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Improvement in Marine Staterooms and Furniture.

A life on the ocean wave is a fine thing in poetry, but in practice to those whose stomachs are sensitive to the motion of vessels, it is often a very sorry experience. Many and various remedies, and as many prophylactics as remedies, have been proposed, among which the most efficacious is to stay at home, but the latter, unfortunately, cannot always be done. The inventor of the device illustrated in the engravings has, however, undertaken the task of providing a remedy for the sufferings of sea sickness. If successful in operation, as would seem probable from the principles involved, the discomforts of a sea voyage to many will be overcome.

Fig. 1 is a perspective view of the invention, and Fig. 2 a plan view. It consists in providing the staterooms, cabins, saloons, etc., of vessels with couches, sofas, and the like, suspended in such a way as always to maintain a horizontal position, no matter how much the vessel may pitch or roll.

The couches, A, Fig. 1, are preferably made in a circular form, as shown in Fig. 1, and suspended on oscillating hangers, C, the hangers being adjusted on the principle in which the mariner's compass is suspended to keep it constantly level.

Doors B, to which steps placed in the corner of the apartment lead, admit the occupants, and the hanging couch may contain a center table, and other small articles of furniture.

Leaves D, Fig. 2, serve to enlarge the surface when it is desired to recline, and they may be turned down out of the way, when only a seat is required.

The corners of the room may be utilized as closets, presses, etc., a wash stand occupying one corner, E, Fig. 2.

Patented April 5, 1870, through the Scientific American Patent Agency, by Lorenzo D. Newell, 514 Broadway, New York.

NEWELL'S OSCILLATING SOFA, TABLE AND COUCH FOR VESSELS.

Presence of Mind.

The following introduction to some stories of great presence of mind, in the last number of *Chambers' Journal*, contains a fine analysis of an obscure mental faculty.

Now, then, throw yourself over; you'll be dashed to atoms; but what matter? Away you go. You feel that unless you speedily retreat, you must obey the dread command; and you turn your head away from gazing down the horrid abyss. You ask yourself: What if I were so placed that I could not withdraw, should I obey the whispering demon? Perhaps you reason with yourself: Nonsense! it is only a feeling, a sensation; impossible! Try again. Yes, there it is again; you dare not remain. What can it be? you ask. Is it the demon of suicide? Can it be anything in my brain? There, you have hit it! It is no demon of suicide that urges you on—it is only something in your brain. Let us try and find out what it is.

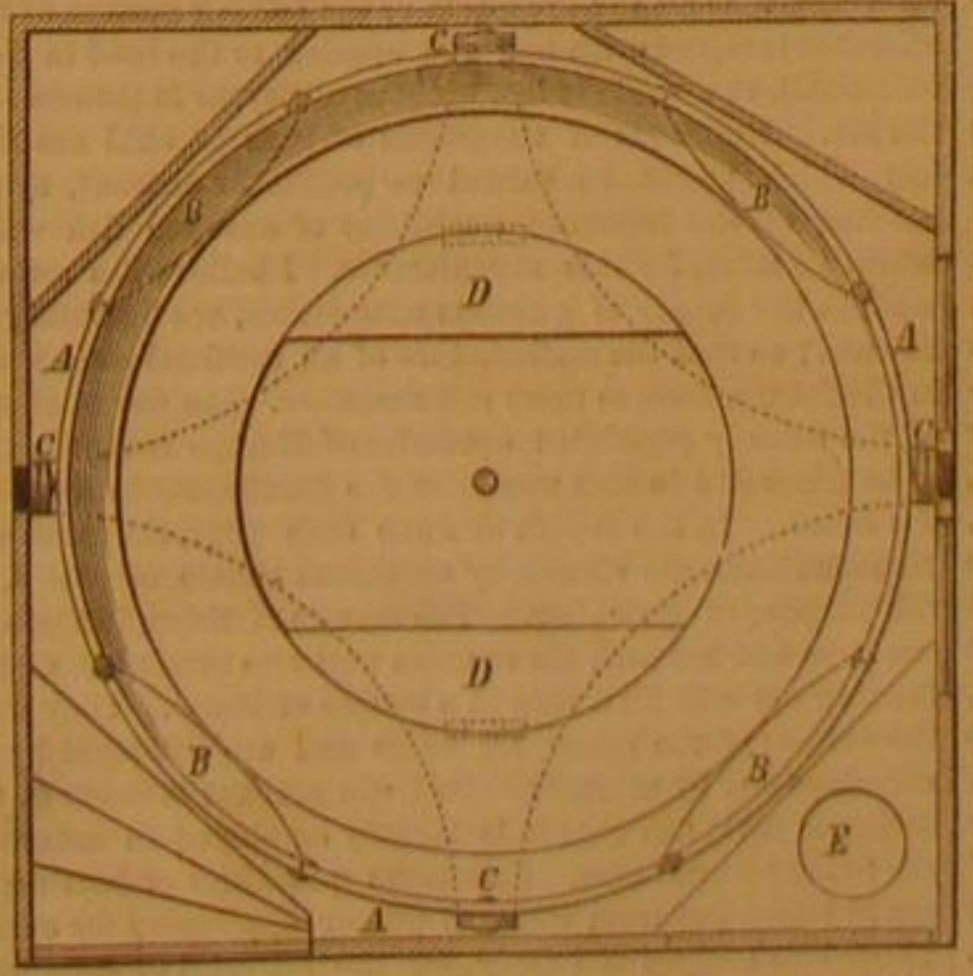
From a pair of scissors to the imperial parliament, and upwards still to the System of the Universe, every agency, moral or physical, seems to be compounded of two antagonistic forces, controllable and performing correctly the duties assigned to them as long as they work in unison; but uncontrollable, and prone to run into excess of their functions, if separated from each other.

Take away the force of gravity, and centrifugal force uncontrolled would scatter us in fine dust through space. Abolish one of the constituent parts of any well-organized government, and the result, in a moral sense, would probably be pretty much the same. Even the blade of a pair of scissors won't work without its fellow. Nor is the brain an exception to this rule. An eminent philosopher (Dr. Richardson), still living, in experimenting recently, on animals, with the object of testing the comparative value of various anæsthetics, discovered that at least two antagonistic forces reside in the brain: one having its abode in the anterior and upper portion (the cerebrum), the other in the lower and posterior part (the cerebellum). In his experiments, he observed that if the cerebrum of an animal be rendered insensible, and its powers thus temporarily destroyed, the animal is immediately impelled to rush forward; on the other hand, the cerebellum being paralyzed, retrograde movement is the result. Thus he accounts for that impulse which many people feel to precipitate themselves from a hight; the cerebrum, which contains the thinking and directing faculties, under such circumstances becoming paralyzed—dizzy—and so the control which it normally exercises over the cerebellum being partially removed, the influence of the later declares itself.

The learned professor having opened the gate for us, we may walk in and observe for ourselves. Many things come to our recollection which we can now account for by this double brain force. We can comprehend why that partridge dashed madly forward after the fatal charge struck him; and why the other, although flying at the same speed, fell back in the air like a tumbler-pigeon, fluttering still backward to the ground. If we take up the one, we find a grain of shot has pierced the skull a little above the eyes; and we see the death wound of the other at the back of the head. We can now understand why those overcome with fright so frequently rush into the danger they wish to avoid. Nor need we confine ourselves to examples of a purely physical nature. We may place in the same category the bashful man who talks nonsense when he should hold his tongue; the awkward man, who is only awkward because he is nervous—the directing power of his brain is in abeyance—and the passionate man, whose words and actions are uncontrolled by his reasoning powers. In a word, we can trace half our foolish words and actions to a want of equilibrium between these two forces that inhabit our brains, and it is only when the balance is correct that we are fit to govern ourselves.

Presence of mind is the popular term to express this mental equilibrium.

Fig. 2



The question has been frequently discussed in social circles, whether men or women are most prone to lose their presence of mind. Lucy, just seventeen, says: "Oh, men, to be sure. Why, self-possession is an attribute almost peculiar to women; a young girl entering society is quite at her ease, while a young man is sure to be awkward and nervous. See how we get out of a scrape; never at a loss for an answer. A man would stutter and mutter, and get deeper into the mire." "Yes, but," says Tom, who is just home from school, and not much troubled with nerves—"just look at you girls, how you scream: if your life depended on silence, you'd betray yourselves by a scream." Then the ladies reply "Oh, we don't pretend to be as brave as men." And so the question remains unsettled.

Lucy no doubt is correct, nor is Tom less so. Perhaps the fairest arrangement would be to grant the weaker sex pre-eminence in the absence of physical danger; and yet, on the other hand, instances of calm thought and deliberate action of women under trying circumstances are so numerous, that they can scarcely be held as merely exceptions to the rule. Among the tales of shipwrecks are recorded noble instances of presence of mind amongst women in the most appalling danger. What could be more heroic, for instance than the conduct of the women on board the illfated *London*? Indeed, it is generally in circumstances of comparatively trifling peril that the balance of the female mind is disturbed—when, as Tom says, they shriek.

New Resources of the Pacific States.

That which we legitimately expected, says the San Francisco *Bulletin*, from the completion of our railroads—that which President Grant in his inaugural denominated "unlocking the strong box of our treasures," seems rapidly coming to pass. New mines are discovered in all directions. Our veteran army of prospecters, experienced in the search, and starting from a hundred new centers of operations and improved bases of supplies, are waging a war upon nature, the results of which are likely to be as productive as our recent civil war was destructive. Not only on the line of the railroad, but in distant Arizona, and in Oregon and Washington, we hear, every day, the old cry, "Eureka!" We have become quite callous to the appeals of gold and silver, or any one of these new discoveries would excite a pursuit like that to which California owed its transformation.

Not less important, perhaps more so, is the reported finding of cannel coal within half a mile of the Union Pacific Railroad in Wyoming, which we chronicle this morning. About three miles from Percy Station, it is said, the first discovery has been made of this species of diamonds—"black diamonds" we may still call them with no disrespect to the fifteenth amendment. Such a discovery is invaluable to the railroad, and through it to all the industries which are to be vivified by it. Cheap fuel is the great desideratum in the barren interior, throughout the treeless West, and for the rapid and cheap development of the lead, iron, copper, silver, and gold mines everywhere. In view of the liberal gifts of nature which are coming to us as treasure trove, the date of our national bankruptcy may as well be postponed. Even specie payments cannot be far off, with another cotton crop worth $300,000,000 and $100,000,000 a year of gold and silver production with which to kick the "balance of trade."

CODFISH AS FOOD FOR MAN, BEAST, AND VEGETABLE.

[From Stewart's Quarterly].

The Cod fishery is the staple industry of Newfoundland. This splendid fish, which graces the table of the noble, and in its dried and salted condition supplies a wholesome food for the poor man, is found in perfection around the shores of Newfoundland. Its chosen home is on the Great Banks, six hundred miles in length and two hundred in breadth. Here the aristocracy of the great race are found, the quality and size of Bank fish being superior to that caught near the shore, averaging thirty to the quintal when dried. The enormous colonies of fish on these Banks may be judged of from the fact that more than three hundred and sixty years of fishing, on an immense scale, have apparently made no impression on them in the way of reducing their numbers. It is questionable whether the smaller banks near the shores, where the dimensions of the fish colonies are but limited, are not suffering from over fishing. It is certain that there are localities where the fish are not nearly so plentiful as formerly, and some have been abandoned altogether. Since the day when the Red Indian lay over the rocks and transfixed the codfish with his spear, till now, when 70,000 men with the most ingenious instruments of capture, are constantly at work, what myriads of codfish have been drawn from those seas, and as yet there is no sensible diminution in the supply! Cuvier tells us that "almost all parts of the cod are adapted for the nourishment of man and animals, or for some other purpose of domestic economy. The tongue, for instance, whether fresh or salted, is a great delicacy; the gills are carefully preserved to be employed as baits in fishing; the liver, which is large and good for eating, also furnishes an enormous quantity of oil, which is an excellent substitute for that of the whale, and applicable to all the same purposes; the swimming bladder furnishes an isinglass not inferior to that yielded by the sturgeon; the head, in places where the cod is taken, supplies the fishermen and their families with food. The Norwegians give it with marine plants to their cows, for the purpose of producing a greater proportion of milk. The vertebræ, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtschatkadales to their dogs." These same parts, properly dried, are also employed as fuel, in the desolate steppes of the shores of the Icy Sea. Even their intestines and their eggs contribute to the luxury of the table. Since Cuvier's day, cod-liver oil has become world-renowned for its medicinal properties. The best is made without boiling, by applying to the livers a slight degree of heat, and straining through thin flannel or similar texture. When carefully prepared it is quite pure, nearly inodorous and of a crystalline transparency. The article however is largely adulterated in England and France. The common cod oil, made by the putrifying process, which deprives it of its iodine and consequently of its medicinal virtues, is refined by charcoal, filtered, and sold as the genuine article, by dishonest dealers. It is much to be regretted that means are not adopted in Newfoundland, such as a seal or label, to be affixed by a responsible officer on each bottle or vessel, so as to attest the genuine article. To invalids, who wish to get cod-liver oil pure, this would be an inestimable boon. It has now become a valuable remedy in that widespread, formidable disease, consumption. The result of an extended trial of this medicine, in the hospital, at London, for the treatment of consumptive patients, shows that about seventy per cent gain strength and weight and improve in health, while taking the cod-liver oil; and the good effect, with a great many, is permanent. Skate liver oil is also coming into use for medicinal purposes. The quantity of common cod oil extracted from the fish caught on the banks and shores of Newfoundland is estimated at 12,500 tuns, the value of which, at £30 a tun, is £375,000.

It is well known that the cod is most prolific in the perpetuation of its race. A cod-roe has more than once been found to be half the gross weight of the fish; and specimens of the female have been caught with upward of eight millions of eggs. Were all these to come to maturity a pair of cod would, in a few years, fill the ocean; but of course, in the great waste of waters, only a portion of the eggs are fertilized, and only a small per centage of the fish ever arrives at maturity. The cod spawns in the mid winter, but its habits have not been observed with sufficient accuracy to determine when it becomes reproductive. The best authorities hold that the cod is an animal of slow growth, and that it is at least three years old before it is able to repeat the story of its birth. A question of great interest to Newfoundland is, whether it is possible, by over fishing, to exhaust her cod fisheries, either partially or entirely? As yet no serious impression appears to have been made on the Bank fishery, after three and a half centuries of ceaseless fishing. The same, however, cannot be asserted in regard to the shore fishery, at least at certain points; and the frequent complaints of late years of the scarcity of fish in certain bays, as compared with former times, and the numerous failures in the summer fishery awaken the suspicion that the perpetual drafts, year after year, without any interval for recruiting, have seriously reduced the number of codfish, in certain localities. The scarcity of cod in Conception and Trinity bays, and other places, of late years, as compared with "the good old times," is generally allowed; and the bulk of the population of these bays now proceed to the Labrador for their summer fishing. The theory of the migration of fish, once a general notion, is now known to be a popular delusion, and has been abandoned by all scientific naturalists. The migratory instinct in fish is ascertained to be very limited, merely leading them to move about a little from their feeding ground to their spawning ground—from deep to shallow water. In fact there are, in the world of waters, great fish colonies, as there are great seats of population on land; and these colonies are stationary, having, comparatively speaking, but a limited range of water in which to live and die. All around the shores of Newfoundland are numerous banks, or submarine elevations, of greater or less extent, which constitute the feeding and breeding grounds of the cod; and each of these has its own fish colony that live and die within a limited range from their own *habitat*. They do not intermingle with other colonies or invade their domains. This is proved by the well known fact that the cod of different localities are marked by distinctive features and qualities—the cod, for example, of Placentia bay being quite distinguishable from that taken in Bonavista bay. So, too, the vast fish colonies of the Great Banks, at a considerable distance from the shores, differ from shore fish, being larger and finer, and, except a few adventurous individuals that roam from home, are not found at any distance from the place of their birth. It is a favorite theory with Newfoundland fishermen that, were it not for the Frenchmen fishing on the Great Banks, and covering miles of the ocean with their *bultows*, the fine bank fish would come in on the shores, and swarm in every bay and creek. This is merely a popular fallacy. The bank and shore fish keep to their respective homes. If heavy drafts are made on the smaller colonies around the shores and in the bays, in the course of years, these will become seriously diminished in numbers. Facts seem to indicate that this is the case in many localities at present. The average catch of codfish now is not greater than it was fifty years ago, though many thousands more hands are now engaged in fishing.

There is one other economic purpose for which the codfish are available, but which is yet undreamed of in Newfoundland. I refer to the manufacture of fish-guano from fish offal. The French have invented a process by which the offal of all fish, and the coarse fish that are useless for food, can be converted into a fish-powder nearly as rich as the best Peruvian guano, equally [transportable and possessed of the same fecundatory properties when employed in agriculture. The process is simple—the offal or fish are boiled—then subjected to pressure, in screw-presses, to extract as much as possible of the water and oil; then dried and reduced to powder, which is found on analysis to contain 12 per cent of nitrogen and 14 per cent of bone earth. In fertilizing qualities, when applied to land, it competes advantageously with Peruvian guano. There are several large factories, for the manufacture of this fish-guano in France—the most extensive being at Concarneau, between Lorient and Brest, in the department of Finisterre, a fishing village, where the catching and preparation of Sardine are carried on. The success of this branch of industry has been great and decisive, and is now placed beyond the possibility of doubt. In the locality in which it is manufactured in France this fish-guano fetches eight shillings per cwt., and is eagerly sought by the farmers; while the oil, which constitutes about 2½ per cent of the raw fish, is worth three shillings and four pence per gallon. These figures show that the manufacture must be highly profitable. The establishment at Concarneau, where only six men and ten boys are employed, produces 2,000 tuns of manure annually, which, at the rate of three cwt. per statute acre, would suffice to manure 13,000 acres of land, and would represent, at 22 per cent of dried manure, a fishing of 9,000 or 10,000 tuns. The quantity of coal used in the manufacture is about two cwt. to one tun of manure. The French have had one of these factories in operation for some years, at Quirpon, near the strait of Belle-Isle, on the northeast coast of Newfoundland; but its existence is all but unknown to Newfoundlanders, few if any of whom are aware of the invention, and the immense field of industry which it opens up. This establishment at Quirpon furnishes from 8,000 to 10,000 tuns of manure annually; and possibly there may be other factories at work along the "French Shore" of which we have no information.

A new and vast field of enterprise in Newfoundland might be opened up, in this manufacture, were persons possessed of skill and capital to enter on it. The cod, previous to being salted and dried, is deprived of its head, its intestines, and the backbone, which together make about one-half of its total weight. With the exception of the trifling portion of this offal that is mixed with bog and applied to the land in Newfoundland, the whole is lost without utility, or is thrown into the sea. Hundreds of thousands of tuns of offal are thus lost which might be turned to profitable account, to say nothing of the immense quantities of common fish which might be taken for this manufacture. I believe the sources, whence the supply of guano is now drawn, are becoming exhausted; so that the manufacture of an artificial guano will, in the future, become more remunerative. The worn-out soils of the densely populated countries of Europe seem destined to be renovated in this way from the inexhaustible wealth of the ocean. In the month of June each year, the shores of Newfoundland are visited by enormous shoals of caplin, for the purpose of spawning. The masses of them, in the various bays and harbors, are so great that two men with a small landing net will fill a boat in a couple of hours. They cover the surface of the ocean for miles and are devoured by the voracious cod by myriads. So little account is made of this delicious little fish that it is largely employed in manuring the fields and gardens. Enormous quantities of herring too are at times lost from want of proper appliances for curing. These two sources of supply, for the material of fish-guano, might be added to those already named, so that the stock could never fall short. He would be a benefactor to Newfoundland, who would introduce this important branch of industry.

EXTRACTS of medicinal plants are now made with the bi sulphide of carbon by M. Lefort.

Nathan Read, the Inventor of the Multi-Tubular Boiler.

Nathan Read was a native of Warren (formerly Western), Worcester County, Mass., born July 2, 1759. His ancestors originally came from Newcastle-upon-Tyne; they then settled in the County of Kent, where they lived for several generations. From thence they emigrated to America at an early day, about 1632, and settled in the vicinity of Boston, where they resided for many years. His grandfather—when the country was new, and but few settlements in that section of the State—purchased a large tract of land in Warren, upon which he settled, and where he spent the remainder of his life in the improvement of his lands. His father, Major Reuben Read, was an officer in the Revolutionary service; and his mother, whose maiden name was Tamison Eastman, was first cousin to Major-General Nathaniel Greene, of Rhode Island. His father was an only son, and resided upon the homestead during his life. At the age of fifteen years, Nathan commenced his preparatory studies for College, and at the close of the summer vacation of 1777, entered Harvard University. His parents were desirous that he should qualify himself for the ministry, and he attended Professor Sewall's Lectures on the Hebrew Language. He acquired a good knowledge ot the language, and by appointment, gave a Hebrew Oration at a public exhibition of the University; and during the interval between the death of Professor Sewall and the appointment of his successor, Mr. Parsons, he was engaged to instruct the class in Hebrew. He graduated in 1781, on which occasion he was selected to deliver the valedictory address. He was distinguished as a scholar, and left College with the respect of officers and students. After graduating he was engaged in teaching in Beverly and Salem, until 1783, at which time he was elected a tutor in Harvard University, where he continued his labors as such until the commencement of 1787. He then resigned his place as tutor, and entered upon the study of medicine with Dr. Edward A. Holyoke of Salem, until October, 1788, when he gave up the idea of following medicine as a profession, relinquished its study, and opened an apothecary store in Salem.

While engaged in the study of medicine with Dr. Holyoke, and also while in his store, he devoted himself, more or less, to study and experiment in the mechanic arts, which indeed held a higher place in his mind than his medical studies or merchandise. It was during this period of time that he invented and constructed his models of a steamboat and locomotive carriage.

In October, 1790, he was married to Miss Elizabeth Jeffrey, daughter of William Jeffrey, Esq., Clerk of the County of Essex, and granddaughter of Joseph Bowdish—August 24th, 1791, he was elected a member of the American Academy of Arts and Sciences—April 4th, 1795, he removed to his farm in Danvers, and built a permanent structure across Water's River, which served the double purpose of a dam and bridge. In 1796, he and his associates erected and put in operation the Salem Iron Factory, for the manufacture of chain-cables, anchors, and other materials of iron, for ship-building, he having the chief superintendence of the work. While thus engaged, he invented and put in operation in the factory, designed for its own special use and benefit, with a view to the saving of labor and other economical purposes, a nail machine, since extensively used for cutting and heading nails at one operation, for which he received a patent, as the original inventor, from the United States Government, on the 8th of January, A. D. 1798. This highly important invention obviated the very great labor and expense of the manufacture of these articles by hand.

In October, 1800, he was appointed a member of Congress for Essex South District, to fill the vacancy occasioned by the death of Judge Sewall, then late member from that district; and in November, 1800, he was elected by the people of the district, a member of the succeeding Congress, for two years from and after March 4th, 1801; and was a member during the severe contest in the House of Representatives for the Presidency, between Jefferson and Burr.

In February 1802, while a resident of Danvers, he was appointed by Governor Strong a special Justice of the Court of Common Pleas for the County of Essex; and after his removal from Danvers to Belfast in Maine, which was in 1807, he presided as Chief Justice of the Court in Hancock County for many successive years. In 1815, he was elected an honorary member of the Linnæan Society of New England.

