, and blazing, on the Fourth of July, seems to fill the minds of boys and even men. Whatever may be the cause, the recent display gives no indication of diminished taste for such sports.

However, as the art of pyrotechny is an industry involving the employment of considerable capital, ingenuity, and artistic taste, it may not be amiss to give our readers an outline of the means employed to produce the effects so much admired by most people.

The word pyrotechny signifies the art of employing fire for useful or other purposes. It consists, first, in the combination and admixture of different materials so that they shall produce, when burned, certain colors, explosions, etc., and also so arranging them that they shall represent a preconceived design, or impart, by their explosive force, motion to wheels, rockets, etc.

The little that is known in regard to this art seems to indicate that the Chinese had a very early knowledge of it, if they were not the first to originate it. And they are still, perhaps, as skilled in it as any other nation.

One of the chief materials employed is gunpowder, the nature and composition of which are varied somewhat according to the purposes to which it is applied. It is unnecessary to dwell upon its composition, as our readers are already well informed in regard to it, as well as the method of manufacturing it; and doubtless some of them have received, during the late celebration, practical demonstration of the impossibility of restraining its force. In such attempts, hands and arms rarely are found equal to the emergency.

Niter is also a material of the greatest importance in this art. It is obtained in the common form in which it is sold in large establishments, and purified by solution, filtration, and recrystallization. The composition of this salt is one equivalent of potash and one of nitric acid. At a red heat it is decomposed, giving off its nitrogen and oxygen, the latter of which constitutes nearly one half the weight of the salt. Being so rich in oxygen its presence in connection with a sufficiently heated combustible affords, by its decomposition, a supply of oxygen to support vigorous combustion, and hence its general use in the art of pyrotechny.

Sulphur, charcoal, steel dust, and iron filings, are also largely used. A material called "iron sand," made by pulverizing cast iron, is also employed. This iron sand is often prepared so as to keep without rusting, by partially combining it with sulphur, in order to coat the grains with a sulphide of iron. It is slowly sifted into melted sulphur, and thoroughly stirred till the mass is cold, when it is finely pulverized, and the extraneous sulphur sifted out. The granules of iron sand give most beautiful sparks when burned. Oil of camphor, benzoin, salts of strontium, antimony, copper, and other metals which impart brilliant colors to flames when burning, glass dust, brass dust, ivory raspings, amber raspings, chlorate of potash, Ethiop's mineral, chalk, orpiment, nitrate of barium, and many other ingredients, are employed. A few recipes will give a clue to the method in which these materials are used to obtain colors.

STARS FOR ROCKETS.

1. *Purple.*—Chlorate of potash, 42 parts; saltpeter, 22 parts; sulphur, 22·5 parts; black oxide of copper, 10 parts; Ethiop's mineral, 2·5 parts.

2. *Lilac.*—Potash, 50 parts; sulphur, 25 parts; chalk, 22 parts; black oxide of copper, 3 parts.

3. *Green.*—Nitrate of barium, 62·5 parts; sulphur, 10·5 parts; potash, 23·5 parts; orpiment, 1·5 parts; charcoal, 1·5 parts.

4. *Yellow.*—Nitrate of soda, 74·5 parts; sulphur, 19·5 parts; charcoal 6 parts.

5. *Crimson.*—Chlorate of potash, 17 parts; nitrate of strontium, 55 parts; charcoal, 4 parts; sulphur, 18 parts.

The coloring principles of the above mixtures are, in No. 1, the oxide of copper and Ethiop's mineral; in No. 2, the chalk and the copper; in No. 3 the nitrate of barium; in No. 4, the nitrate of soda; in No. 5, the nitrate of strontium. In all of them the sulphur modifies the color more or less, and when burned alone it gives a blue flame.

Black pitch gives a dusky flame, like thick smoke; sal ammoniac and copper salt, a greenish flame; raspings of amber, a lemon yellow; powder of metallic antimony a russet; raspings of ivory, a beautiful silvery flame; steel dust, very brilliant silver-colored spangles.

Rockets and wheels are propelled by the reaction of suddenly generated gases, discharging from cases of strong pasteboard. The motion of serpents is produced by a small piece of paper, or its equivalent, attached to the middle of the case, which, by its resistance upon the air produces the erratic motions of these amusing fireworks.

Gerbes, or fountains, a species of firework, which throws up a sparkling jet of fire, resembling somewhat the shape of a water spout, are made of thick paper or pasteboard, partly filled at the bottom with clay through which a priming hole is bored. Roman candles are very nearly like the gerbes. Between their layers of composition, balls or stars are placed, which vary the effect produced.

Rockets are strong paper cylinders filled with a composition rammed hard. They may have attached to them "heads" of gunpowder, sparks, stars, serpents, etc., as fancy may dictate. The stick attached to them acts as a rudder to keep their flight in the proper direction.

The composition with which rockets are filled varies with the weights. For one and two ounce rockets the ingredients may be one pound of gunpowder, two ounces of soft charcoal, and one and a half ounces of saltpeter. For four-pound rockets, gunpowder one part, saltpeter thirty parts, sulphur four parts, charcoal twelve parts. All the materials are pulverized except the gunpowder, and the mixture thoroughly incorporated by sifting. The composition is then rammed hard into a case made by cartridge paper upon a brass former, with paste between the laminæ. The sticks being attached properly the rocket is completed.

To give a more minute description of the details of this art would extend this article too much. Suffice it to say, that the recipes and compositions above given are by no means the only ones by which similar effects may be obtained. To give them all, with all others used in the art, would require a volume.

MANUFACTURE OF IRON AND LEAD PIPES.

Whoever will examine the various methods of supplying modern cities with water cannot fail to contrast the modern water-main with the ancient aqueducts. Generally speaking, we lose nothing by the comparison. The man of sentiment may deplore the innovations which displace the well or fountain, but the practical, matter-of-fact man or woman will yield more to comfort and economy. A windlass or pump-handle looks well in a rustic picture; at the same time, they are suggestive of labor, while our hydrants, to employ a Hibernicism, "do their own pumping."

Has it ever occurred to the reader to inquire how pipes—common water and gas pipes—are made? In every large city in the Union there are miles upon miles of large and small pipes under ground. Nearly every resident of a large city is aware of the fact that these pipes are made of iron, but we question if one in a hundred knows how they are made. They are taxed for their construction, taxed for their connections, taxed for every gallon of water and every foot of gas which courses through them, yet further than that they know nothing about them. Here in brief is the process:

1. A hollow spindle, or tube, the length of the pipe required, is covered with a rope composed of straw, and the latter covered evenly with loam about the consistency of mortar. 2. This spindle, thus prepared, is next placed in a drying oven, dried thoroughly and washed carefully with a composition which prevents the loam from adhering to the metal. At this stage it is now termed the "core," around which the pipe is to be cast. 3. A large iron flask, corresponding in length with the "core," in the form of a cylinder, constructed in such a manner as to open and shut as a hinge is opened, is placed on end (the sides being held together firmly with clamps), an iron pattern corresponding in size with the diameter of the pipe inserted, and the intervening space filled with sand. 4. The iron pattern or shaft is then withdrawn, the mold washed with the composition already described, and the flask placed in a drying oven. 5. When thoroughly dry, the flask is placed on end in a pit, the "core" placed exactly in the center, and the boiling metal poured in from the top, as in the method of casting bells. 6. The spindle around which the "core" is formed and the metal flask being perforated, permits the heated air and gas generated in the pouring process to escape. The purpose served by the straw rope will be better understood when we explain that all metals shrink or contract in cooling. If the metal were cast around a perfectly solid cylinder, whether composed of stone, iron, or dry sand, it would crack from end to end, or burst into fragments on cooling, from which it will be seen that the straw serves as a cushion which accommodates itself to the strain brought to bear upon it. When the metal has remained a sufficient length of time in the mold or flask, the latter is taken from the pit, the clamps removed and the pipe turned out. The "core" is afterward pulled out, and the pipe is complete.

The pit alluded to is about twelve feet deep. As the iron flasks alone weigh from seven hundred to four thousand pounds, the reader will naturally be curious to know how they are lifted in and out of the pit when full of sand and metal. It sometimes happens that the total weight exceeds eight or nine tuns. This is accomplished by means of a number of cranes or adjustable windlasses, which raise, lower, and move the flasks from one spot to another as easily as a man moves his arm. Operated by a small steam engine, the cranes perform the work of a regiment of men every day, and are absolutely indispensable. "Swinging around a circle," they hoist, lower, or draw toward or push away from themselves the most prodigious weights with a celerity truly marvelous. They even do their own cleaning, for as the pits become full of sand, or dirt accumulates in their vicinity, the moment it is shoveled into a huge barrow, they lift it up and "dump" it at a respectable distance.

Those who are unacquainted with the principles which govern liquids may inquire, "Why not use earthen or wooden pipes under ground, or something less costly than iron?" Why, dear sir or madam, it would not stand the pressure. To illustrate this matter, we will state that by placing a small iron tube of a given hight in the strongest cask or barrel and filling the same with water, you can burst the latter into fragments at the imminent risk of breaking your ribs. The majority of the iron pipes under our streets sustain from fifteen to thirty pounds pressure to the inch, so, to avoid those accidents which flood your streets with a sheet of water in winter, and make ice entirely too cheap for comfort, all the pipes are subjected to a pressure of from two to five hundred pounds to the inch.

