

## ENGINEERING INVENTIONS.

Mr. Charles E. Macarthy, of Forsyth, Ga., has patented an improvement in horse powers of that type in which a king-wheel is arranged in horizontal position on a vertical post rotated by lever arms below, which wheel has a rope belt that passes around and drives a speed pulley, from which the power is utilized, while a tension pulley and idler pulley serve to give proper direction and tension to the rope.

An improved form of feathering paddlewheels for steam vessels, whereby the full power of the paddle against the water is utilized for the effective part of its movement, while the carrying of dead water is avoided by the paddles as they pass from their lowest position to the surface in the rear, has been patented by Mr. Joseph F. Breux, of Hardwick, Vt.

Mr. Charles E. Macarthy, of Forsyth, Ga., has patented an improvement in automatic car couplings, and it has reference to that class of such couplings in which a sliding block is arranged in the throat of the draw bar, and is pressed forward by a spring past the hole for the coupling pin, and which is made to hold up the coupling pin until the said block is forced back from under the coupling pin by the entering link of the opposite car, when the coupling drops through the link and couples the cars.

An improvement in slide valves has been patented by Mr. William S. Hughes, of Long Island City, N. Y. The main object of this invention is to reduce or prevent the noise made by exhaust steam of engines, which has heretofore been attempted by the use of muffles and similar devices. With the ordinary link motion and slide valve used on locomotives the exhaust edge of the valve must be moved the length of lap and lead before the piston receives steam from the direction in which it has been moving. In other words, the exhaust opening begins before the piston finishes its stroke, and before the steam has fully expanded. The exhaust being also opened suddenly by the quick movement of the eccentric, a wasteful and disagreeable explosion of steam from the cylinder takes place. To remove this difficulty the exhaust steam, instead of being allowed to explode, is gradually released, and without back pressure.

Mr. Abraham O. Frick, of Waynesborough, Pa., has patented an improvement in valve gears for changing the relation of the eccentric to the main crank. It is an improvement in that class of valve gear in which one or more cog wheels are arranged between a rigid gear wheel on the shaft and a loose gear wheel carrying the eccentric.

An improved elevator has been patented by Mr. Henry D. O. Kurrus, of Boston, Mass. The object of this invention is so to construct a passenger elevator that the cage cannot by any accident fall nor be elevated above a fixed point, and will automatically adjust itself to any inclination of the building occasioned by settling, warping, or shrinking.

## Liberian Coffee.

The expectations awakened by the discovery of the species of coffee indigenous to Liberia, and its exemption from the blight which has ruined so many plantations of Arabian coffee, seem to have been well founded. Already it has furnished relief to the planters of Ceylon, and there is every promise that it will enable San Domingo to recover the standing it enjoyed fifty years ago as a coffee-growing island. Its productiveness is great, the tree is large and hardy, and the quality of the berry (certainly as represented by that sent to this market from Ceylon) is equal to the best.

In a recent pamphlet on the cultivation of Liberian coffee in the West Indies, Dr. H. A. A. Nichols says that its immunity from blight is of the utmost importance to the welfare of Dominica and the neighboring colonies, both English and French, for there is now nothing to prevent the islands of the Lesser Antilles from being once more large coffee-supplying countries. In Dominica the cultivation of coffee may be said to be re-established, although it is only yet in its infancy, and the productiveness of the Liberian trees is a matter of astonishment to those of the older residents who remember the coffee estates of forty years ago. The Liberian coffee plant is much larger than that of Arabia, being indeed in its native state a small tree. It has several other characteristics which render its cultivation different from that of its Arabian congener, and give it several advantages, all in favor of the planter. Its leaves are much larger; it flowers for several months, so that flowers and berries may be found on the same plant, and the berries are twice the size of the ordinary coffee bean. The ripe berries do not fall from the tree, like the ordinary coffee plant, but remain on the tree, without detriment to their quality, for weeks, an important feature, where it may be difficult to procure the labor necessary for speedy gathering.

## SEVRES VASE.

The Imperial Manufactory at Sevres has unquestionably taken the lead in pottery art work, not only in the designs in general, but in the unique and artistic ornamentation.