After removing to Belfast, Judge Read gave most of his time to agricultural pursuits; but he often indulged himself in new inventions in the mechanic arts and trying experiments therein; and during his whole life these and the natural sciences were his favorite study. He invented several useful agricultural implements, for some of which he took a patent; but constructed them mainly because he had use for them on his farm. His farm consisted of some four hundred acres of land, finely situated near the head of Belfast Bay, lying upon the shore just south of the city of Belfast. His residence overlooked the bay, with its attractive scenery; and here he spent the remainder of his life, ever taking a lively interest in all matters of a public character, especially such as were designed to improve the moral condition, and advance the intellectual and social improvement of the people among whom he lived. He regarded the cause of education as involving one of his highest duties; and at an early day, when the town was comparatively new, he was instrumental in establishing a high school in Belfast, that the youth of the place might be educated at home—the beneficial effects of which have long been appreciated.

He died at his residence in Belfast, January 20th, 1849, in the ninetieth year of his age, and in the full possession of his intellectual powers, except a few days at the close of his last sickness. He possessed a strong constitution, and a strong and highly cultivated mind; his aims were high, and he soared above the sordid interests of the world. He never sought to make himself conspicuous, or to give publicity to his attainments or labors, but chose rather unobtrusive retirement. His deportment was always gentlemanly; his form fine, and his countenance highly intellectual. His conversation was ever interesting and instructive; and he lived and died with the respect and esteem of all who knew him. He was the last surviving member of his college class; and with two exceptions—Judge Farrar and James Lovell—the oldest living graduate of Harvard University.

As early as 1788, as already noticed, while a resident of Salem, he became especially interested in the purpose of applying steam-power to the practical end of propelling boats and land carriages. He foresaw the importance of attaining such a purpose, and set himself to work to contrive the necessary machinery to effect it, which at that time was felt by all intelligent men who had given their attention to the subject, to be a *desideratum*—a work yet to be accomplished. The idea as applied to boats was not new; various experiments had been tried, but were mainly directed to the mode of propulsion, without so much attention to the motive power; and all the experiments hitherto tried had proved a failure.

THE WIRE ROPE TRAMWAY AT BRIGHTON, ENGLAND.

[Condensed from Scientific Opinion.]

The wire-rope transport system may be described as consisting of an endless wire rope running over a series of pulleys carried by substantial posts which are ordinarily about 200 feet apart. This rope passes at one end of the line round a drum, driven by either steam, water, or even horse power, in small farming operations, at a speed of from four to eight miles per hour. The boxes in which the load is carried are hung on the rope at the loading end by a wooden Λ-shaped saddle, about 14 inches long, lined with leather, and having four small wheels, with a curved pendant, which maintains the box in perfect equilibrium while traveling, and most ingeniously, but simply, enables it to pass the supporting posts and pulleys. By a sliding-ring arrangement the boxes or buckets are easily emptied by tilting, without unshipping the saddle from the rope. The boxes can be made to carry from 1 cwt. to 10 cwt., and the proportions of the line and the loading and discharging arrangements can be varied to suit any particular requirement, ranging from 10 tuns to 1,000 tuns per diem. At each end of the line are rails placed to catch the small wheels attached to the saddles of the boxes, by which means the weight, having acquired momentum, is lifted from the rope, and, thus suspended from a fixed rail or platform, can be run to any point for loading or emptying, and again run on to the rope for transport, the succession being continuous and the rope never requiring to be stopped for loading and unloading.

Curves of sharp radius are easily passed, as well as steep inclines, and its applicability to cross rivers, streams, and mountains, or hilly districts, will be apparent at a glance, as the cost of construction increases but little under such circumstances, whilst that of a road or railroad is, perhaps, increased tenfold, and the daily working cost doubled or trebled. The rope being continuous, no power is lost on undulating ground, as the descending loads help those ascending.

In the case of lines for heavy traffic, where a series of loads, necessarily not less than 5 cwt. to 10 cwt. each, must be carried, a pair of stationary supporting ropes, with an endless running rope for the motive power, will be employed, but the method of supporting, and the peculiar advantage of crossing almost any nature of country with a goods line without much more engineering work or space than is necessary for fixing an electric telegraph, without bridges, without embankments, and without masonry, exists equally in both branches of the system.

In the minor applications, such as short transport from mines to railways, the landing or shipping of goods in harbors and roadsteads, and the carriage of agricultural produce on farms, some peculiar features of the system render it specially advantageous. Amongst these are the facility with which power can be transmitted by the rope and taken off at any required point for mining or other purposes. In lines terminating on the seaboard, or on great rivers, a manifest advantage is secured in the facility for taking goods direct to or from ships in harbor or roadstead without transhipment into lighters.

Seen from a distance, the posts which carry the tramway wires at Brighton, might be mistaken for telegraph poles, but a nearer inspection reveals a second line of wires on the same level, and upon these two wire-rope lines, supported on standards at intervals varying from 300 feet to 1,000 feet apart—according to the requirements of the ground—are suspended iron boxes for the carriage of the goods, which boxes pass on noiselessly and steadily, carried forward by the rope at the uniform rate of five miles an hour—the time required for performing the entire circuit of the line.

In laying out these five miles at Brighton the opportunity has been taken of exemplifying the working of the system under every variety of difficulty that could possibly present itself; thus we have at one part an incline of 1 in 6, up and down which the rope and boxes work with perfect facility, the descending weights assisting those which are ascending; then there are, besides several bends less acute, two instances of absolutely right-angles which are passed with the greatest ease; in some instances the standards are carried to the hight of 70 feet, to meet inequalities of the ground, undulating and hilly country being more trying to this system than craggy and mountainous—such as that for which this plant is designed, and where, from the long reaches taken, fewer posts will be required.

The line is rather over five miles long; there are 112 posts, or standards, in the whole length; these standards can either be made of light angle and band iron neatly put together, as in the present case, or of wood. The rope is made of charcoal iron, is two inches in circumference, each strand as well as the center of the rope having a hempen core, to secure ductility. The power employed to drive the rope is a portable 10-horse power engine.

Some of the spans are 600 feet and 900 feet in length, and ingenuity has been shown in devising every possible mode of testing the merits of this system of transport; and we are bound to record that all difficulties have been overcome with complete success. The line is capable of delivering 240 tuns per day of ten hours, *i. e.*, 120 tuns in each direction.

This tramway has been erected by Mr. Hodgson the inventor, at the request of some gentlemen with whom he was in negotiation, for the supply of materials for a line sixty miles in length in Ceylon.

It is intended to divide the proposed Ceylon line of 60 miles into 5-mile sections such as the one described—one engine working every two sections, and the boxes passing each section by shunting arrangements, similar to those used at the termini, from one section to another. The line in work will be open daily to public inspection during the month of April, and is well worth a visit. It is hardly likely that so efficient and economical a means of transport will be for long exclusively confined, as at present, to the conveyance of goods. For ourselves, we venture to confidently predict an early adaptation of the principle of this ingenious system to passenger traffic.

FURROWING AND PITTING IN LOCOMOTIVE BOILERS.

BY JOHN G. WINTON.

Some theorists attribute furrowing to the expansion and contraction of the boiler, inducing a bending and unbending of the plates; if so, then the outside of the plates would show an abrasion similar to the end plates of the smoke-box, as with inside cylinders, or simply to a straight strip of iron bent and unbent by the hand. These furrows are observed with lap joints, with butt joints having inside strips, but when the strips are outside no furrowing takes place. Now, with this statement, I hold this theory of bending and unbending of a circular boiler to be perfectly erroneous, and look to natural laws for an explanation of the furrowing and pitting of steam boilers.

Mountain torrents very rapidly wear the bed of a river of the most compact material, and it is well known that the bilge-water in a ship rapidly wears off the rivet heads, by the mere friction of the water rolling forwards and backwards. Were water allowed to drop on an iron plate, drop by drop, pitting would follow, corrosion taking place, and the impact of the falling water washing away the rust as it formed—thus eating into the iron very quickly, more especially on soft spots of the surface.

Now, what is the mechanical action of the water in a locomotive boiler? I take it to be a racing of the particles from the fire-box to the smoke-box end, and as the steam is generated from the tubes, a partial explosion takes place in all directions, carrying the particles of water along with it. I am not so certain that the impact of the water propelled by the steam generated by the tubes acting on the surface of the boiler does not, in a great measure, account for pitting. When corrosion takes place, the incessant impact of the water on the soft spots of the iron must wash off the rust as it forms, leaving the surface always raw, as it were (assisted in some cases by galvanic action). The boilers generally show the center of the furrow about one inch from the lap joint. I will endeavor to give an explanation of this. Noticing pieces of wood floating on the surface of our silent Thames when the river had attained its greatest downward velocity, I was quite struck by observing at the piers of the bridges that the pieces of wood never came in contact with the pier, but invariably took a rapid current about one foot from the pier, and were carried away more rapidly than in the center water-way. How is this to be explained? I take it that the water flowing against the pier is repelled, the same as the sea dashing against a breakwater is thrown back again, and being met with a downward current, and the meeting of the waters, I will say, induces a rapid current one foot from the pier. Those interested can make this observation for themselves by simply looking over, say, Westminster Bridge, and observing materials floating on the surface. I am just going to state that this phenomenon is the cause of the furrowing of locomotive boilers. Where a boiler is made perfectly cylindrical, with butt joints and the strips outside, no furrowing is observed; with the strips inside, or with lap joints, furrowing takes place. Now, in my opinion, the strips and lap joints are the obstructions, as in the piers of a bridge, causing these furrows; the steam generated from the tubes, shooting the water against the edges of the plates, is repelled, and the racing of the water from the fire-box end causes a rapid current to flow parallel with the joints, this upward and repelling and onward action of the confined water inducing more friction, and, consequently, keeping this part of the boiler in a raw state, making it more subject to corrosion and galvanic influence. With these opinions I consider, when the edges of the plates are placed downwards, they are more liable to form furrows. Some bevel the edges of the plates, which I consider will tend to lessen this evil, but cannot imagine it would be easily calked, as it is very difficult to calk a knife-edge. The best cure is by making outside strips strong enough with butt joints and a proper form of rivet, which I maintain is a double counterlap; thus we shall have as strong a boiler with no furrowing, which must tend, in a great measure, to reduce the number of boiler explosions. The following shows the rivet I would adopt for lap and butt joints. A curved countersink is, I consider, the strongest form, as the iron is less distorted. Part of the head of the rivet is retained to resist the force of impact from the riveting hammers; and it is evident that if the head is reduced by corrosion the countersink will hold good. This is not a bending and unbending theory, neither is it a bulging one, as in some cases these theories may hold good; but at the same time the mechanical action of the water in either case I consider rapidly deteriorates the boiler.

Girdling Fruit Trees to Make them Bear.

A correspondent of the *Boston Journal of Chemistry* states that there is no doubt that the girdling of fruit trees is a cause of abundant fruitage, but it by no means follows from this fact that a general principle can be deduced, that trees would be improved, or the crop increased for a series of years, by such treatment. It is well known that gardeners frequently girdle a branch, by removing a narrow ring of bark around it, when they wish to increase the size and beauty of the fruit; but it is done at the expense of its vitality, and, unless the operation is skillfully performed, will invariably destroy it before the season of bearing the next year.

The crude sap, taken up from the soil by the roots of the tree, ascends principally through the vascular tissue of the alburnum or sap-wood to the leaves of the branches, and there both this and the carbon of the carbonic acid, absorbed from the air by the leaves, are organized into the proper substance for the growth of the wood and fruit. It then descends on the outside, principally through the sieve tissue of the cambium layer, forming a new layer of wood and bark; while a part also goes to the nourishment of the fruit. If there is no obstruction of the elaborated sap in its downward course, it is equally distributed to the branches, fruit, stem, and roots; but, if the bark and cambium layer are removed by girdling, it is stopped in its descent, and consequently received into the branches and fruit in excess, and they are thus increased at the expense of the part below. In this way we account for the increase of the fruit by girdling.

Professor John Lindley, when speaking of this subject in his late treatise on horticulture, quotes Mr. T. A. Knight approvingly, as follows: "When the course of the descending current is intercepted, that naturally stagnates, and accumulates above the decorticated space, whence it is repulsed and carried upward, to be expended in an increased production of blossoms and fruit." This theory is adopted by the best physiologists of the present time, and can be demonstrated with almost mathematical certainty. Therefore, this unnatural development of fruit, instead of indicating an improvement of the trees, must be looked upon as a premonitory symptom of disordered physical action, and of premature death.

If the bark and the cambium layer have been removed by girdling, as seems to be the case with the trees, the downward circulatory connection on the outside between the upper and the lower part is destroyed, and the upper part at least must die. If, however, the cambium layer has not been destroyed, and has been so covered by wax and bandages as to prevent evaporation and drying of the surface of the decorticated part, there is a chance for some of them to live. It is true that some few cases are recorded of trees which have lived several years after the bark and cambium layer have been removed, but they are of very doubtful authority.

M. Ernest Faivre, a French physiologist, gives a statement of his recent investigations on this subject, published in the *Gardener's Chronicle*, about two months ago, in which he says: "In mulberry trees, as in all trees deprived of latex, annular incisions generally produce the following manifestations: 1. Formation of a swelling, or tissue restorer, at the upper lip of the wound. 2. Diametrical growth of the parts above the zone of bark taken off. 3. Hardening of the wood in that region. 4. Stationary condition of the parts below, if they are deprived of leaves and buds; or, if not, vigorous shoots from below the lower lip of the wound. 5. More easy, more early, and more abundant flowering and fructification. 6. Destruction, after a variable time, of all the parts above the annulation."

From the foregoing observations it appears that girdling trees in any form is ruinous, and almost always fatal; therefore I heartily concur in the advice given in the *Journal* that orchardists should not experiment on their trees too freely before they see what the final result will be with those already girdled.

Speed of Electric Signals.

Professor Gould has found that the velocity of the electric waves through the Atlantic cables is from 7,000 to 8,000 miles per second, and depends somewhat upon whether the circuit is formed by the two cables or by one cable and the earth.

Telegraph wires upon poles in the air conduct the electric waves with a velocity a little more than double this, and it is remarked, as a curious fact, that the rapidity of the transmission increases with the distance between the wire and the earth, or the hight of the support. Wires buried in the earth likewise transmit slowly, like submarine cables. Wires placed upon poles, but slightly elevated, transmit signals with a velocity of 12 000 miles per second, while those at a considerable hight give a velocity of 16,000 or 20,000 miles.—*Journal des Telegraphes.*

THE Boston *Journal of Chemistry* recommends a mixture of equal parts of dry white lead and red lead mixed into a paste with mastic varnish, and used as soon as made, as a cement for aquariums.

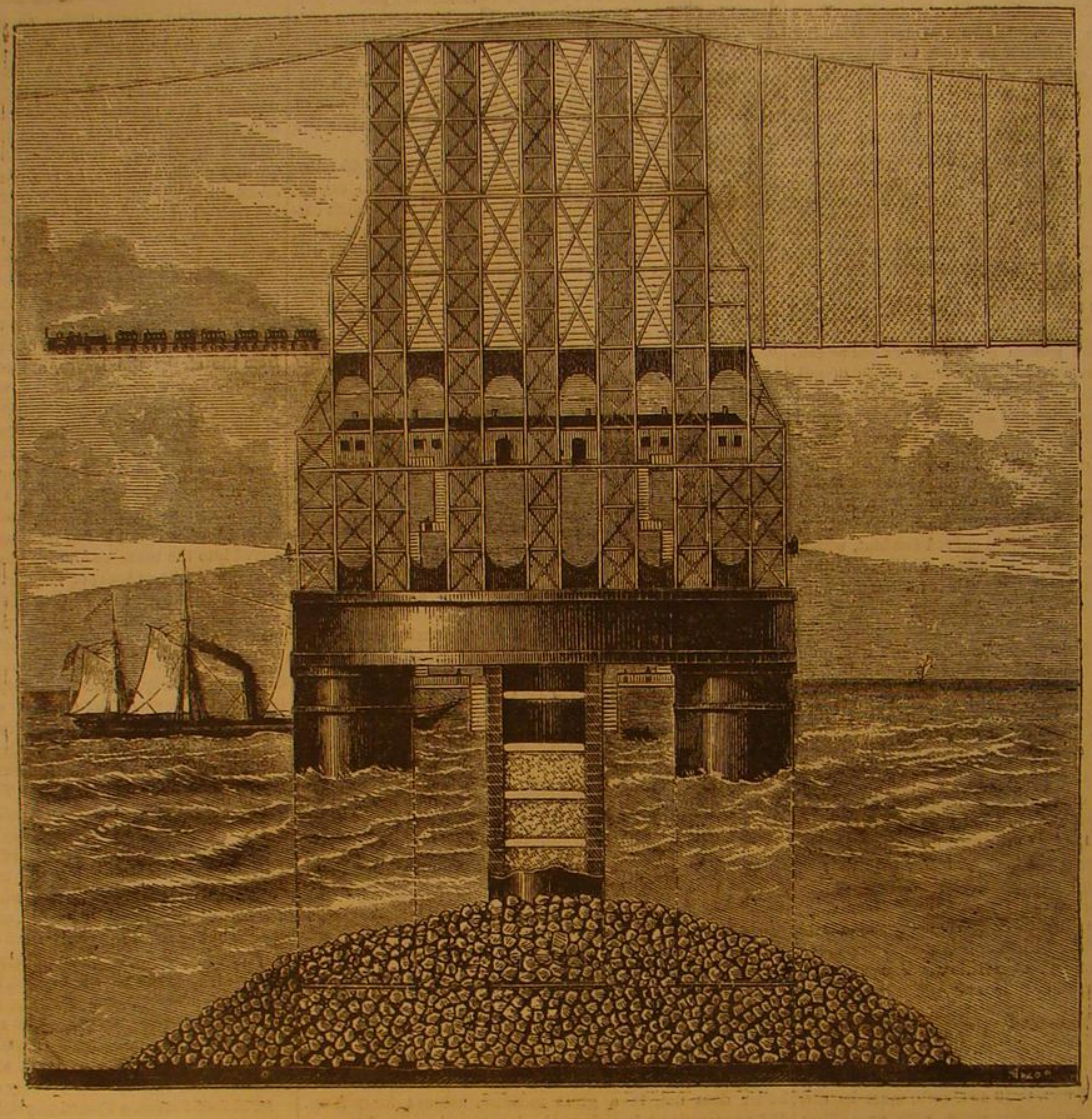
Deep-Sea Railroad Bridges Crossing the English Channel.

If all the plans and projects for crossing the English Channel, which have been published, were engrossed upon suitable paper, rolled up, and cast into that famous passage, they would nearly bridge the space between Dover and Calais, and would form as practicable a structure as many that have been seriously mooted.

We illustrate this week from the English *Mechanic* a plan proposed by John S. Winton, an English engineer, which is, to say the least, as feasible as many others put forth by men of wider celebrity.

Mr. Winton writes to the above-named journal as follows:

"The great difficulty in laying down deep sea bridges is, undoubtedly, the piers; for in the Channel the depth of water varies from 75 feet to 175 feet. The bed, we will presume, is gravel. Some prefer piling, screwing long piles into the sand or gravel, as the case may be. I would lay before you a very different mode of sinking deep sea piers—the accompanying sketch almost explains the plan I would adopt. Three hollow piers are constructed of metal, filled in with concrete, securely joined together at the bottom, as well as having distance pieces uniting them, a little below the surface of the sea, as shown. The length of each would be 390 feet, the breadth of each 60 feet, and the total breadth 260 feet. The piers would have an inner and outer skin, strongly trussed together, the space between the skins being filled up with concrete, as well as the bottom part that rests on the bed of the Channel. Such I consider is the size that would be required for the piers at mid-channel, as the total hight of the structure at that part would be little less than 550 feet, the track being 200 feet above the level of the sea. To those who have had similar works to execute, it is an easy matter to construct in shoal water those huge piers, tow them to their destination, and sink them by simply admitting water into the piers, and afterward displacing it by precipitating puddle and small stone from above; thus we would have piers of great weight, strength, and stability, to resist the troubled waters of the Channel. The total holding-down weight, making due allowance for the displacement of the structure, would be about 453,963 tuns, principally composed of concrete and ballast—this is only for one pier proper, sunk in a depth of 175 feet of water; should it be considered necessary, hydraulic, or pile piers, could be sunk into the bed of the Channel to secure a better foundation. These piles being contained within the piers, could easily be working from the platform, with suitable pipes, valves, etc. Thus, having laid down all the piers, the superstructure could be proceeded with. I consider the suspension principle far before the horizontal wire-rope bridge of M. Bratch, and would certainly recommend a suspension bridge, embodying the ideas of the French engineer, by the system of interlacing all the wire ropes. I consider, when the main suspension ropes were laid on to the depth of the bridge or lattice-work at the center of the spans, a platform could then be laid for finishing the structure, requiring no scaffolding, as in the Boutet Viaduct. I will not trespass on your valuable space much further; suffice it to say, that when both countries agree to a bridge, that bridge can be easily constructed, and although my tunnel project does not interfere with the navigation, I think all must allow, and more especially the fair sex, that railway communication per bridge would be a delightful way of visiting our Continental friends. The inclosed sketch is drawn accurately to scale; the railway train seems a mere toy, and it is this fact that renders the whole structure not only safe, but practical. Of course the electric light would guide navigation at night."



DEEP-SEA PIERS FOR A PROPOSED BRIDGE TO CROSS THE BRITISH CHANNEL.

ALL exact knowledge depends upon exact measurement.

Heat from Nebular Condensation.

Professor Tyndall, in his "Heat as a Mode of Motion," affirms that the chances that iron is in the sun are 1,000,000,000,000,000,000 to 1, on account of the coincidence of certain dark lines in its spectrum with certain bright lines yielded when incandescent vapor of iron is employed as the source of light. This is put forth as an *actual* calculation. It may be *actual* in the sense that Professor Tyndall actually made it, but purely imaginary at the same time. The elements for a *real* calculation of the probabilities are not known. Very likely the professor is right if he thinks only of coincidence arising from *chance*, but we have no information whatever concerning the probability that coincidences may result from *law*. The quantity of experiments yet made is insufficient to justify such extravagant assertions, and no one has yet arrived at a law explaining why the spectra of different so-called simple bodies vary exactly as is found to be the case. No philosopher really imagines that there are scores of substances which are really simple, and if, as is probable, the chemist may find means of decomposing metals, and certain gases, or carbon, who can venture to predict what fresh spectra may appear.

Helmholtz, cited by Tyndall, estimates the heat occasioned by nebular condensation as prodigious in intensity. Tyndall, describing his opinions, says, that supposing the nebulous matter to be in the first instance of extreme tenuity, and the specific heat of the condensing mass the same as that of water, then the heat of condensation would be sufficient to raise the temperature 28,000,000° Centigrade, or about 13,000 times the heat of the Drummond light. A question arises whether condensation would take place under such circumstances, or at such a temperature, which we should be inclined to suppose would dissociate all chemical compounds. Nebular condensation, producing suns and planets, must give rise to chemical unions, and if heat were not the cause of the dispersion of the molecules of the nebula into the highly-attenuated form of those bodies, their condensation may not evolve heat as Helmholtz supposed.

The Relations of Labor---Letter from General Butler.