We presume there are not ten readers of this magazine who have any idea of the manner in which our common lead pipe is made. We are satisfied that if their lives depended upon it, they would never guess the real process. Time was (in the 18th century and until 1820) when lead pipe was cast and drawn in a manner similar to the process of wire-drawing. Now, however, it is forced through a cylinder between a "core" and dies, *when in a solid state.* A hollow cylinder is constructed in such a manner as to admit a steel die in one end with an opening of the shape and diameter of the out side of the pipe required. A solid piston or ram fits this cylinder evenly without friction. Attached to this piston is a long, movable "core" or spindle, of the diameter of the inside of the pipe.

The cylinder is filled with melted lead, allowed to "set," and the piston pressed into it by a hydrostatic press. When the pressure is applied, the lead is forced forward and out between the orifice in the die and the steel spindle or "core," which accommodates its movements to the action of the lead in forming the pipe. Still another and better plan is the introduction of a stationary spindle, which produces a superior and more uniform article. As the lead is forced through the dies in the form of a pipe, it falls over a large pulley or drum, where it is caught by a workman with heavy gloves and guided upon a roll, where it is coiled up and set aside. Lead pipe is pressed out at the rate of a mile an hour. All sorts of bar lead are made in the same manner. The pressure exerted in the manufacture of bar lead and pipes is enormous, varying from two to three tuns to the square inch.—*Once A Month.*

THE French Academy of Science has been considering the subject of burial grounds, and one of its members, Mr. Chas. de Freyemet, recommends that vaults composed of stone or brick, should be abolished, as they have a tendency to intensify the mephitic exhalations. All coffins should be deposited in the earth, which, in a short time, will absorb all the noxious gases. Every burial ground should be thoroughly drained and thickly planted with trees, which purify the atmosphere by the vast amount of oxygen which they produce; and finally, no new cemeteries should be allowed to be opened within a regulated distance from any town or village.

The Chinaman as a Railroad Builder.

It is a significant fact, says the *San Francisco Times*, that at the laying of the last rail on the Pacific Railroad, John Chinaman occupied a prominent position. He it was who commenced, and he it was who finished the great work; and but for his skill and industry the Central Pacific Railroad might not now have been carried eastward of the Sierras. The experience of this undertaking has proved that the Chinaman is an admirable railroad builder. His labor is cheap, his temper is good, his disposition is docile, his industry is unflagging, his strength and endurance are wonderful, and his mechanical skill is remarkable. There are Chinamen in the employ of the Central Pacific Company who are more clever in aligning roads than many white men who have been educated to the business, and these Mongols will strike a truer line for a longer distance with the unassisted eye than most white men can with the aid of instruments. A good deal of nonsense has been talked about the Chinaman's want of stamina, and his inferiority to the white laborer in point of strength and capacity for work. The Central Railroad has pretty thoroughly settled that point; for numerous experiments have been made during its construction, with a view to test the respective capabilities of the two races. On one occasion a party of Irishmen and a party of Chinamen were pitted against each other in blasting a hard rock for a tunnel. Bets were freely made that the white men would come out winners; but at the end of the day, when the work of each party was measured, it was found that John Chinaman had burrowed further into the rock than his antagonist, and was, moreover, less fatigued.

The bands of Chinamen now organized by the Central Railroad Company are as fine railroad builders as can be found anywhere. The officers of the Union Pacific road were amazed at the work these fellows did, and it is by no means improbable that our Eastern friends will endeavor to secure some of these trained gangs for the next railroad enterprise in which they may engage. Many of the Chinese bosses, or heads of gangs on the Pacific Railroad are very intelligent men, and a few days since we were present when one of these entered a car and engaged in a conversation then going on, speaking good English, and showing an extensive acquaintance with railroad matters. It is well that we should bear in mind the great assistance that the Chinese have afforded to the Pacific Railroad, and that we should remember the difficulties which their presence dissipated. The training they have received on that road has given to California a large body of men peculiarly adapted to this description of work, and it has rendered comparatively easy the carrying out of other enterprises of the same character. They will probably be largely employed in the construction of the California and Oregon Railroad, now about to be entered upon; and, while they do not prevent the engagement of white men, they will facilitate enterprises which might be impracticable, lacking their aid. The Chinaman is a born railroad builder, and as such he is destined to be most useful to California, and, indeed, to the whole Pacific slope.

Ballooning in California.

In a large hall, near San Francisco, a small steam balloon has lately been tried, with so much success as to excite enthusiasm among the stockholders, and make them think that the great problem of aerial navigation has been solved. We are assured that the first packet of a regular line of aerial steamships will start from California for New York within a very few weeks.

We should be glad if there were any reasonable basis for this expectation, but we find none whatever. Substantially the same forms of balloon and machinery have before been tried, always with apparent success on the small scale in still air; always with failure when subjected to atmospheric currents. Experience shows that the attachment of wings, tails, and wheels to balloons, tends more to impede than to assist their progress.

Aerial navigation will never be reduced to a regular commercial system until some one shows us how to dispense with the unwieldy gas balloon, and replace it with an effective method of generating the requisite buoyant power. The subject is one of great importance, and worthy of diligent study on the part of all inventors. Glorious fame and princely fortune await the successful discoverer.

We copy from the San Francisco *Times* the following account of the recently tried Aerial Carriage:

The carriage, which is merely a large working model, is a balloon, shaped like a cigar, both ends coming to a point. It is 37 feet long, 11 feet from top to bottom, and 8 feet in width. These are the measurements at the center of the balloon, from which point it gradually tapers off toward either end. Around the balloon, lengthwise, and a little below the center, is a light framework of wood and cane, strongly wired together and braced. Attached to this frame, and standing up as they approach the front of the carriage, are two wings, one on each side. They are each five feet wide at a little back of the center of the carriage, and do not commence to narrow down until they approach the front, where they come to a point. These wings are made of white cloth fastened to a light framework which is braced securely by wires. The main frame is secured in place by means of strong ribbons, which go over the balloon, and are attached to corresponding portions of the frame on the other side. To the frame at the hind part of the carriage is attached a rudder, or steering gear, which is exactly the shape of the paper used in pin darts, four planes at right angles. This, when raised or lowered, elevates or depresses the head of the carriage when in motion; and when turned from side to side, guides the carriage as a rudder does a boat. At the center and bottom of the balloon is an indentation, or space left in the material of which it is built, in which the engine and machinery are placed on framework.

The engine and boiler are very diminutive specimens, but they do their work handsomely. The boiler and furnace are together only a little over a foot long, four inches wide, and five or six inches in hight. Steam is generated by spirit lamps. The cylinder is two inches in diameter, and has a 3-in. stroke. The crank connects by means of cog wheels, with tumbling rods which lead out to the propellers, one on either side of the carriage. The propellers are each two-bladed, four feet in diameter, and are placed in the framework of the wings. The boiler is made to carry eighty pounds of steam. When not inflated, the carriage weighs eighty-four pounds. The balloon has a capacity of 1,360 feet of gas. When inflated and ready for a flight it is calculated to have the carriage weigh from four to ten pounds.

An engineer's private trial trip was first made in the presence of the constructing engineers, several of the shareholders of the Aerial Steam Navigation Company, a number of the employees and residents in the neighborhood. The morning was beautiful and still—scarcely a breath of air stirring. The conditions were favorable to success. The gasometer was fully inflated, and the model was floated out of the building. In six minutes steam was got up—the rudder set to give a slight curve to the course of the vessel—and the valves opened. With the first turn of the propellers she rose slowly into the air, gradually increasing her speed until the rate of five miles an hour was attained. The position of the rudder caused her to describe a great circle, around which she passed twice, occupying about five minutes each time. Lines had been fastened to both bow and stern, which were held by two men, who followed her track, and had sufficient ado to keep up with her at a "dog trot."

As she completed describing the second circle, a pull given to the head line, unintentionally, caused the rudder to shift to a fore-and-aft position when the model pursued a straight flight about a quarter of a mile; she was then turned round, and retraced her flight to the point of departure; whence, being guided, she entered the building. The fires were drawn, and the first extensive flight of a vessel for aerial navigation was accomplished. The total distance traversed was a little over a mile. The appearance of the vessel in the air was really beautiful. As seen in the building she looks cumbrous and awkward. The change of appearance as she is circling gracefully through the air, is equal to that of a ship when first seen in the water. The moment of opening the steam valve was one of suspense; as the vessel rose and forged slowly ahead, the suspense was scarcely dissipated; but in a very few seconds her speed increased—in obedience to the rudder she commenced to swing round the curve—the men at the guys broke into a trot, and cheer upon cheer rose from the little group of anxious spectators.

The public exhibition was attended by some slight accidents, but elicited much enthusiasm from the audience which had assembled in a hall where the trial was made. The wind was so violent and irregular without, that it was considered unsafe to risk the model beyond the shelter. The carriage mounted near to the roof with a firmness and steadiness equal to the movements of an ocean steamer on smooth water. The guests cheered long and loud, and many fairly danced with delight at the success. The trip back and forth across the hall was performed several times with success.

Within a few weeks the first large vessel will be completed by the Aerial Steam Navigation Company—one calculated to carry four persons—and the principles involved in its construction will then be fully tested. The projectors consider that the model carriage has developed two facts of the greatest importance. First, the effective power developed by the propellers is greater than the estimated power according to the formulæ of aero-dynamics; and, second, the atmospheric resistance encountered by the vessel was less than had been calculated. Consequently the speed attained was higher than was estimated, and at the next trial, when the effective heating surface of the boiler will be increased, a further considerable increase of speed will be attained. Some doubt had been entertained as to the facility of steering the vessel. That is shown to be the easiest part of the business. She obeys the deflections of the rudder with extreme sensitiveness, and is under the most complete control.

