Telegraphing Without Connecting Wires.

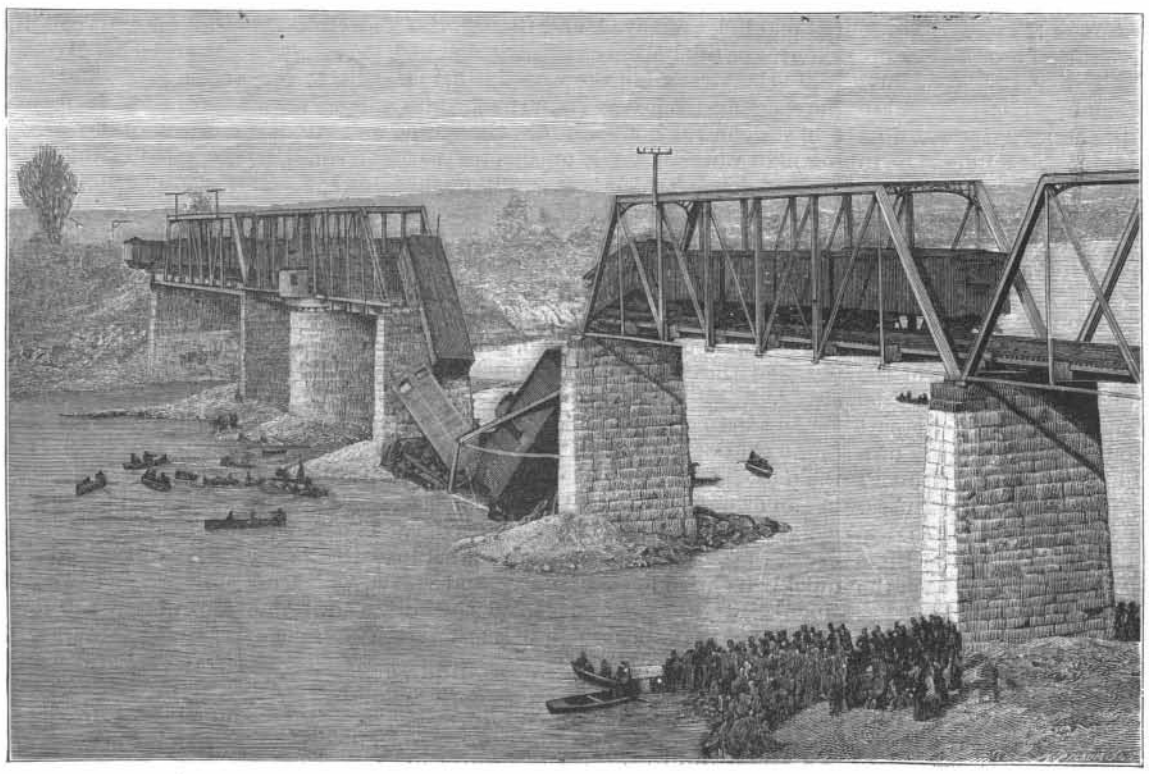
Interesting experiments have recently been made under Mr. W. H. Preece, with a view to electric communication between distant points without wire connection, namely, through air, water, or earth. Mr. Preece proposed to conduct experiments in three different methods. First, by running a wire along the shore on light poles for a distance of about a mile, and a second wire from stem to stern of the ship, the two acting upon each other inductively through the intervening space; secondly, by suspending a short line over the side of the ship, so that it might dip into the sea in the direction of the end of the shore line, to work by conduction through the sea; and, thirdly, by running out a light cable from the shore to the ship, terminating in a coil at the bottom of the sea, near the ship, but not attached to it, while another coil is placed on board. These two coils are expected to act inductively, and to give ample sound on telephones by means of rapid alternations. The experiments by the first method have been carried to a successful issue within the last few days, the shore wire having been erected along the Welsh coast, commencing at Lavernock Point, a little south of Cardiff, and proceeding for a mile in the direction of Lavernock House. The lightship was represented for the occasion by the island of Flat Holme, in the Bristol Channel; and the line there erected, parallel to the first and three miles distant from it, was about half a mile long. The shore line was furnished with a powerful generator at Lavernock Point, and the island line with a sounder to receive the messages. The result was that the words dispatched into the mainland wire were heard on the island with perfect distinctness, but we can scarcely admit that Flat Holme represents the conditions of a ship. This method is analogous to that patented by Mr. Edison for establishing telegraphic communication between two vessels when at sea.