General Butler has written a letter in which he describes the changes that have taken place in the management of the great manufacturing establishments of New England, and in the character of the operatives, and expresses his views of the proper policy to be pursued hereafter in the following terms:

"It seems to me that the time has come for the interference of the Legislature in the investigation at least of the limit of the hours of labor, and the limit of the employment of youth, to determine how far it is best for the State that its children shall be deprived of an opportunity for education and training, by the employment of its young life in accumulating the gains of selfish parents, or adding to the profits of equally selfish capitalists; also, what safeguards ought to be placed around the lives and limbs of the operatives engaged in managing huge and powerful machines, where a false step or a false motion may cost the life or limb. On this very necessary and important subject our statute books are wholly silent, while the laws of England are dotted all over with penal enactments to preserve the persons of the laborers from accident.

"Also, to inquire as to what may be done to insure a fair division of the rewards of labor as against the profits of capital. In a word, that the law may intelligently do in this most important relation of life and business what it ought to do, and does do, in almost every other, step in and restrain the strong from crushing the weak, and protect the needy against the promptings of avarice or the cruelty of selfishness.

"Of course, to do this effectively and justly to both parties requires accurate and careful observation of the conditions and relations of the operative to the employer, and of labor to capital, a full examination and report upon the abuses which require remedy, a full understanding and comprehension of all the facts on the one side and on the other which should guide legislation, to the end that injustice may not be done to the employer, or the citizen when employed shall not be without adequate protection by the laws.

"I was more than gratified at the establishment of the Bureau of Statistics and inquiry into the connection of labor with capital, and I have examined the report of that bureau with the utmost interest and attention I most earnestly desire that this work may go on, and that the Legislature, with a liberal hand, will afford all necessary and proper assistance, and that the objects of its investigation may take a more extended range.

"In my judgment there are no statistics so vital to the future well-being of the Commonwealth as those which would be gathered by the bureau. A struggle is just commencing here between capital and labor. If the contest is pursued with harshness, intensity, and bitterness of feeling, it will be because of want of knowledge by both parties of the duties of each to the other, and the rights of either relative to the other. Let the capitalist remember that, unlike England, here the vote of the laborer controls capital in legislation, and that if capital desires to preserve itself from unjust legislation, it must be because labor wields the ballot with intelligence. Let capital also remember that abuses, if any exist, in its relations with labor, cannot be hidden, and may grow all the more magnificent in their proportions from being partially unknown. A wrong understood only to be felt as a fear, is always the most terrible. The voter uninstructed will act upon exaggerations and erroneous impressions. The capitalist will refuse the amelioration of evils of which he neither knows the extent, nor, perhaps, the existence; and therefore collision with the operative because of them is inevitable. When that collision comes, the history of all governments shows capital goes to the wall."

FRAMING WOODEN BUILDINGS.—A writer in the *Architectural Review* says that in constructing wooden buildings, there is one thing to which particular attention should be paid; namely, the binding the top of the walls well together, and that is accomplished by framing the wall plate all around the house, and spiking the ceiling joists down on the same; then herring-bone, bridging these joists in as many rows as are necessary to make a thoroughly stiff brace for the whole. The roof (no matter whether Gothic or Mansard) cannot exercise any bad influence in pushing out the walls when this system is adopted.

A BEETLE ON THE WAR PATH.

[By Edward C. H. Day, of the School of Mines, Columbia College.]

Beetles constitute the order of the Coleoptera or sheath-winged insects, so called because their anterior pair of wings are modified into a, more or less, hard case, within which the thin, membranous, and delicate hinder pair, when not in use, are folded. The wing cases, or "elytra," do not subserve the purpose of flight, and as such heavy-bodied insects, as beetles usually are, require a large expanse of wing to support them, we accordingly find the hind wings in this order in general, largely developed. If we watch a lady-bird as it alights, we see that at first the wings extend far behind the elytra, but soon our welcome little friend furls the outer portions quickly and neatly beneath their cases. We could not, therefore, have a more expressive term for this group than the word coleopter; and there are are but few forms belonging to the order that the beginner in insect studies will fail to recognize at once as "sheath-winged." The wing cases, in some exceptional instances, are much reduced in size; more frequently the true wings are more or less aborted, and the beetles then, of course, do not possess the power of flight. The inner edges of the elytra always fit together along the middle of the back; that is, they do not overlap and partly cross one another, as do the wings of the true bugs, which belong to another order, the Hemiptera.

The transformation of the beetle is a complete one. It begins life as grub, generally with legs (three pairs), and furnished like the adult insect with powerful gnawing jaws. When it passes into its pupa stage it becomes inactive, the legs and wing cases of the futur einsect are, however, free, and the perfect form is already clearly foreshadowed. This enables us at once to distinguish the coleopterous pupa from those of the flies or the butterflies, in which the wings and limbs are soldered into the pupa case, thus effectually disguising the outlines of the form that is about to appear from it.

Beetles, from their vast numbers and from their varied habits, are of great economical importance. Of the weevils alone, a family to which the notorious pea weevil and plum curculio, and a host of other pests belong, from 8,000 to 10,000 species, according to Packard, are known; and the total number of species of beetles, of all families and from all countries, preserved in collections, is variously estimated at from eighty to one hundred thousand. Of these, some, as the Scolytus, figured in a late number, bore into timber; others feed upon leaves, flowers, or fruit; great numbers are carnivorous, preying upon their fellow insects; while many, again, are scavengers, living upon carrion or decaying substances. There are species that live in the nests of ants, and an entire group that inhabit fungi. Some kinds are altogether arboreal, while whole families are confined to the waters. The grubs, too, are equally variable in their habits, their food generally corresponding in its essential character to that of the perfect insect. The habits of beetles are thus of the most varied interest to the observer, though we do not find among them such high instincts as we do among the Hymenopters (the bees, wasps, and ants), which we have heard well termed "the thinking insects." On the other hand, the remarkable forms and the brilliant colors of many beetles and the comparative ease with which they are preserved in cabinets, render this order a great favorite with the mere collector.

THE CALOSOMA AND ITS PREY

The beetle shown, in the annexed illustration, descending the tree towards the procession of caterpillars, is the Calosoma (beautiful body), a terrestrial and, as we can almost determine by a superficial glance, a carnivorous insect. Its neat, light form, its evidently active legs, its trenchant jaws, all indicate a predatory being. It is clothed, too, in a close-fitting coat of mail—an armor brilliantly burnished, its dark green color flashing gorgeous metallic tints in the sun light. This is evidently one of the free-lances of the insect world. Its larva, taking the caterpillars on the other flank is likewise on the war path. Our picture, in fact, represents one of the innumerable scenes in nature, in which the maxim is enforced that "might is right;" and that train of slow leaf-eating caterpillars is as certain to lose some of its members, as they swarm up the tree trunk, as the richly-laden caravan in the desert is to be harried and black-mailed by the marauding Arab. The Calosoma, however, and its grub, unlike the human plunderers, are to be regarded as the friends of civilization and agriculture.

In this connection we may remark, that it is quite worth the gardener's while to learn something of the nature and habits of the grubs, which he turns up with the spade, for in his ignorance on this subject he too generally smites his best friends as well as his worst foes. On the lower left-hand corner of the cut, the pupa of the Calosoma is represented buried in its temporary tomb. How strange that death-like, transforming trance, interposed between two periods of such active existence!

Among a host of other carnivorous genera there are about thirteen species of the genus Calosoma recorded as occurring in the United States; of these, one, the Calosoma scrutator, is a common, large, and beautiful example. It is known to be the determined enemy of the canker-worm, and, according to Harris, it may be found, in the month of May, searching beneath and upon the trunks of the trees infested by those caterpillars.

The caterpillars represented in our engraving are of a European species, worthy, however, of illustration for several reasons. They are of a genus most destructive to the forest vegetation of Europe, and they have on occasions caused incalculable damage to the oaks, elms, and pines which they infest. Like many allied caterpillars, they live in a common web or tent, which they weave on the trunk of the tree on which they have been hatched, but in this tent each caterpillar makes its own chamber. When the feeding hour comes they sally forth from their tent by the common doorway, in regular order, one always leading, then two, then three following, until, finally, the whole community marches on in a gradually swelling column. From this habit they obtain their common name of "processionary" caterpillars. Finally, the hairs which clothe them possess a remarkable property, expressed in the scientific appellation of the moth from which they come—*Cnethocampa* (*knetho*, to irritate, and *kampe*, a caterpillar). The penetration of these hairs into the skin, produces an irritation similar to that of a nettle. When the caterpillar is about to change to a chrysalis, it lines its chamber with its hairs, and he who incautiously places his hand on such a nest will not be likely soon to forget his experience. Noel Humphreys quotes the case of a boy who, while birds-nesting, was so severely stung on the neck and breast by these hairs, that the irritation caused his death. A very common caterpillar in this country, belonging to a different genus of the silk-spinning moths, possesses this same disagreeable power of nettling at once your skin and your temper. Curiously it has likewise the habit of marching in strictly follow-my-leader processions of progressive development; but, happily for us, it is behind its European fellow in the matter of a domicile—it has not arrived at the idea of tent building, and of lining its sleeping apartment with its own cast-off hairs, but the entire community rest together beneath the primitive shelter of a leaf. The moth from which this particular American stinging caterpillar comes, is the large and handsome Io moth (*Saturnia Io*), and differs considerably from the moths represented in the engraving as the parents of the European processionary caterpillars.

White of Egg an Antidote for Corrosive Sublimate.

It is asserted by Peschier, that the white of one egg will render four grains of corrosive sublimate innocuous. Orfila administered to a small dog twelve grains of this poison; after it had acted for about eight minutes, the whites of eight eggs were given; it vomited several times, the pain ceased, and in five days it quite recovered. The white of egg should be beat up in a little water, and it should be given freely, at intervals. A woman, named Rose Maney, poisoned herself with corrosive sublimate; various remedies were tried, but with little benefit. The morning after the poison was taken, the whites of two eggs, beaten up with a little cinnamon water, were given; this dose was repeated every half hour, until she had taken the whites of twelve eggs, when she began to feel easier; and, during the time she had been under this treatment, she had only vomited twice, and other unfavorable symptoms began to disappear. The white of egg treatment was continued until she had taken the whites of thirty-two eggs. She went on progressing favorably, and was eventually cured. Here the albumen was not given till many hours after the poison was first taken. There is another substance which is considered to act as an antidote, namely, gluten. Its properties were discovered by Taddei, an Italian chemist. In administering it, it is usual to mix the gluten with soap, so as to hold it in suspension. If eggs are not at hand, gluten may be thus used. It is easily prepared by kneading dough, made of flour and water, under a tap from which the water is pouring in a small continuous stream; the starch is washed away from the flour, the gluten remaining behind; and this should be rubbed up with soap and rinsed with water.

Thenard, the great French chemist, during a lecture, by mistake drank a strong solution of corrosive sublimate. He immediately discovered what he had done, and made the fact known to his class. The excitement produced was intense. He told them to bring him eggs. Eggs were sought for in every direction; in a few minutes large quantities were obtained by his anxious pupils, and thus the life of this eminent professor was saved. This happened shortly after the discovery of the effects of albumen on corrosive sublimate were discovered by Orfila. A case is also recorded of a gentleman who, by mistake, drank a portion of an alcoholic solution of this substance. He was so alarmed by the taste that he did not finish it. He was, however, seized with a sense of tightness in the throat, burning at the stomach, and purging. Orfila saw him when the symptoms had acquired great severity, having lasted two hours. The administration of white of egg caused a mitigation of his sufferings, and he ultimately recovered.

Potatoes.

In Gerarde's "Herbal," 1597, page 926, will be found the following interesting account of the uses of the potato: "The potato roots are among the Spaniards, Italians, Indians, and many other nations, ordinary food and common meat; which no doubt are of mighty and nourishing parts, and do strengthen and comfort nature; whose nourishment is, as it were, a mean between flesh and fruit, but somewhat windie; yet being roasted in the embers, they lose much of their windinesse, especially being eaten sopped in wine. Of these roots may be made conserves no lesse toothsome, wholesome, and dainty, than of the flesh of quinces, and likewise those comfortable and delicate meats called in shops Morselli, Placentulæ, and divers other such like. Their roots serve as a ground or foundation whereon the cunning confectioner or sugar-baker may work and frame many comfortable delicate conserves and restorative sweetmeats. They are used to be eaten roasted in the ashes. Some when they be so roasted infuse and sop them in wine; others, to give them the greater grace in eating, do boil them with prunes, and so eat them; likewise others eat them (first being roasted) with oil, vinegar, and salt, every man according to his owne taste and liking. Notwithstanding, howsoever they be dressed, they comfort, nourish, and strengthen the body, vehemently procuring bodily lust."

TO TAKE INK-STAINS OUT OF MAHOGANY.—Put a few drops of spirits of niter in a teaspoonful of water, touch the spot with a feather dipped in the mixture, and on the ink disappearing, rub it over immediately with a rag wetted in cold water, or there will be a white mark, which will not be easily effaced.

Correspondence.

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

Curious and Incongruous Attachment.

Messrs. Editors:—I am reminded by your article of last week, entitled "Curious Associations among Animals," of an incident in my boyhood's experience more remarkable and more inexplicable than anything I have ever heard or read, which, if you think it worth the while, you may give to your readers.

My boy brothers and myself were one day roaming over the fields with a little dog—our inseparable companion in such rambles—and amusing ourselves by turning over logs, flat stones, etc., to give the dog a chance at the field-mice or meadow moles, as we called them, so frequently to be found in moist meadows and pastures.

Boys and dog were having rare sport "bagging" lots of game, when on turning over a log, we found one of those round, soft, skillfully constructed nests, with which every country boy is familiar, and, upon tearing it open, discovered five little bare, helpless mice, not yet able to crawl. We concluded to take nest and mice to the house, the nest as a curiosity, and the mice as a feast for our favorite cat. Upon placing the little creatures on the floor before her, expecting to see them consecutively gobbled with all that gusto which cats from time immemorial have manifested for that species of delicacy—imagine our astonishment at the result. Instead of devouring them, pussy, with that peculiar caressing purring usually heard only from the feline mother when calling their young, commenced licking and petting the little things, lay down on her side, and pushed them up to her body with her paws exactly after the manner of cats with their very young kittens. The whole family were called to witness the strange performance.

We had read in our juvenile treatises on natural history of the curious freaks of cats which had lost their kittens, and should not have been so much surprised if our cat had been subjected to any such bereavement, but our cat *had never had any kittens*, and became a mother for the first time ten days or a fortnight after the occurrence in question. After watching them for a time, we were told to take them away, and carried them to the barn a short distance from the house, the cat following, and calling as to kittens. The infantile mice being deposited in the barn, the cat continued to caress, and as far as she could to care for them. After a little time we left them, and returned to the house to dinner. Pussy availed herself of the opportunities thus offered to bring *every one* of her newly adopted proteges into the house again and to place them on a bed to which she had access, where they were found about an hour afterward.

The performance was becoming something of a nuisance, to get rid of which, as well as to save the little creatures from a lingering death, we destroyed them. I do not recollect that the cat manifested any particular regret, or that her subsequent conduct was at all peculiar, and as I have said, a few days after she had a family of her own.

Let those who attribute all the acts of animals to "unerring instinct," account for these facts. I give them as they occurred, and give you my word that they are exactly as stated.

Albany, N. Y. C. A.

The Currant Worm.

Messrs. Editors:—On page 297, of the Scientific American, copied from an exchange, is a description of the currant worm and its habits, which contains three errors: "The miller that deposits the eggs" is not a miller at all, but a small yellow fly with brown wings, about as large as the common house fly, but slimmer and more active. The flies deposit their eggs the last of April or first part of May, the worms appearing usually by the middle of May. This year they were first seen May 7th. When the worms attain to their full size they go under ground and turn to flies again and lay their eggs sometime in June. Last year a *third* brood of worms appeared about the 1st of September, which continued upon the bushes till every leaf was destroyed. The last brood of worms after reaching maturity, go under ground where they remain till the following April.

The "miller" of which your correspondent speaks is the parent of the loop or measuring worm, its body being about an inch in length, yellow, and covered with black dots. This worm also preys upon the currant leaf, but is *comparatively* harmless.

My method of fighting these plagues is as follows: I hold a tin pan underneath the bushes, and gently rap the branches with a paddle, the worms fall into the pan and are then easily destroyed. This I do once a week, or oftener if they be numerous. In this way I save my bushes, keep the worms in check, and have all the currants I want. J. H. P.

Wear of Driving Wheels on Locomotives.

Messrs. Editors:—A correspondent asks "Why the forward wheels of locomotives wear more than the hind ones?" In answer I would say that it is lateral slip, produced mostly in passing curves. The forward wheels only, partake of lateral slip, and having this extra motion must, as a natural consequence have more wear.

St. Louis, Mo. Geo. Shone.

The Australian preserved meat imported into England has it is asserted, hitherto proved an unsuccessful experiment, as people will not touch the strange food, preferring to go without meat altogether rather than to taste an untried dish. The importation of live cattle from Brazil has, therefore, been attempted, and the River Platte Company has recently sent 500 oxen, which arrived in good order at Falmouth.

[For the Scientific American.]

ON RUTHENIUM.

BY PROFESSOR CHARLES A. JOY.

Gottfried William Osann, born at Weimar, in 1797, Professor of Chemistry at the University of Dorpat from 1823 to 1828, and afterwards, until the time of his death a few years since, Professor at Wurtzburg, while examining some platinum ores from Siberia, found in them what he considered traces of three new metals. One of them because it was discovered in platinum from Urai, he named from the first letters of those words—pluranium; the second, from its gray color, was called after the Greek, polinium; and the third, as it was the first metal discovered in ores from Russia, was called after the ancient name of that empire, *Ruthenia*, ruthenium.

Professor Osann never succeeded in fairly isolating and describing these metals, and all these names would have been dropped and forgotten if it had not been for the labors, in 1845, of a native Russian chemist, Professor Claus, who was more successful in his efforts, and really found a new metal in the platinum ores, differing from anything described by Osann, but which, out of compliment to that *savant*, and in honor of his country, he called ruthenium.

According to Claus, the original ruthenium was composed of zirconia, with oxide of iron, silicic and titanic acids, and was consequently nothing new. As for polinium and pluranium, it is not probable that we shall ever hear of them again.

Professor Claus found ruthenium in the residues after treating ores of platinum with acids. It occurs in the fine black scales called "iridosmine," now so extensively used for pointing gold pens, and is so rare that if it were ever to be required in considerable quantity in the arts it would be difficult to supply the demand.

The platium ores of Russia, America, and Borneo, contain it, and recently an interesting mineral has been found at the latter locality, which Woehler shows to be a sulphur compound of osmium and ruthenium, and to which, out of compliment to an old friend, he has given the name of *laurite*. Previous to the discovery of this mineral it was not supposed that sulphur would ever be found associated with the metals of the platinum group.

It is not necessary to recapitulate all of the steps taken by Claus to isolate ruthenium, as that would lead us into a scientific labyrinth of no practical value, but it is quite worth while to give an account of the method pursued by Deville for obtaining it, as it has qualities that adapt it to interesting uses, and many persons may desire to make it. The material to be employed is iridosmine; which is a refuse article from the gold-pen manufactory, and also from the assay office. At one time it was to be had in considerable quantity, but of late years, partly owing to a different way of working gold ores and partly to the absence of the scales in gold and platinum from new localities, we have less of it than formerly. Since the discovery of a method for the employment of iridium in alloys with platinum, the iridosmine has become more valuable, and more efforts are made to discover and save it.

The iridosmine is fused with four or five times its weight of zinc in a carbon crucible, and the heat is then raised sufficiently to volatilize all of the zinc.

This leaves a porous, easily pulverized mass, which is again fused with 3 parts of peroxide of barium, and 1 part of saltpeter, and the resulting powder must be treated with hydrochloric acid, and afterwards with nitric and sulphuric acids, we then convert the ruthenium into oxide and fuse it by means of the oxyhydrogen blow pipe in a lime crucible.

We have omitted certain details of the operation, but have given enough to show that it is no easy matter to obtain the metal. Ruthenium is, after osmium, the most difficult to fuse of all the metals; it is only possible to melt small quantities in the hottest point of the oxyhydrogen flame at a temperature that would convert gold and platinum into vapor.

The specific gravity of the metal thus prepared is 11·4. It can be alloyed with other metals, such as zinc and tin, but does not, as an alloy, present any peculiar features or uses. There is a property of spongy ruthenium that is worthy of note, and is not generally known. It was discovered by Professor Schoenbein, and used to be exhibited by him as a capital class experiment. He found that when cholorine gas was conducted into water and spongy ruthenium added, the metal acted in a manner analogous to sunlight, and decomposed the water into free oxygen and hydrochloric acid.

The metal was not itself in the least changed, so that the same piece would decompose an indefinite amount of chlorine water. Schoenbein was of the opinion that by passing chlorine gas continuously through water in which ruthenium was placed, a stream of oxygen gas would continue to come off as long as any water was left to be decomposed.

This curious reaction suggests other possible uses of the metal as a substitute for platinum in the manufacture of vinegars, and also to bring about many chemical changes where simple contact is sufficient. It is a subject that needs investigation and may lead to the discovery of important uses for ruthenium.

Since 1845, Claus has continued his investigations into the properties of ruthenium, and has published several papers on the subject; also Fremy, Deville, Bunsen, and Gibbs have increased our knowledge of the element, but their papers are of a purely scientific character, unsuited to a popular journal, and we refrain from attempting an abstract of them.

Ruthenium belongs to the platinum group of metals, and is closely allied to osmium in many of its chemical relations. The metals of the platinum family never occur separately, with the exception of palladium. They all possess the curious properties of determining a large number of chemical reactions by simple contact.

The order of fusibility of the group is as follows: Palladium, platinum, rhodium, iridium, ruthenium, osmium.

The specific gravities as given by Deville are: Ruthenium, 11·4; palladium, 11·8; rhodium, 12·1; platinum, 21·15; iridium, 21·15; osmium, 21·4.

It will thus appear that osmium is at once the heaviest and the most infusible of all the metals; ruthenium stands next to it in point of fusibility, but is much lighter.

The sesqui-chloride of ruthenium has been recommended by Gibbs as a delicate reagent in testing for salts of the nitrates—with nitrates of the alkalies it forms double salts which are difficultly soluble.

Many salts of ruthenium have been made by chemists, but they possess a purely scientific interest, and we refrain from giving them here.

Manufacture of Benzine, or More Properly, Benzol.

In the year 1825 Faraday was occupied with the investigation of certain liquids which were deposited in the cases used for containing compressed oil-gas, a material which was at that time a cheap source of illumination. He was able to detect, in the complex mixture on which he had to work, a body to which, in accordance with the current nomenclature and notation of his time, he gave the name "bicarburet of hydrogen." Several years afterwards, Mitscherlich found that on distilling benzoic acid with lime, a volatile oil came over, and that this was in every respect identical with Faraday's compound. Hence the name "benzol." It was not, however, until 1845 that Hofmann proved the presence of benzol in coal tar; nor until three years later that Mansfield (unhappily a martyr to these researches) showed how it might be obtained from that source on an industrial scale. A small specimen of Faraday's original preparation is still in existence, sealed up as a recondite curiosity by its discoverer; now, benzol is manufactured by the tun. The direct proportion of power to knowledge could scarcely be illustrated by a more instructive contrast.