Enamels.

The fine enamels of trade are generally prepared by fusing at high temperatures, silica, oxide of tin, and oxide of lead, and spreading the mixture over the surface of a sheet of copper, of gold, or of platinum.

The objections to these enamels are, in the first place their high cost, and, secondly, the impossibility of giving them a perfectly flat surface.

Mr. E. Duchemin has advantageously replaced them by the following economical and efficient compound: Arsenic, 30 parts by weight; salpeter, 30; silica (fine sand), 90; litharge, 250. This is spread on plates of glass of the required shape and size, care being taken, however, that the kind of glass employed be not inferior in point of fusibility to the enamel.

Enameled glass prepared from the above substances may be drawn or written on as readily as if it were paper, and in less time than one minute the writing may be rendered indelible by simply heating the plate in a small open furnace or muffle.

Drawings, autographs, legal acts, public documents, historical facts and dates of importance, labels for horticultural purposes or destined for out-of-door exposure, coffin plates, signboards, show-case signs, etc., may thus be cheaply made, which will resist atmospheric influences for ages.

First-class photographs, either negatives or positives, may be taken on such enamels without collodion, by using bitumen, or citrate of iron, or perchloride of iron and tartaric acid, or bichromate, or any other salt.

A good solution for this purpose is, water, 100 parts by weight; gum, 4 parts; honey, 1 part; pulverized bichromate of potash, 3 parts. Filter the liquid, spread it over the enamel, and let it rest, after which:

1. Expose it to the camera.
2. Develop the image by brushing over it the following powder: Oxide of cobalt, 10 parts by weight; black oxide of iron, 90 parts; red lead, 100 parts; sand, 30 parts.
3. Decompose the bichromate by immersion in a bath formed of: Water, 100 parts by weight; hydrochloric acid, 5 parts.
4. Wash it in clean water and dry it.
5. Vitrify the proof on a clean piece of cast iron, the surface of which has been previously chalked. One minute will suffice for indelibly fixing and glazing the photograph, which must be carefully and slowly allowed to cool.

Photographs on enamel of any size, taken in this manner, are perfectly unalterable under all atmospheric conditions, and may consequently and aptly be called "everlasting photographs."

Editorial Summary.

THE following ingenious method of keeping beer on draft excluded from air, and thus preventing it from turning sour, has recently been devised. A slate cistern is formed, having a wooden lid, fitting accurately, floating on the surface of the liquid. The sides of the lid are beveled, so that a sharp edge is presented to the walls of the cistern, and along this edge a strip of india-rubber or canvas is attached, which forms with the bevel on the upper side a V-shaped space, into which wet sand or other suitable material is packed, in order to keep the canvas in close contact with the cistern and exclude the air from its contents. A hole is formed in the lid, provided with a stuffing box, through which a pipe passes into the liquid, and the connection to the beer engine is made in the usual way. The end of the pipe in the liquid is not open, but has perforations at about an inch from the extremity—an arrangement which prevents any sediment from escaping with the fluid. The action of the device is very simple: Atmospheric pressure acting on the lid forces it to descend as the liquid is removed from under it, and thus a constant flow is obtained by means of the engine. By letting the cistern into the ground, the temperature of the liquid will remain nearly uniform the year round.

THE New York *Times* says that about two years ago several Japanese silk worms were imported and placed on some alanthus trees in Washington street. The result is that this year the alanthus trees are overrun with Japanese silk worms. This fact accounts for the huge dark-colored, broad-winged insects that are to be seen flying in almost all parts of Brooklyn.

PROF. LOOMIS, with a party of six or seven other savants, are going to start, *via* Norfolk, for western North Carolina, for the purpose of witnessing and making observations with regard to the eclipse which takes place next August. They intend sojourning in the neighborhood of Ashville, or the elevated regions about Middle Springs, and afterwards purpose returning home by way of Tennessee, Virginia, etc.

S. T. CLEMENTS, D.D.S., writes to the *Dental Cosmos* that although wax and resin, shellac varnish, and liquid silex are recommended for mending plaster models, neither, in his experience, can compare with sandarac varnish. Saturate the broken surfaces thoroughly, and press them well together. Allow it to dry, and the model will stand all the manipulation required.

PATENTEES of car-heating devices will be glad to know that a law exists in Ohio that every railroad in the State shall, when necessary to heat any of its cars, do so by heating apparatus so constructed that the fire in it will be immediately extinguished whenever the cars are thrown from the track and overturned. The same law provides that cars shall be lighted by candles only.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. D. S., of Conn.—It is impossible for us to assign a cause for the spoiling of the water in the tube of your pump under the circumstances as described by you, although it would doubtless become apparent upon inspection. There is no reason why the outside of a tube should affect the water differently than the inside, if all other circumstances are similar.

S. W. A., of Pittsburgh.—Nothing short of an extended and abstruse article would give a satisfactory answer to your queries about modelling hulls of vessels. The peculiarities of the model you mention cannot be isolated from other considerations, which have an important relation to the subject.

T. R. M., of Ohio.—The idea of propelling vessels by ejecting water from the stern is old.

R. S., of Ill.—Rubber corks for chemical apparatus although somewhat expensive are for many purposes excellent. You can obtain them of any dealer in chemical apparatus.

C. D. M., of Tenn.—The "watermark" is given to paper in the process of manufacture. It is made by a figure woven upon the wire cloth upon which the pulp is deposited. These figures leave the paper thinner where they occur.

A. H., of Conn.—The cables of the proposed East River Bridge will be made on the spot, in the position they will occupy when the bridge is completed. Their construction will require extensive preparation and machinery. Such cables could not be transported after they were completed.

A. E. B., of Miss.—The washing of binoxide of lead, prepared by Fresenius' method, is a tedious process, and will require patient manipulation.

E. P. W., of Wis.—Dampness in cellars is frequently caused by want of proper ventilation. From your description we judge this to be the difficulty with your cellar.

G. R. M., of Mich.—A pair of pincers with platinum points will enable you to hold the substances named in a very hot flame, without damage to the pincers.

T. E. D., of Pa.—You can reduce the friction on your two wood surfaces without oil by black-leading them. It will not need frequent renewal.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Recent American and Foreign Patents.

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

GRAIN BINDER.—E. H. Clinton, Iowa City, Iowa.—This invention has for its object to furnish a convenient and effective machine for attachment to a reaper, which shall be so constructed and arranged as to receive the cut grain from the reaper platform and securely bind it into bundles. It consists in a novel and ingenious arrangement of mechanism, by means of which the binding cord is passed around the grain and tied automatically in an ordinary bow knot, after which the cord is cut, allowing the sheaf to drop from the machine. The entire mechanism is simple and compact.

ATMOSPHERIC TANNING APPARATUS.—J. E. Kauffelt, Shrewsbury, Pa.—This invention consists in applying atmospheric air to the processes of liming, bating, and tanning hides, for the purpose of producing a mechanical action upon the compound in the leaches and vats.

APPARATUS FOR PLANKING SHIPS.—Peleg Staples, Stockton, Me.—This invention consists in the application of various mechanical powers to the process of bending planking, so as to make it conform to the curve of a ship's side at the time the planking is attached to the ribs, among which powers may be enumerated the windlass, the screw, the pulley, and the wedge, conjoined with certain clamps for holding the planks so bent, whereby a very laborious manual operation is converted into a very easy mechanical one, and a vast amount of time and labor saved.

IRONING MACHINE.—Louis Ringler, New York city.—This invention relates to a new machine for ironing pantaloons and other garments, and for smoothening the sewed seams of the same. The invention consists in the application of two smoothening tubes, of which one is made to revolve while the other can be moved in its slotted bearings.

VAPOR BURNER FOR LAMPS.—Joseph H. Melick, New Germantown, N. J.—This invention relates to certain improvements on that class of lamp burners in which the vaporized hydrocarbon escapes through small apertures from the burner, the jets thus produced being ignited.

LANTERN.—P. J. Clark, West Meriden, Conn.—This invention relates to a new manner of securing the canopy or cap of a lantern to the guards of the same, in such manner that it can readily be taken off and put on, and that when put on it will be securely fastened. The invention consists in making the guard wires in pairs, and in connecting the upper ends of each pair by a cross piece, which, at its junction with the guard wires, forms a catch, to which a hook projecting from the canopy can be locked.

STEERING GEAR.—Henry York, Smith's Landing, N. J.—The object of this invention is to provide a simple and effective steering apparatus for vessels.

ADJUSTABLE BRACKET.—J. H. Davis, Chilicothe, Mo.—This invention relates to a new clock bracket, which is so arranged that it can be readily attached to the wall without marring the same, and that it can also be readily removed and adjusted to bring its surface level.

BLAST-HEATING FURNACE.—Homer Hamilton, Youngstown, Ohio.—This invention has for its object to construct a simple and effective device for heating the air that is carried to a blast furnace; and consists in such an arrangement of pipes that the air will be in thin sheets exposed to heated surfaces, and that expansion and contraction of the pipes will not injure the apparatus. The device will therefore operate successfully, and will not readily get out of order.