Society of Naval Architects and Marine Engineers.

Prominent men in the shipbuilding and shipping interests of the United States have completed the preliminary organization of a professional society, to be called the Society of Naval Architects and Marine Engineers, whose object will be to promote the art of shipbuilding in all its branches, both commercial and naval. The committee of organization, consisting of William H. Webb, of New York; Lewis Nixon, general manager of Cramp's Shipbuilding Company, of Philadelphia; Col. E. A. Stevens, of Hoboken; Francis T. Bowles, Naval Constructor, United States navy; and (*ex-officio*) Clement A. Griscom, president of the International Navigation Company, expect to incorporate the society in New York and are now sending out invitations to membership.

FALL OF A RAILWAY BRIDGE AT TERRE HAUTE.

Our engraving is reproduced from a photograph showing the very serious consequences which resulted from a rather slight butting collision at Terre Haute, Ind., on October 28. The bridge, which carries the track of the Cleveland, Cincinnati, Chicago and St. Louis road, crosses the Wabash River at an elevation of about 50 feet above the water. The cars which appear at the right of the engraving were those of a train which had been run upon the bridge for a few minutes to get out of the way of another train, switching in the yard. While it stood there it was run into by the stock train from the opposite direction and a truss was broken sufficiently to cause it to give way, letting both engines and eight cars of cattle and coal into the river. One of the engines was entirely submerged. One engineer was killed. The other men on both trains saved themselves. The published accounts indicate, so says the *Railroad Gazette*, that there was fault on both sides; that the brakeman of the standing train did not go far enough with his flag, and that the approaching train was running too fast.



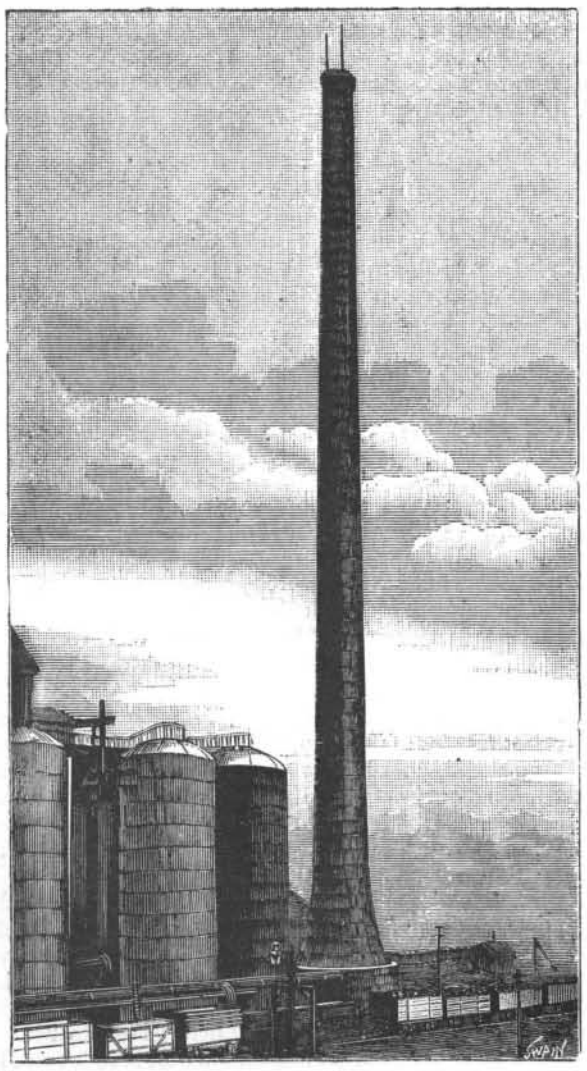
FALL OF A BRIDGE FROM COLLISION.