Benzol constitutes sometimes as much as one tenth of the weight of crude tar. In order to prepare it, the light oil is used as a starting point. This material is placed in large stills, and submitted to what is termed "fractional distillation," that is, to a distillation in which the contents of the retort are separated into certain portions, which are distilled over and received separately. The apparatus employed is very simple in principle, and, however varied in form, is generally merely the embodiment of a method first delineated by Mansfield. The retort invariably contains a mixture of hydrocarbons, having a gradually increasing boiling point, and a gradually increasing chemical complexity. On applying heat so as to cause ebullition, the first "distillate," or substance that arrives at the receiver, will be that which possesses the lowest boiling point; the next will have the next higher boiling point, and so on. This law, however, is not more than approximately true, it being always found in practice that a complete separation of the constituents in the retort cannot be effected, each body of lower boiling point dragging with it, so to speak, some of each body of higher boiling point. The impurities which would thus be introduced into the distillate necessarily exist in the vapor; but it is found that, by passing the vapor through an upright tube surrounded by baths of various suitable temperatures, they can be cooled out, and compelled to run back into the retort, without rising high enough to pass over into the receiver.

The benzol of commerce, however, is never pure, its boiling point being frequently 100° in fact, a steam bath is employed in its preparation. Absolutely pure benzol can be obtained by re-distilling commercial benzole at about 80°, and submitting the distillate to the prolonged action of a freezing mixture. It then crystallizes in beautiful white plates, having a high luster, which melt at about 3°, and from which the impurities can be removed by draining and pressure in a cold apartment. When these crystals are re-melted, they constitute a colorless, highly refractive liquid, of somewhat agreeable odor, boiling at 82°, and considerably lighter than water. The crude or pure product may be used as a solvent of grease stains, of caoutchouc, gutta-percha, and resins, as an ingredient in varnishes, as a chemical discriminant in analysis, as a means of rendering tracing paper temporarily transparent, etc.; but its most important application is to the manufacture of nitro-benzol.

What the Telescope is Doing.

One of the largest telescopes in the world, it is well known is owned by the Chicago University. The destined work of this wonderful instrument is to make, in connection with nine chief observatories of Europe and America, an entirely new catalogue of 250,000 stars, determining the right ascension and declination of each particular star; so that by observing its position, astronomers may, in far-off ages, be able to announce authoritatively on its motion, and to declare in what direction it has proceeded through the illimitable voids. At this moment it is slowly and surely performing its sublime work, and furnishing those far-off astronomers the data upon which to base their calculations respecting that mighty problem, the direct motion of the sun through space.

When this is solved, data will also be abundant for locating the position of the great central sun, around which millions upon millions of other suns popularly denominated stars, do, in all probability, revolve. The labor being divided among the ten principal observatories in the world, will make the share of it falling to the Chicago Observatory, 25,000 stars—upon each one of which the most careful observations will be made and recorded. It will require about ten years to accomplish this stupendous work, and when it is done we may expect some most important astronomical discoveries.

The Draft of Mowing Machines.

Mr. H. H. Ingalsbe communicates his views upon this subject to the *Country Gentleman*, which we think of sufficient interest to quote at length.

"The power required to drive a mowing machine at work may be resolved into direct draft and side draft. A good mowing machine should be so balanced between the driving wheels and the cutter bar, by placing the line of draft nearer, or further from, the heel of the bar, that ordinarily, there will be little or no side draft. If so placed, the end of the tongue will sometimes, when at work, be drawn toward the standing grass, and sometimes thrown away from it by the side draft. Practically, the side draft is of small account in a good machine.

"The direct draft depends upon three causes, and may be resolved into three parts:

"1. The draft of the machine itself, on its own wheels on the ground.

"2. The power required to give motion to the gearing and the knife.

"3. The resistance offered by the grass or other substance cut.

"These three several parts, added together, make up the sum total of the resistance, are called the draft of the machine, and for convenience are spoken of as pounds power, which for comparison are sufficiently accurate.

"Each of these separate causes varies much in different machines at the same time, and in the same machine at different times. The power required to draw the machine on its own wheels depends upon the size of the wheels, the perfection of the axles and the smoothness of the ground, and,other things being equal, upon the weight of the machine, and in a machine weighing 600 lbs. should not, on a smooth, firm turf and a level field, be more than 75 to 100 pounds. Adding to the weight of the machine would add to the draft just in proportion, whether that added weight be in the machine or in a driver on it. Suppose the machine to weigh 600 pounds and the draft to be 80 pounds; put a driver of 150 pounds on the seat, and you have increased the draft 25 per cent or to 100 pounds, while the power required to drive the knife and to cut the grass, remains unchanged, and you have only increased the draft 20 pounds.

"The power required to drive the knife and gearing, depends upon the perfection of the gearing,and the weight and velocity of the knife. It should,while differing in different machines, remain nearly the same in the same machine at different times, and would do so if they were built upon correct mechanical principles, and kept in proper order. A machine that in proper order may not require more than 10 or 20 pounds of power, may require ten or twenty times that amount from deficiency of oil, collection of dirt in the gearing, gum on the knife, or loosening of the connections of the pitman by wearing or otherwise.

"The resistance of the grass to be cut will vary with every change of condition, kind, and thickness of grass, and every variation in the condition of the knife and rapidity of stroke. The greater the velocity of a cutting edge, after the velocity is once obtained, the less power is required to do a given amount of work. In the great trial of the New York State Agricultural Society,the first and second causes were measured together under the name of 'trial out of grass,' and the third by itself, called 'absolute draft,' got by deducting the sum of the first and second from the total amount of power required. In one or two cases machines were used which had an absolute heavier draft out of the grass than when in the grass and at work, a fact which was wondered at by the committee, and unaccounted for by them, but which we will consider by and by.

"The direct draft of a good machine, working under the most favorable circumstances, as shown by the trial of the State Agricultural Society, is less than 300 lbs., but those favorable conditions are not always to be obtained, so that the draft must, many times, be much heavier. The machine having the lightest draft at a trial may not be the best machine for practical use; it may not have sufficient power to work under less favorable circumstances. The power of a machine to cut, other things being equal, depends upon the hold the wheels have upon the ground. When the second and third causes,combined,are sufficient to overcome the hold the wheels have, they slide, the knife stops, the machine is clogged. The heavier the machine, the less likely this is to occur; putting a heavy driver on the seat will sometimes carry a machine through, when with a lighter one it would clog.

"As to the trial of the machine which drew lighter when at work than when running free,at which the judges expressed surprise, while it probably cannot now be told with certainty what the reason was, still it would not be difficult to give a reason which is good in some cases, and may have been so in this one. When the knife reaches the end of the stroke, its momentum is considerable, and it requires nearly as much power to stop it as it did to start it to make the stroke—it would require quite as much if it were not for the loss of some power by the friction of the knife in the guards; now, if the joints of the pitman and connections are all perfect, this stopping occurs when the crank passes the center of the shaft driving it, and the remainder of the momentum of the knife is expended upon the crank in the direction of its length and at right angles to the driving power, so that none of that is used up in stopping the knife. But if these joints of the pitman are, from any cause, loose,so that there is a little play, and the crank can pass the center before the knife reaches the end of the stroke, this momentum will be expended in opposition to the driving power, and will of course increase the power necessary to work the machine by so much as is necessary to overcome the momentum of the knife; again, the crank beginning to act upon the knife after it has passed the center to make the return stroke, the knife must start with a greater velocity, causing another loss. Now put the same machine into the grass, and the grass operates to stop the knife as soon as the crank allows it to stop, thus saving the momentum that was expended upon the crank in opposition to the driving power, and also shortening the stroke and saving power in that way.

"To illustrate: if from the imperfection of all the joints, by wear or otherwise, there is a play of half an inch (and as there are never less than four of them, a play of one eighth of an inch to each one will amount to half an inch in the aggregate), the knife running out of the grass will be thrown to the extreme length each way, and will add one inch to the length of the stroke, increasing the power necessarily required to make it. If it requires a certain number of pounds power to make a stroke of three inches in length, it will require 33 1-3 per cent more power to make a stroke of four inches in length in the same time. Whenever these amounts of power lost in this way equal the power required to cut the grass, then the machine will draw just as heavily out of the grass as in it. From these premises, many deductions might be drawn as to the care of and practical use of mowing machines."

Roast Beef by Wholesale---A New Industry.

A Houston, Texas, paper describes an establishment for packing and shipping roast beef, situated near that city, the details of which novel branch of business are interesting. It says:

"The location of the packery is a very desirable one. The bayou is straight for a considerable distance above and below, and at the wharf the bayou is wide enough for two boats of largest size to pass without difficulty. Water is deep to each bank. The wharf, a very substantial one, is just at high water mark. Two large cypress trees were growing in the bank at the exact spot where they were wanted. They were cut down, and the stumps are the foundation upon which the wharf is built.

"A large amount of excavation was required for a location for the buildings, so as to have space all around them, and ventilation underneath; no part of any of the buildings coming against a bank of earth, which would cause the timber to decay, and be objectionable otherwise. At the same time, the slaughter house is so arranged that cattle come into it almost on a level with the ground, and on to a floor level with the second floor of the packery or main building. All the framing and flooring of the building is of the best Florida pine. The dirt, mostly sand, that was moved, filled up the low ground between the buildings and wharf,and quite a distance on either side of that, so that there is a gradual slope from the main buildings to the wharf.

"The first building from the wharf is a framed shed, very substantial, 30 feet square, upon brick pillars. Ten feet from that is the main building, two stories, 30 by 50 feet, and ten feet from that is the slaughter house, 30 by 25 feet, 14 feet to the plates; it is on a level with the second floor of the main building, with a ten-feet passage between the two, connecting the floor of the slaughter house with the second floor of the packery. Between these two buildings is the rendering tank under the passage. In the floor of the passage is a door, through which all the offal, to be rendered, is put into the tank. There is,also,a cistern between these buildings holding 3,000 gallons of water, above the floor of slaughter house, and above the second floor of the packery. From the slaughter house is a sewer, running past the main building to the bayou. This conveys the blood from the slaughter house,and the water used in slaughtering and cleansing it to the bayou under ground. The water from the rendering tank and from the boiler, and the escape steam, is also conveyed into the same sewer. There is a cistern under the shed, also, holding 3,000 gallons, designed to catch the water from the roofs of buildings for drinking purposes. There are pipes from this and the other cistern to the same sewer, to carry off the surplus water, or to prevent the cisterns overflowing.

"At the side of the two-story building is the oven and boiler house, 14 by 26 feet, built of brick, with an iron roof. The oven part of it is two stories high. There is not a piece of wood about this building, where the fires are, not even a lintel, the openings being arched with brick. As the openings are of different widths and hight, the building presents quite a unique appearance. A large amount of air is required to roast meat by this process, and quite a large opening, the whole width of the building, is left under the roof of the oven part of it, with brick pillars to support the roof.

"Next the oven, and on the same side of the packery, is a room 14 by 24 feet. In this room there will be a steam chest, of galvanized iron, with two railways,where the cans of meat, after being sealed up, will be heated with the escape steam from the engine. The air will be let out of the cans while hot, and then they are ready for boxing. All these buildings have been put up in three weeks and a half, and all have gutters conveying the water from the roofs to the cisterns. It is intended that there shall be as little manual labor in the handling of meat in this establishment as possible. The work is nearly all done by machinery.

"The beeves go into the slaughter house nearly on a level with the ground. After they are killed, they are suspended for dressing with a windlass, and, when dressed, are let down on a car platform, which runs into the packery on the second floor, through the passage before spoken of. The platform of the car is level with the cutting benches, and the carcass is slid from the one to the other, and the meat cut from the bone while still retaining the animal heat. From the cutting bench to the receiver on the same level,where the air is pumped from it to a very high vacuum through a condenser, reducing the temperature to about 38 degrees, and the weight of the meat about five per cent by the loss of ammonia and other gases pumped out of it by the air pump. From the receiver it goes to the top of the oven three feet above the same floor; as it is roasted it is let down by machinery to the bottom of the oven, a couple of feet above the first floor, where it goes through the cutter to the press, and the filled cans from the press to the railway in the steam chest,and thence to the shed, where it remains for the steamer at the wharf, a few yards only from the shed. The cans are made in the same room where the meat is run through the cutter and packed.

"As the meat goes through the air-pump process while warm, but one animal is killed at a time. The slaughter house is washed after each animal is dressed. The offal is immediately removed. The blood and washings are carried to the bayou underground, and there will be nothing more offensive about the establishment than in any clean and well-kept kitchen.

"The oven will hold eight or ten steers at a time, and will roast twenty a day. The buildings are calculated for one hundred beeves a day, and space has been left for four more ovens like the one now constructed. It is intended to increase the business as fast as a market can be created for the meat. On the premises purchased there are sites, just as convenient as this one, for nine more establishments of the same size, and the business will be increased as fast as a market can be foundfor the roast beef, up to one thousand beeves a day, or any number that can be sold, up to that amount.

"The twenty-two acres of ground will be enriched by the offal of the animals slaughtered, and an arrangement has been made with a very intelligent and enterprising German, who understands the business, to plant an extensive vineyard on the ground, with a view to the manufacture of wine.

"There is a small stream of never-failing water running through the place from a spring on the adjoining property. The water being very soft and free from mud, is superior to the bayou water for a steam boiler, the water of the bayou being generally muddy and sometimes brackish. A dam has been built across the stream, making a small pond, from which water is taken for the packery, and in which it is proposed to test the cultivation of fish in Texas. The grove of three or four acres, near the packery, heavily timbered, is to be thinned out till there is sunshine enough for grass to grow, the fuel furnished by it more than paying all the expenses of making it quite ornamental."

Will Pills Explode?

It is really terrible to find out every day some new danger to which we are exposed. If there is one thing which people have hitherto confided in, it is a pill box; it is allowed to lie about anywhere, it is shut up in a drawer or a cupboard, or is carried in the pocket. A general panic will therefore be caused in many a household by the account given in the *Pharmaceutical Journal* of what recently befell a lady for whom a doctor had prescribed twenty-four pills, each containing two grains of the oxide of silver, a twenty-fourth of a grain of muriate of morphia, and a sufficiency of extract of gentian, the pills being coated with silver in the usual manner. The pills, it is stated, were delivered to the patient in an ordinary pill box; but the lady, being in her nursery, and having no pocket in her dress, placed the box in her bosom, probably next the skin. Little did this unfortunate lady know the deadly peril which awaited her. In three quarters of an hour a severe explosion occurred; her underclothes were reduced to a tinder, she was seriously burned, and, but that she had the presence of mind to extinguish the flame with her hands, she would have been destroyed. Oxide of silver, being reduced by contact with vegetable extracts, is, it seems, in the habit of exploding. It is really as well people should be made aware of the danger they run, in order that they may have magazines for pill boxes attached to their dwellings. We should also be glad to know if pills of this nature are liable to explode after being swallowed. No information is given on this point, which is of some little importance; but the *Lancet*, for our consolation, under the head of "Things not Generally Known," says that a similar occurrence has been known in compounding the extract of colocynth with the oxide of silver, and that with creosote of oil of cloves this salt is reduced to the metallic state with the production of heat, amounting often to an explosion. In fact, there are some pills which are nothing more or less than infernal machines, and people with volcanic temperaments and undermined constitutions, for whom they are prescribed, should be careful to take them in secluded spots, where no one but themselves can be injured in the event of the explosion.

Stucco.—This substance, now much in use for walls, pillars, etc., is at present prepared by mixing plaster of Paris with a solution of gelatin or glue, instead of with water. This, while stiffening more slowly, becomes much harder than with water alone. For white stucco, the proper quality of gelatin must be employed; for colored, less care need be exercised. When the mass has been suitably applied, and sufficiently hardened, the surface is to be moistened and rubbed down with pumice stone until smooth. It is finally to be coated by means of a brush with a concentrated solution of gelatin, and, when perfectly dried, it may be polished with tripoli on a buffer, with the addition of a little olive oil. It is often desirable, in using plaster of Paris in the ordinary way, to prevent its hardening too rapidly. This may be easily done by adding a saturated solution of borax to the water in suitable proportion. One volume of the solution to twelve of water will prevent hardening for fifteen minutes; while with equal parts this will not take place for ten or twelve hours.

Machine for Punching and Inserting Eyelets in Leather.

We illustrate herewith a very ingenious and important improvement in machines for punching leather and inserting eyelets therein, which surpasses in cheapness and efficiency anything of the kind with which we are acquainted, while it has all the elements of durability, freedom from complications, and ease of operation, which characterize a practical and useful invention.

It may be operated successfully by young girls, and punches a hole and inserts an eyelet at each stroke of a foot lever, with perfect uniformity, both in the width of space from the edge of the piece and in the distances between the eyelets.

The machine is one of those ingenious affairs which are only produced occasionally, and is worthy the attention of all who delight in curious mechanical contrivances, as well as those for whose use it is specially designed.

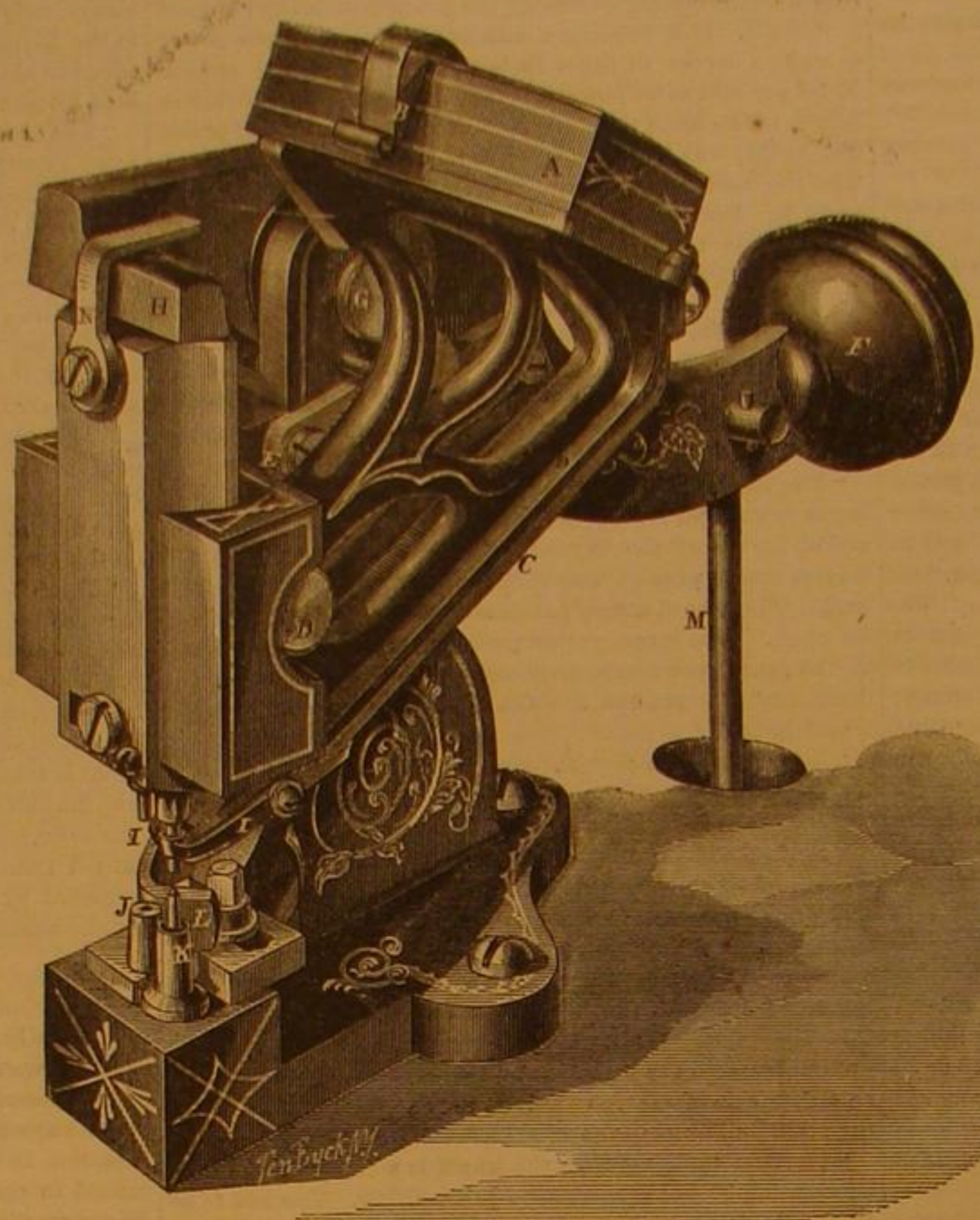
The eyelets are placed in a magazine, A, which moves with every motion of the foot lever. This magazine is divided into two compartments by a perforated partition, the perforations being of such shape that the eyelets pass from the first chamber to the second, with the turned or flanged end downward. The hight of this second chamber is such that the eyelets cannot turn over while passing through it, and it tapers so that the eyelets are forced finally to move in single file down a curved way, C, which reverses their position as they pass over the curve at the end next the magazine. The way, C, down which the eyelets slide, consists of two rails sufficiently separated to allow the body of the eyelets to pass between them, while the rim or flange slides along their upper surfaces. At I, two springs act as fingers to hold the eyelets from dropping till they are wanted.

A spring latch, B, serves to secure the cover to the magazine, A, so that the eyelets cannot be accidentally thrown out.

Having thus traced the course of the eyelets to the point of insertion, we will next describe the movement of the machine.

A rod, M, connects the principal actuating lever, F, of the machine with a foot lever or treadle. The lever, F, is weighted, as shown, so that when it is not moved by the foot lever through the rod, M, it falls into the position shown in the engraving.

By the action of the foot lever the back end of the lever, F, is raised, and being pivoted at S a right-angled lateral projection, H, forces down the sliding punch stock, which carries a punch corresponding to the female die, J, and an eyelet-riveting punch corresponding to the die, K.



KOMP'S COMBINED PUNCHING AND EYELET-INSERTING MACHINE.

A link, E, connects the principal lever, F, with the frame which carries the magazine, A, and the sliding way, C. This frame is pivoted at D, so that every movement of F raises it, and by means of a slot and a pawl arrangement, not distinctly shown in the engraving, allows it to fall with a sudden jar, by which the eyelets in the magazine are shaken up and a sufficient number passed through into the second chamber and down the way, C, to keep the punch supplied.

The die corresponding to the die, K, is a hollow cylinder, and has a spindle in its interior, which, when it meets the upper point of K is thrust up into the hollow, and as the die rises is thrust out again by a spring. The eyelet having arrived at the spring fingers, I, the sliding punch stock descends and thrusts the spindle just described through the eyelet. As the punch stock descends vertically, and the spring fingers are drawn back radially, they are forced to release the eyelet, which then slides down the spindle on to the die, K, where it is riveted by the force of the blow. At the same time a new hole is punched in the leather by the punch corresponding to the female die, J; a guide bar, L, serving to keep the distance from the edge uniform.

The punch stock is raised by a hook, N, which engages with the lateral projection, H, on the lever, F.

The facility and accuracy, with which this machine does its work, are surprising, and its merits will undoubtedly attract the attention of all interested in the shoe manufacture, where it will find its most useful application.