BLAST FURNACE.—George Atkins, Sharon, Pa.—This invention has for its object to so construct a blast furnace that the waste gases escaping from the ore may be utilized and carried back to the ore, together with steam, hot air, or superheated steam. The invention consists in the arrangement of gas pipes, which lead from the upper part of the furnace down to the tweers, through which the blast is injected.

WEAVING LOOM.—Wm. Gadd and John Moore, Manchester, England.—This invention consists in the method of giving motion to the "lay," "picker shaft," and other moving portions of the loom, whereby the construction of the loom is greatly simplified, and the cost much reduced as compared with ordinary looms.

ELASTIC TACKLE BLOCK.—J. E. Jones, Wiretown, N. J.—The object of this invention is to construct a tackle block, which is more particularly to be used on ships, and which is to be yielding to sudden motions of the sails, to prevent jars and the consequent injuries to the sails, masts, and rigging.

OUT-HAUL FOR BOOMS.—Thomas O'Neill, New York city.—The object of this invention is to so construct the out-haul for a boom that it can be operated from the deck on fore-and-aft booms, and that the apparatus by which it is worked can be applied to the inner part of the boom.

WAGON BRAKE AND LOCK.—John T. Bennett, Lenora, Minn.—The object of this invention is to provide a simple and effective arrangement of devices for braking and locking wagons.

VELOCIPEDE.—Henry Wolfkill, Millcreek P. O., Pa.—This invention relates to a new mechanism for propelling three and four-wheeled vehicles, and also to certain improvements in the steering apparatus. The invention consists chiefly in the application of adjustable chains, which transmit the power to the driving axle from the crank axle, with the requisite degree of speed. The invention also consists in so notching the steering levers that they are held in place by their guides when not used.

ENDLESS BLACKBOARD.—William H. Joeckel, New York city.—The object of this invention is to provide a blackboard for schools, lecture rooms, etc., which can be adjusted, so that marks made upon its lower part can be elevated to be in sight of the whole audience, and so that such marks which are not used at a certain time may be concealed on the back of the board, to be brought forward whenever desired for future reference and without shifting the frame.

BALANCED CYLINDRICAL SLIDE VALVE.—J. G. Millholland, Harrisburgh, Pa.—This invention has for its object to improve the construction of balanced slide valves in such a manner as to make the steam pressure perfectly uniform and equal on all sides.

WEIGHING VESSELS' CARGOES.—William O. Reim, Springfield, Ohio.—This invention consists in a device for indicating the weight of a vessel's cargo by measuring the depth to which the vessel, when loaded, sinks into the water.

PAINT MILL.—Wm. R. Axe, Rockton, Ill.—This invention, which is an improvement upon the device patented by Samuel J. Goodwin, April 2d, 1867, No. 63,502, consists in combining with said Goodwin's invention a lower grinding disk, revolving in a direction opposite to that of the hopper, and an adjustable and detachable spindle step of peculiar construction, all arranged and operating in connection with the frame and motive apparatus.

COCKLE SEPARATOR.—S. W. Andrews and L. Godfrey, Greenville, Tenn.—In this invention the impure wheat is fed through an adjustable hopper so as to fall between a gum roller and a hard roller. The two rollers being put in motion, the cockle and wheat are pressed between them, and the cockle is thereby caused to adhere to the gum roller, and to be carried round and dropped into a receptacle prepared for it, while the pure wheat falls directly from the rollers upon a screen which separates the small kernels from the large.

SPRING FAN ATTACHMENT.—John Carey, Victoria, Mo.—This invention relates to improvements in spring-propelling fan attachments for chairs, beds, and other places, the object of which is to provide an improved attaching apparatus adapted to support the fan in any required position for directing the blast; also an improved arrangement for propelling springs calculated to give a more steady and uniform motion and to continue the motion a greater length of time.

PIPE CUTTER.—Edward Clarkson, Carbondale, Pa.—This invention relates to improvements in pipe-cutting tools, and consists in the double clawed shank made in two parts, adjustable relatively to each other, to open or close for large or small pipe, one jaw having a sliding cutter working in a recess to or from the other jaw, and a feeding screw working longitudinally through the stock for forcing the cutter against the pipe.

WASHING MACHINE.—Moses A. Page, La Crosse, Wis.—This invention relates to improvements in washing machines, and consists in a vertical oscillating frame arranged with a tub provided with vertical rollers around the interior wall, against which the clothes are rubbed by the oscillating frame, the latter is operated by hand through the medium of a lever and suitable gearing.

CAR COUPLING.—Joel E. Simpson, Malden Bridge, N. Y.—The object of this invention is to provide a car coupling, so arranged that when a car is thrown from or runs off the track, and the coupling parts thrown out of line to a materially greater extent than occurs when on the track, it will become self-uncoupling and thereby save much of the damage both to passengers and cars in cases of running off, due to dragging the cars over the ties and rough places.

EXCAVATING MACHINE.—J. A. Bailey, Detroit, Mich.—This invention consists in arranging the scoop upon pistons working in cylinders, wherein water or air may be used to force the scoop back and forth in performing the excavating or dredging operation. It also consists in the combination with the said cylinders, of guides or rails whereon the supporting arms of the scoop slide to and fro in the operation of the machine. It also consists in the combination of the said cylinders and supporting arms with a walking beam or frame, for elevating the scoop when loaded, and for lowering it again to the working position. It also consists in the combination with the said walking beam of a water or air cylinder and piston for elevating and lowering the said walking beam, whereon the weight of the apparatus is mainly supported, and which constitutes the axis of horizontal oscillation. It also consists in an arrangement of devices for dumping the scoop and restoring it to the working position. It also consists in certain details and modifications thereof, for the adoption of the apparatus for use, either as an excavating or dredging machine.

AUGER HANDLE.—S. T. Peat, Florence, N. J.—This invention relates to improvements in auger handles, such as are used for holding shanks of various sizes and form, and adapted for readily attaching and detaching the same and consists in certain improvements designed to cheapen the construction, and provide a more reliable holding device.

ICE PLANES.—Wm. F. Pough, Esopus, N. Y.—This invention relates to improvements in ice planes, and consists in an improved arrangement of knives whereby the cutting is made easier. Also an improved method of securing the cutters to the framing or runners, and, also, an improved arrangement of means for adjusting the knives to vary the depth of cutting.

MATHEMATICAL BOOKS.—F. B. Wells, Fishkill, N. Y.—This invention relates to improvements in mathematical and other books, the object of which is to provide such books with leaves, or sheets of silicated paper, for convenience in working out examples, the said silicated leaves or sheets being adapted for reuse, as slates; and, it consists in combining the said silicated leaves with the said books, either by binding them together with the leaves of the book, pasting or otherwise securing them to the surface of blank leaves or to the covers, or in any preferred manner of accomplishing the same.

NECKTIE OR COLLAR HOLDER.—Samuel A. Fite, Philadelphia, Pa.—This invention consists of an arrangement of small wires or flat springs for attachment to the stud or shirt button and adapted to impart a vertical pressure to the collar and on the folds for stiffening it, also to press the collar or necktie snugly to the neck, and to prevent the collar or tie from disconnection from the stud.

SPICE CAN.—Edwin Norton, Brooklyn, N. Y.—This invention relates to improvements in packing cans, for spices, having for its object to provide a simple and cheap arrangement of the same, whereby the contents may be permanently and securely inclosed as long as required for shipment and for storage, and by a slight change readily made, the said cans may be adapted for the delivery of the contents through a perforated cover, in a separating and distributing way as is required for ordinary purposes.

CAN OPENER.—M. E. Davis, Folsom, Cal.—This invention relates to improvements in implements for opening tin cans by cutting a circular piece out of their ends, whereby, by the employment of a peculiarly formed knife, arranged to be adjusted to cut holes of any size on a radial arm having a center pin for thrusting through the can, to serve as the fulcrum around which the knife is caused to rotate on the said radial arm, it is designed to provide a simple and cheap implement which will accomplish the work with greater facility than can be done with those now in use.

TONGS.—M. C. Heptinstall, Enfield, N. C.—The object of this invention is to provide an improved construction and arrangement of fire tongs that will prevent the legs from having lateral play at the griping ends, as is common with tongs as at present constructed, especially when worn at the joint.

COMBINED COLLAR AND HARNESS.—F. Jones, Burlington, Iowa.—This invention has for its object to simplify and cheapen the construction of harness collars and hames, and at the same time to make them more convenient and effective in use.

FEED CUTTER.—Felix Sims, Ridgeville, Ind.—This invention has for its object to furnish a simple convenient, durable, and effective feed cutter, by means of which more cutting can be done in a given time and with more ease than is possible with cutters constructed in the ordinary manner.

GATE.—William H. Goodale, Colton, N. Y.—This invention has for its object to furnish an improved gate, simple in construction, durable, and easily and conveniently operated.

RECORDING DESK OR TABLE.—W. B. C. Stirling, Batavia, Ohio.—This invention has for its object to remedy the difficulty heretofore experienced in writing in large record books of several hundred pages, from the unavoidable elevation of the fore arm above the top of the desk or table.

CARRIAGE SPRING.—George R. Groot, Cincinnati, Ohio.—This invention has for its object to improve the construction of the springs of what are known as three-spring carriages, to make them easy riding without too much weakening the side or parallel springs.

CORK EXTRACTOR.—Charles G. Wilson, Brooklyn, N. Y.—This invention has for its object to furnish a simple and convenient machine for extracting the corks instantly from beer, wine, and other bottles, without the necessity of previously removing the wires or capsules from said bottles.