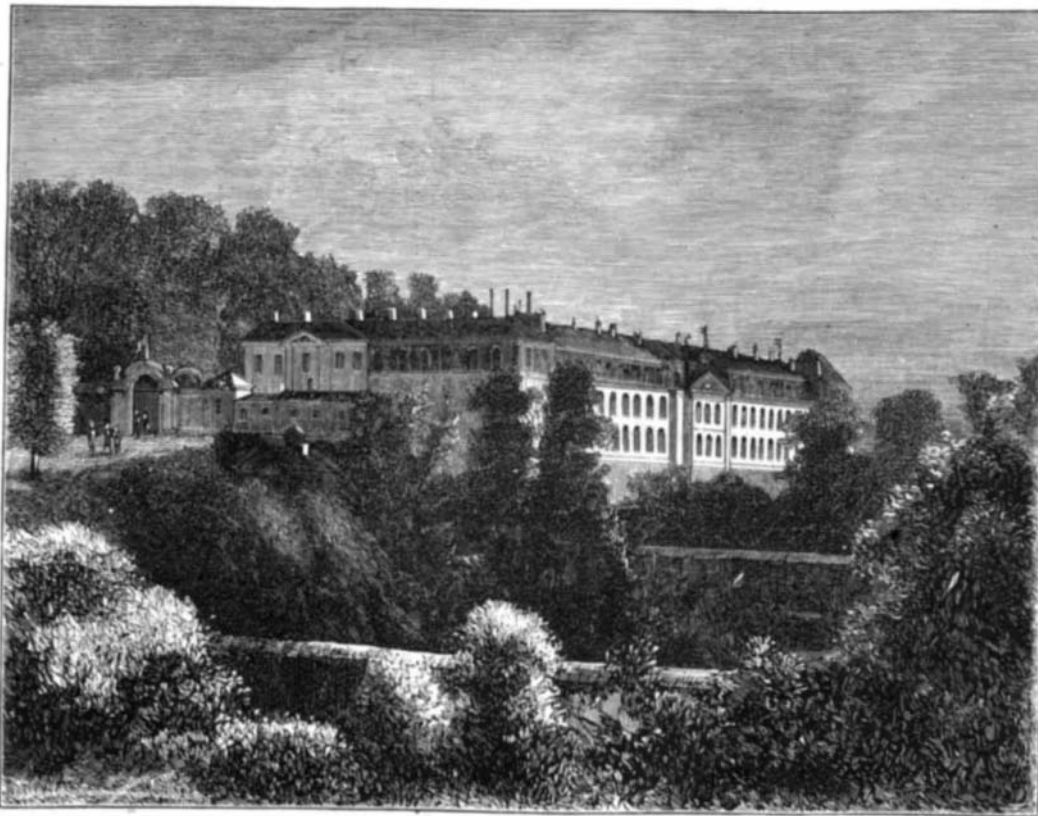


SEVRES VASE.

The engraving presents an example of this work which differs from other vases illustrated in these pages, both in respect to its configuration and its decoration.

## THE SEVRES PORCELAIN FACTORY.

We give an engraving of the celebrated porcelain factory at Sevres. We have frequently given illustrations of the beautiful wares from these works, and have outlined the history of the porcelain industry, giving some of the leading facts. This porcelain factory was removed from Vincennes, in 1756, to its present picturesque site in Sevres, on the left bank of the Seine, six miles from Paris. It stands between the hills of Meudon and St. Cloud.



THE PORCELAIN FACTORY AT SEVRES.

The great reputation of the Sevres factory is due to the employment of the highest artistic skill, both in form and decoration. A very large number of artists are employed, and the work has no equal.

## The Selenium Cell.

At a recent meeting of the Physical Society, Dr. James Moser, read a paper expressing his opinion that the well known action of the selenium cell in Professor Graham Bell's

photophone is not so much a mechanical, physical, or chemical one as it is a microphonic action. The cell is usually composed of metal plates cemented together by annealed selenium, and having wire electrodes. Dr. Moser, therefore, argues that the junction between the metal and the selenium is what electricians term "a bad joint," or in other words a microphonic contact. The varying beam of light from the photophone transmitter, falling upon the cell, expands and contracts the metal plates or the electrodes by virtue of the heat rays, and thereby tightens and slackens the microphonic joint. This has the effect of undulating the current of electricity which flows through the cell, and causing the modulations of the voice to be audible in the telephone. Dr. Moser showed that with copper plates the selenium cell was really a pile of copper, selenite of copper, and selenium, built up in order, and he compared it to the thermoscope of Professor Hughes and Mr. Edison, in which a number of little cakes of carbon are arranged end to end in a glass tube with brass filings between. When a current is sent through this combination it becomes very sensitive to heat rays falling on it, owing to the expansion of the carbons by heating and the consequent closing of the microphonic joints between them.