Morley's Polishing Paste.

Made by calcining flint and grinding the calcined material to a very fine powder, then mixing with fat, oil, or other such liquid to make a suitable paste, which "is put up or sold preferably in tins or boxes," and on the application of a little moisture is ready for use." For cleaning glass the levigated flint is sold dry to be used with water.

THE TALLEST WROUGHT IRON CHIMNEY.

The annexed illustration is from a photograph of a large wrought iron chimney, erected at Darwen, in North Lancashire, by the Pearson & Knowles Coal and Iron Company, of Warrington, for the Darwen and Mostyn Iron Company. It was designed, says the *Engineer*, by Mr. J. T. Smith, of Rhine Hill, Stratford-on-Avon, and the Pearson & Knowles Coal and Iron Company, to supersede brick stacks of the ordinary description, which were used for carrying off the gases from the blast furnaces of the Darwen and Mostyn Iron Company. This chimney is 275 feet high from foundation to top, and the tallest iron structure of its kind in Great Britain. Shortly after erection, and before more than half the lining was in, it withstood without injury and in a perfectly satisfactory manner one of the severest gales experienced for many years.



WROUGHT IRON CHIMNEY AT DARWEN.

The following are a few general particulars of this chimney. As stated above, the total height, including foundation, is 275 feet; height from bottom of base plate to top of chimney, 260 feet 6 inches; distance from bottom to top of cone, 28 feet; distance from top of cone to top of chimney, 232 feet 6 inches; taper from bottom to top of cone, 10 feet 6 inches; taper from top of cone to top of chimney, 6 feet; number of tiers of plates, 66; total number of plates in chimney, 308; diameter of base plate, 27 feet 6 inches; base plate made in six segments; number of rivets used in construction, 17,000; twelve foundation bolts, 16 feet 3 inches long, by 2½ inches diameter, with swelled and screwed ends; total weight of iron work, 114 tons 7 cwt.; thickness of brick lining at bottom, 1 foot 6 inches; thickness of brick lining at top, 3 inches; time occupied in erection of iron work, 11 weeks; total weight of chimney, including foundations and lining, about 1,100 tons; total weight of a brick chimney same height, over 3,000 tons.

This system of construction, for chimneys about the same height, has many advantages. These should receive the careful consideration undoubtedly due to them by all interested in the subject. In the first place, there is a saving in the cost as compared with a chimney of similar height built in any other manner. The time occupied in erection is also much shorter, and, under certain circumstances, this must be a considerable advantage, especially as the work is not affected or stopped by frost. It is well known that the uncertain and imperfect nature of ground upon which a chimney may have to be constructed is often a source of grave anxiety to owners of chimneys, architects and builders. If, therefore, a reduction from the ordinary weight can be effected by building with iron, without, at the same time, in any way impairing the margin of safety, this should be a recommendation to the system. It is proved that iron chimneys are of much less weight. There is also the satisfaction of knowing that chimneys built in this way are necessarily free from the liability to sudden collapse, and to cause accident by material falling from them, due in brick chimneys to the cracking and displacement of the external surface, caused by the high temperature of the gases or defective workmanship. An additional advantage of this form of construction, to the Darwen and Mostyn Iron Company, is the freedom from damage to their chimney by excessive heat, produced in the manufacture of ferro-manganese.

In America there are many wrought iron chimneys erected in connection with different works. The Pennsylvania Steel Company have no less than eight such chimneys, varying in height from 110 feet to 170 feet. The Cleveland Rolling Mill Company, Ohio, has one 213 feet high. In France and Russia iron chimneys are also used. MM. Schneider & Company have one at Creusot, France, 280 feet high, and Mr. Bhekoldin, of Kineshnia, Russia, has one at his paper mills 170 feet high. There are also several smaller chimneys of the same kind in this country, in addition to that at Darwen already described. The Pearson & Knowles Coal and Iron Company, Limited, has seven, varying in height from 50 feet to 87 feet. The Acklam Iron Company, Limited, has two, 165 feet high, at the Acklam iron works, near Middlesbrough. There is one at Messrs. B. Heath & Sons works, Stoke-on-Trent, and also at the Nine Elms cement works, and several at different iron works in the Middlesbrough district.

