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Self-regulating Wind-wheel.

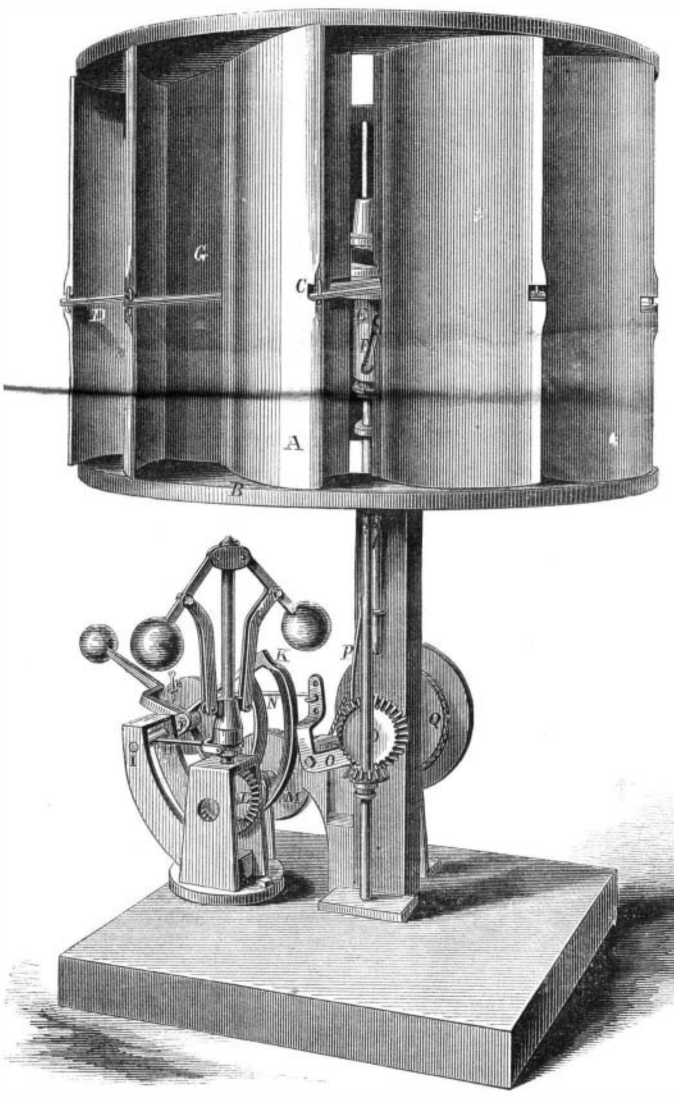
A convenient and well-constructed wind-wheel is a most economical and efficient motive power in some localities. Many small manufacturers, carpenters and other mechanics can use them to great advantage. In Western towns, where fuel is scarce and wind is cheap and very abundant, if we may use such an expression, a good wind-wheel would be a valuable motive power. We think the plan of this machine a good one, and believe that it will work with economy and require little repair if properly made and taken care of. It is simple in its principle, as will be seen by referring to the engraving and description. The vanes or wings of the wheel are self-regulating, and are opened or closed by the action of the governor. The construction of this wheel and governor is as follows:—The vanes, A, are swung on centers in the flanges, B, and have joints, C, at the middle, to which rods D, are connected. These rods proceed to a central disk on the main shaft inside. The disk itself is attached to a sleeve. E, having a slot, F, in it. This sleeve slides over a tube (also on the shaft), and there is a pin which allows on the sides of the diagonal slot, F, and causes the disk to rotate enough to open and close the vanes. The slotted-sleeve turns, but the tube on the shaft has a vertical key which allows it to move up and down without revolving.

The vanes of the wheel are so arranged that when opened to their greatest extent, as shown in the engraving, they form a V-shaped pocket with another set of wings or vanes, G, inside, so that the force of the wind is utilized to its utmost. When the vanes recede, however, or close, there is an aperture between the inside edges of the two sets of vanes through which the current escapes to the center of the wheel; in this way the velocity o. the revolutions can be fully regulated.

The governor of this wind-wheel is also peculiar, and is the subject of a separate patent. It consists of the usual balls and lever, but the lever, H, is attached to a rock-shaft, I, on which there is an arm, J. At the extremity of this arm a curved link, K, is fixed in the slot of which a friction pinion works. This pinion is on the same shaft that the bevel gear, L, is, and at the further end of the same shaft there is a pulley, M, keyed. It is easy to see that when the rocks-haft, I, is moved, the arm, J, will give the link a horizontal motion, or sufficiently like it to throw the inner face of the curved link against the friction pinion; this action causes the link to move on its own center at the end of the arm. On the side of this arm, J, may be seen a face-plate; as the link moves, this plate turns with it and draws the rod, N, attached to the elbow, O, in one direction or another, according as either side of the link happens to be in gear with the friction pinion. When this occurs the vanes above are shifted, for the vertical shaft, P, is connected to the tube on the main shaft so as to cause this effect. The governor is driven by a belt from the pulley, Q, which in turn is worked by the bevel gears in front.

This wheel and governor is an ingenious arrangement, and is well adapted for the work required of such machinery.

The wheel was patented on the 5th of April, 1864, and the governor on the 23d of February, 1864—both through the Scientific American Patent Agency. For further information address the inventor, Mr. John P. Burnham, at Chicago, Ill.



BURNHAM'S SELF-REGULATING WIND-WHEEL.

Mock Salmon.

We have heard of mock-turtle soup and "chicken soup" made out of veal stock, but it seems there is still another novelty in store for us. Sturgeon, formerly a much despised fish, are now taken in great numbers in the Delaware river and sold to provision-dealers in this city. The meat is put up in cans spiced and made palatable otherwise; a contemporary says the flavor is scarcely inferior to salmon, and that large quantities go abroad as ship-stores. When we have coffee with fancy names revamped from the spent-grounds of hospital stores, tea grown in New Jersey—milk pure from the cow and the pump, sherry wine from potatoes, and spiced salmon from sturgeon, who shall say that the waste products of nature and art are not utilized?