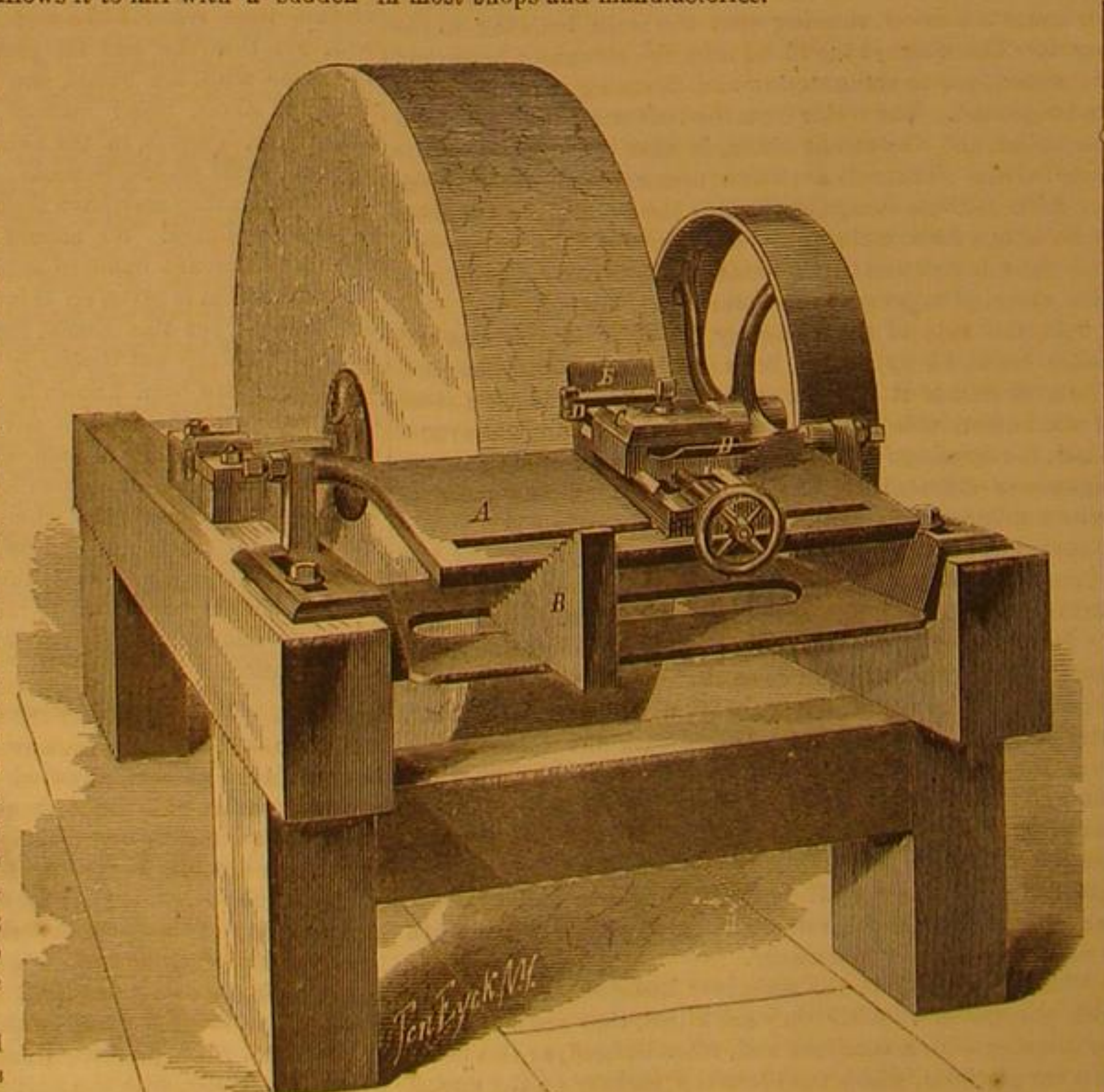
It was patented, June 30, 1868, and a patent for recent improvements is also now pending through the Scientific American Patent Agency.

For further information, address Albert Komp, 215 Center street, New York city.

Improved Tool Holder and Machine for Turning and Scraping Grindstones.

Every mechanic is aware that the accurate grinding o. a tool can be accomplished only on a stone properly faced and free from glazed streaks, and that with many kinds of tools it is important that they should be held uniformly at a given angle. This is in many cases a difficult thing to do, especially in grinding long knives for wood planers, tobacco cutting machines, and the like.

The invention we herewith illustrate, is designed to provide for both the convenient and accurate facing of the stone, and the uniform holding of tools in grinding, and is, we believe, not only a cheap but a valuable adjunct to a grindstone in most shops and manufactories.



LEONARD'S TOOL HOLDER AND GRINDSTONE DRESSING MACHINE.

The parts are so clearly delineated by the excellent engraving, that any mechanic will comprehend at once the operation of the device.

A pivoted plate, A, is adjusted to any required angle by means of a wedged-shaped step-block, B. This plate carries a tool holder, C, by which the adjustment of the scraper, D, is effected, and by which the latter is firmly held when dressing the stone.

Parallel motion is given to the tool-holder by means of a slot in the plate, A, in which a guide slides.

The tool-holder is also used for holding any other tool which it is desired to grind perfectly true, acting as a clamp firmly sustaining the tool to be ground in the required position. A fender plate, E, prevents the scattering of dust while facing the stone.

The form shown in the engraving is a cheap style for general use; it will, however, be understood that the principle may be carried to any extent, and to any degree of refinement, for any tool of whatever size or length required for various kinds of work.

This device has been made the subject of four patents, bearing date, respectively, July 14, 1868, June 29, 1869, December 7, 1869, and February 22, 1870, all taken through the Scientific American Patent Agency by Philip Leonard, Sharon, Pa., who may be addressed for rights, etc.

The Wild Beast Trade.

An English magazine says, "The trade in wild beasts is a system as regular as the trade in tea, coffee, or cotton, or any other merchandise. Some creatures, of which parrots are the most numerous, are brought over by sailors, who intend them, perhaps, as presents for their sweethearts, but they sell them for grog or tobacco as soon as they land. A dealer has agents in every country; and these agents communicate with the natives of the various countries. The system is now carried to such perfection, that if any gentlemen or lady would like an elephant for private riding, a tiger as an ornament to the garden, a crocodile or hippopotamus for the lake, or an ostrich or emeu for the lawn, the wish can be gratified by merely addressing a letter to the London dealer. He will calculate distance, the time occupied in catching and transporting the desired animal, give a close estimate of the cost, and deliver it at the door on the appointed day."

RUBBER TIP FOR FURNITURE LEGS.

In some forms of rubber tips for furniture legs, now in use, the method of attachment is such that when the rubber wears away from long usage, the attachment by which it is held fast to the leg, becomes a nuisance, marring floors, and cutting carpets. There is also danger of their coming off, especially when submitted to the test of the Yankee practice of tipping back in chairs. These things have been serious drawbacks to the use of such tips for libraries, sitting rooms for hotels, etc., when otherwise they would be found very useful, in preventing the wear of polished floors, and reducing the noise consequent upon moving chairs from place to place, sliding them about, etc.

The object of the present invention is to remove both the annoyances specified.

The screw by which the rubber tip is held to the leg is formed as shown at A, Fig. 1, with a broad head, to abut against the leg, as shown in Fig. 2; and it also has a button, B, formed upon the head, upon which the rubber tip is cast, as shown.

The portion of the head which abuts against the end of the leg, is made octagonal in form, with a circular flange, which gives it a finished appearance, the angular part enabling it to be driven into the wood by a wrench, or other suitable implement.

The whole forms a neat, cheap, and durable attachment,

Fig. 1

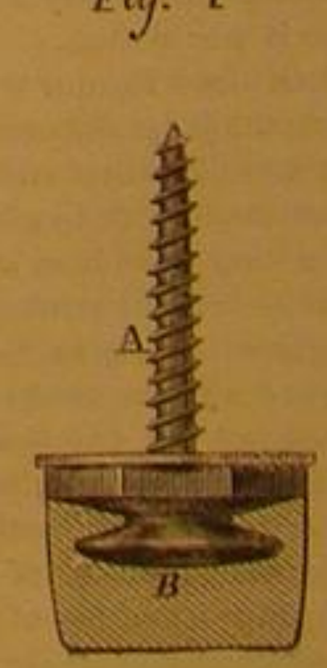
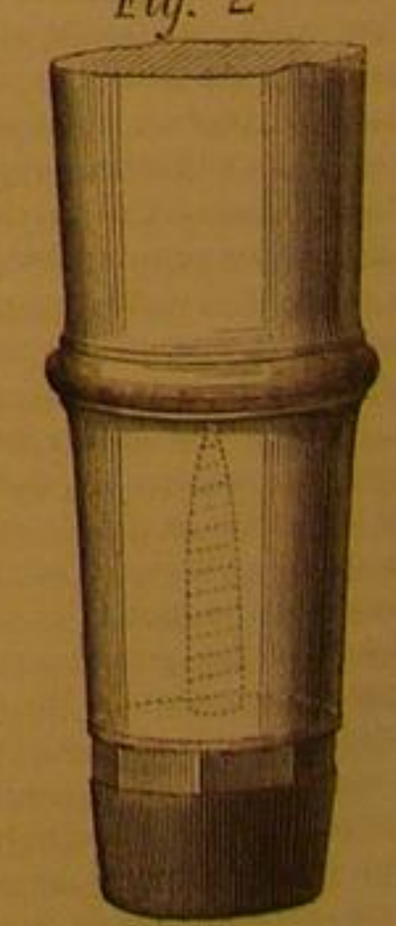


Fig. 2



and we regard it as a decided improvement upon other methods hitherto employed.

Patented, through the Scientific American Patent Agency Dec. 22, 1868, by O. B. Collins, whom address for further information, Box 249, Charleston, S. C.

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Contents:

(Illustrated articles are marked with an asterisk.)

THE VALUE OF SCIENCE.

Many persons have been deterred from pursuing scientific studies on account of the cry of utilitarianism and the reproach that attends upon anything practical. There is something quite unworthy of the age in which we live, in any such notion, as the progress of society and the advance of civilization in modern times depend chiefly upon the application of the discoveries of scientific men. We never know what use may ultimately be made of a discovery. What appears to us at the time as a trivial and insignificant fact, may become one of the links in a great chain of practical application.

When Oersted observed the deflection of the needle produced by the galvanic current, he could not have anticipated that a telegraph would grow out of so slight a circumstance. Faraday's discovery of induction gave us the present form of the telegraph, and also electro-plating and electro-chemistry. The black powder in the alkali manufacturers' vats in Paris, to which the name of iodine was given, was of no consequence when first discovered, but now we know that the grand application of photography depends upon it.

A few years ago a German chemist announced the discovery of sugar in the beet. The account was received, like a vast number of other announcements, as a useless fact, and rather disgraceful to the man who wasted his time in such insignificant labors. Now we know that the beet sugar industry is one of the most important on the continent of Europe, involving millions of capital, and giving occupation to thousands of men.

The illustrious philosopher, Faraday, succeeded in condensing a number of gases. It was an interesting experiment, but certainly no one could have predicted that some day the question of furnishing cheap food to large cities would depend upon the application of this discovery, but such appears likely to be the fact. The best refrigerating machines, and the most practical methods of producing artificial cold, are founded upon the condensation of gases, especially of ammonia, by means of which we shall be enabled to transport frozen meat any distance.

But not only in the production of cold is Faraday's discovery available; we have in it the germ of a valuable motive power, that is capable of extensive application. Faraday also discovered benzol, and for many years no use could be devised for it; we now know that the whole aniline industry, with its magnificent array of colors, rests upon what appeared to be a useless discovery; and yet Faraday, who gave us our present form of telegraph, who enabled us to produce the richest colors, who put cheap food within our reach, and gave us a motive power available at all times, himself worked in poverty, and died a poor man.

Professor Tyndall has just aroused the attention of the world to the great question of haze and dust, and out of the agitation of this subject will eventually grow true methods of ventilation, the suppression of cholera and fevers, the proper care of the poor in tenement houses, and many improvements in the sanitary condition of mankind.

De la Rive, of Geneva, while experimenting in electricity, found that a bit of zinc would prevent the oxidation of iron, and he at once suggested its employment for this purpose. Out of this simple fact has grown the immense industry of galvanizing iron; but that is not all, for in the same battery De la Rive observed that the minute scratchings on one of the cups was accurately copied on the copper deposited upon it. He mentioned the circumstance; Jacobi took it up, and we now have electro-plating and galvano-plasty carried to complete success.

Pasteur has been devoting years to the study of fermentation, and as a result of his experiments, we are taught to know the true causes of disease and decay, and to invent the proper remedy.

The workers in copper were found to be exempt from cholera, and on investigation it was found that they breathed considerable sulphurous acid, and it was at once seen that this gas, which prevents fermentation and destroys the cholera germs, was what had afforded protection to the coppersmiths, and the same remedy was applied with success in cholera districts and in hospitals.

Sir Isaac Newton discovered the solar spectrum. It was an insignificant thing to throw a beam of light on to a screen through a hole in the shutter, and his neighbors thought he ought to have been better employed; but what a wealth of invention has grown out of this one fact. We now dissect our light, and apply each part as we want it. We can shut out the light and admit the heat. We can concentrate the chemical rays and take a picture. We can examine the spectrum and determine the composition of the sun, moon, and stars, and we shall, before long, separate the light and chemical rays from the heat, and shall store up the heat of the sun as our great motive power, after our coal and fuel have been exhausted. We cannot tell to what vast uses this discovery is destined to be applied.

Professor Schrotter, of Vienna, found that he could convert phosphorus into a red powder, which had many peculiar properties: It was not so poisonous to the workmen in the match factory; it did not ignite on friction, and could be easily transported from one place to another; it was not soluble in the same re-agents as the ordinary phosphorus; and it had powerful reducing properties. It was a trifling matter at first, but has since saved the lives of many a poor person in match factories, and served an important use in the extermination of vermin.

The catalogue of trifling discoveries is almost endless, and we have mentioned enough to show the importance of appreciating the labors of those whose whole life is devoted to the good of their fellow men.

In ancient times it was said, "The proper study of mankind is man," and acting upon that, the world stood still for centuries. The study of mankind led to metaphysical mysteries and superstitions, and it is only since science has dispelled these clouds and let in the light of observation, perception, and judgment, that man has begun to enjoy freedom from such thralldom as our early philosophers imposed upon him. One superstition after another passes away before the clear light of scientific inquiry, and it is not the man of science, but the metaphysician and inductive philosopher, who throw doubt and distrust and unbelief into our ranks. The value of scientific study is therefore two-fold; it gives us the comforts of civilized life, and overturns all doubt and superstition; "it proves all things and holds fast that which is good."

IS HYDROGEN A METAL?

About a year since, we published an account of the late Mr. Graham's researches on the occlusion of hydrogen by the metal palladium, from which he arrived at the conclusion that hydrogen was a metal in a gaseous form. In a recent issue we also gave an account of an interesting experiment performed by Mr. Loew before the Lyceum of Natural History in this city, from which it appeared that he succeeded in making a hydrogenium amalgam with mercury.

It is well known to chemists that when mercury containing a little sodium is treated with a solution of chloride of ammonium, the mercury apparently swells to a bulk very much greater than it originally possessed, and the radical ammonium, generated by the reaction of the chloride of ammonium with the sodium, appears to enter into combination with the mercury to form an amalgam, called the ammonium amalgam.

From this deportment of ammonium with mercury it has been maintained by eminent chemists that hydrogen, one of the elements of the radical ammonium, is probably a metal, which theory the investigations of Graham were pretty generally accepted as confirming.

In the discussion upon Mr. Loew's experiment above alluded to, Professor Seely took occasion to remark that he, together with others, entertained the opinion that there yet existed no proof calculated to substantiate the belief that hydrogen was metallic in its nature, and that the term "hydrogenium" which Mr. Graham applied to that element, was therefore inappropriate.

In a recent conversation, Professor Seely expressed the same opinion to us, adding that the so-called ammonia amalgam is nothing more than a *froth* of mercury, and that the hydrogenium amalgam of Mr. Loew is a similar *froth*.

To enforce his views he performed in our presence an interesting experiment. The mercury amalgam was made by him in a glass tube, to which a small air-tight piston had been previously fitted. After the reaction had taken place he subjected the same to a pressure of probably ten atmospheres by forcing the plunger into the tube. The amalgam deported itself exactly in accordance with Mariotte's law of the compression of gases, which certainly could not have been the case if the amalgam was other than a froth as claimed by Mr. Seely.

We deem this experiment as wholly conclusive that this apparent compound is really nothing but a mechanical mixture and not a true chemical compound as hitherto maintained.

We may add that Professor Wurtz, of this city, who had his attention called to the experiment of Professor Seely, has since been able to produce a froth of mercury by simple agitation of aqua ammonia with the metal first amalgamated with a little zinc.

HOW PEOPLE LIVE TOO FAST.

The word "fast" has latterly obtained a peculiar significance as indicating a tendency to general high living and indulgence in sensual pleasures. A man of reckless expenditure, who indulges himself in all that can gratify his sensual tastes, is a "fast man" in the common sense of the term. This expressive adjective has also been applied to those who habitually risk money in games of chance, and has in some instances been coupled with the names of others, who speculate in doubtful stocks.

We have come to the conclusion that sensual indulgence, exciting games of chance, or speculation in fancy stocks, are not the only ways in which men may live too fast.

Many a godly and devout divine is a fast man. Many an editor, lawyer, merchant, or scientific man, against whom no thought of suspicion exists as to the soundness of his moral character, is fast in as just, though not in so reprehensible a sense, as the man who wastes his substance in riotous living.

Fast living in the sense of such living as shortens life, is a much more common evil than it is generally regarded. We have been an observer of faces and character for a long time, as we have had opportunity in cars, stage-coaches, and our daily intercourse with men, and we believe that in the vast majority of cases it would be found that the rapidity of the pulse in Americans is above the normal standard. Every man's life may be measured by pulse-beats. He will live, accident excepted, to make a definite number of these, and his life will be shortened in proportion to the excess of work performed by his vital organs, in a given time.

Excitement, physical or mental, is the cause of the rapid rate at which most American people are living. The love for excitement is a vice, as positively evil in its effects as the love for strong drink, licentiousness, or gambling. It matters not what kind of excitement; all excitement is fast living, and begets a feeling of exhaustion in intervals of indulgence, which clamors for relief from some other form of stimulant.

Thus it is that the universal demand for artificial stimulants has increased, until there is perhaps not one in a thousand who does not resort to something of this kind. Alcohol, absinthe, opium, hashish, tobacco, coffee, tea, or whatever else it may be, is taken to support the system under the effect of nervous prostration, and to supply in another form the excitement which it craves.

Now all this is just the reverse of what should be the case. Instead of seeking excitement, health and long life demand that we should shun it. The natural, healthy condition of the mind and body is that of unruffled calmness. If excitements occur, they should be exceptional, not the rule of life. As soon as they become a necessity there is a diseased state of mind and body, and the candle begins to burn at both ends.

THE STEAM MAN.

Have we not heard somewhere in song of a wonderful steam arm, which hammered away all obstacles, and of a steam leg that walked the owner to death, and then walked away with his ghost? If our memory serves us, we have. We never expected to meet those wonderful members in the flesh, but no man knows to-day what is reserved for him to-morrow. We have lived to see steam legs, steam arms, steam body and breeches, steam coat, hat and choker, all combined to eclipse all that poets have sung or dreamed.

Passing up Broadway we saw large posters announcing the greatest wonder of any age, past, present, or future, which wonder was explained, in smaller letters, to be an imitation of the human form divine, impelled by steam, and approximating in agility the renowned Hanlon Brothers.

We paused, considered, entered the place of exhibition, and found the steam man in a perfectly nude state, with the exception of his hat. His other articles of dress were hung upon a line, as if to dry from them the prespiration they had absorbed in his severe exercise. We were at fault, however, in this supposition, as we were told by the steam gentleman's valet, who was giving his master a drink of benzine through a hole in his shoulder. This attendant told us that the grace of the steam man's movement, and the comeliness of his features had begotten a general desire in the minds of his admirers to see his manly proportions, and his modesty offering no protest he was accordingly disrobed for the benefit of the public.

We proceeded to take observations of his anatomy from divers points of view. The gluteal region, kindly protected from rude assaults of hostile boots in ordinary mortals, by thicker muscles than are found on other parts of the frame, was replaced on the steam man by a Behrens rotary engine, the contour of which would give, we may imagine, an outline—when covered by clothing—not unlike that demanded to sustain the resemblance to a man so far as this important portion of the human system is concerned.

This engine impels a screw, which actuates worm gears; the gears actuating eccentrics, which actuate the legs and feet, which actuate the entire man at a velocity of, we should say, about forty feet per minute, when doing his level best.

His legs are merely straight bars, with large blocks of iron for feet, fastened rigidly to the legs. The legs are joined to the feet at the middle, so that the heels are as long as the front part of the foot; and to keep the figure from toppling over side-wise, a flat bar extends laterally from each foot.

To give the appearance of bending at the knee a toggle joint is attached to the front part of each leg, but this has nothing to do with the propulsion of the automaton.

There is nothing in the movement analogous to that of the human leg. One foot is raised and then advanced, the whole leg moving forward, not swinging, with the foot, each foot being alternately the pedestal or base upon which the body rests.

The fuel employed is some fluid hydrocarbon, and the boiler is concealed in the body. The smoke escapes through a hole in the crown of the hat. When the steam man is about to take a walk, his valet takes a pair of pinchers and after opening the throttle valve, seizes with the pinchers the end of a shaft which protrudes just below the abdomen, and giving it a partial turn, a most remarkable sound resembling the rumbling of wind in the bowels commences, and the steam man sets out upon his travels with a rather unsteady gait, and with extremely short steps. When he reaches the end of his limit the steam is shut off, and he is turned about face by his faithful attendant, and retraces his steps in the same manner as we have described.

On the whole, the steam man is a curious automaton, and very much more satisfactory than his predecessor exhibited two or three years since in this city, who could only stand upon fixed crutches, and kick like a spunky child suffering for a spanking.

WASHINGTON CONSIDERED AS A PLACE FOR AN EXHIBITION.

Hallet Kilbourn, Esq., has sent to us a copy of the interesting speech delivered by him at Lincoln Hall, Washington, in support of the somewhat melancholy project of holding an "International Industrial Exhibition" in that city.

Our readers are probably aware that Washington is situated on the Potomac river, about twenty-five miles above Mount Vernon. It is principally celebrated for being the capital of the United States, and was selected for that purpose by the "Father of his Country," in view of its retired and almost inaccessible situation. A railroad communication has, however, been opened since the death of Gen. Washington, and it is now much easier than formerly to reach the Federal Capitol, though it is still somewhat off the line of public travel.

In speaking of the characteristics of Washington city, Mr. Kilbourn refers thus to the "Market House:"

"Probably no one prominent object in the city commands so many opprobrious epithets, and is so universally conceded a nuisance, alike by citizens and sojourners, as the group of old sheds fronting five hundred feet along Pennsylvania avenue, and styled the Center Market. Mark Twain, in one of his lectures, said that, in all his travels around the world, visiting objects of interest in Christian and heathen lands, his national feeling was constantly buoyed up by the recollection that, at the national capital of his own proud Republic, there existed a structure whose equal was not to be found on the face of the habitable globe—the Center Market-house, on Pennsylvania avenue."

It seems, however, that four years ago the city authorities proposed to erect an elegant structure on the premises, and present a building, which would be a credit to Pennsylvania avenue, clean and commodious, for market purposes. Plans were adopted which would require the expenditure of several hundred thousand dollars, and the money was appropriated by the city. After the erection of the foundation, at an expense of several thousand dollars, Congress suddenly realized the fact that the old white-washed land-mark (and guide-post for meandering representatives) was about to disappear and a permanent structure to be erected in its place; whereupon the House stopped this outrage on civilization by unanimously passing a resolution putting a stop to the job.