## An Ancient Mat.

At a late meeting of the San Francisco Academy of Sciences, Mr. B. B. Redding presented, from Captain Mellon, an interesting fragment of a prehistoric mat or garment with a piece of wood attached, found in a deposit of salt, seven feet below the cap rock of the Belding ledge, on Virgin River, six miles above its junction with the Colorado, in Lincoln County, Nevada. Mr. Redding said it was probably very old indeed, and was knit by hand from the inner fiber of some tree. He believed only one similar case had been found in Louisiana, where, like this one, it was directly over a bed of salt; and that was among bones of the mastodon and fossil elephant, thus clearly establishing its great antiquity.

He has written to learn if the cap rock was formed by accretion, or if a land slide could possibly have occurred in the vicinity. If it came where found by the ordinary sedimentary process, and not by any cataclysm, it is a most valuable proof of the vast period of time during which man has existed on this continent. It may be thousands of years since this work was woven, and it has only been preserved to come down to our day by the immediate presence of extensive salt beds. This will add to the rapidly accumulating evidence of the great antiquity of man on the American continent. It will be interesting also to know whether the mat is a specimen of weaving, matting, or knitting.

## Quebracho Wood.

Mons. F. Rhem has lately communicated a paper on the "Quebracho Wood" to the *Société Industrielle du Rouen*, from which the following particulars are extracted:

This wood belongs to the family of the Asclépiades, and comes from America. Being very hard, and composed of a great quantity of interlaced fibers, the tannin it contains is different from that of chestnut or of oak. Gelatine precipitates this tannin out of a water solution with a flesh color, while salts of protoxide of iron give an ash-gray precipitate, and the peroxide salts a dirty greenish coloration. When boiled with weak sulphuric acid, the tannin is not converted into gallic acid. According to a German chemist, quebracho wood contains 18 per cent of tannic acid. The bark of this wood contains an alkaloid analogous to quinine. Extract of quebracho, now much used in wool dyeing, giving a yellow shade with a tin solution. It gives even shades, resembling those of cutch, if used with bichromate of potash, but its principal use is for obtaining blacks, for which the wool is given first a bottom of the extract, then passed through iron, and dyed with the quebracho; this, in these conditions, can replace cutch. Solutions of quebracho wood, or extract, will only keep limpid if heated to a certain temperature, but get turbid on cooling. Dyeing experiments, with the dry quebracho extract, as manufactured by a French firm, in comparison with cutch, have proved the former of more value, since, with a lower price, it possesses a greater richness of coloring matter. Three series of trials were made, one by passing the cotton prepared in a quebracho or cachou bath through bichromate of potash, the second through iron, and in the third the patterns were passed through iron and then chromed. In all cases the same results were obtained, showing the advantage of the quebracho over cutch, in spite of a slightly more grayish shade of the colors obtained with the former. The same

results have been got by printing mordants on calico, aging, dunging, and dyeing with quebracho extract or cutch; in all cases the quebracho shades being identical with those of cutch, not only for the tone of color, but also in regard to fastness.

#### STEAM BOILER NOTES.

We learn from Chief Engineer McDougal's annual report for 1881 that the French decree relating to inspection of stationary steam boilers requires that all new boilers pass a test which consists of subjecting them to hydraulic pressure superior to the working pressure allowed, to be maintained during the examination of every part of the boiler. As a general rule the pressure to be double the working pressure, but never to be less than 7 pounds nor more than 85 pounds above such pressure. There must be two safety valves, so loaded that the steam will escape at maximum limit, which is stamped upon the boiler in a conspicuous place, together with the date of the last test.