An "Army and Navy Button Co." has been organized at Waterbury, Conn., with a capital of $75,000.

Great Paraffine Oil Patent Case.

The first patent in England for the production of paraffine oil was, if we mistake not, issued to James Young, of Manchester, in 1850. Two years later (March 23, 1852,) Mr. Young patented his invention in this country, and since that date he has established a large manufactory of paraffine in Bathgate, Scotland—a full account of which was published on page 309, Vol. IX. (new series), Scientific American. The patent has been on trial in England before Vice Chancellor Sir John Stuart, and occupied the attention of the court for thirty-five days. A bill was filed by Messrs. Young, Meldrum, and Binney, manufacturing chemists, of Bathgate, for an injunction to restrain the defendants, Messrs. Fernie, Carter and Robinson, manufacturers of oil at Leeswood and Saltney, from an alleged infringement of a patent granted to the plaintiff Young in October, 1850, "for improvements in the treatment of certain bituminous substances, and in obtaining products therefrom;" those products being paraffine and paraffine oil. The substances which the patentee in his specification said he treated were bituminous coals; and the coals which he deemed best fitted for obtaining paraffine oil, from which he procured paraffine, were usually called "parrot coal," "cannel coal," and "gas coal." The main objections to the validity of the patent were, that there was no novelty either in the process or the material used, and that the patent altogether was something already well known. The defendants, however, failed to establish these objections, and the Vice-Chancellor gave an unconditional judgment in favor of the plaintiffs on all the issues, condemning the defendants to pay all costs as they are taxed.

Shingles rendered Fire-proof.

Mr. John Mears says, in the Boston *Cultivator*, that he has prepared shingles in the following manner, and after an experience of eleven years, and using seven forges in his blacksmith's shop, he has never seen a shingle on fire, nor has a nail started. The shingles are prepared in the following manner:—"Having a large trough, I put into it a bushel of quicklime, half a bushel of refuse salt and five or six pounds of potash, adding water to slack the lime and dissolve the vegetable alkali and the salt—well knowing that pieces of an old lime pit, a soap barrel, or a pork tub, were not the best kindling stuff, and having long since learned, while at the Vineyard Sound, that hot salt-water whitewash would endure far longer than that made with fresh water, absorbing moisture, striking into the wood and not peeling and washing off. I set the bundles of the shingles nearly to the bands, in the wash for two hours; then turned them end for end. When laid on the roof and walls, they were brushed over twice with the liquid, and were brushed over at intervals of two or three years after."

Live fish, pickerel or trout, will keep a cistern free from worms, dirt or smell.

Benjamin Franklin's Useful Labors.

Parton, in his "Life and Times of Dr. Franklin," recently published by Mason Bros., gives the following interesting summary of the valuable labors of that eminent statesman and philosopher:—

"He established and inspired the 'Junto,' the most sensible, useful, and pleasant club of which we have any knowledge.

"He founded the Philadelphia Library, parent of a thousand libraries, an immense and endless good to the whole of the civilized portion of the United States.

"He edited the best newspaper in the colonies—one which published no libels and fomented no quarrels, which quickened the intelligence of Pennsylvania, and gave the onward impulse to the press of America.

"He was the first who turned to great account the engine of advertising—an indispensable element in modern business.

"He published 'Poor Richard,' by means of which so much of the wit and wisdom of all ages as its readers could appropriate and enjoy, was brought home to their minds, in such words as they could understand and remember forever.

"He created the Post-office system of America; and forbore to avail himself, as postmaster, of privileges from which he had formerly suffered.

"It was he who caused Philadelphia to be paved, lighted, and cleaned.

"As fuel became scarce in the vicinity of the colonial towns, he invented the 'Franklin Stove,' which economized it, and suggested the subsequent warming inventions, in which America beats the world. Besides making a free gift of this invention to the public, he generously wrote an extensive pamphlet explaining its construction and utility.

"He delivered civilized mankind from the nuisance, once universal, of smoky chimneys.

"He was the first effective preacher of the blessed gospel of ventilation. He spoke, and the windows of hospitals were lowered; consumption ceased to gasp, and fever to inhale poison.

"He devoted the leisure of seven years, and all the energy of his genius, to the science of electricity, which gave a stronger impulse to scientific inquiry than any other of that century. He taught Goethe to experiment in electricity, and set all students to making electrical machines. He robbed thunder of its terrors and lightning of its power to destroy.

"He was chiefly instrumental in founding the first high school of Pennsylvania, and died protesting against the abuse of the funds of that institution in teaching American youth the language of Greece and Rome, while French, Spanish, and German were spoken in the streets and were required in the commerce of the wharves.

"He founded the American Philosophical Society, the first organization in America of the friends of science.

"He suggested the use of mineral manures, introduced the basket willow, and promoted the early culture of silk.

"He lent the indispensable assistance of his name and tact to the founding of the Philadelphia Hospital.

"Entering into politics, he broke the spell of Quakerism, and woke Pennsylvania from the dream of unarmed safety.

"He led Pennsylvania in its thirty years' struggle with the mean tyranny of the Penns, a rehearsal of the subsequent contest with the King of Great Britain.

"When the Indians were ravaging and scalping within eighty miles of Philadelphia, General Benjamin Franklin led the troops of the city against them.

"He was the author of the first scheme of uniting the colonies—a scheme so suitable that it was adopted in its essential features, in the union of the States, and binds us together to this day.

"He assisted England to keep Canada, when there was danger of its falling back into the hands of a reactionary race.

"More than any other man, he was instrumental in causing the repeal of the Stamp Act, which deferred the inevitable struggle until the colonies were strong enough to triumph.

"He discovered the temperature of the Gulf Stream.