It seems to us, therefore, in view of the facts that the idea of Mr. Kilbourn, or any other man, that Washington should have an "International Industrial Exhibition," borders a trifle upon the absurd.

ARTIFICIAL STONE.

We have heretofore expressed the opinion that nothing whatever can take the place of good stone for building purposes. Nothing else is so durable and nothing else is capable of producing such architectural effects. The only drawback to its more general use is the expense attending cutting it into the required forms.

As the constituents of building stones are easily ascertained and well known to chemists, it is somewhat remarkable that long before this the art of making artificial stone has not been brought to perfection. Yet if we may judge from the great and increasing variety of processes, patented and otherwise, which now press their claims upon public notice, the time is ripe for the introduction of any process which can demonstrate practically its capacity to fulfill the requirements of the case.

These requirements are not numerous, yet they have been hard to attain, as the history of the failures which have marked the course of invention in this field, sufficiently shows. The Ransome process, successful in England, has not proved so in America yet, though it cannot be said to have had a fair trial here.

We doubt, however, that it will ever compete with cheaper American processes, by which some excellent and cheap building stones are produced.

We have for the last two years availed ourselves of every opportunity afforded us to examine and test specimens of artificial stone, and have met with many kinds which have very little merit. Some however are really good stones, and as such must in our opinion come largely into use.

We notice in the *Art Review Advertiser*, a new journal published in Chicago, that a stone has been introduced there called the Frear Artificial Stone, which is described as fully equaling brown stone both in appearance and endurance. A very handsome residence has been erected on one of the fashionable avenues of that city of this stone, the sidewalk and fence being also of the same material.

The nature of the process is not detailed, in fact it is generally thought advisable by manufacturers of artificial stone to give as little publicity to their processes as possible, in order to prevent infringements.

We have latterly had our attention called to a kind of artificial stone—an advertisement of which will be found in another column—manufactured by Mr. Herman A. Gunther, of Eighty-sixth street, between Third and Fourth avenues, in this city, which we find to be a very excellent stone. In fact we have not met with anything which in our opinion is superior to it in solidity or beauty of surface. It chips with the chisel almost as hard as blue lime stone, and is almost as dense.

We have been shown specimens of this stone which have been laid into sidewalks, and made into a continuous surface of great strength and beauty. Our experiments with it lead us to believe that it will sustain a crushing weight of 150 tuns to the square foot, and the action of water hardens rather than softens it.

It has the great advantage that it may be laid up in continuous walls, leaving no cracks or crevices; a property which has given it considerable request for breweries, malt houses, linings for water tanks, and cellars into which water flows. It may also be molded while in the plastic state into any desired ornamental form, thus saving the expense of cutting. Any desirable shade of color may also be given it except, we believe, pure white.

The material sets very quickly and the stone can be made very cheaply. We believe the Frear stone and other kinds of artificial stone will find it somewhat difficult to give better results than those secured by Mr. Gunther, who is the assignee of the patent which covers the process. We have said thus much as a matter of simple justice to what we deem a meritorious invention, and would advise those interested to examine the stone in question, at the works above mentioned.

THE YACHT RACES.

Last year the American yacht *Sappho* was badly beaten in England by the British yacht *Cambria*. The owners then came to an agreement for additional races this year, the *Sappho* people being very confident that their boat was the fastest sailor, and attributing their defeat to breakage of spars. Three races have been arranged for the present year between the above yachts, the first of which took place on the 10th May, when the *Sappho* came off victorious, greatly to the delight of the Americans. The race was from Cowes, for a distance of 60 miles to windward, up the English Channel. The *Sappho* soon beat the *Cambria* out of sight, so the latter gave up the contest, admitted defeat, and returned to port without having sailed to the stake boat. Two races yet remain to be sailed—one "sixty miles dead to windward and back," and the other a triangular course of sixty miles, twenty miles on each bounding side of the equilateral triangle. The *N. Y. Herald* thus describes the rival vessels:

THE CAMBRIA.

The *Cambria*, schooner, 248 tuns, New York Yacht Club measurement, and probably the fleetest of the British yachts, was launched in May, 1868. She is a fine type of the deep and narrow English model, and in external appearance bears a resemblance to the stiffness and stability of a Cunard steamer. It can hardly be said that the *Cambria* is as graceful and charming in her *pose* upon the water as the majority of American schooners, and this is simply because the English are willing to sacrifice anything to secure the full embodiment of their ideas as to speed. Her dimensions are—

	Feet.
Length (from stempost to sternpost)	108
Beam	21
Depth of hold	11
Draft of water	12
Mainmast (hounds to deck)	61
Foremast	56·6
Main boom	61
Main gaff	33·9
Fore gaff	25
Bowsprit (outboard stem)	35
Maintopsail	35·6
Foretopsail	32·3
Maintopsail yard	32
Foretopsail yard	29

She is a keel schooner, substantially built of oak, with teak topsides. Her interior fittings are remarkably beautiful, rich, and in good taste, and the wainscoting is finished in polished oak. On the principle upon which she was built the *Cambria* is a most perfect triumph, and no one need doubt that she is the finest schooner in Great Britain. All of the delicate niceties employed by English yachtsmen in ballasting, sparring, and canvasing, have been tested by Mr. Ashbury, who, with a spirit which does credit to the most fascinating of all pastimes, has done much to develop yachting among his own countrymen to its present high status.

The *Cambria* has twenty-one tuns of ballast smelted and run into her timbers, and she has also four tuns of lead bolted to her keel. Under sail she spreads a vast area of canvas, and works in the wind with the ease and facility of a weather vane. It is by her qualities of being sharp and quick in stays, of being close to the wind, of making good time in light airs that yachtmen claim that she is one of the fastest schooners in the world. By the wind—that is, close-hauled—she has gaff-topsails bent to the ordinary spars; but in sailing free she has much longer and lighter and more flexible yards aloft, and the sail of lighter canvas, of course, clubs out a considerable distance. Her bowsprit is a very peculiar spar, and with the jibboom and flying jibboom is all in one stick and rigs in and out at the option of the sailing master. Of course it is ugly in appearance, but the nautical advantages claimed for it are many and doubtless well founded.

The *Cambria* has had a brilliant and eventful history. She has been the victor in many contests, and her bold and gallant owner and commander has sailed her in most all the seas that wash European shores, and has but recently returned from his cruise up the Mediterranean. She first won fame upon June 2, 1868, when she came in first, with the *Egeria* and *Fleur de Lis* as competitors; but in this contest she failed to win the prize because she had to give time allowance. She also figured with evidences of the finest qualities on the 17th of June, 1868; on the 30th of June, 1868; on the 6th of August, 1868; and on the 11th of August, 1868.

On the 26th of August, 1869, she beat the *Sappho*, her competitor yesterday, and in the same race, three fast English yachts—the *Aline*, *Oimara*, and *Condor*.

After these victories alterations were made in the *Cambria* to make her more sea-worthy. She was padded forward, her masts were bored, and the weight of her keel was diminished. Besides, on the occasions named, the *Cambria* has won golden laurels, especially upon beating to windward, in a trial of this quality with an English cutter (corresponding to our American sloop), in which she was again the victor. This is her *forte*. During the present season the *Cambria* has been given more ballast, her bulwarks have been raised forward and her scuppers have been much enlarged. She is now, according to the dispatches in her best trim, and she will have every American and English eye bearing upon her during the season of 1870.

THE SAPPHO.

All will remember the keel schooner *Sappho*, 274 tuns New York Yacht Club measurement, owned by that thorough yachtman Mr. William Douglas. She is one of the finest, ablest, and fastest of all American or English yachts. Her dimensions are:

	Feet.
Length of keel	113
Length on water line	123·3
Length on deck	125
Length over all	154·8
Beam	27
Depth of hold	11
Foremast	91·20
Mainmast	89·6
Maintopmast	54
Foretopmast	50
Main boom	76
Main gaff	40
Fore gaff	36
Head booms (outward)	30

The *Sappho* draws twelve feet of water aft and seven forward, carries a squaresail, a staysail, two gaff-topsails, and five lower sails, and has great buoyancy and stability by form, both of which comes from a good model and sixty-five tuns of ballast, stowed with fine judgment.

In her model, as can be seen from her comparative beam and hold, respectively 27 and 11 feet, she carries out the American idea of construction. Her bows are very long and fine and her lines forward are nearly straight. She has very little concavity. One peculiarity forward is her bowsprit, which is built in her, thus securing one-third more strength than by the usual plan, with one-third less weight. A very severe test of this improvement has shown it to be of great value, and as an experiment it is very successful.

Coming aft an examination of her lines reveals the excessive swell in her bilge lately increased by Mr. Douglas by "hipping"—that is, by planking on the original framework and augmenting her width below the water line. These alterations took place between the fore and main mast and certainly give the *Sappho* more buoyancy under the large cloud of canvas which she spreads in all weathers; but it is doubtful if she has gained in speed—at least this is the impression of her former owners. Perhaps it might be well to say she has little to gain in this particular.

From the fattest part of the bilge the schooner's sides hollow with considerable concavity, and terminate in a rocker keel, 36 inches deep. She has a very fine and light stern, peculiar to herself, and is quite hollow aft. Her stern is all dead wood and drags no water, leaving a narrow wake. She stands up well, is remarkably quick in stays, is well sparred, and nearly as strong as crystallized rock: built of oak, locust, and hackmatack; finished on the interior with a hard wood cabin, and in everp respect a graceful and elegant craft. She has few superiors or equals.

The amount of sail she spreads is incredible, and in light airs there is not a square inch of area within the limits of the stays through which the sky is visible.

Death of Franklin Peale.

Franklin Peale, Esq., whose decease occurred May 5th, in Philadelphia, was a highly esteemed citizen, and extensively known through the public positions he formerly held, and his connection with various scientific, musical, literary, and charitable societies. For a number of years past he has been President of the Pennsylvania Institution for the Blind. Mr. Peale was the son of Charles Wilson Peale, himself an eminent Philadelphian, and the founder of the widely known "Peale's Museum." He was an associate of his father in the organization, and subsequently was engaged in the mainten ance and supervision of that extensive collection. In 1836 he was appointed Melter and Refiner in the United States Mint, and in 1839 was promoted to be Chief Coiner of that institution, succeeding the venerable Adam Eckfeldt. Mr. Peale served until 1855, and during his sixteen years of service exerted his skill in introducing the steam coining apparatus and the model steam engines which have always been so much admired by visitors to the Mint. He was also instrumental in bringing into use the French medal lathe, which, by subsequent improvements, has become of great use in executing the original dies for our national coinage. He traveled extensively in Europe, visiting the various government mints and private medal establishments, and made effective use of his information in the reorganization of the Mint, rendered necessary by the removal of the establishment from the dilapidated and confined quarters in Seventh, below Arch, to the handsome building in Chestnut street. His taste in the fine arts was also of great assistance in the change of the designs on the coin, which took place in the early part of his duties as Chief Coiner. Mr. Peale was also some time President of the Hazelton Coal Company. He was a prominent member and officer of the American Philosophical Society, the Horticultural Society, the Musical Fund, and various other scientific and social societies which have exercised beneficial influences in favor of the public. He died in his 75th year, greatly regretted.

Filing a Flat Surface.

The following practical and valuable remarks from the *Irish Builder*, will be of use to many of our amateur subscribers: "Filing consists in the paring off of very small shavings of metal by means of the numerous teeth of the file. It need scarcely be observed that the coarser the teeth the larger will be the shavings removed, and that with sufficient force the quicker will the work be accomplished; hence it is customary to use coarse files for the greater part of the work; but as coarse files make deep scratches, the work is finished with smooth files. The file is considered one of the most difficult tools to use with accuracy; this, perhaps, is owing to the want of a sufficient guide by which to regulate the direction of the file, the direction of the file depending altogether on the hand for a guidance. In filing a flat surface on a piece of iron, unless there is some skill or care used in the operation, the two exterior edges are apt to be greatly pared away, so that that part of the service about midway between them will be least worn down. It will be clear that the two edges are supported with the metal at only one side, whereas any other point on the surface between these two is supported with metal on both sides; then as the file is drawn backwards and forwards nearly its own length, it is apt to hang over these corners and to file them off. The work is held in a bench vice, in such a position that the file will run in a horizontal direction nearly level with the workman's elbow, but should the work be of a very light nature, it may be held in a more elevated position: or, if it be very heavy, it may be held a little lower. In filing flat surfaces, a 'surface-plate' is used to enable the operator to finish the work with accuracy. The surface plate is merely a cast-iron plate planed and carefully reduced to a true surface. Some red lead is rubbed on this plate before being used; then this piece of work is rubbed on the plate, and wherever the work is reddened it shows that that part of the work is above the level, and has to be filed down; and this process of testing and filing is carried on until the work is reduced to a perfectly true surface. It saves the file to draw it back at each stroke as lightly as possible. There is also economy in using the files first on brass or cast iron, and afterwards on wrought iron."

Machine for Treating Borings.

In all well-managed engineering workshops care is taken to keep the brass borings, filings, etc., as distinct as possible from those of iron or steel; but notwithstanding the precautions which can be practically taken, there are produced in all such establishments a large quantity of mixed borings, etc., which it is desirable should be subjected to some separating process. The ordinary mode of effecting this separation is to rake the mixed borings by hand with large magnets; these magnets of course attracting the iron and steel particles, and leaving the brass behind. This, however, is at best but a slow process, and where large quantities of boring, shavings, filings, etc., have to be operated upon it is not only expensive but also unhealthy for those employed in it. It was to obviate these inconveniences that M. Vavin, a French engineer, some months ago designed an ingeniously arranged machine, which has been in regular use at the works of MM. Cail and Co., of Paris, since June last, being constructed so as to effect the desired separation of the brass and iron borings, etc., without the aid of manual labor.

The machine is provided with a hopper, which receives the mixed borings, these latter falling from the hopper on to an oscillating spout, which has a vibrating movement given to it. By the aid of the spout the particles are delivered on to a drum, the circumference of which is formed of bands of soft iron, alternated with bands of copper. Each band of iron is in contact with a series of horseshoe magnets, these magnets being so arranged that each has one pole in contact with one of the iron bands and the other in contact with the next band.

The particles of iron falling on the drum, are attracted by the soft iron bands, and are carried round by the drum until they are removed by a revolving brush; this brush sweeping them off, and causing them to fall on an inclined plane, which conducts them to a proper receptacle. The brass particles, on the other hand, together with any iron particles which may have escaped the attraction of the bands of the first drum, fall off this latter on to a second drum, which is constructed in the same manner as the first, and which, like it, is furnished with a revolving brush. This drum completes the separation of the iron from the brass particles, the two kinds of borings, etc., being finally delivered into separate receptacles.

Preservation of Cast-Iron Water-Pipes.

In 1858 the cast-iron pipes carrying the Cochituate Water from Boston to South Boston were treated with a preparation from coal tar, known as Dr. Smith's process, and the result has been so favorable that it has been permanently adopted by the Cochituate Water Board, and by the managers of other water works throughout the country, where the material used for pipe is cast iron. The pipes laid in 1858 were taken up and examined after ten years' use and were found nearly free from rust or ocherous accretions. This coal pitch varnish is applied substantially according to Dr. Smith's process, which is described as follows in the specifications:

Every pipe and casting must be entirely free from dust, sand, or rust, when the varnish is applied.

The varnish or pitch is to be made from coal tar, distilled until all the naphtha is removed, the material deodorized, and the pitch reduced to about the consistency of wax or very thick molasses; pitch which becomes hard and brittle when cold will not answer for this use.

Pitch of the proper quality having been obtained, it must be heated in a suitable vessel, to a temperature of three hundred degrees Fahrenheit, and must be maintained at not less than that temperature during the dipping. As the material will deteriorate after a number of pipes have been dipped, fresh pitch must be frequently added, and at least eight per cent of heavy linseed oil must be added daily with the fresh pitch, and the vessel must be entirely emptied of the pitch and refilled with fresh material as often as may be necessary to insure the perfection of the process.

Each casting shall be kept immersed from thirty to forty-five minutes, or until it attains the temperature of three hundred degrees Fahrenheit, and, if required by the engineer, shall be heated to such temperature as he may designate before it is dipped.

After the bath is completed, the castings will be removed and placed in such a position to drip that the thickness of the varnish shall be uniform.

The coating on the pipes and castings must be tenacious when cold, and not brittle, nor disposed to scale off, and when it shall appear to the inspector that the coating has not been satisfactorily applied, the pipe or casting shall be thoroughly scraped, cleaned, and re-coated.

Meteorological.

Professor H. H. Hildebrandson, of the University of Upsal, in Sweden, has prepared four synoptical meteorological maps, which contain several features of scientific interest. It is generally known that a fall of the barometer is usually followed by an increase of heat, and *vice versa*. But in Sweden, from observations taken from Lapland to Upsal, the barometer and thermometer frequently show results quite contrary to the general experience of more southern latitudes; the barometer often falls considerably, while during the long winter nights of this region the thermometer generally remains stationary, and when storms are prevalent invariably falls along with the barometer.

Experience shows that in those regions an intimate relation exists, not only between the variations of the pressure of the atmosphere and those of the direction of the wind, but also between the movements of the barometer and thermometer during serious atmospheric perturbations. The dampness of the atmosphere being much greater in the southeast part of the territory visited by a violent storm than at the opposite extremity, it is easy to conceive that the atmospheres at those two points possess entirely different qualities, analogous, in some degree, to those of the equatorial and polar currents.

The Cow Tree.

"Among the many curious phenomena which presented themselves to me in the course of my travels," says Humboldt, "I confess there were few by which my imagination was so powerfully affected as by the cow-tree. On the parched side of a rock on the mountains of Venezuela grows a tree with dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower; its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts, provided with large bowls to receive the milk, which grows yellow and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock."

Tungstate of Soda.

Buckmaster's "Elements of Chemistry" says: "Every year considerable loss of life occurs from the inflammable nature of materials used for dress. Solutions of several salts have been proposed with a view of rendering fabrics non-inflammable. From numerous experiments, it appears that a solution of the tungstate of soda is greatly to preferred. A concentrated neutral solution of the salt is diluted with about one third of water, and then mixed with three per cent of phosphate of soda. This solution is found to keep well, and is used in the Royal laundries. The lightest muslin washed in this solution and dried, becomes non-inflammable."

Gutta-percha Vessels for Chemical Uses.

A contributor to the *Chemical News* says, "Erroneous views have been held and circulated concerning the durability of gutta-percha under the action of various reagents. We are ordinarily told that it is absolutely unacted upon by cold mineral acids, with the single exception of the sulphuric at 1·6 sp. gr. and upwards. This is far from being the case. There is, indeed, no immediate corrosion, or other rapid and striking change; but, in course of time, the surface becomes overspread with a thin buff-colored layer, which may be easily rubbed off. This change extends gradually deeper and deeper, till the whole mass loses its coherence and splits in various directions. I have before me a number of jugs which have been used for nitric, chlorhydric, and dilute sulphuric acids, as, also, for solutions of stannous, stannic, and ferric salts, and which, in less than three years' service, have become quite worthless; on being sent for repairs to a dealer in such articles, they were returned with the remark that they 'could not be mended, as they had been used for acids.' I find that the disintegration in question can be very much retarded, if the vessels are always rinsed in cold water immediately after being used."

Use of Borax in Glass Manufacture.

M. M. Maës & Clemendot, glass manufacturers at Clichy, produce a crystal as fine as the best Baccarat and St. Louis crystal by using boracic acid.

The presence of this flux allows a modification in the composition of the crystal, as the oxide of zinc can then be substituted for the oxide of lead; and soda, lime, or barytes can thus replace potassa.

The barosilicates of zinc and potassa, of potassa and barytes, of soda and zinc, manufactured by Maës & Clemendot, are remarkable for their limpidity and whiteness. The following are the proportions:

Silicious sand (white)	261	225
Minium	261	225
Potassa (1st quality)	60	52
Borax	18	4
Niter	18	3
Manganese	18	1
Arsenious acid	18	1
Refuse of former operations	18	89

USE OF CALCIUM LIGHTS AT THE ST. LOUIS BRIDGE.—Mr. W. Milnor Roberts, who is in charge of the work, says: "We have used calcium lights only for our open-air work in laying masonry on the top of our caissons—one light on one side, and one at the other, on diagonal corners: we found that they distributed the best light when thus placed. We had the oxygen gas forced into copper gas-holders with a pressure of about 200 lbs. to the square inch. These were carried over from the city to the piers on a little steamer, and the gas was conveyed to the burner through small lead pipe. At first our reflectors were of glass, but so many were broken that they were replaced by metal. A man remained with the two burners through the night, to regulate them occasionally, and to mend the pipes when a burst occurred. They usually burn from eleven to twelve hours; and, with the aid of some movable large reflector lamps, the masons worked as well at night as in the day. The cost of the calcium lights to our company was 3·75 dollars per hour each."

A COMING EXHIBITION.—During the past few months we have noticed in the daily papers vague allusions to an association organized for the purpose of establishing in this city, on a monstrous scale of dimensions, a permanent Exhibition of Industry and Art. It is said that the concern has not only been chartered by the Legislature, but that its capital, amounting to $7,000,000 or more, has all been paid in. At last accounts this huge affair was prospecting about for some land whereon to build its Tower of Babel. Can any one enlighten us about this mysterious affair? Who are the incorporators? and what are they intending to do? If an exhibition of that character is to be located in this city or vicinity, we should like to get at the facts.

MARINE COUCH.—We would call the attention of steamship companies to an illustrated description of Newell's marine couch, published in another column. Mr. Newell has patented his invention in Europe as well as in the United States, and is desirous of interesting capitalists in its introduction.

Inventions Patented in England by Americans.

(Compiled from the "Journal of the Commissioners of Patents.")

PROVISIONAL PROTECTION FOR SIX MONTHS.

948.—PREPARING ICELAND AND IRISH MOSS AS A FOOD.—W. J. Rand, Brooklyn, N. Y. March 31, 1870.

33.—WATCH CASES AND MACHINERY FOR MANUFACTURING THEM.—C. L. Thiery, Boston, Mass. January 4, 1870.

533.—MACHINERY FOR MAKING HORSESHOE NAILS.—Daniel Dodge, Keeseville, N. Y. February 23, 1870.

887.—MACHINERY FOR HEATING AND DELIVERING METAL BARS.—S. A. Darrach, Newburgh, N. Y. March 26, 1870.

889.—MACHINERY FOR GRINDING AND POLISHING SAWS, ETC.—W. J. Lippincott, Cincinnati, Ohio. March 26, 1870.

897.—ROTARY PRINTING MACHINES.—Jesse B. Brown, Nashville, Tenn. March 26, 1870.

907.—PUMPS FOR RAISING WATER AND SAND, MUD, OR OTHER DISINTEGRATED SUBSTANCES.—B. H. Jenks, Philadelphia, Pa. March 28, 1870.

960.—SEWING MACHINES.—Nathan Wheeler, New York city. April 1, 1870.

967.—CRUSHING AND GRINDING MILLS.—H. Jackson, Leeds, England, and Charles and John Ross, New York city. April 2, 1860.

973.—MACHINERY FOR MAKING HORSESHOE AND OTHER NAILS.—S. Schleisinger, Boston, Mass. April 2, 1870.

1,015.—INKSTAND.—C. H. Wight, Baltimore, Md. April 6, 1870.