The area of each safety valve (two on each boiler) must be sufficient to prevent the pressure exceeding the limit, whatever may be the intensity of the fire.

Every boiler must have a pressure gauge *in good order*, marked plainly to show the point that must not be exceeded by the pressure; a check valve, a steam stop valve on the boiler itself, and two water gauges independent of each other, one of which must be a glass gauge, so constructed that the tube may be readily cleaned, and its casing conspicuously marked for the low water level.

All boiler plates (not in separate superheaters, or small, and so located that they cannot become red hot) exposed to the flame on one side must be in contact with water on the other side.

The registry of all "fixed" boilers must be made before they can be put to work. It must show the origin of the boiler, the place where it is fixed, its shape and heating surface, its official and special number, and the purpose for which it is used.

A table is annexed to the decree that shows the temperature of the water in any given boiler when working at limited pressure, and all boilers are classified by multiplying their capacity in cubic meters by the temperature in excess of the atmospheric boiling point in degrees centigrade. Boilers giving a product greater than 200 are denominated first class; those from 50 to 200, second; and those at or below 50, third class.

Boilers of the first class must be fixed in one story buildings, and if not protected by heavy walls, 50 meters must intervene between them and any dwelling house, but in no case are they to be nearer than 3 meters, except when located with their top line 1 meter or more below the ground line.

Boilers of the second class may be fixed in workshops of any kind if no part of them are dwellings.

Boilers of the third class may be placed in shops or dwellings, provided the furnace is half a meter clear space from neighboring houses.

Portable boilers, or such as do not require special fixing or setting in brick, must, in addition to the above, be provided with an engraved plate, on which plainly appears the owner's boiler number and his business address. The attendant must be able to show a copy of the registry declaration whenever required to do so.

All the regulations, except those specially applicable to stationary, apply also to locomotive boilers, but some special rules relating to the rights of locomotion are provided.

Detached vessels that may be heated by steam to above the atmospheric pressure of a capacity greater than 22 gallons (English) must also be registered and stamped, and the test pressure must be 50 per cent in excess of the working pressure, but never more than 57 pounds per square inch. They must be provided with safety valves that will, when lifted, prevent the pressure from rising above that indicated on the stamp.

Tanks in which water is confined at high temperatures, serving as storage reservoirs of power or heat, are subject to the same rules as receivers of steam.

Users of steam apparatus must see that they are kept in good working order, and report to the official engineer any important repairs that are made after inspection.

In case of accident, by which injury to any person is caused, the owner or his representative must at once report to the local police and the government inspecting officer, who will proceed as soon as possible to the scene of accident, and report to the *Procureur* of the Republic and the Chief Engineer, who will inform the proper magistrate.

The building must not be repaired nor the fragments of the exploded boiler removed or altered before the engineer makes his official inspection.

In 1878 there were 79,071 land boilers and steam vessels under surveillance in France, of which 32 exploded during that year, or nearly 1 in 2,200, while there were among marine boilers in the same year 1 explosion in every 614 boilers.

J. McM. asks: "Is there any difference between the bursting and explosion of steam boilers?" It may be said in response that by common acceptance among engineers bursting means rupture, while explosion implies rupture, but it is also accompanied by detonation. The terms as applied to bombshells are used indiscriminately by many writers. As applied to steam boilers "bursting" may be considered a rupture from internal pressure, and "explosion" the loud noise and flying to pieces of the boiler after the rupture. This last will always occur with ordinary working pressures

if the initial rupture is of sufficient size and suddenness to instantly relieve the contained water of pressure. Every elementary atom of the water then gives up its quota of steam, which causes an expansion of the mass of such suddenness that it may be characterized as explosive.

Another correspondent asks: "Does it take more fuel to run an engine with steam at a given pressure than to keep the same pressure without running the engine?" A. Yes. To maintain a given pressure already existing in a steam boiler no fuel at all would be required when no steam is withdrawn from or condensed within the boiler. Banked fires will usually keep up the pressure even in unprotected boilers when the engine is stopped.