"He discovered that north-east storms begin in the south-west.

"He invented the invaluable contrivance by which a fire consumes its own smoke.

"He made important discoveries respecting the causes of the most universal of all diseases—colds.

"He pointed out the advantage of building ships in water-tight compartments, taking the hint from the Chinese.

"He expounded the theory of navigation which is now universally adopted by intelligent seamen, and of which a charlatan and a traitor has received the credit.

"In Paris, as the antidote to the restless distrust of Arthur Lee, and the restless vanity of John Adams, he saved the alliance over and over again, and brought the negotiations for peace to a successful close. His mere presence in Europe was a moving plea for the rights of man.

"In the Convention of 1787, his indomitable good humor was, probably, the uniting element, wanting which the Convention would have dissolved without having done its work.

"His labors were for the abolition of slavery and the aid of its emancipated victims.

"Having, during a very long life, instructed, stimulated, cheered, amused and elevated his countrymen, and all mankind, he was faithful to them to the end, and added to his other services the edifying spectacle of a calm, cheerful, and triumphant death, leaving behind him a mass of writings, full of his own kindness, humor, and wisdom, to perpetuate his influence and sweeten the life of coming generations."

Waifs of Animal Life in California.

As the capricious and extraordinary season of 1864 advances, the zoological life of the valleys and mountains, pestilent to the cultivator but diverting to him who wanders by flood and field, increases and multiplies. The ground squirrels, the kangaroo or jumping rat, and gopher mole, furnished with pouches and baskets to store spare morsels—all three of which burrowing animals are represented in our State by distinct species of each family—abound and multiply this year as they never seemed to abound heretofore, and almost defy efforts of extermination. They all breed below the earth in colonies, and not only devour the crops of vegetables and grass on the surface, but attack with greediness the roots of all fruit trees under ground and commit an immense amount of injury. The squirrel is said to bring forth six at a birth, four or five times a-year, and the other two congeners four every three months, which is about as bad as rats and rabbits.

The kangaroo rat, however, is confined to a few localities on the coast and in the mountain valleys, but is specially abundant in many parts of the Tulare country. There are not less than twenty kinds of these small *rodentia* not bigger than a squirrel, which are met with inside the confines of California, several of which live above ground, and seldom trouble the farmer: but all the underground ones are his unrelenting and pertinacious enemies. One of the sylvan rats, twice the size of a mouse, constructs a nest of sticks in the unmolested oak groves, as big as an Indian hut and as high as a two-cord pile of wood.

The fore-mentioned *rodentia* increase in a tremendous ratio in the settled parts of the State where the cultivators and herdsmen have thinned off their natural destroyers—the bears, lions, coyotes, cats, skunks, ferrets, hawks, owls, and snakes. Every green crop is attacked by the squirrel, and they are terrible on all eggs and young chickens this year, and very wasteful where grain and hay are stored.

A tired citizen wandering in the country a few days ago, tells us that he came across a mustard field in blossom, where he sat down for hours admiring the hundreds—the swarms of humming-birds, hunting up musquitoes and *aphids*, flashing in and out and filling their crops to depletion among the fragrant flowers of the beef-eater's condiment, which by the way, makes the best of honey pasture for the busy bee in California.

Bears and lions have made great havoc among the cattle and horses, as their food of oats and wild fruits is everywhere scarce this season. As the former are thick in the mountain pastures where the stock animals have been recently taken, which have to be accustomed and acclimated to their new ranges, great numbers have been lost; and it is feared that the sheep in thousands will soon fall a prey to these enemies, if not to regular nostalagia, before they can be thinned off by December next.

Ants, flies, musquitoes and tarantulas, with all sorts of weasels and bugs, infest the air and the water in vicinities where they were very seldom known before, and are becoming excessively troublesome.

Geese and ducks have been multitudinously abundant and familiar this year. They have effected much damage in localities where the young grass is first seen and longest preserved, and have done great injury to young grain.

Crows, ravens, and rooks, are as thick as musquitoes near willow swamps, and a bigger set of thieving rascals never waylaid the good things of the farmer or orchardist, and the black villains now turn up their noses at worms and caterpillars.

Hundreds of hives of bees in lazy, neglectful or ignorant hands, have deserted to the forests or been starved out, as their flowery pastures dried up early in February; and even among experienced apiarists they will do very bad, and occasion unusual expense and labor.

The orioles, finches, linnets and canaries, of rainbow colors, and indigenous to the country, of which there are over twenty-five species, the most of which carol delightful notes, and well worthy the arts of the bird fancier, are extremely familiar and plentiful near houses, and in the neighborhood of springs and water pools. The social blackbird, or chenate of California, in clattering, surging, fife-noising flocks, is seen in sections of cultivated lands or the neighborhood of swamps, often in such clouds and swarms as to seem myriads. The house martin was curtailed of the usual rations of mud for his adobe nests, and is very scarce generally; but the blue-coated swallow has made up for its absence, and fills the air near sunset, cramming his crop with musquitoes and such vermin as most infest the heavy atmosphere of the declining day.

We forgot to mention the velvet, mouse-colored mole, without eyes and with very small teeth; he is "death" on "garden sarce," Hoot owls or *takalotees* make awful music and bar-room too-loo-koos in the groves near by, looking after toads, frogs and birds and the little ground owl, a fellow-citizen in the burrows with squirrels and snakes. The ground owl is very spiteful this hot year. He is seen skimming and scouring near to earth, over the plains and hills, hunting up his little bugs, beetles, mice and small frogs. He is a quick, choleric, nervous, excitable little fellow this California ground owl, the dimensions of a pigeon and gray as a badger. And badgers and possums are unwontedly familiar in places where they had not been seen before in years, and with skunks unusually plentiful, smelling not sweet but loud, they make havoc on eggs and chickens, and, thank heaven, squirrels and gophers they scatter some. And we are reminded here that Don Coyotte, a mighty sly and greedy fellow, has made his teeth tell on many a fat young wether and calveling not out of the months, and which the herdsman had taken his best care of, as most likely to live and make up some of his losses. As to tame animals, it is now undoubtedly well known throughout the State for 1864 that no calving, foaling or lambing is worth a pound of salt. The mothers have no milk and the young must die.