PORTABLE FIELD FENCE.—William Wilson, Jr., Raymond (Sidney P. O.), Ill.—This invention has for its object to furnish a simple, cheap, strong, durable, and substantial fence, and which shall be so constructed and arranged that any of the panels may be easily adjusted for use as a gate.

POTATO DIGGER.—W. W. Cole and T. McGhee, Eudora, Kansas.—This invention has for its object to furnish an improved machine for digging potatoes, which shall be simple in construction, easily operated, and effective in operation.

BAKING DRUM.—George F. Reinhardt, Lincoln, Ill.—This invention relates to a combined baking and heating drum for stove pipes or pipe flues through which a current of heated air or gas is passed.

POWER DOOR CLAMP.—H. O. Hooper, Diamond Springs, Cal.—This invention relates to a new and improved device for clamping doors, and similar articles, by means of horse, water, or other power than hand or human power.

SAW BUCK.—Erastus H. Clark, Appleton, Wis.—This invention relates to a new and useful improvement in saw "bucks," or saw "horses," for holding wood in sawing, by which improvement the wood is firmly held while it is being sawed and clamps supported for holding the saw while the saw is being filed.

LIGHTNING ROD.—Leland D. Vermilya, Dayton, Ohio, and William S. Reyburn and Edmund A. W. Hunter, Philadelphia, Pa.—This invention consists in covering twisted angle iron with sheet copper, whereby the stiffness and tensile strength of iron is combined with a broad surface and superior conductive power of copper.

WINDOW SASH SUPPORTER.—William Stanfield, Flora, Ill.—This invention relates to a new and improved method of supporting and operating th sashes of windows.

WIRE CUTTER.—Henry Axtell, Yreka, Cal.—This invention relates to a new and improved implement for cutting wire or bolt iron of the smaller sizes, whereby much time and labor is saved.

VELOCIPEDE.—Richard C. Hemmings, New Haven, Conn.—This invention relates to a new and improved method of constructing and operating velocipedes, whereby they are made more durable and at less expense than than heretofore, and it consists in rotating the rim of a traction wheel, by means of a traversing wheel bearing on its inner surface and revolved by the operator within the rim of the wheel.

FENCE.—Thos. Barnes, Wayne, Mich.—This invention relates to improvements in fences, designed to provide a simple, cheap, and durable construction of the same adapted either for permanent or portable fences.

STOVE.—Isaac J. Baxter, Peekskill, N. Y.—This invention relates to a new and useful improvement in stoves, whereby they are rendered convertible for different uses.

VEHICLE.—J. R. McAlister, Heuvelton, N. Y.—The object of this invention is to provide a front coupling for vehicles which is simple and durable.

WATER WHEEL.—Jeremiah Barney, Perry's Mills, N. Y.—This invention has for its object to furnish an improved water wheel, which shall be so constructed as to utilize both the head and weight of the water for the propulsion of the wheel to a greater extent than is possible with water wheels constructed in the ordinary manner.

DECISION BY THE COMMISSIONER OF PATENTS.

In the matter of the application of Ira D. Warner for letters patent for improvement in Catarrhal Douche.—The applicant claims "a nasal douche, or syringe, having a tube with reversed curves, S and C, substantially as described." The invention consists simply in giving a double curve to the tube so that the nasal ducts are readily reached, and, at the same time, the syringe and hand of the operator are removed from the front of the mouth, where they would obstruct, more or less, the admission of the light. This is quite simple, but it is very useful, and, I think, presents a fair example of one of the cases in which form is patentable. Curvatures and angle become of importance in plowshares, water wheels, rotary pumps, engines, and blowers; and generally in all cases, when, by change of form, a new and useful result is produced.

In the present case the result is useful; and, although the catarrhal douche is old, the present form was not thought of until applicant devised it.

The decision of the Board of Examiners-in-Chief is reversed.

(Signed) S. S. FISHER, Commissioner of Patents.

July 12, 1869.

Facts for the Ladies.

NEW PUBLICATIONS.

ARCHITECTURE. Designs for Street Fronts, Suburban Houses, and Cottages. Including Details for both Exterior and Interior of the above classes of Buildings. Also, a great Variety of Details not included in the Designs. Illustrated by Elevations, and containing in all over 1,000 Designs and Illustrations. Edited by Cummings and Miller, authors of "Modern American Architecture." A. J. Bicknell & Co., Publishers, Troy, N. Y., and Springfield, Ill.

The peculiar features of this large and handsome quarto volume, which render it of great value to practical men, are the prominence given to details, the omission of plans, and the representatives of designs by elevations solely. The justification for the omission of plans is that these are generally modified when a general design is adopted, to suit the ideas of persons for whom the building is to be erected; and it is justly inferred that it is useless to cumber a book with what can be so readily supplied. Much valuable space is thus economized, which is filled with details drawn to a large scale, and a much more perfect idea obtained of the beauty of a design than when such details are omitted. The work thus becomes of great service when it is not convenient to secure the services of a competent architect, and gives owners and builders in such localities ready means of supplying themselves with good designs. The elevations given are such as may be appropriately selected for all classes of structures except public buildings. Rural architecture receives a full share of attention. The illustrations are of a high order, and the work is well calculated to elevate taste in architecture.

WE are in receipt of the first number of the "American Horological Journal," a new monthly published in this city, devoted to the interests of marine chronometer, watch, clock, and mathematical, astronomical, nautical instrument makers, repairers, and dealers, and the cognate branches, directly or remotely connected with these industries. It is a welcome addition to the industrial literature of the United States, and we wish it the success which it merits.

WHITLOCK EXPOSITION RECORDER.

The Whitlock Exposition Association have commenced a semi-monthly publication of a handsome quarto newspaper to be mostly devoted to illustration and description of such wares and new inventions in the machinery line as are on exhibition and for sale at their rooms. The first number presents a creditable appearance. Published at 35 Park Place.

APPLICATIONS FOR EXTENSION OF PATENTS.

MACHINE FOR MAKING ENVELOPES.—E. W. Goodale, of Clinton, Iowa, has petitioned for an extension of the above patent. Day of hearing, September 20, 1869.

SEWING MACHINES.—(Numbered 13,662).—Isaac M. Singer, of New York city, has petitioned for an extension of the above patent. Day of hearing, September 20, 1869.

DUST DEFLECTORS FOR WINDOWS OF RAILROAD CARS.—James M. Clark, of Boston, Mass., has applied for an extension of the above patent. Day of hearing Sept. 27, 1869.

FAUCET.—Albert Fuller, New York city, has applied for an extension of the above patent. Day of hearing September 27, 1869.

ENVELOPES.—E. Harmon, of Gettysburg, Pa., has petitioned for the extension of the above patent. Day of hearing, October 25, 1869.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING JULY 13, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

On each caveat....$10
On filing each application for a Patent (seventeen years)....$15
On issuing each original Patent....$20
On appeal to Commissioner of Patents....$20
On application for Reissue....$30
On application for Extension of Patent....$50
On granting the Extension....$50
On filing a Disclaimer....$10
On an application for Design (three and a half years)....$10
On an application for Design (seven years)....$15
On an application for Design (fourteen years)....$30
In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

For copy of Claim of any Patent issued within 30 years....$1
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upward, but usually at the price above-named.
The full Specification of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them....$1·25
Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.
Full information, as to price of drawings, in each case, may be had by addressing
MUNN & CO.,
Patent Solicitors, No. 37 Park Row, New York.

92,415.—MATCH MACHINE.—Emery Andrews and W. Tucker, Portland, Me.

92,416.—FINISHING AND DRESSING SHEEP SKINS FOR LEATHER.—Robert Andrews, Milwaukee, Wis.

92,417.—UTERINE SUPPORTER.—A. D. Angell, Coldwater, Mich.

92,418.—RAILWAY CAR SEAT.—Arthur Barbarin, New Orleans, La.

92,419.—DRILL.—Hamilton Bates and D. L. Bates, Dayton, Ohio.

92,420.—CANE SCRAPER.—L. A. Bringier, Ascension parish, and N. B. Trist, New Orleans, La.

92,421.—MACHINE FOR MAKING LEVEES.—E. J. Brown, Carroll parish, La.

92,422.—ROTARY HARROW.—M. B. Champion, Sturgis, Mich.

92,423.—CIGAR TIP.—Jonas Clark, Lowell, Mass.

92,424.—MACHINE FOR SETTING, FITTING, AND TEMPERING SPRING PLATES.—J. B. Cleveland and Henry C. Guilderslein, Hackensack, N. J.

92,425.—MEANS FOR REFRESHING HORSES WHILE IN HARNESS.—Wm. Compton, Newark, N. J.

92,426.—DUMPING CAR.—J. G. Conlon, New Orleans, La.

92,427.—MANUFACTURE OF TOBACCO PAPER.—P. M. Consuegra and Ramon Antiguedad, New York city.

92,428.—CURTAIN FIXTURE.—John Crandell and P.W. Smith, Chicopee, Mass.

92,429.—BEER COOLER.—H. C. Dart, New York city.

92;430.—AUTOMATIC GATE.—B. F. Dickey, Marshall, Mich.

92,431.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Henry Dodge, Washington Mills, N. Y.

92,432.—SPOOL.—M. F. Doran, Philadelphia, Pa.