1,016.—FRAME FOR STATIONARY, WITH THERMOMETER, ETC.—C. H. Wight, Baltimore, Md. April 6, 1870.

1,048.—LOOM.—G. Crompton, Worcester, Mass. April 9, 1870.

1,051.—WROUGHT IRON AND STEEL.—J. Henderson, New York city. April 9, 1870.

1,073.—RAILWAY BRAKE AND STARTER.—E. P. Jones, Shell Mound, Miss. April 12, 1870.

1,074.—WHIFFLETREES.—E. P. Jones, Shell Mound, Miss. April 12, 1870.

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; besides, 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. B., Jr., of Ohio.—To test the purity of white lead ground in oil, take a small portion and wash it with spirits of turpentine, to remove the oil, and rinse thoroughly with alcohol. Pour on the sample thus prepared, dilute nitric acid. If a residue remains it is sufficient indication of sulphate of baryta. The weight of this substance when separated from the solution by filtering and drying, will, when compared with the weight of the sample, give the proportion of this very common adulteration, provided sulphate of lead be not present. The clear solution which has been filtered off, may next be tested for carbonate of lime (chalk or whiting), by evaporating to dryness, and treating with alcohol. This will dissolve the nitrate of lime into which the carbonate of lime has been changed by the first treatment with nitric acid. The loss of weight in the residue after treatment with the alcohol, filtering, and drying, will indicate the proportion of carbonate of lime present in lead, provided there is no oxide of zinc present, and the amount of carbonate of lime may be determined by multiplying this loss by 56, and dividing the product by 82; the quotient will be the weight of carbonate of lime present in the sample before treatment. A mixture of lead, carbonate and oxide of zinc, prepared cheaply from an ore found in North Carolina, has been latterly used to adulterate white lead; therefore, oxide of zinc may be present. To test for this salt, add to the alcoholic solution obtained in the first washing, sulphide of ammonium, which will throw down all the zinc as a sulphide, five sixths of which will be the amount of oxide of zinc present in the sample, which must be deducted in estimating the carbonate of lime. Sulphate of lead may be present; if so, it will remain undisturbed with the sulphate of baryta, upon the first treatment with nitric acid. It may be washed entirely out of the sulphate of baryta with pure water; the loss in weight ascertained after drying the sulphate of baryta, will then indicate the quantity of sulphate of lead present. In this case the whole of the residue at first left when the nitric acid is added, is not the sulphate of baryta, and the latter must be weighed after washing out the lead salt. Whiting is not, in our opinion, as good as lead for a priming coat. Zinc white has not the body of white lead, but it does not change in color on exposure. We recommend for outside work two coats of lead and a finishing coat of zinc.

C. E. W., of N. Y.—To find the supporting power of an air chamber immersed in water, divide the weight of the inclosed air by the number indicating its specific gravity, when water is taken as the standard unit. The quotient minus the weight of the air will be the amount it will support over and above its own weight. Divide also the weight of the chamber by the number expressing the specific gravity of the material of which it is made. If the quotient be less than the weight of the chamber, subtract the difference between the quotient and the weight from the supporting power of the air, over and above its own weight, as found above; but if the quotient be greater than the weight of the material, add the difference instead of subtracting it. Perform a similar operation for each of the chains, cords, or other appurtenances to which the weights are to be suspended, successively adding the results to or subtracting from the last sum or difference found, as above directed. The final result will be the supporting power of the entire apparatus, over and above its own weight. To find what weight of any submerged material heavier than water it will support, divide the supporting power of the apparatus above determined, by the number denoting the specific gravity of the material to be supported; subtract this quotient from the supporting power, and divide the latter by the difference thus obtained. Add the quotient to the supporting power of the apparatus This result will be the weight of the given material the apparatus will support. To find the same result when the fluid is other than pure water, make the fluid itself the unit of specific gravity, or what is the same thing, divide, before making the calculation, each specific gravity number, or coefficient in the ordinary water standard table, by the specific gravity coefficient of the fluid required, taken from the same table.

N. N., of Pa.—The use of the magnet to reduce the friction of journals was proposed many years ago by James Way, of England. He fixed the permanent magnet over the vertical axle in such a manner that the weight of the wheel was nearly balanced by the magnetic attraction. Experiment showed an economy of 50 per cent. A given weight would drive the wheel 30 seconds with the magnet applied, but only 20 seconds without the magnet. We once succeeded in revolving a wheel armature suspended from a magnet, a full hour and one half in vacuo, with no increment of force after the initial force, given to it by the fingers before the bell glass was placed over it on the plate of the air pump. The weight of the armature was adjusted so as to nearly overcome the force of the magnet, and reduce the pressure between the bearing points as nearly as possible to a minimum.

W. C. & Co., and others.—We do not know the exact address of Mr. Charles Hodgson, the inventor of the English Wire Rope Tramway, or "Sky Railway" System; but by addressing him to the care of the editor of *The Engineer*, 163 Strand, London, England, you will probably receive immediate attention.

C. R. T., of Ga.—The centrifugal force of the moon and other planets results from the original force with which they were projected into space. Whatever that may have been, science has not determined it. You may spend a good deal of leisure time in trying out the problem.

T. H., of Pa.—We know of no book which specially treats of the manufacture of small fire-arms. The chambers of revolvers are generally of steel, and the parts are fitted by very ingenious and accurate machinery, of which we cannot give you a good idea without diagrams.

A. J. Wood, of Pa.—We do not believe there is any tidal action which can affect the flow of water into your mine, nor do we believe that there is any difference in the flow during the night. If this is so, however, you can easily test it by experiment.

H. H. H., of Ind.—What is meant by working steam expansively is the cutting off the influx of steam to the cylinder before the end of the stroke, and allowing the force of expansion in the steam to complete the stroke.

S. & S., of Ohio.—A cupola may be used for large brass castings, but for small work a suitable furnace is preferable, and most ordinarily employed, the brass being melted in a black lead crucible.

A. D., of Iowa.—You will find the subject of the link motion fully discussed in Auchincloss' Link and Valve Motion, published by D. Van Nostrand, 23 Murray street, New York.

A. L. P., of Pa.—Your letter about the Vertical Multiplier, with many others of a similar character, has been handed over to Mr. Fithian. Specimen papers sent as directed.

P. C. H., of Ohio.—The Painter, Gilder, and Varnisher's Companion, published by Henry Carey Baird, 406 Walnut street, Philadelphia, contains the information you desire.

W. L., of N. Y.—Stove polishes are various forms of plumbago or black lead, either in a pulverulent state, or cemented into cakes by a weak size.

D. D., of Md.—The rouge, or colcothar, used for polishing purposes, is an oxide of iron.

Recent American and Foreign Patents.

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

Mop Wringer.—Charles Bradway, Maquoketa, Iowa.—This invention has for its object to furnish a simple and convenient mop wringer, which shall be so constructed that the mop may be easily and thoroughly wrung without its being necessary for the operator to put her hands into the dirty water to wring out the mop, and which at the same time may be made and sold for a trifling sum.

Self-Adjusting Watch Keys.—J. S. Birch, New York city.—This invention has for its object to furnish a simple and convenient self-adjusting watch key which will adapt itself to the arbors of different watches, however much said arbors may vary in size, and which shall be so constructed that it may be manufactured and sold for less money than the self-adjusting watch keys heretofore made.

Hand Corn Planter.—Henry Hickman, Omaha, Neb.—This invention has for its object to furnish an improvd hand corn planter, which shall be simple in construction, and effective in operation, and which shall be adapted for planting in sod or in plowed land, as may be desired.

Culinary Boiler.—J. S. Bunnell, Carbondale, Pa.—The object of this invention is to construct a culinary boiler in which one, two or more separate dishes may be cooked at the same time without mixing the flavor of the several articles. The invention consists in arranging within each one of a series of vessels which are set one upon the other, a perforated false bottom, and in connecting the pipe, which conducts the steam to the said vessels, with the lower part under the false bottom of each.

Razor Strops.—W. D. Evans, Philadelphia, Pa.—This invention relates to a new and useful improvement in strops for sharpening razors, whereby the operation of giving a razor a good edge is much more speedily and perfectly performed than it has hitherto been, and it consists in the use of cork beneath the outer or leather coating of the strop.

Acid and Waterproof Composition.—Henry W. Johns, New York city—This invention has for its object to furnish an improved composition for coating and saturating canvas and other woven or felted fabrics for roofing and sheathing purposes, for lining boxes and barrels, etc., and for other uses, such as bags for guano, phosphates, and other fertilizers, and forming tarpaulins, sails, cordage, seines, etc., for coating the interior of boxes, barrels, and other articles liable to injury from acids, mold, or decomposition of vegetable and animal matter, and as a body for roof coatings, cements, and preservative and marine paints, etc.

Padlock.—H. F. Haack, New York city.—This invention relates to a new manner of arranging and combining the bolt, tumbler, and bolt arrester in a padlock of that class which can be opened by pushing in a flat key.

Car Brake.—Almerin H. Lighthall, Albany, N. Y.—This invention relates to improvements in car brakes, and consists in an improved arrangement of spring-actuated car brakes and means for tripping the springs by the act of pulling the bell-rope to signal for the stopping of the train.

Bird Trap.—S. M. Brooks, Memphis, Tenn.—This invention relates to improvements in traps for birds and small animals, and consists in the application to a small rectangular or other frame adapted for attachment to the ground readily, of a woven netting of any kind, and a swinging frame actuated by springs, and a setting and tripping device, so arranged that when set access is afforded to the birds or animals within the first-named frame, where they trip the swinging frame, which instantly carries the netting over them and becomes secured by a spring catch.

Vegetable Cutter.—H. P. Lauer and H. G Reichard, Pottsville, Pa.—This invention relates to improvements in vegetable cutters, and consists in an arrangement in a case resembling in form an inverted, truncated, hollow cone, of a vertical, hollow, cylindrical cutter carrier as large as the interior of the shell at the bottom, and having two or more wide vertical slots, in which are hinged vertical gages to regulate the thickness of the slices to be cut, by cutters attached to the walls of the slots opposite where the gages are hinged. The top of this cylinder is geared with a hand-crank for revolving it, and the vegetables are placed on the space between the shell and the cylinder; the cut pieces are forced to the interior of the cylinder and drop out below. The hinged gages are provided with adjusting apparatus for varying the openings, for cutting thicker or thinner slices, the said apparatus is manipulated by a thick screw at the top of the cylinder.

Cutter Rack.—W. C. Gifford, Jamestown, N. Y.—This invention relates to improvements in means for opening and closing the stanchions of cutter-feeding racks for securing and releasing the cattle, and consists in connecting the movable stanchions with the adjacent fixed stanchions by one or more bars pivoted to each, so that in opening, the stanchion is also raised, the object of which is to utilize their weight to make them self-closing. The invention also consists in the combination with the connecting bars of arms arranged to hold the stanchions open by hooking on to pins or studs in such a manner that when the cattle reach between the stanchion and down to the food they will disconnect the hooked arms and let the stanchions close by the action of gravity; and it also consists in forming the said hooked arms with spring catches to lock the stanchions in the closed position.

Bench Pin.—H. Gabelmann, Fort Scott, Kansas.—This invention relates to improvements in bench pins for joiners and cabinet makers' use to support the boards at the side of the bench for pointing the edges, and consists of blocks of wood or metal with diagonal grooves in the sides or edges adapted for engaging in slots in the side of the bench so as to project obliquely therefrom and hold the rear end of the board in the diagonal slot by the corners of the walls of the slots cramping against the side of the board, one end of which is held in the vise, or both ends may be held by these pins, the said pins are more especially intenued for side boards which are too high to joint conveniently when supported on a pin in the common way at the lower edge.

Self-Packing Bush.—Carl Miller, Sandoval, Ill.—This invention relates to a new and useful improvement in a self-packing bush for mill spindles.

Forming Extension Table Slides.—S. J. Moore and G. A. Buckman Ogdensburgh, N. Y.—This invention has for its object to improve the manner of forming extension tables slides so as to make them stronger and more durable than when constructed in the ordinary manner.

Grain Binder.—W. D. Harrah, Ira M. Gifford, and Edward T. Johnston, Davenport, Iowa.—This invention has for its object to furnish an improved machine for forming grain into bundles, and binding it as it passes from the reaper, which shall be simple in construction, effective in operation, and convenient in use.

Poke.—A. E. Cruttenden, Canaseraga, N. Y.—This invention has for its object to furnish an improved poke for horses and cattle, which shall be so constructed as to more effectually prevent the animal from throwing down or getting over a fence, than the pokes constructed in the ordinary manner.

Earth Closet.—George G. Baldwin, New Haven, Conn.—This invention relates to a new earth closet, which is so arranged that the person occupying it may readily apply the necessary quantity of earth, and that the pan, or receptacle, can be removed and replaced when desired.

Fire-Arms.—Charles Felix de Dartein and Jules Edouard de Dartein, Strasbourg, France.—This invention relates to an improvement in revolving fire-arms, and consists chiefly in a novel mode of actuating and stopping the revolving cylinder.

Lantern.—Samuel Peters, Crescent, N. Y.—This invention has for its object to improve the construction of lanterns, so as to make them simple in construction, and at the same time convenient, and safe in use, enabling the upper, or globe part of the lantern to be detached from the lower, or lamp part, with one hand.

Stoves, Ranges, etc.—Frederick G. Cochran, St. Louis, Mo.—This invention has for its object to improve the construction of stoves, furnaces heaters, ranges, etc., for burning coal, peat, or other gaseous or fuliginous fuel, in such a way that the gases and other combustible products of said fuel may all be consumed, instead of being carried off into the smoke flue, or chimney, as is the case with ordinary stoves.

Wooden Pavement.—Alexandre Trenaunay, Neuilly-Sur-Seine, near Paris, France.—This invention relates to the manufacture and application of mineralized wood blocks or slabs for paving purposes.

Carding Engine.—Ferdinand Morf, Wetzikon, Switzerland.—The object of this invention is to enable the top flats or top cards to be stripped in any required succession, instead of stripping them in regular alternate succession

Manufacture of Artificial Flowers and Foliage.—Octave Eugene Fillion, Paris, France.—This invention consists in making artificial flowers of a composition consisting of collodion, castor oil, and glycerin.

Baling Press.—Bryant F. Stroud, Marshall, Texas.—This invention has for its object to improve the construction of baling presses so as to make them simpler in construction and more convenient and effective in operation.

Healing Salve.—William Kramer, New York city.—This invention has for its object to furnish an improved healing salve for sores, wounds, cuts, and the various purposes for which a healing salve is applicable.

Apparatus for Cleansing and Preparing Rags for the Manufacture of Paper.—William Edward Newton, London, England.—This invention has for its object to cleanse rags from the dirt and impurities which naturally adhere to them, before being operated upon and prepared for conversion into pulp for the manufacture of paper.

Harvester.—C. Lidren, La Fayette, Ind.—This invention relates to a new platform attachment to harvesters, which can be extended in the rear of the finger bar, to receive the cut grain, or constructed under the bar when not used, or to drop the grain. The grain is therefore deposited upon the platform, and can be raked off by hand, or may, by quickly contracting the platform, when a gavel is completed, be allowed to drop behind the finger bar.

U. S. Patent Office.

How to Obtain Letters Patent FOR NEW INVENTIONS.

Information about Caveats, Extensions, Interferences, Designs, Trade Marks; also, Foreign Patents.

For a period of nearly twenty-five years, MUNN & CO. have occupied the position of leading Solicitors of American and European Patents, and during this extended experience of nearly a quarter of a century, they have examined not less than fifty thousand alleged new inventions, and have prosecuted upward of thirty thousand applications for patents, and, in addition to this, they have made, at the Patent Office, over twenty thousand preliminary examinations into the novelty of inventions, with a careful report on the same.

The important advantages of MUNN & CO.'S Agency are, that their practice has been ten-fold greater than that of any other Agency in existence, with the additional advantage of having the assistance of the best professional skill in every department, and a Branch Office at Washington, which watches and supervises, when necessary, cases as they pass through official examination.

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Those who have made inventions and desire a consultation are cordially invited to advise with MUNN & CO. who will be happy to see them in person at the office, or to advise them by letter. In all cases, they may expect an HONEST OPINION. For such consultations, opinion, and advice, NO CHARGE is made. A pen-and-ink sketch and a description of the invention should be sent.

TO APPLY FOR A PATENT,

A model must be furnished, not over a foot in any dimension. Send model to MUNN & CO., 37 Park Row, New York, by express, charges paid, also, a description of the improvement, and remit $16 to cover first Government fee, and revenue and postage stamps.

The model should be neatly made, of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show with clearness the nature and operation of the improvement.

PRELIMINARY EXAMINATION

is made into the patentability of an invention by persona search at the Patent Office, among the models of the patents pertaining to the class to which the improvement relates. For this special search and a report in writing, a fee of $5 is charged. This search is made by a corps of examiners of long experience.

Inventors who employ us are not required to incur the cost of a preliminary examination. But it is advised in doubtful cases.

COST OF APPLICATIONS.

When the model is received, and first Government fee paid, the drawings and specification are carefully prepared and forwarded to the applicant for his signature and oath, at which time the agency fee is called for. This fee is generally not over $25. The cases are exceptionally complex if a higher fee than $25 is called for, and, upon the return of the papers, they are filed at the Patent Office to await Official examination. If the case should be rejected for any cause, or objections made to a claim, the reasons are inquired into and communicated to the applicant, with sketches and explanations of the references; and should it appear that the reasons given are insufficient, the claims are prosecuted immediately, and the rejection set aside, and usually **Without Extra Charge to the Applicant.**

MUNN & CO. are determined to place within the reach of those who confide to them their business, the best facilities and the highest professional skill and experience.

The only cases of this character, in which MUNN & CO. expect an extra fee, are those wherein appeals are taken from the decision of the Examiner after a second rejection; and MUNN & CO. wish to state very distinctly, that they have but few cases which can not be settled without the necessity of an appeal; and before an appeal is taken, in any case, the applicant is fully advised of all facts and charges, and no proceedings are had without his sanction; so that all inventors who employ MUNN & CO. know in advance what their applications and patents are to cost.

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MUNN & CO. give very special attention to the examination and prosecution of rejected cases filed by inventors and other attorneys. In such cases a fee of $5 is required for special examination and report, and in case of probable success by further prosecution, and the papers are found tolerably well prepared, MUNN & Co. will take up the case and endeavor to get it through for a reasonable fee, to be agreed upon in advance of prosecution.

CAVEATS

Are desirable if an inventor is not fully prepared to apply for a Patent. Caveat affords protection, for one year, against the issue of a patent to another for the same invention. Caveat papers should be carefully prepared.

The Government fee on filing a Caveat is $10, and MUNN & Co.'s charges for preparing the necessary papers are usually from $10 to $12.

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A patent when discovered to be defective, may be reissued by the surrender of the original patent, and the filing of amended papers. This proceeding should be taken with great care.

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Can be patented for a term of years, also, new medicines or medical compounds, and useful mixtures of all kinds. When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

PATENTS CAN BE EXTENDED.

All patents issued prior to 1861, and now in force, may be extended for a period of seven years upon the presentation of proper testimony. The extended term of a patent is frequently of much greater value than the first term; but an application for an extension, to be successful, must be carefully prepared. MUNN & Co. have had a large experience in obtaining extensions, and are prepared to give reliable advice.

INTERFERENCES

Between pending applications before the Commissioners are managed and testimony taken; also, Assignments, Agreements, and Licenses prepared. In fact, there is no branch of the Patent Business which MUNN & Co. are not fully prepared to undertake and manage with fidelity and dispatch.

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American inventors should bear in mind that five Patents—American, English, French, Belgian, and Prussian—will secure an inventor exclusive monopoly to his discovery among ONE HUNDRED AND THIRTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such, that patents can be obtained abroad by our citizens almost as easily as at home. MUNN & Co. have prepared and taken a larger number of European Patents than any other American Agency. They have Agents of great experience in London, Paris, Berlin, and other Capitals.

A Pamphlet, containing a synopsis of the Foreign Patent Laws, sent free. Address MUNN & CO., 37 Park Row, New York.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING May 10, 1870.