It is a pity the natural history of California is not better known. It merely exists in long, dry, scientific lists and catalogues scattered in hundreds of volumes in every language and country of Europe and America, and no Goldsmith or Audubon has worked their gambols and tricks and sly ways, or habits and uses of vantage and disadvantage into model lessons yet. The arcana of the mountains, valleys, and uplands is even yet very imperfectly listed, particularly the insect life; but it is high time they were, for all this kind of thing has gone on since the year One, during the howlings of war and the pipings of peace, and science never stands still no more than human passions, by the beneficent law of Providence.—*San Francisco Bulletin.*

Messrs. Chubb & Son, iron-safe makers, of London, England, have recently constructed a safe for a bank in India, in size 14 feet long, 10 feet deep, 8 feet high, and weighing 17 tuns. The outer doors are fastened by four locks throwing 27 bolts.

The Way Imphee and Sorghum were Introduced.

In the Agricultural Report for 1862, J. H. Smith, of Quincy, Ill., gives the following account of the introduction of sorghum and imphee:—

"Of the cane plants hithertocultivated in the North there are two distinct kinds, though similar in their habits, characteristics, and wants, viz., the Chinese cane and the Imphee or African varieties. The former is from the north of China, the latter from the south-eastern coast of Africa. Only one kind of the Chinese cane is known to us. Its first introduction was made in France, and was briefly as follows: Count d'Montigny, in the year 1851, and while he was the French consul at Shanghai, in China, in compliance with an official request, sent to the Geographical Society of Paris a collection of plants and seeds which he found in China, and which he thought would succeed in his own country, and among these this celebrated plant which we have in America. It strikes us at once as a curious instance of the manner in which momentous results often depend upon the slightest thread, when we consider that of the package sent by the Count to Paris only one single seed germinated in a garden at Toulon, and that if, by any attack of insects, by injudicious planting, cultivation or manuring, or any one of a thousand possible mischances, the plant springing from this one seed had been destroyed, France and America might for years have been without knowledge of the Chinese sugar-cane. The capitalist might never have hesitated whether to invest his means in buildings and machinery for purifying its juice, and the farmer never counted the cost of its cultivation. Fortunately the plant grew and escaped all dangers, and in due time furnished the seeds sufficiently matured for subsequent propagation.

"The Chinese cane has a very lofty and well-proportioned stalk, with a graceful, bushy, bowing top. Its seeds are of a very dark purple color and almost black. Among the principal difficulties which it has to encounter during its growth are our heavy plant winds. These winds break and bend the plants to the earth, and when broken or bent they seldom make good sirup. The Chinese are more slender and more liable to be thrown down than the Imphee canes. We have never succeeded in making much sugar from the Chinese plant, but it makes a more pleasant sirup than the Imphee tribe and is far more free from acid. Whenever the cane is injured in any way it changes the color of the sirup and gives it an acid taste.

"The Imphee canes are from the south-eastern coast of Africa, as already stated. Mr. Wray, of England, tells us that there are sixteen different kinds of these African canes. The Imphee tribe, which have been introduced by this gentleman, are certainly far superior to all others for sugar-making. Their crystallization is much coarser than that of the Chinese, which is of a quite floury texture; and there is evidently a marked distinction found in our experiments between the Imphee cane and that which is called the Chinese sorghum in respect to their real value for producing sugar, the former giving about seven-tenths, while the latter gives only about two-tenths sugar. The juice of the Imphee is of far more limpid, and contains much less of that mucilaginous substance, known among farmers as white glue scum, than that of the sorghum; subsequently it crystallizes much more easily, and we believe that there is as much real sugar in the Imphee canes as there is in any of the sugar canes raised in the tropics. We have taken from one gallon of mush sirup, weighing thirteen pounds, eight pounds of sugar, as coarse-grained as any of Southern production, showing that it has sufficient body and capacity for being refined into the best kind of sugar that the market could afford. We are convinced that this work of refinement is merely a matter of time."

Failure of the Austrian Iron-clads.

According to the following extract of a letter from the Vienna correspondent of the London *Times*, the Austrian Government has failed in its experiments with iron-clad vessels of war:—"In military circles it is said that Admiral von Tegetthoff would probably have been victorious in his recent encounter with the Danes had not the Reichsrath refused to grant a part of the sum which was required by the Government for the fleet. The representatives of the nation declined to furnish the Naval Department with the means of constructing new armor-plated vessels until those already built had been properly tried, and recent occurrences have proved that they acted very wisely in so doing. The *Don Juan*, the best of the Austrian iron-clad vessels, shipped so much water in her trip to the North Sea that she was in some danger of going to the bottom. Had the whole sum demanded been granted by the Reichsrath the water would still have found its way into the powder-room of the *Kaiser* and *Don Juan*, and their crews have been troubled with sea-sickness! Twelve millions of florins were voted for the navy during the last session of the Austrian Parliament, but, unfortunately for the country, the deputies of the people had no means of seasoning the wood used in the construction of the three or four iron-plated frigates which are now lying in the port of Pola. The captain of an English man-of-war some time ago examined the vessels in question, and he told me that the money spent on them had been thrown away. The information received from the British officer was subsequently confirmed by a Trieste merchant of the very highest respectability, who said that to his certain knowledge one-half of the wood used in the construction of the three iron-clad vessels last made was 'green.'"

Ames's Wrought-iron Gun.