92,433.—SPRING FOR STEADYING THE MOTION OF MILLSTONES.—J. J. Doughty, Lake City, Minn.

92,434.—HORSE HAY FORK.—J. A. Eberly and Henry Wechter, Reamston Station, Pa.

92,435.—HARVESTER.—Ezra Emmert, Franklin Grove, Ill.

92,436.—AUTOMATIC GRAIN-WEIGHING SCALE.—Henry Fairbanks, St. Johnsbury, Vt.

92,437.—POTATO DIGGER.—E. T. Ford, Stillwater, N. Y.

92,438.—CARRIAGE WRENCH.—E. T. Ford, Stillwater, N. Y.

92,439.—BUNG CUTTER.—Andrew Goetzinger, Cincinnati, Ohio.

92,440.—PLASTER SOWER.—E. J. Gordon, Greenville, Mich.

92,441.—MUSQUITO SCREEN.—John M. Griswold, Auburndale, Mass.

92,442.—FENCE.—H. A. Grover, North Cohocton, N. Y.

92,443.—ROCKING CHAIR.—Edson Hartwell, Hubbardston, Mass.

92,444.—FEED RACK FOR ADDRESSING MACHINES.—Wm. H. Henderson and W. H. Snider, Lena, Ill.

92,445.—SADIRON HEATER.—Gardner Herrick, Albion, Mich.

92,446.—NEEDLE SETTER FOR SEWING MACHINES.—J. M. Hoadley, Derby, assignor to Weed Sewing Machine Company, of Hartford, Conn.

92,447.—COAL BOX.—Charles Hœfinghoff (assignor to himself, C. C. Winchell, and J. T. Sargent), Cincinnati, Ohio.

92,448.—DOUBLE-FOOTED PLOW STOCK.—J. L. Hood, Floyd county, Ga., assignor to himself, J. F. Martin, and J. S. Black.

92,449.—ASH SIFTER.—B. F. Horn, Boston, Mass.

92,450.—POTATO DIGGER.—James M. Hotchkin, Prattsburgh, N. Y.

92,451.—FENCE GATE POST.—Elijah Humphreys, Samsville, Ill.

92,452.—PROCESS FOR COATING AND BEAUTIFYING THE SURFACE OF BILLIARD BALLS, KNIFE HANDLES, ETC.—J. W. Hyatt, Jr., Albany, N. Y.

92,453.—SASH CORD SHEAVE.—W. T. Jaquith and Robert Calhoun, Allegheny, Pa.

92,454.—CURRY COMB.—L. P. Jenks (assignor to H. A. Hall), Boston, Mass., and J. A. Minott, New York city.

92,455.—APPARATUS FOR CONCENTRATING EXTRACTS OF BARK AND OTHER LIQUIDS.—T. W. Johnson, New York city. Antedated June 26, 1869.

92,456.—SCROLL GATE FOR WATER WHEELS.—J. H. Jones, Charlton, Mass.

92,457.—DUMPING CAR.—Isaac Keith (assignor to himself, Hiram Keith, and I. N. Keith) West Sandwich, Mass.

92,458.—CHURN.—August Kindermann, Cleveland, Ohio.

92,459.—WASHING MACHINE.—C. H. Knox, Mount Pleasant, Iowa.

92,460.—VELOCIPEDE.—Henry Laurence, New Orleans La.

92,461.—APPARATUS FOR RAISING COAL.—Alfred Lawton (assignor to F. N. Lawton), Philadelphia, Pa.

92,462.—MACHINE FOR MAKING PLUG TOBACCO.—Peter Mayo, Richmond, Va.

92,463.—SAW MILL.—G. L. McCahan, Baltimore, Md.

92,464.—COOKING STOVE.—J. H. McConnell, Newcastle, Pa., assignor to himself and J. R. Richardson.

92,465.—APPARATUS FOR DEPURATING LIQUIDS.—William Needham and James Kite, Vauxhall, England.

92,466.—CIRCULAR SAW MILL.—John Orm, Paducah, Ky.

92,467.—BOWLING ALLEY.—A. T. Peirce, Fair Haven, Mass.

92,468.—BUTTER-KNIFE REST.—B. D. Reed, Westfield, Mass.

92,469.—METHOD OF MAKING BANDS FOR SHINGLE BUNDLES.—Jacob Reese, Pittsburgh, Pa.

92,470.—ROTATING BELL AND BELL WHEEL.—Joshua Regester, Baltimore, Md.

92,471.—PICKER CUSHION FOR LOOMS.—G. L. Richardson and J. C. Moody, Brunswick, Me.

92,472.—UMBRELLA FRAME.—H. T. Robbins, Boston, Mass.

92,473.—HORSE POWER.—Cyrus Roberts and John A. Throp, Three Rivers, Mich.

92,474.—HORSE POWER.—Cyrus Roberts and John A. Throp, Three Rivers, Mich.

92,475.—HORSE POWER.—Cyrus Roberts and John A. Throp, Three Rivers, Mich.

92,476.—COAL-LOADING APPARATUS.—S. S. Roberts, Elizabeth, Pa.

92,477.—STILL FOR ALCOHOLIC SPIRITS.—Wm. Robson and G. W. Robson, Cincinnati, Ohio.

92,478.—FURNACE FOR MANUFACTURING IRON AND STEEL.—Henderson Ross and D. F. Agnew, Pittsburgh, Pa. Antedated June 30, 1869.

92,479.—DOUGH KNEADER.—C. B. Sawyer, Fitchburgh, Mass., assignor to himself and F. G. Allen, Providence, R. I.

92,480.—APPARATUS FOR SHOTTING METALS.—Thos. Shaw, Philadelphia, Pa. Antedated April 30, 1869.

92,481.—COTTON-SEED PLANTER.—Joseph Shearer, and M. B. Armstrong, Timbersville, Ill.

92,482.—BOOKHOLDER.—C. W. Simpson, Bangor, Me.

92,483.—BROOM.—Albert Sinclair, West Waterville, Me.

92,484.—PROCESS OF TANNING SKINS.—Christian Smith, Bell Air, assignor to himself, August Briel, and Godfrey Rusck.

92,485.—VELOCIPEDE.—W. H. Smith, Newport, R. I.

92,486.—DOOR SPRING.—Enos Stimson, Montpelier, Vt.

92,487.—TENT.—P. E. L. W. Stockmann, Keppel street, Russel Square, England. Patented in England, September 21, 1868.

92,488.—CLOTHES-PIN.—D. M. Strain, Jr., Des Moines, Iowa.

92,489.—PRESSURE BLOWER.—B. F. Sturtevant, Boston, Mass.

92,490.—BLAST APPARATUS.—B. F. Sturtevant, West Roxbury, Mass.

92,491.—MACHINE FOR CUTTING BEAD MITERS.—R. F. Tompkins, New York city.

92,492.—EXTENSION LADDER.—W. F. Trautman, Llewellyn, Pa.

92,493.—SIGNAL LANTERN.—E. G. Turner, New Bedford, Mass.

92,494.—MACHINE FOR MAKING RAILROAD CHAIRS.—Wm. VanAnden, Poughkeepsie, N. Y.

92,495.—HORSE HAY FORK.—J. M. Walker (assignor to himself and J. C. Hollinger), Rossville, Pa.

92,496.—MACHINE FOR PRESSING THE SEATS AND BACKS OF CHAIRS AND SETTEES INTO THEIR FRAMES.—G. A. Watkins, Cavendish, Vt.

92,497.—COMPOSITION FOR TOBACCO SUBSTITUTE.—J. B. Webster (assignor to himself, W. E. Greene, and Henry E. Winslow), Stockton, Cal.

92,498.—WORK TABLE IMPLEMENT AND SPOOL OF THREAD COMBINED.—Geo. Wells, Bethel, Conn.

92,499.—CAR STARTER.—G. A. Wilbur, Skowhegan, Me. Antedated Dec. 4, 1868.

92,500.—HARVESTER.—D. H. Wilgus and S. M. Denny, Harveysburg, Ohio.

92,501.—TRESTLE.—Jos. Witmer, Niagara, assignor to himself, and Tobias Witmer, Williamsville, N. Y.

92,502.—DOOR LOCK.—T. B. Worrell, Frankford, Pa.

92,503.—THREE-HORSE EQUALIZER.—E. M. Wright, Castile, N. Y., assignor for one half to Gardner Herrick, Albion, Mich.

92,504.—POST AUGER.—James Armstrong, Bucyrus, Ohio.

92,505.—BLAST FURNACE.—Geo. Atkins, Sharon, Pa.

92,506.—PLASTERING TROWEL.—Samuel Ault, Bridgtown, near Cannock, England. Patented in England, Nov. 2, 1868.

92,507.—WIRE CUTTER.—Henry Axtell, Yreka, Cal.

92,508.—EXCAVATING MACHINE.—J. A. Bailey, Detroit, Mich.

92,509.—FENCE.—Thomas Barnes, Wayne, Mich.

92,510.—TURBINE WATER-WHEEL.—Jeremiah Barney, Perry's Mills, N. Y.

92,511.—COAL STOVE.—I. J. Baxter, Peekskill, N. Y.

92,512.—WAGON BRAKE.—J. T. Bennett, Lenora, Minn.

92,513.—SPRING-FAN ATTACHMENT.—John Carey, Victoria, Mo.

92,514.—SAW BUCK.—E. H. Clark, Appleton, Wis.