Steel boilers appear to be making slow progress in France, as shown by a paper recently read by M. Jourdain before the Societe des Ingenieurs Civils. In response to an inquiry by the president of that body, M. Jourdain, whose paper discussed the subject of boiler inspection associations, stated, according to *Engineering*, that a certain number of makers were employing steel plates for parts directly exposed to the fire, but that he did not know of any stationary boiler constructed entirely of steel. As M. Jourdain is in a position to be well acquainted with French practice, we conclude that our neighbors are greatly behind us in the use of steel for steam boilers.

A large steam pipe connecting the boilers with the engine at Foster & Merriam's shop in Meriden, Conn., is reported to have recently burst with a noise like the explosion of a cannon. John Leary, who was in the vicinity, was badly scalded, and a boy named Doran was knocked senseless. The engineer is reported as saying that the pipe was too tightly bound in the brickwork, hence the explosion. If he had told us that water had collected in the cast iron pipe and had cooled during the night, so that unequal expansion occurred on opening his valve in the morning, he would have made a reasonable statement. Many a cast iron pipe has done so before.

#### Striking Oil in a Titusville Garden.

A dispatch to the *New York Sun*, dated Titusville, Pa., July 16, says that a month or so ago, Sebastian Haehn, a blacksmith, living in Mechanic street, this city, was spading in his garden after a heavy rain. As he turned up the earth, he noticed that little pools of crude petroleum formed in the cavities made by the spade. He dug a pit four feet deep. It filled up with oil to such an extent that he dipped out five barrelsful. The oil was of excellent quality, and Haehn sold his five barrels to the Octave Oil Refinery. Week before last, Haehn dug another "well" in his garden. It responded with a yield of two barrels an hour. The well attracted great attention. It produced eighty barrels, and then ceased to flow. The excitement over the novel oil territory died out soon afterward.

On Monday last, the news spread through the city that Haehn had opened another well in his garden, and that it was yielding at the rate of thirty-six barrels a day. Hundreds flocked to the scene of the new oil operations. The well was located in the southwestern corner of Haehn's potato patch. With a large tin hand pump, the owner was taking out of the "hole" two barrels of oil an hour. His previous well had also started again. From that, one of Haehn's sons was taking oil at the rate of twenty barrels a day.

Immediately following this strike of the lucky blacksmith, a great demand for leases of adjoining gardens arose. Such an oil field had never been heard of before. Without capital, and with no tool but a shovel, an operator could sink a well and strike the "sand" in half an hour. The right to dig on four feet of a man's garden became worth \$5 bonus and one-quarter of the oil. For three days Mechanic and adjacent streets have been thronged with excited spectators of the new operation in oil production, and parties anxious to get a "piece of the territory."

On Tuesday night, Theodore Avery, who had a coal yard adjoining Haehn's garden, put down a well. At the depth of four feet he struck oil. The yield was a barrel an hour. He has put down four more wells since. The five wells were yesterday yielding eight barrels an hour.

The success of the Haehn and Avery ventures led to a wide extension of this strange territory. A vacant lot on Washington street, southeast from Haehn's, was yesterday the scene of active operations. Three producing wells were put down. The rest were "dusters." Captau Pickering went to "wild-cattin'" under a shed near the Buffalo, Pittsburg, and Warren Railroad track, south of Haehn's. He dug to a depth of eight feet, and got a well good for ten barrels a day. Two wells were put down on the ground of the Octave Refinery. At five feet oil was found. One of the wells is pumping twenty-five barrels a day. The McKeown Garden, east of the refinery, was leased by J. P. Thomas, William McKenzie, and J. M. Brinton. Thomas took the northern half of the garden. He got two five-barrel wells of excellent green oil. The other parties struck oil, but it was of a red hue, and had the appearance of being mixed with tar. In the gardens along the east side of Washington street, several wells "came in" as good producers, but the oil was of an inferior quality. All the property along Oil Creek, between Washington and Franklin streets, has been leased by A. J. Krafft. He will develop it on a large scale. The original Haehn territory maintains its yield, and is being further developed. Haehn has made a trench all around his garden and one through the center. In these

the oil collects rapidly. The operator is putting up tanks to receive his oil, as there is a great scarcity in barrels. Haehn's garden is now yielding one hundred barrels a day. He expects to increase it to two hundred. The oil is worth, at the refineries, \$1.10 a barrel. The price of one barrel defrays all the expense of putting down a well. Operations are carried on day and night. That part of the city is lighted up all night by the flaming torches of the oil men. The weird scene is witnessed nightly by hundreds of people.