The Ames' Works, at Falls Village, are making a cannon which weighed twelve tuns in the rough. After incessant but hitherto unsuccessful applications, Mr. Ames has obtained an order from the Department for 15 cannon, which he is confident will prove far superior to any in use, and will carry *seven* miles, and will admit of a charge twice as heavy as the Dahlgren gun. His process is as follows:—A bar of round iron 18 feet long, 10 inches diameter at one end and 14 at the other, is made to serve as the handle of the gun. Upon the larger end of this are welded one by one large bars of iron of about 2 feet in length, until a round mass has been formed of 30 inches in diameter, perfectly solid. This is to serve as the breech of the gun, and the end is upset by a horizontal steam hammer until it is perfectly even and true. After this the gun is built up of sections of the full size (circumference) of the gun, of about five inches in length—the entire gun (14 feet long when completed) being composed of thirty transverse sections. These sections are made up as follows:—a cylindrical block of the best refined iron is turned out 7 inches long, 10 inches in diameter, and with a 4-inch hole through its length. This is fitted closely into an iron band or hoop made from bars of iron 6 by 7 inches; and this is again fitted into another band of 3 inches in thickness. These bands are closely welded, and as solid as the best mechanism can make them. When thus put together it will be seen that the whole forms a cylindrical section (or wheel) of 30 inches in diameter—the greater length being near the center.—*Boston Commercial Bulletin.*

Save your Old Files and Rasps.

A correspondent of the Maine *Farmer* says old files and rasps may be made nearly equal to new ones. First boil them in soap, ley, or a mixture of slacked lime and soda in water. This done, wash them in water and directly throw them into a vessel full of diluted sulphuric acid, formed of one part acid and six parts water: let them remain here for some time, the exact period being easily found by taking out a file, observing whether the nicks appear sharp or not; as soon the sharpening is effected, the files must be taken out and washed in another vessel containing a solution of soda, about an ounce of soda to a pail of water.

[The best way to repair an old file is to go and buy a new one. We always advocate economy in every case—*economical economy*—not that sort which saves at the spigot and leaks at the bunghole. Files recut in this way do not pay for the trouble; and for general use it is better to go and buy a new one than potter with acids, soap, lye, etc.—Eds.

Sir Macdonald Stephenson has projected a comprehensive system of railways in China. An application has already been made for permission to build a line of 75 miles, from Shanghai to Soochow. The East India railways, constructed by English capital and influence, are a success, and it is augured that the prospect in China is, in some respects, superior, inasmuch as the Chinese are much the most enterprising people.

Old and New Atlantic Telegraph Cables.

We are indebted to Cyrus W. Field, Esq., for the following descriptions respectively of the cable submerged between Ireland and Newfoundland, by the Atlantic Telegraph Company, in 1858, and of the cable now being manufactured for the same company by Messrs. Glass, Elliot & Co., at Morden Wharf, East Greenwich:—

OLD ATLANTIC CABLE, 1858.	NEW ATLANTIC CABLE, 1864.
Conductor—A copper strand, consisting of 7 wires (6 laid round one), and weighing 107 lbs. per nautical mile.	*Conductor*—A copper strand consisting of 7 wires (6 laid round one), and weighing 300 lbs. per nautical mile, embedded for solidity in Chatterton's compound. Gage of single wire ·048=ordinary 18 gage. Gage of strand ·144 =ordinary No. 10 gage.
Insulator—Gutta-percha laid on in three coverings and weighing 261 lbs. per knot.	*Insulation* — Gutta-percha, 4 layers of which are laid on alternately with four thin layers of Chatterton's compound. The weight of the entire insulation 400 lbs. per nautical mile. Diameter of core ·464, circumference of core 1·392.
External Protection—18 strands of charcoal-iron wire, each strand composed of 7 wires (6 laid round one), laid spirally around the core, which latter was previously padded with a serving of hemp saturated with a tar mixture. The separate wires were each $22\frac{1}{2}$ gage, the strand complete was No. 14 gage.	*External Protection*—10 solid wires of the gage ·095 (No. 13 gage), drawn from Webster and Horsfall's homogeneous iron, each wire surrounded separately with five strands of manilla yarn, saturated with a preservative compound, and the whole laid spirally around the core, which latter is padded with ordinary hemp, saturated with a preservative mixture.
Weight in air 20 cwt. per nautical mile.	Weight in air 35 cwt. 3 qrs. per nautical mile.
Weight in water 13·4 cwt. per nautical mile, or equal to 4·85 times its weight in water per knot; that is to say, it would bear its own weight in a little less than 5 miles depth of water.	Weight in water 14 cwt. per nautical mile, or equal to eleven times its weight in water per knot; that is to say, it will bear its own weight in eleven miles depth of water.
Breaking strain 3 tuns 5 cwt.	Breaking strain 7 tuns 15 cwt.
Deepest water to be encountered, 2,400 fathoms, or less than $2\frac{1}{2}$ nautical miles in depth.	Deepest water to be encountered 2,400 fathoms or less than $2\frac{1}{2}$ nautical miles in depth.
The contract strain was equal to 4·85 times its weight per nautical mile in water.	The contract strain is equal to 11 times its weight per nautical mile in water.
One knot, being in fathoms $=1{,}014\times4=\frac{4917{\cdot}0}{2400}=$ 2·05 times the strength requisite for the deepest water.	One knot, being in fathoms $=1{,}014\times11=\frac{11154}{2400}$ $=4{\cdot}64$ times the strength requisite for the deepest water.

The Engineer of the "Sassacus."

James M. Hobby is the name of the engineer of the U. S. steamer *Sassacus*. This officer stuck to his post amid the most trying circumstances. Even after he had been severely scalded by steam escaping from a shot-hole in the boiler, he stood by and worked the ship out of the reach of the enemy. The *Sassacus* was in action with an iron-clad rebel ram, and the contest was most severe. Such men as Mr. Hobby are an honor to their profession.