Reported Officially for the Scientific American

SCHEDULE OF PATENT OFFICE FEES

On each caveat	$10
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On issuing each original Patent	$20
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MUNN & CO.,
Patent Solicitors, No. 37 Park Row, New York

102,748.—ELECTRO DEPOSITION OF NICKEL.—Isaac Adams, Jr., Boston, Mass.
102,749.—VAPOR BURNER.—John W. Baker, Columbus, Ohio.
102,750.—EARTH-CHAMBER VESSELS.—G. G. Baldwin, Milford, Conn.
102,751.—STOVEPIPE ATTACHMENT.—O. B. Bartlett and G. E. Bartlett, Lewiston, Me.
102,752.—PRUNING AND HEDGE SHEARS.—E. K. Bigelow (assignor to himself and Peter Comstock), Litchfield Mich.
102,753.—ADJUSTABLE WATCH KEY.—J. S. Birch, New York city.
102,754.—CRIMPING ATTACHMENT TO PAPER MACHINE.—W. H. Bleasdale, Chagrin Falls, Ohio.
102,755.—BANDAGING AND BOXING CHEESE.—Joel Blood, Watertown, N. Y.
102,756.—COLLAR FOR ATTACHING COW BELLS.—T. H. Body, Kilbourn City, Wis.
102,757.—STEAM HEATING APPARATUS.—E. M. Bosley, Baltimore, Md.
102,758.—CHURN DASHER.—Francis Bosom (assignor to himself and W. A. Wright), Jonesville, Mich.
102,759.—MOP WRINGER.—Charles Bradway, Maquoketa, Iowa.
102,760.—BLEACHING, TANNING, AND COLORING SPONGES.—Frederick Brann and A. T. Schmidt, Pittsburgh, Pa.
102,761.—BIRD TRAP.—Silas M. Brooks, Memphis, Tenn.
102,762.—BUCK-BOARD SPRING.—Thomas H. Brown, Chicago, Ill.
102,763.—HOISTING APPARATUS.—William H. Brown, New York city.
102,764.—HULLING MACHINE.—G. A. Buchholz, Regent's Park, London, England.
102,765.—CULINARY BOILER.—Isaac S. Bunnell, Carbondale, Pa.
102,766.—PENCIL SHARPENER.—Hubert Burgess, Oakland, Cal.
102,767.—HEATING STOVE.—Micajah Currier Burleigh, Somersworth, N. H.
102,768.—ROTARY PUMP.—Richard Bush, Brooklyn, N. Y.
102,769.—SOFA BEDSTEAD.—James C. Butler, Albany, N. Y.
102,770.—WRENCH.—Benjamin F. Buxton, West Randolph, Vt.
102,771.—FALL LEAF TABLE.—Walter Caldwell, Bryan, Ohio.
102,772.—SPOOL OR BOBBIN.—Alexander Carmichel (assignor to himself, J. P. Stillman, Ames Stillman, Albert Stillman, and Thomas V. Stillman), Westerly, R. I.
102,773.—FAUCET.—Isaac Carey, Morristown, N. J.
102,774.—DISTILLING TURPENTINE.—David Cashwell, Wilmington, N. C.
102,775.—BAR FOR HORSESHOE BLANK.—Ebenezer Cate, Watertown, Mass.
102,776.—HARVESTER.—Charles Clapp (assignor to Erastus C. Gregg and Chauncey P. Gregg), Trumansburg, N. Y. Antedated Nov. 10, 1869.
102,777.—HEATING STOVE.—F. G. Cochran, St. Louis, Mo.
102,778.—POKE.—Alvan E. Cruttenden, Canaseraga, N. Y.
102,779.—FRICTION-ROLLER BEARING.—C. M. Daboll, New London, Conn.
102,780.—BOLT FOR SAFES, ETC.—G. L. Damon, Portland, Me.
102,781.—CHILL FOR CASTING TOOTHED GEAR.—R. T. Davis, Canton, Ohio.
102,782.—REVOLVING FIRE-ARM.—C. F. De Dartein and J. E. De Dartein, Strasbourg, France.
102,783.—GATE.—Benjamin F. Dickey, Marshall township, Mich.
102,784.—GAS GENERATOR.—Ellis Doty, Janesville, Wis., assignor for one half his right to Thor Judd.
102,785.—FIRE TONGS.—Samuel Douglass, Kalamazoo, Mich.
102,786.—METHOD OF MAKING TURNED SEWED SHOES.—William Duchemin, Boston, Mass, assignor to G. B. Bigelow, trustee.
102,787.—TENSION DEVICE FOR THREAD IN SEWING MACHINE.—G. L. Du Laney, Mechanicsburg, Pa.
102,788.—MEDICAL COMPOUND.—C. J. Eames, New York city.
102,789.—PLOW.—A. F. Eppes, Stony Creek, Va.
102,790.—RAZOR STROP.—William D. Evans, Philadelphia, Pa.
102,791.—WEIGHING-SCALE.—Thaddeus Fairbanks, St. Johnsbury, Vt.
102,792.—WASHING MACHINE.—John Farmer, Rockport, Ohio.
102,793.—BOLT FOR SAFES.—John Farrel, New York city.
102,794.—BRICK MACHINE.—Charles W. Ferguson, Jackson, Tenn.
102,795.—NEEDLE-SETTERS FOR SEWING MACHINES.—J. W. Field, Marysville, Ohio.
102,796.—MANUFACTURE OF STEEL.—William Fields, Wilmington, Del.
102,797.—MANUFACTURE OF IRON.—Wm. Fields, Wilmington, Del.
102,798.—MANUFACTURE OF ARTIFICIAL FLOWERS.—O. E. Fillion, Paris, France.
102,799.—DUCK-CALL.—Elam Fisher, Detroit, Mich.
102,800.—TAG FASTENER.—Henry Fisher (assignor to himself and W. H. Williams, Canton, Ohio.
102,801.—GANG PLOW.—P. H. Flansburgh, Haywards, Cal.
102,802.—BENCH PIN.—Henry Gabelmann, Fort Scott, Kansas.
102,803.—COMB CLEANER.—Charles Edward Gibbs, Boston, Mass.
102,804.—STANCHION FOR CATTLE.—W. C. Gifford, Jamestown, N. Y.
102,805.—DEVICE FOR HANGING PICTURE FRAMES, ETC.—J. N. Gillispie, Waltham, Mass.
102,806.—REFINING AND AGEING LIQUORS.—S. H. Gilman, Galveston, Texas.
102,807.—MATCH BOX.—John H. Goodfellow and Martin Russell, Jr., Troy, N. Y.
102,808.—FEEDING MECHANISM FOR SEWING MACHINES.—James E. Gowen, Stoneham, assignor to himself and C. H. Wetherell, Boston, Mass.
102,809.—BUREAU.—G. S. Graf, Pittsburgh, Pa.
102,810.—PADLOCK.—H. F. Haack, New York city.
102,811.—POTATO DIGGER.—John Hall, Jr., and Owen Flanigan, Temperanceville, Pa. Antedated December 20, 1869.
102,812.—POTATO DIGGER.—John Hall, Jr., Temperanceville, Pa.
102,813.—AGITATOR WHEEL FOR POTATO DIGGER.—John Hall, Jr., Temperanceville, Pa.
101,814.—POTATO DIGGER.—John Hall, Jr., Temperanceville Pa.
102,815.—GRAIN BINDER.—W. D. Harrah, Ira M. Gifford, and E. T. Johnston, Davenport, Iowa.
102,816.—ROLLING MACHINE.—J. B. Hastings, Ironton, Ohio, and G. Hastings, Jr., Wheeling, W. Va.
102,817.—ADJUSTABLE SHUTTER HOLDER.—C. N. Herr, Lampeter Pa.
102,818.—HAND CORN PLANTER.—Henry Hickman, Omaha Nebraska.
102,819.—APPARATUS FOR DISTILLING HYDROCARBON OILS.—S. A. Hill and C. F. Thumm, Oil City, assignors to themselves and O. P. Scaife, Pittsburgh, Pa.
102,820.—COMBINED LATCH AND LOCK.—Friedrich Hoppe, Stuttgart, Germany, assignor to Theodor Hahn. Antedated April 28, 1870.
102,821.—CUE-CUTTING MACHINE.—Joseph Huber (assignor to himself and Solomon Brunswick, St. Louis, Mo.
102,822.—CHURCH ORGAN.—Wm. Jackson (assignor to himsel and H. C. Wilkins), Albany, N. Y.
102,823.—LIFE PRESERVER.—Lyman Jacobs, Albion, Mich.
102,824.—ACID AND WATER-PROOF COMPOSITION FOR COATING CLOTH, ETC.—H. W. Johns, New York city.
102,825.—SUBSOIL ATTACHMENT FOR PLOWS.—Ross Johnson, Lawrence, Kansas.
102,826.—DRAWER FOR FURNITURE.—G. F. Joyce, Boston, Mass.
102,827.—SASH SUPPORTER.—G. F. Joyce, Boston, Mass.
102,828.—MATCH SAFE.—A. D. Judd, New Haven, Conn.
102,829.—BORING BIT.—Daniel Kelley, Muskegon, Mich.
102,830.—MOSQUITO BAR.—Simon Kemper, Berger, Mo.
102,831.—CLOTHES DRYER.—Hiland H. Kendrick, Fulton N. Y.
102,832.—APPARATUS FOR OBTAINING TANNING EXTRACTS.—Simon H. Kennedy (assignor to himself and F. G. Macomber), New York city.
102,833.—MANUFACTURE OF MEDICATED MALT LIQUORS.—H. H. Kessler, Detroit, Mich.
102,834.—FENCE.—Edward Kirk, Sharon, Pa.
102,835.—HARVESTER.—Jacob Kline, Mechanicsburg, assignor to himself and George Winters, Harrisburg, Pa.
102,836.—HEALING PLASTER.—William Kramer, New York city.
102,837.—VEGETABLE CUTTER.—H. P. Lauer and H. C. Reichard, Pottsville, Pa.
102,838.—BRIDLE BIT.—William P. Letchworth, Buffalo, N. Y.
102,839.—PLATFORM FOR HARVESTERS.—Christopher Lidren (assignor to himself and R. Jackson), La Fayette, Ind.
102,840.—RAILWAY CAR BRAKE.—Almerin H. Lighthall, Albany, N. Y.
102,841.—CULTIVATOR.—Truman Mabbett, Sr., Vineland, N.J.
102,842.—PLANING MACHINE.—George H. Mansfield, Concord, N. H.
102,843.—TRACE BUCKLE.—T. C. Martin and J. Offineer (assignors to T. C. Martin, John Taylor, and Daniel Geiselman), Perrysville Ohio.
102,844.—TWEER OF BLAST FURNACE.—T. W. McCune, Pittsburgh, Pa.
102,845.—LADDER.—W. H. McHench, Cobleskill, N. Y.
102,846.—PAVEMENT.—Abram B. McKeon, Rutherford Park, N. J.
102,847.—HEAD BLOCK FOR SAW MILLS.—Cornelius Meiners Indianapolis, Ind.
102,848.—SELF-PACKING BUSH FOR SPINDLES.—Carl Miller Sandoval, Ill.
102,849.—APPARATUS FOR CORRUGATING METAL.—Jas. Montgomery, New York city.
102,850.—TOOL FOR MAKING SLIDES FOR EXTENSION TABLES.—S. J. Moore and G. A. Buckman, Ogdensburg, N. Y.
102,851.—MECHANISM FOR STRIPPING THE TOP FLATS OF CARDING MACHINES.—Ferdinand Morf, Wetzikon, Switzerland.
102,852.—TRUSS.—Peter Mueller, Middle Lancaster, Pa.
102,853.—WHEEL FOR VEHICLE.—Ira F. Munson, Washington, D. C.
102,854.—APPARATUS FOR CLEANING AND PREPARING RAGS FOR MANUFACTURE OF PAPER.—W. E. Newton, London, England.
102,855.—FUNNEL.—P. H. Niles, Boston, Mass.
102,856.—ELECTRO MAGNET.—H. M. Paine, Newark, N. J., assignor to himself and M. S. Frost, New York city.
102,857.—SELF DISCHARGING PULVERIZING BARREL.—A. B. Paul, San Francisco, Cal.
102,858.—LANTERN.—Samuel Peters, Crescent, N. Y.
102,859.—FARM GATE.—Howard Piper, Haskins, Ohio.
102,860.—PLOW.—S. W. Pope, Louisville, Ky.
102,861.—SPOKE FOR WAGON WHEELS.—Robert Potts and Nathaniel Ogden, Chatham, N. Y.
102,862.—BRICK MOLD AND BOTTOM BOARD.—A. T. Putnam, Detroit, Mich.
102,863.—WHIP.—A. C. Rand, Westfield, Mass.
102,864.—ALARM TILL.—Eden Reed (assignor to himself and L. L. Warren), St. Louis, Mo.
102,865.—SCRUBBING BRUSH AND MOP WRINGER.—Edwin Rees (assignor to himself and Lewis Stull), Stoddartsville, Pa.
102,866.—HEATING DRUM.—Jesse Reynolds, Philadelphia, Pa.
102,867.—CONNECTION OF SPRINGS FOR BED BOTTOMS, SEATS, ETC.—Chas. Rich, Poughkeepsie, N. Y.
102,868.—BLEACHING STRAW GOODS.—A. M. Rosbrugh, Panora, Iowa.
102,869.—PRESERVING AND HARDENING STONE, BRICK, ETC.—E. J. Salisbury (assignor to himself and George A. Brush), San Francisco, Cal.
102,870.—APPARATUS FOR SAVING GOLD.—Chas. Schofield Kernville, Cal.
102,871.—RIVETING HAMMER.—H. A. Seymour and W. H. Nettleton, Bristol, Conn.
102,872.—WINDOW SCREEN.—George Shatswell, Waukegan, Ill.
102,873.—FASTENING FOR RAILROAD RAILS.—George Shatswell (assignor to himself and E. M. Haines), Waukegan, Ill.
102,874.—STALL FOR FEEDING ANIMALS.—S. H. Shaw, Attica, N. Y.
102,875.—FLAX PULLER.—Jas. Smith, Troy, N. Y.
102,876.—AXLE NUT.—E. A. Stanley (assignor to himself and O. A. Palmer), Brewer, Me.
102,877.—COVER FOR CHAMBER VESSEL.—Wm. Stockton, New York city.
102,878.—BATHING APPARATUS.—William Tell Street, Frankfort, Pa.
102,879.—BAILING PRESS.—B. F. Stroud, Marshall, Texas.
102,880.—STOVE GRATE.—Levi Stuck, Bryan, Ohio.
102,881.—FILTER.—Taylor P. Thompson (assignor to himself and L. R. Bradbury), Charlestown, Mass.
102,882.—LEVELING AND GRADING INSTRUMENT.—H. E. Towle, New York city.
102,883.—LIQUOR METER.—S. C. Treat, Tabor, Iowa, assignor to himself and C. P. Treat, Oberlin, Ohio.
102,884.—WOODEN-BLOCK PAVEMENT.—Alexandre Trenaunay, Neuilly-sur-Seine, near Paris, France.
102,885.—IMPLEMENT FOR MEASURING BOARDS.—Melzer Tuells, Penn Yann, N. Y.
102,886.—APPARATUS FOR ASSORTING POTATOES, ETC.—J. F Unglish, Webster, N. Y.
102,887.—METALLIC CHURN DASHER.—Orrin Updike, Grass Lake, Mich.
102,888.—PEGGING JACK.—Charles Varney, East Brookfield Mass.
102,889.—HAMES BUCKLE.—David Vogt, Trenton, Mich.
102,890.—HARVESTER DROPPER.—Aaron Ward (assignor to himself and Jesse Hiatt), Dublin, Ind.
102,891.—HOE.—Edward Warren, Ceresco, Mich.
102,892.—LAMP CHIMNEY.—S. W. Warren, Boston, Mass., assignor to himself and G. B. Parrott.
102,893.—MACHINE FOR VARNISHING PENCILS, ETC.—Albin Warth, Stapleton, and Philipp Hufeland, and Geo. Braun, New York city assignors to Eberhard Faber, New York city.
102,894.—MOLD FOR MAKING RUBBER PENCIL TIPS.—Wm Weicker, Blackstone, Mass.
102,895.—LANTERN.—Wm. Westlake, Chicago, Ill.
102,896.—LANTERN.—Wm. Westlake, Chicago, Ill.
102,897.—LAMP BURNER.—H. J. White, Boston, Mass.

102,898.—MACHINE BAND.—Samuel J. Whitton, Coleraine, Mass.
102,899.—SPRING CLAMP FOR GLASS BLOWERS.—T. Wightman, Pittsburgh, Pa.
102,900.—BLIND, SCREEN, AND SHUTTER.—B. J. Williams, Philadelphia, Pa.
102,901.—CRUTCH.—P. R. Wimer, Trenton, N. J.
102,902.—WIRE AND STONE FENCE COMBINED.—H. C. Wire, Wilmington, Ohio.
102,903.—BRICK MACHINE.—Robert Wolff, New York city, assignor to himself and Bernard Silverman, Brooklyn, N. Y.
102,904.—STANCHION FOR SECURING CATTLE.—E. S. Alvord, Harmony, N. Y.
102,905.—BUGGY GEARING.—John B. Augur, Poughkeepsie, N. Y. Antedated Jan. 13, 1870.
102,906.—MANUFACTURE OF SOAP.—H. M. Baker, Washington, D. C.
102,907.—MACHINE FOR CUTTING, STAMPING, AND PACKING SOAP.—Lurandus Beach and Lurandus L. Beach, Jr., Lawrence, Mass.
102,908.—RAILWAY CAR WHEEL.—C. K. Bradford, Lynnfield, Mass. Antedated April 29, 1870.
102,909.—WATER WHEEL.—Truman Bristol Cheshire, assignor to himself and Charles Monson, New Haven, Conn.
102,910.—FERTILIZER DISTRIBUTER, CORN AND COTTON-SEED PLANTER.—R. M. Brooks, Woodbury, Ga.
102,911.—COMPOSITION FOR VARNISH, ETC.—Henry Browning, No. 77 Salmon Lane, Limehouse, England. Patented in England, June 1, 1869.
102,912.—MANUFACTURE OF IRON AND STEEL.—J. P. Budd, Ystalyfera, near Swansea, Wales. Patented in England, March 8, 1869.
102,913.—FRUIT JAR.—John L. Mason, New York city.
102,914.—DROPPING PLATFORM FOR HARVESTERS.—E. P. Eady, Trenton, Wis.
102,915.—INDELIBLE WRITING FLUID OR INK.—J. M. Caldwell and G. W. Caldwell, Burlington, N. J.
102,916.—MACHINE FOR STRAIGHTENING BARS OF METAL.—Ethan R. Cheney (assignor to himself and Naylor & Company), Boston, Mass.
102,917.—BEEHIVE.—Wm. Courtney, Richview, Ill.
102,918.—PAPER FILE.—E. J. Crane, La Porte, Ind.
102,919.—VISE.—Edwin Crawley and T. L. Baylies, Richmond, Ind.
102,920.—MACHINE FOR THE MANUFACTURE OF WOODEN TRAYS.—C. H. Dana, West Lebanon, N. H.
102,921.—SAWING MACHINE.—Marcus E. Dean, Foxborough, Mass.
102,922.—COMPOSITION FOR COATING WOOD, METAL, ETC.—P. S. Devlan, Jersey City, N. J. Antedated May 4, 1870.
102,923.—PACKING CASE FOR SAWS.—Henry Disston, Philadelphia, Pa.
102,924.—MACHINE FOR PUNCHING METAL.—Ellis Doty, Janesville, Wis.
102,925.—COOKING RANGE.—B. Wells Dunklee, Boston, Mass.
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REISSUES.

3,963.—RAILWAY AXLE BOX.—J. B. Fletcher, St. Albans, Vt., assignee of C. B. Boynton).—Patent No. 70,793 dated November 12, 1867.
3,964.—MANUFACTURE OF INKSTAND.—T. S. Hudson, East Cambridge, Mass.—Patent No. 94,113, dated August 24, 1869.
3,965.—BASE BURNING STOVE.—Geo. G. Hunt, Quincy, Ill.—Patent No. 38,828, dated June 9, 1863.
3,966.—DEVICE FOR FLANGING FLUE-HOLE OF BOILER HEADS.—Edward Regan, Indianapolis, Ind.—Patent No. 99,707, dated February 8, 1870.
3,967.—GRATE FOR FURNACES.—E. S. Renwick, Millburn, N. J.—Patent No. 81,109, dated August 18, 1868.
3,968.—STOVE FOR BURNING STUMPS.—Henderson Willard, Grand Rapids, Mich.—Patent No. 98,801, dated February 15, 1870; antedated January 29, 1870.

DESIGNS.

4,011.—TRADE MARK.—Robert W. Bell, Buffalo, N. Y.
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4,021.—LAMP FOUNT.—Henry Whitney, East Cambridge, Mass.
4,022.—CANDLESTICK.—Henry Whitney, East Cambridge, Mass.

EXTENSIONS.

PRINTING TELEGRAPH.—H. N. Baker, Binghamton, N. Y.—Letters Patent No. 14,759, dated April 29, 1856; reissue No. 3,812, dated January 25, 1870.
CONSTRUCTION OF ARTIFICIAL LEGS.—William Selpho, New York city.—Letters Patent No. 14,836, dated May 6, 1856.

NEW BOOKS AND PUBLICATIONS.

HAND-BOOK OF THE STEAM ENGINE.—Containg all the Rules Required for the Right Construction of Engines of every Class. With the Easy Arithmetical Solution of those Rules, constituting a Key to the Catechism of the Steam Engine. Illustrated by Sixty-seven Wood-cuts and Numerous Tables and Examples. By John Bourne, C.E., author of "A Treatise on the Steam Engine," "A Treatise on the Screw Propeller," "A Catechism of the Steam Engine." New Edition. Philadelphia: J. B. Lippincott & Co. London: Longman & Co.

This edition of a well-known popular and standard work contains little that is new, yet it is none the less valuable on that account. The reasons why there could not be many additions are so well set forth in the author's instructive preface that we copy a portion as the best notice we can give of the book. Mr. Bourne says: "In this third edition of the present work, I have merely corrected some typographical and arithmetical errors, which had escaped detection in the earlier issues, and the existence of some of which has been brought to my knowledge by correspondents. Since the appearance of the first edition, there have been no improvements in the steam engine of any importance; and in the Paris Exhibition of 1867, the machinery department of which I carefully inspected, I found that although much strained and fantastic ingenuity was displayed in many of the engines exhibited, there was in point of fact nothing to be seen that could be accounted a solid and permanent improvement. For many years past, indeed, I have ceased to expect the realization of substantial improvement in the steam engine; and what I now looked forward to is its early supersession by less cumbrous and costly motors. With this conviction I have undertaken a new quarto work on 'Steam, Air, and Gas Engines,' which treats of all kinds of motive power engines, and which, reviewing all the reasonable expedients which have been proposed for obtaining motive power, discusses their comparative merits, specifies what expedients have been again and again published or long ago patented, so that they are now public property open to the adoption of any one, and points out in what direction improvement must advance to attain results superior to any that have yet been realized. To carry improvement forward, two things are necessary; 1st. That there shall be a clear conception of what it is desirable to effect; and 2d. That there shall be an accurate knowledge of what expedients are available for carrying such improvement out without being hindered at every step by the wide and ambiguous claims of pretended patentees, who in most cases have in reality invented nothing that was not notorious and obsolete long before they appeared upon the field."

COSMOLOGY. By George M'Ilvaine Ramsay, M.D. Published by William White & Co., Boston.

We do not like to be unjust, nor to censure without cause. We cannot, however, commend this work. The author has altogether too much poetry in his composition for a philosopher. That he has taken a rather large contract upon his hands the reader can judge from the following extract from on page 15: "Oh, man, buckle on thy whole mental armor, and strive to get thee back upon the *chimes* of time, to a period anterior to the sun's existence, to the sun's formation; to a period when there was no light, and there in deep, deep darkness and solitude, let thy non-created mind contemplate the yet uncreated, visible universe. Perchance thou mayst feel the first tiny glow of heat; or see the first flicker of light by the powers of which two primordial atoms of matter were ousted from their eternity of rest and were made to unite in one, *and thus creation was begun*." These last italics are our own. It will be seen that when the author "gets his whole mental armor buckled on," he hopes to know, and presumably that his readers having read his book, will know all about it—*it* meaning creation, not the book. This journey "back upon the chimes of time to behold the first two primordial atoms of matter OUSTED" would, doubtless, be a very pleasant trip, and perhaps profitable, but the author will excuse us for a little timidity as to the undertaking. If he could only manage to get his readers fairly mounted "upon the chimes of time" before they were fully aware of what he was going to do with them, the excursion might not be in reality so formidable as this very poetic programme makes it appear. In short, to be serious, the author's style is too grandiloquent for the gravity and character of the subject with which he deals. The book may have merit, but we fear that others will share the prejudices which such passages as the one quoted inevitably awaken.

NATHAN READ: His Invention of the Multi-Tubular Boiler, and Portable High-Pressure Engine, and Discovery of the True Mode of Applying Steam Power to Navigation and Railways. A Contribution to the Early History of the Steamboat and Locomotive Engine. By his Friend and Nephew, David Read. New York: Hurd & Houghton. Cambridge: Riverside Press.

There is little doubt that many entitled to a large share of the credit due to those who have been instrumental in the development of the application of steam to the propulsion of machinery, culminating in the steam railway, and the majestic ocean steamer of modern times, have not received their dues in this respect, and that others have been overpaid by a grateful posterity. The simple love of justice will therefore impel the candid reader to examine the present work with attention. The author has, in our opinion, made a rather strong case in favor of his uncle's claims to a share of grateful remembrance, and has, moreover, given many interesting and important particulars relating to the inventions of others. The book is a small octavo, printed and bound in a very neat and tasty style. It will be found decidedly interesting, both in the matters of fact it contains and the style in which they are presented. We publish, in another column, a biographical sketch of Mr. Nathan Read, extracted from the work.

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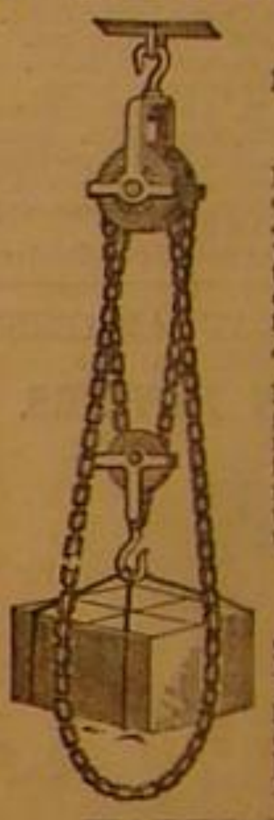

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