92,515.—LANTERN.—P. J. Clark, West Meriden, Conn.

92,516.—PIPE CUTTER.—Edward Clarkson, Carbondale, Pa.

92,517.—GRAIN BINDER.—E. H. Clinton, Iowa City, Iowa.

92,518.—POTATO DIGGER.—W. W. Cole, and T. McGhee, Eudora, Kansas.

92,519.—ADJUSTABLE BRACKET.—J. H. Davis, Chilicothe, Mo.

92,520.—CAN OPENER.—M. E. Davis, Folsom, Cal., administratrix of the estate of M. C. Davis, deceased.

92,521.—HORSE RAKE.—Edward Dorr, Rockford, Ill.

92,522.—NECKTIE RETAINER.—S. A. Fite (assignor to himself and J. H. Mansur), Philadelphia, Pa.

92,523.—LOOM.—Wm. Gadd and John Moore, Manchester, Great Britain.

92,524.—GATE.—W. H. Goodale, Colton, N. Y.

92,525.—CARRIAGE SPRING.—G. R. Groot, Cincinnati, Ohio.

92,526.—BLAST HEATING FURNACE.—Homer Hamilton, Youngstown, Ohio.

92,527.—FIRE-ESCAPE LADDER.—H. T. Hartman, Norwood, Va.

92,528.—VELOCIPEDE.—R. C. Hemmings, New Haven, Conn.

92,529.—CULTIVATOR.—Isaiah Henton, Shelbyville, Ill.

92,530.—FIRE TONGS.—M. C. Heptinstall, Enfield, N. C.

92,531.—DOOR CLAMP.—H. O. Hooper, Diamond Springs, Cal.

92,532.—HATCHET.—Jabez Jenkins, Philadelphia, Pa.

92,533.—BLACK BOARD.—W. H. Joeckel, New York city.

92,534.—COMBINED COLLAR AND HAMES.—F. Jones, Burlington, Iowa.

92,535.—ELASTIC TACKLE BLOCK.—J. E. Jones, Wiretown, N.J.

92,536.—CARRIAGE.—J. R. McAlister, Heuvelton, N. Y.

92,537.—VAPOR BURNER.—J. H. Malick, New Germantown, N. J.

92,538.—SPICE CAN.—Edwin Norton (assignor to himself and O. W. Norton), Brooklyn, N. Y.

92,539.—OUTHAUL FOR BOOMS.—Thomas O'Neill, New York city.

92,540.—WASHING MACHINE.—M. A. Page, La Crosse, Wis.

92,541.—AUGER HANDLE.—S. T. Peat, Florence, N. J.

92,542.—ICE PLANER.—W. F. Pough, Esopus, N. Y.

92,543.—COMBINED DRUM AND OVEN.—G. F. Reinhardt, Lincoln, Ill.

92,544.—IRONING MACHINE.—Louis Ringler, New York city.

92,545.—WATCH-MAKERS' LATHE.—C. C. Rowell and John Belknap, St. Johnsburg, Vt.

92,546.—COAL SCUTTLE.—Morris Saulson, Troy, N. Y.

92,547.—CAR COUPLING.—J. E. Simpson, Malden Bridge, N.Y.

92,548.—FEED CUTTER.—Felix Sims, Ridgeville, assignor to himself and J. N. Templer, Portland, Ind.

92,549.—SASH BALANCE.—Wm. Stanfield, Flora, Ill.

92,550.—RECORDING DESK OR TABLE.—W. B. C. Stirling (assignor to himself and D. O. Cowen), Batavia, Ohio.

92,551.—LIGHTNING ROD.—L. D. Vermilya, Dayton, Ohio, and W. S. Reyburn, and E. A. W. Hunter, Philadelphia, Pa.

92,552.—CORK EXTRACTOR.—C. G. Wilson, Brooklyn, N. Y.

92,553.—PORTABLE FIELD FENCE.—Wm. Wilson, Jr., Raymond, Ill.

92,554.—VELOCIPEDE.—Henry Wolfkill, Mill Creek Post Office, Pa.

92,555.—STEERING APPARATUS.—Henry York, Smith's Landing, N. J.

92,556.—GRAIN CLEANER.—Wilson Ager, Washington, D. C.

92,557.—WAGON BRAKE.—Wm. P. Alcorn, New Wilmington, Pa.

92,558.—ENVELOPE GUMMER.—Edwin Allen, Norwich, Conn. Antedated July 3, 1869.

92,559.—COCKLE SEPARATOR.—S. W. Andrews and L. Godfrey, Greeneville, Tenn.

92,560.—HORSE POWER.—Cornelius Aultman and Joseph Allonas (assignors to C. Aultman and H. H. Taylor), Mansfield, Ohio.

92,561.—PAINT MILL.—William R. Axe, Rockton, Ill., assignor to Samuel J. Goodwin, Beloit, Wis.

92,562.—FURNACE GRATE.—Isaac R. Barbour, deceased, Hannibal, Mo.: Wm. G. Barbour, administrator.

92,563.—SIDING GAGE.—Stephen V. Barns (assignor to himself and Isaac G. Dundore), Whitney's Point, N. Y.

92,564.—LOW WATER INDICATOR.—Frederick S. Barus, New York city.

92,565.—MACHINE FOR CUTTING MILLING TOOLS.—Benjamin F. Bee, Harwich, Mass., assignor to the New York Tap and Die Company. Antedated June 10, 1869.

92,566.—CHURN.—Charles H. Beeman and Edwin G. Beeman, North Fairfax, Vt.

92,567.—DIE FOR FORMING THREADS ON BOLTS.—Alexis Belaieff, St. Petersburg, Russia.

92,568.—MACHINE FOR CLEANING SAND.—Edwin Bennett, Baltimore, Md., assignor to himself and William T. Gillender, Philadelphia, Pa.

92,569.—TUBE WELL.—S. L. Bignall, Chicago, Ill.

92,570.—LAMP CRANE.—Andrew C. Black, Kaukauna, Wis.

92,571.—AIR-TRAP FOR STEAM AND OTHER ENGINERY.—Geo. W. Blake, New York city.

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92,574.—METHOD OF PROPELLING SLEDS.—John Braun, Philadelphia, Pa.

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92,578.—METHOD OF RETARDING THE GROWTH OF STRAWBERRY VINES.—George Burson, East Palestine, Ohio.

92,579.—IRON FENCE.—Clark T. Bush, Middleburg, N. Y.

92,580.—RECIPROCATING BELLOWS.—John S. Butler and Andrew J. Stucker, Silver City, Idaho Ter.

92,581.—HAND GARDEN CULTIVATOR.—Philander Byrns, Mindoro, Wis.

92,582.—FENCE.—John Carr, Emerald Postoffice, Ohio.

92,583.—STRAW CUTTER.—Danford Chaffee, Rome, Pa.

92,584.—PORTABLE PUMP.—Jules A. Cheron, New York city.

92,585.—PULVERIZING AND MIXING CYLINDER.—William Coggeshall, Springfield, Ohio, and John W. Stanley, Chicago, Ill.

91,586.—LUBRICATING DEVICE FOR SPINDLES.—Albert A. Davis and Benjamin F. Walker, Lowell, Mass., assignors to B. F. Walker and M. R. Favoe.

92,587.—COMPOUND FOR CURING PILES.—Stephen S. Davis, Edgerton, Wis. Antedated June 30 1869.

92,588.—COPY HOLDER.—H. B. Denny, Washington, D. C.

92,589.—AUTOMATIC FAN.—Coellestin Lieringer and Morris Lindamann, Cincinnati, Ohio.

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92,601.—BOTTLE STOPPER.—Wm. H. Gibbs, Cincinnati, Ohio.

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92,603.—TURBINE WATER WHEEL.—Mahlon Gregg, Rochester, N. Y.

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92,605.—MEANS OF ATTACHING ARTIFICIAL TEETH TO THEIR BASE PLATES.—Edward Hale, Jr. (assignor to himself and Joshua H. Alexander), St. Louis, Mo.

92,606.—MODE OF ATTACHING RUBBER TIRES TO CARRIAGE WHEELS.—David Ham, Iowa City, Iowa.

92,607.—DEVICE FOR PROPELLING CARRIAGES.—Thomas U Hamilton and Hendrick H. Hamilton, Panama, N. Y.

92,608.—THILL COUPLING.—Edmund A. Harvey, Wilmington, Del.

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92,618.—SPOOL SHOW CASE.—John N. Leonard, Rockville, Conn.

92,619.—APPARATUS FOR DISPLAYING SPOOLS OF COTTON, ETC.—John N. Leonard, Rockville, Conn.

92,620.—CHAIR.—Leon Lindquest, Pittsburgh, Pa.