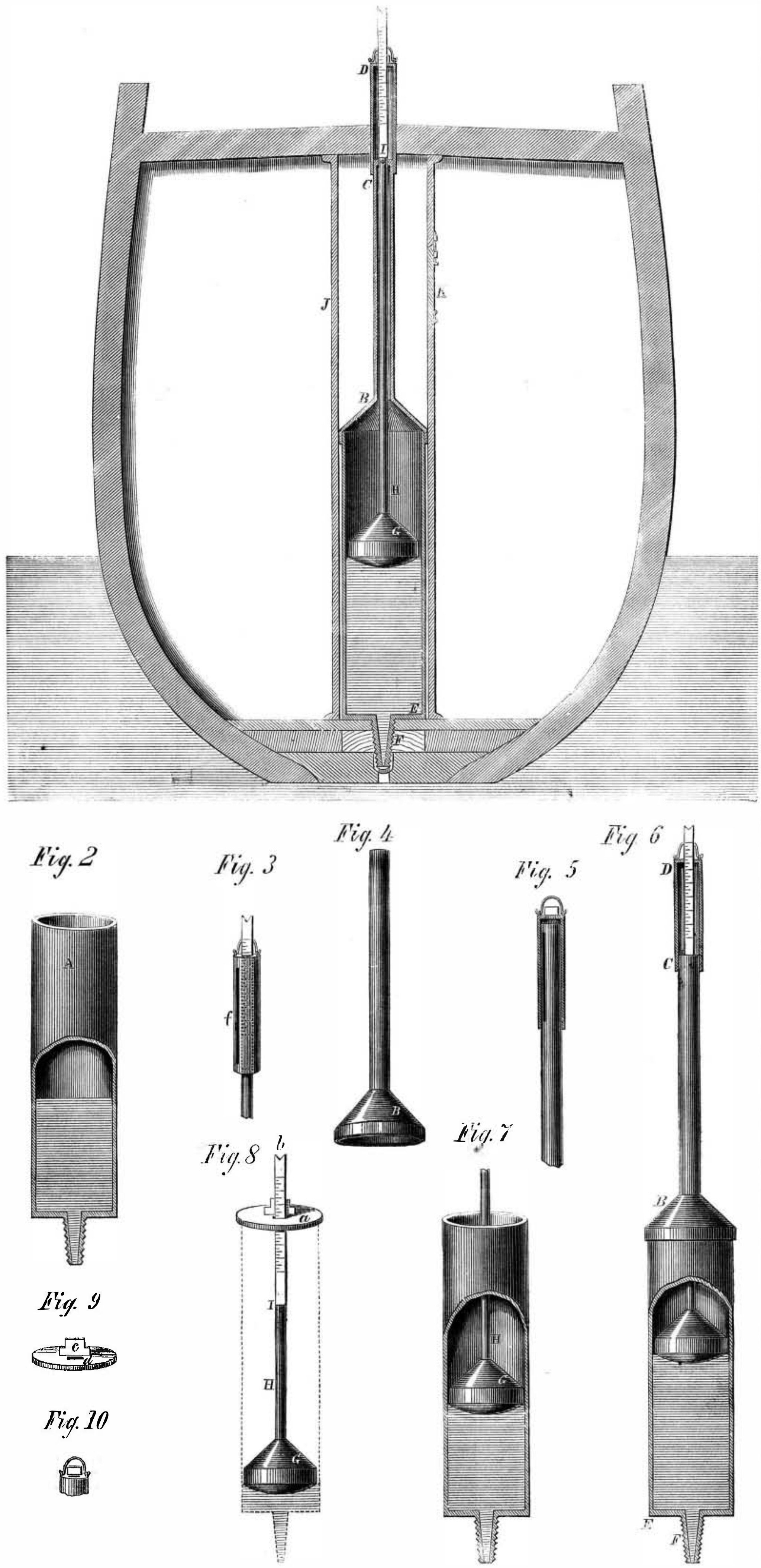
In 1766, 207,600 lbs. of powder, which was stored in the church of St. Nazaire, in Brescia, Italy, was fired by a stroke of lightning, and the explosion reduced about one-sixth of the city to ruins, and killed 3,000 of the inhabitants.

Hydrostatic Scale.

The object of the apparatus illustrated herewith is to weigh canal boats, barges and vessels of any description conveying freight, and their cargoes, and to measure and exhibit the true weight with undoubted accuracy and at less expense than under the present system of weigh-locks. It does not require any balances, counterpoises or their equivalents. The apparatus is philosophical in principle, simple in design, and concerns such important interests of State, freight and boat-owners, that it is entitled to receive a careful and impartial consideration of its merits.

The engraving shows a view of the machine attached to the boat or barge; the various parts and details are presented and explained by the figures and letters on the engravings. The construction and the principle of application are so easy of comprehension that every one will understand it from the following description:—

It consists of a copper cylinder (A, Fig. 1) from four to five inches in diameter in the lower part, and narrowed from B to C and D, upward—the whole being four feet, or longer if it is to come to the deck. At the bottom, E, a tube, F, which has a screw on it, is fastened water and air-tight in the hole bored through the middle of the keelson and keel, and passes nearly through the keel. At the end of the tube, F, is a perforated cap, convex downward, and through which the water can pass freely upward into the cylinder as the boat sinks, and thus rise to its level on the outside of the boat. In the cylinder is placed a hollow float or buoy, G, which in its widest part is one-eighth of an inch distant from the cylinder, so as to move without friction. From the top of the buoy rises a smaller copper tube, H, which is connected by a screw to a flat silvered stem of copper, which rises to the top of the cylinder, and passes through a guard or flange, at D, on the upper side of which is the zero, or mark for the light weight of the boat. The perforated cap below F is near the bottom of the keel, to prevent any obstructions from passing upward. The instrument has a simple contrivance at the top, C to D, for depressing that part of the cylinder through the deck, and also the flat stem, which will project still higher, so that these parts may be removed from the way of the men when not in use, and be covered by a lid on the level of the deck. It is thus easy of access and use when the weight is to be taken. Copper is used in the construction of the instrument because it is uncorrodible by water; the whole is inclosed in a strong case or square frame, J, rising to the deck to prevent any injury to the instrument. A door, K, is made, or can be made in the frame, so as to make this part of the frame accessible.