There are no indications of any decline in the yield of this oil, and Haehn, the lucky discoverer of the field, is laying away not less than \$100 a day as clear profit.

There are many theories in regard to this unheard-of presence of petroleum in large quantities so near the surface. One is that the oil is the leakage of tanks and pipe lines, which has sunk into the earth until it reached the gravelly deposit, in which it is now found in pools. Another is that this deposit has been forced up from the true petroleum sand stratum by some unknown agency, and caught and retained in the stratum where it now lies.

#### MECHANICAL INVENTIONS.

An improved cotton press has been patented by Mr. Charles E. Macarthy, of Forsyth, Ga. This invention relates to certain improvements in presses for baling cotton or other analogous material, of that type in which the box is made to revolve, and the follower is forced down in the same by the action of a screw stem. The improvement consists in the peculiar means for throwing the screw stem and follower to one side of the mouth of the box, to permit the packer to have free access to the same to pack the cotton therein.

Mr. John Flanagan, of Newburg, N. Y., has patented an improved pipe wrench with an angular stationary jaw, a slotted shank, and an inclined handle made in one piece, a movable jaw having a concaved outer end, and a fastening nut, and a swiveled screw for adjusting the movable jaw, whereby the wrench can be adjusted to grasp pipes of different sizes.

An improved grounding machine for paper hangings and other materials has been patented by Mr. Thomas B. Smith, of West New Brighton, N. Y. The object of this invention is to apply the ground color to paper hangings and other materials rapidly and uniformly. The invention consists in giving to the rotary brushes that distribute the color a longitudinal movement by eccentrics and levers, to insure a uniform application of the color to the paper, and also in attaching the fulcrum studs of the levers to the bearings of the brushes, so that the brushes can be adjusted without disarranging the connection between the levers and brushes.

An improved hub for wheels, which will not shrink and warp, and which is durable, has been patented by Messrs. Alonzo Gandy and Rusinus M. Black, of Freeport, Ohio. The invention consists in a hub constructed with a central ring of wood into which the inner ends of the spokes are mortised, and which is provided with a conical continuation or sleeve toward the outside of the wheel, upon which central ring of wood a flanged ring is placed at each side. These flanged rings are bolted or riveted together, so that the inner ends of the spokes will be held between the flanges. The axle box passes through the central ring and the conical sleeve, and is held in this hub by lugs fitting in grooves in the flanged rings.

#### The New Comet.

The comet discovered by Professor Schaeberle, of Ann Arbor, July 13 (Comet C, 1881), is now visible through an opera glass, and will soon be to the naked eye. Its identity is still uncertain; most probably there is no record of its previous appearance. It is expected to be one of the most conspicuous comets of the century. Under date of July 22, Mr. Henry M. Parkhurst says: "It may not equal Gould's comet in brightness, for the nucleus may not be brighter than the north star, and yet it is not uncommon for the brightness of a comet after passing its perihelion to much exceed that computed from its appearance before its perihelion passage. It has already developed a tail as marked as that of Donati's comet an equal time before its perihelion passage, and it would now be visible to the naked eye but for the presence of the moon, although perhaps not distinguishable from a star. Up to the 15th of August the comet will be visible in the morning in a direct line between Aldebaran and Theta Ursa Major, being now midway between them. On August 15 it will be near Theta, with its tail pointing toward the north star. It will then cease to be visible in the morning, not rising until after twilight begins. It now sets at the same time with the sun, but will gradually set later, so that it will become visible in the evening before it is entirely lost in the morning. On August 19 it will be near Nu Ursa Major, with its tail pointing toward and perhaps reaching Gould's comet, then visible only in the telescope in the Little Dipper. On August 25 it will be in the constellation Coma Berenices, the tail probably passing over or near Arcturus. Early in September the comet and its tail will both pass below our horizon, still as bright as Coggia's comet at its best."

Prof. Swift says, under the same date: "Of course it is impossible yet to predict with certainty, but it would seem as if it would eclipse the glories of Comet B" (Gould's Comet).