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92,622.—STEAM WATER HEATER.—William B. Mack, Detroit, Mich.
92,623.—COOKING STOVE.—Charles Maguire, Chicago, Ill.
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92,655.—"FULLING SOAP."—Geo. Sanger, Beloit, Wis.
92,656.—PROCESS FOR REFINING TALLOW.—Geo. Sanger, Beloit, Wis.
92,657.—STENCILING APPARATUS.—Leonhard Schmidt and F. E. Held, Chicago, Ill.
92,658.—GRAIN DRILL.—P. J. Schmitt (assignor to Siegel, Schmitt & Co.), Carlinville, Ill.
92,659.—CORN PLANTER.—Jas. Selby, Peoria, Ill.
92,660.—COOKING STOVE.—W. G. Semple, Cincinnati, Ohio.
92,661.—LAMP.—J. W. Shehan, San Francisco, Cal.
92,662.—HINGE.—J. D. Shepard and R. W. English, Buffalo, N. Y., assignors to J. D. Shepard.
92,663.—TOAST RACK.—Daniel Sherwood, Lowell, Mass., assignor to Woods, Sherwood & Co.
92,664.—HORSE-POWER.—C. J. Shuttleworth, Springville, N.Y.
92,665.—COOKING STOVE.—Elihu Smith, Albany, N. Y.
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92,667.—MANUFACTURE OF IRON.—David Stewart, Kittanning, Pa.
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92,669.—CARTRIDGE LOADER.—J. M. Taylor, Lexington, Ky., assignor to Chas. Parker, Meriden, Conn.
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92,671.—STAIR ROD.—H. Uhry, New York city.
92,672.—STAIR ROD.—H. Uhry, New York city.
92,673.—BREECH-LOADER.—Zdeuko Ritter Von Wessely, New York city, assignor to Providence Tool Company, Providence, R. I.
92,674.—STOVE COVER.—S. D. Vose, Milwaukee, Wis.
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92,679.—GRAIN DRILL.—Wm. Weusthoff, Dayton, Ohio.
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92,685.—APPARATUS FOR RECTIFYING AND FLAVORING SPIRITS.—Ludwig Wolff, Chicago, Ill.
92,686.—CULTIVATOR.—J. P. Zeller, South Bend, Ind.
92,687.—STEAM PETROLEUM GAS GENERATING APPARATUS.—R. M. Whipple and A. I. Ambler, Chicago, Ill.
92,688.—HAND STAMP.—M. P. Norton, Troy, N. Y. Antedated June 10, 1869.

REISSUES.

38,056.—SHOVEL PLOW.—Dated March 31, 1863; reissue 3,545 (dated July 6, and omitted in the list of claims of that date).—Israel Mosher, Mosherville, and Walden Eddy, Union Village, N. Y.
15,838.—APPARATUS FOR GENERATING CARBONIC ACID.—Dated Oct. 7, 1856; reissue 3,546.—J. F. Boynton, Syracuse, N. Y.
84,091.—MACHINE FOR FOLDING AND CORDING THE EDGE OF PAPER STRIPS.—Dated Nov. 17, 1868; reissue 3,547.—A. T. Denison and E. P. Furlong, Mechanic's Falls, Me., assignees of J. E. Coffin.
48,536.—METALLIC CARTRIDGE CASE.—Dated July 4, 1865; reissue 3,548.—W. C. Dodge, Washington city, D. C.
67,530.—TUBE CUTTER.—Dated August 6, 1867; reissue 3,549. Division B.—Henry Getty, Brooklyn, N. Y.
38,862.—THRASHING MACHINE.—Dated June 9, 1863; reissue 3,550. Division A.—Reuben Harder and Minard Harder, Cobleskill, N.Y., assignees of Minard Harder, George W. Douglass, Hiram Becker, and David Anthony.
38,862.—THRASHING MACHINE.—Dated June 9, 1863; reissue 3,551. Division B.—Reuben Harder and Minard Harder, Cobleskill, N.Y., assignees of Minard Harder, G. W. Douglass, Hiram Becker, and David Anthony.
89,768.—COMPOUND FABRICS FOR THE PRODUCTION OF SHIRT COLLARS.—Dated May 4, 1869; reissue 3,552.—W. E. Lockwood, Philadelphia, Pa., assignee, by mesne assignments, of Walter Hunt.
72,335.—MANUFACTURE OF IRON.—Dated Dec. 17, 1867; reissue 3,553.—David Stewart, Kittanning, Pa.
80,261.—WOODEN PAVEMENT.—Dated July 21, 1868; reissue 3,554.—C. Williams, New York city.

DESIGNS.

3,578.—FACE-PLATE OF A LOCK.—Wm. Gorman (assignor to the Russell & Erwin Manufacturing Co.), New Britain, Conn.
3,579.—SCARF PATTERN.—F. W. Henson (assignor to himself and T. S. Henson), Philadelphia, Pa.
3,580.—FLOOR OILCLOTH PATTERN.—Robert Hoskin, Brooklyn, assignor to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburg, N. Y.
3,581.—TRADE MARK.—F. M. Maas, New York city.
3,582.—WRENCH HEAD.—C. N. Morgan, Granby, Mass.
3,583.—STOVE DOOR.—I. A. Sheppard, Philadelphia, Pa.
3,584.—FLOOR OILCLOTH PATTERN.—J. T. Webster, New York city, assignor to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburg, N. Y.

EXTENSIONS.

MACHINE FOR MITERING PRINTERS' RULES.—W. McDonald, Morrisania, N. Y.—Letters Patent No. 13,197, dated July 3, 1855.
SELF-REGULATING WIND MILL.—A. P. Brown, Syracuse, N. Y.—Letters Patent No. 13,156, dated July 3, 1855.

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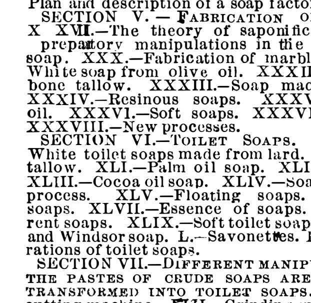

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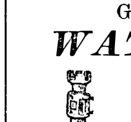

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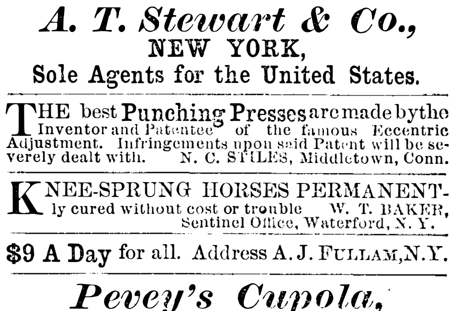

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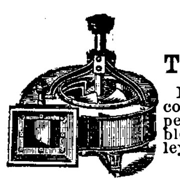

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Country Women
OF
AMERICA.

The following considerations concerning the

DRY EARTH SYSTEM

are respectfully submitted as worthy of their thoughtful attention.

Probably no single cause has had so much influence in producing the peculiarly delicate condition for which women living in the country and in small towns in America are notorious, as the discomfort, inconvenience, and frequent repulsiveness of their closet accommodations.

In towns which are supplied with water, and in those houses of the better class, which are furnished with water by private works, the use of the water closet soon becomes universal, and its usefulness is at once recognized. But, probably, ninety-nine out of every hundred habitations in the whole country have nothing better than an unsightly privy, standing at some distance from the house—too often barbarously foul—and generally unapproachable except by an entirely unprotected walk, that is more or less exposed to public view, and, in wet or cold weather, is passable only at the risk of getting wet feet, dragging through wet grass or weeds, plodding through snow, or facing cold winds or storms.

As a natural consequence, delicate women soon school themselves to a postponement of the demands of nature, sometimes for days together, rather than expose themselves to the danger of taking cold, and to the certainty of great annoyance. Sometimes modesty, and sometimes the dread of discomfort and exposure, is the motive. In all cases the result is the same. The natural functions become disordered, the digestion is impaired, and dyspepsia, with its thousand and one horrors, breaks down the constitution and lays the foundation for all manner of "female complaints."

It is unnecessary to enlarge on this subject. Every sensible woman, who has been subjected to the evil alluded to, must accept the foregoing statement of the case as a true one, and recognise the fact that any plan by which suitable accommodations can be provided WITHIN THE HOUSE offers unspeakable relief.

In addition to this, women who have had the least experience in sick-rooms know that nothing connected with our lives is more horrible than the want of suitable accommodation for helpless invalids (and this not even the WATER CLOSET supplies)—horrible for the attendant and still more horrible for the invalid himself.

The most perfect relief in both cases is afforded by the use of the

Earth Closet.

It is not worth while to discuss here the relative superiority of the Water Closet and the Earth Closet; the only idea that it is sought now to enforce is that, by the aid of the latter, the well-known advantages of the former are placed within the reach of every person in the land.

By the simple use of DRY EARTH, in quantities that even the dust of a country road places within the reach of all, the waste of our bodies may be rendered immediately and completely inodorous. It matters little (except for the question of convenience) what means are adopted for applying the earth—a barrel in the cellar with a seat over it and a box of dry earth beside it; paper bags of earth to be used in connection with any suitable vessel; any arrangement, in fact, by which the fæces may be covered with earth will amply suffice, and the necessity either for going to a distant building or of creating an offense in the house is entirely removed. The requirements of the laws of health may be fully met without fear of exposure to danger, inconvenience, or annoyance.

It is chiefly important:

1. That the earth be not too sandy—any fertile soil will do.
2. That it be dried (and this may be done in the sun).
3. That it be sifted (at least through a coal sifter).
4. That the bottom of the vessel be first covered with earth to prevent adhesion; and
5. That enough earth (a pint or more) be thrown on the deposit to entirely cover it.

This is all. The deposits may accumulate in the house for a whole year, or they may be removed daily, as circumstances suggest. They will at no time be more offensive than so much earth from the garden.

For those who desire something more convenient and systematic than the plan suggested above, COMMODES for private rooms and the APPARATUS for Privies may be cheaply obtained

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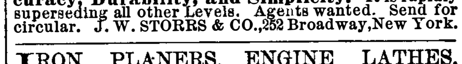

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