AMSDEN'S HYDROSTATIC SCALE.

Figs. 7, 8 and 9 represent the plan of this instrument as arranged for open boats. In Fig. 8 the cover, *a*, sets upon the cylinder and has a small slot, *d* (Fig. 9), in it to guide the scale, and also a guard, C, to indicate the hight to which the index rises. In Fig. 10 a simple contrivance is shown for holding the float down when not in use; this is a bail, *a*, which is turned over the notch end, *b* (Fig. 8), of the scale, for the purpose alluded to. In Fig. 6 the scale and slide are shown as they will stand when weighing the cargo, and the slot, *f* (Fig. 3), has a small bolt working in it, attached to the stem, so that the slide can be made fast when pushed down out of the way.

This scale has been examined and reported on some years ago, by a committee of scientific gentlemen. Since the first patent was issued important improvements have been made, which are also covered by a patent dated March 8, 1864, and it is claimed that this scale is very necessary to economy both of water and a true exhibit of the actual freights on the boats. The proprietors say that the reports of the committees show that a great saving results to the State, forwarders, boat-owners, etc., in the adoption of this scale, by cheapening freight, increasing the accuracy of measurement, and by avoiding all damage to the boats from racking in the old-fashioned weigh-locks, and all loss of water (always very great) incurred in the use of locks. Canal-boats cost double what they did when this scale was first brought out; there is a greater scarcity of water, and increased competition, and it therefore becomes an important question whether this improvement should not be adopted. The item of expense in the way of damage to the boats when weighed, especially when heavily loaded, is variously estimated at nearly one-third of their value. One other advantage to be derived from the use of this scale is the facility with which the condition of the boat, as regards leakage, can be seen. A glance at the scale is sufficient to reveal whether the water is gaining or diminishing in quantity. The attention of boat-owners, forwarders, underwriters, and the canal administration, should be directed to this improvement as lately patented, and if it be such as these committees and its friends claim for it, they should secure its early adoption.

Patents in this country and Great Britain have been secured through the Scientific American Patent Agency. All further information can be had by addressing Dr. O. Reim, Springfield, Ohio.

CONCERNING MELODEONS AND THEIR MANUFACTURE.

It is difficult to conceive of two things more antagonistic than music and mechanism. In the first we have melody, in the second discord. Of course in speaking of music we *mean* music; not the remorseless agitation of an instrument which poor players inflict upon persons unfortunate enough to be in their vicinity. The genius of man is capable of almost anything, and this assertion is well illustrated by the improvements which have been made in the melodeon of late years by Messrs. Carhart, Needham & Co. We were especially struck with this fact by a recent visit to their factory, in Twenty-third street, in this city. Ordinarily but little mechanism is used in the construction of musical instruments. By this we mean machines for special purposes. There is not a workshop in the land but what uses iron and wooden planing machines, etc., and these are as common as knives and forks in households. For really ingenious and labor-saving machinery, which will do in half an hour sextuple the amount that a man could, commend us to Carhart, Needham & Co.'s workshop.

It is a pleasure to go through it. For those who admire the skill and cunning which can put pieces of iron and brass together so that they are not machines, but great inspirations—like paintings or poems—this factory will have charms. The tools are not melodious in their nature, but they make music, and there is nothing to remind the reader in his rounds that he is witnessing anything else than the ordinary transactions of a factory. We have been at some pains to obtain facts in regard to the melodeons made in the works alluded to, and the result of our researches is here presented.

THE REED.

A melodeon is in all essential points an accordeon upon legs. The sound is produced in the same way, and by the same agents, namely a current of air, driven with greater or less velocity, through a brass block, having a brass tongue fitting an opening in

Fig. 1

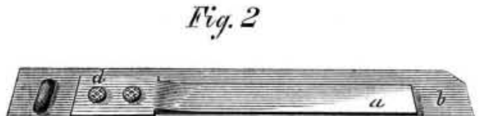
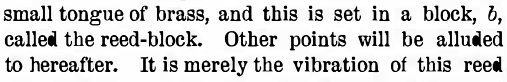


Fig. 2

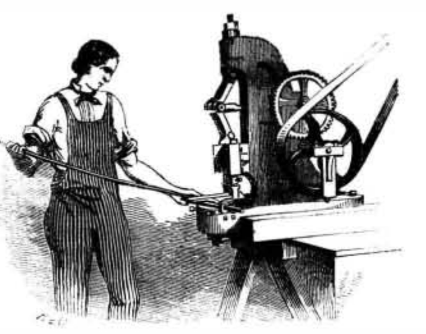


the same, as in Fig. 2. The reed itself is *a*, or the small tongue of brass, and this is set in a block, *b*, called the reed-block. Other points will be alluded to hereafter. It is merely the vibration of this reed that makes the sound, and the order of the sounds, the melody. The wires strung along the telegraph routes vibrate in high winds, and the tone or key is regulated by the force of it. In fitful gusts the wires breathe as softly and sweetly as an eolian harp, and an imaginative person might say that it was a fitting refrain to the sorrowful details of battle and of sudden death which they convey.

These reeds, therefore, make music by vibration, and though the initiated may deem it a simple thing to dwell upon, the unprofessional reader will be glad to know that the reed which gives the tone, C, or pitch, C, as it is called, vibrates five hundred and twelve times in a second. In doing that it rises nearly $\frac{3}{16}$ths of an inch, and consequently travels in one minute upwards of 450 feet, or as far as the piston of a steam engine in the largest of our river steamers. These details illustrate popularly some of the physics of music.

It is in the elaboration of this little reed-block and the reed that the greatest ingenuity has been exercised. The raw material of the reed is simply a strip of sheet brass, a full tenth of an inch thick, some two or three inches wide, and several feet in length. The operator takes this strip in convenient lengths for handling and puts it under the die of a press, as shown in the engraving. This die cuts out one blank, which is simply a flat bar of brass. The bar then goes to a machine, invented by Mr. Carhart, which planes the edges and one face. From this machine it passes to another which cuts the slot in the block. These processes occur very rapidly.

The slot in the reed-block is made by a small circular cutter, also in a machine, which we have no space to describe at length. Every mechanic knows that in cutting through a thin plate of metal with a circular cutter a thin fin, or jagged edge, is left at the ends where the cutter enters and stops. To remove this edge by an ordinary file is no great task if one has plenty of time; but in order to make musical instruments at a low price they must be made quickly, and therefore elaborating a small orifice like the one mentioned is too costly.



Mr. Carhart has provided a peculiar file for this purpose, which is a very curious thing in itself. We shall not excite the reader's curiosity any further, for details respecting it are contraband, and cannot be published. It is so economical and efficient, however, that the greatest benefit has been received by the inventor from its use in his work.

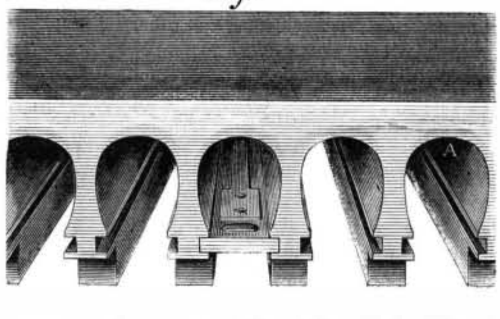
The reed—or as the the uninitiated would call it, the tongue—is also peculiar. In former times it was punched out. Experience has proved, however, that punched reeds are not durable. The metal is condensed so much about the base of the reed (where the square shoulder is) that the cohesion of the particles is destroyed, and the reed breaks at the place designated. The improved practice is to saw them out by means of a series of delicate cutters set in a wheel. This process takes more time than punching, but a much better piece of work is produced.

When the reed is sawed out it is riveted on to the block by another machine, which, although insignificant in its appearance, has worked a complete revolution in this branch of making melodeons. The appearance of the rivet head can be noticed by referring to Fig. 2, at the commencement of this article. It will be seen there that there are two raised heads, *d*, crossed with lines. These heads are portions of metal pushed up out of the reed-block, as at *e*, in Fig. 1; there is no pin or solid rivet in the reed or its block, and the saving of time in punching holes, cutting off the pins, putting them in and closing them, as practiced in the old method, is apparent at once to the professional reader.

After the reed is in its place in the block it is planed on top. The thickness of the reed is less at the base than at the free end, and the tone of the reed is determined by this planing. So accurately does this planing machine work that the reed, when delivered finished from the machine, is within a sixteenth of a true note, and requires only a little adjustment to make it perfect. When we add that the tuner, in giving the reed its proper pitch before it is finally placed in the instrument, uses a smooth file, and that *one rub* of this file is sufficient to alter the tone materially, it will be seen that the machine must be very nicely adjusted to make the reeds correct, or nearly so, at first. We cannot dwell longer upon the reed, however, interesting as it is; the tubeboard, or that detail of the instrument which receives the reed-block, demands attention; viewed as the product of machinery it is marvellous.

THE REED BOARD

Fig. 3



is simply a strip of plank, the length of the key-board full of little cells, as shown in Fig. 3. In each of these cells there dwells one of the reeds we have seen made, and under the bottom of the cell there is a valve placed with soft kid.

Now as the performer works the bellows by his feet he produces a vacuum therein. So when his nimble fingers press the ivory keys before him, the valve alluded to opens, and the air rushing down upon the reed below makes it vibrate most rapidly. This is the mechanism of music, and the Oratorios of Handel, the "Creation," "the Deluge," and others, are in reality reduced to certain mechanical movements. So many blasts of the bellows, so many keys pressed upon at such and such times, will produce some of the most exalted and refined emotions in the human breast that the soul is capable of receiving.

The cells, or tubes as the makers call them, where the reeds set, are all made by a most ingenious machine, contrived by Mr. Carhart. This machine is automatic, and the strip of plank out of which the board is made, having been placed in a certain position, the cutter goes on and produces all the cells, as at A, and performs its office with a regularity and exactitude which is almost human. This machine will rank with the automatic lathe of Blanchard; for it is not only capable of executing work in straight lines but also carves scrolls for lyres, and similar work, with such nicety and rapidity that no hand-work can approach it. The cutters revolve with great velocity, 7,700 times a minute, and the speed of the driving belt is just one mile in a minute.

There is another little detail in this reed-board which commanded our attention, and this is the small groove the reed-block sets in. This groove is about a tenth of an inch wide and deep, and is made by a swiftly revolving cutter. Each groove is an exact fac-simile of the other, and those made years ago will fit any reed-block made to-day. One of these tube boards is cut in five minutes, and the rapidity with which the details are executed is worthy of notice.

Another discovery of Mr. Carhart's—that of bending the reed to enhance its tone—voicing it as Mr. Carhart says—is one which has proved beneficial to them and very much enhanced the character of these melodeons for sweetness and power. Fifteen years ago the reed instrument was very generally despised. At the present time there are over 20,000 melodeons made annually on the plans of Mr. Carhart, involving principles for which he has obtained patents.

It is not alone from this utilitarian point of view that the improvement of the melodeon and reducing its cost by introducing machinery has been valuable to society. By directly giving to the masses opportunities of cultivating a musical taste (which tends to refinement of soul more than any other accomplishment) very much has been done towards elevating and ennobling them. We stood by the side of one of these reed organs in the sales-room, and heard one