The tallest brick chimney in the United Kingdom is at Glasgow. It is 468 feet from bottom of foundation to top of coping; diameter outside at ground line, 32 feet; at top, 13 feet 4 inches; thickness of brick work at bottom, 5 feet 7 inches; at top, 1 foot 2 inches. No piles were used in the foundation, the blue clay upon which the chimney was built proving satisfactory. One million and a half bricks were used in its construction, and the time occupied about three years. Total weight, about 8,000 tons; total cost, about £8,000. The next tallest chimney, also at Glasgow, is 455 feet 6 inches from bottom of foundation to top of coping; outside diameter at foundation, 50 feet; at ground line, 40 feet; at top, 13 feet 6 inches.

A short account of the successful demolition of a tall brick chimney may be interesting. Some years ago the tall circular brick chimney at Messrs. Muspratt's chemical works, Warrington, 406 feet high, 46 feet diameter at base, 17 feet diameter at top, was destroyed by gunpowder. The works having been moved to another locality, the chimney was not required. Mr. Stephen Court, engineer and architect to the St. Helens Canal and Railway Company, superintended these operations. A number of holes were dug

round the base, and fourteen charges of gunpowder inserted. These charges were fired at 2:30 p. m. Nine charges exploded without any apparent damage to the stability of the chimney, but the report of the tenth had no sooner been heard than the chimney was seen to be rent from top to bottom, and the huge mass disintegrated from the base upward. The chimney fell very nearly within the circumference of its own base. No accident occurred.

We understand that a steel chimney, 350 feet high, is now being constructed at the Chicago Exhibition.

Sugar Crystals.

A correspondent asks the editor of the *Louisiana Planter:* "Does a grain of sugar contain any impurity in itself? It appears to me that sugar in crystallizing would repel all foreign matters." To which the editor replies as follows:

"A grain of sugar is rather an indefinite term. Sugar may crystallize in large crystals or small, and seemingly large crystals of sugar are frequently an agglomeration of smaller crystals, in the interstices between which impurities may be retained. Further, a thin film of impurity, ordinarily containing colored matter, surrounds each crystal of ordinary sugar, and if it were possible to remove this coloring matter, such crystals would be transparent. The largest single crystals of sugar known are made by the rock candy process, and such crystals are comparatively transparent.

We may, therefore, say that our correspondent is correct in believing that sugar in crystallizing would repel all foreign matter, but that practically sugar does not crystallize into individual crystals, but into agglomerations of crystals, which may, and ordinarily do, engage considerable foreign matter with them."

THE BOHEMIAN TWINS.

The twin sisters, Rosa and Josepha, who were lately exhibited in Vienna, excited the interest, not only of scientists, but alsoof the lay public, on account of the union of their bodies. They were born in Skreychow, Bohemia, and are now fifteen years old. Their parents, simple people named Blazel, gave them up to the French impresario Forbé, who first brought them before the public in Paris, at the "Theatre Imperial de la Gaité," and is now taking them on a tour through Europe.

Rosa and Josepha, of whom we publish an engraving, are not well grown for their age, but are delicate and frail. Their complexions and hair are dark, and their faces, which are very much alike, show no traces of their nationality. As will be seen from the cut, the first impression is that they are two perfectly formed individuals with a connection at the hips, but an investigation proves that this is not the case; for, although the upper parts of their bodies are separate, the backbones grow together in the region of the coccyx, and there is only one pelvis; strangely enough, however, there are four legs instead of two. Therefore, we have not two complete beings that have grown together, but two half female bodies, so to speak, that are normally developed only as far as the hips. Under the circumstances a separation by means of a surgical operation was impossible. When one half of this unfortunate double creature dies, the other sister must soon meet the same fate.—*Illustrirte Zeitung.*

THE BOHEMIAN TWINS.

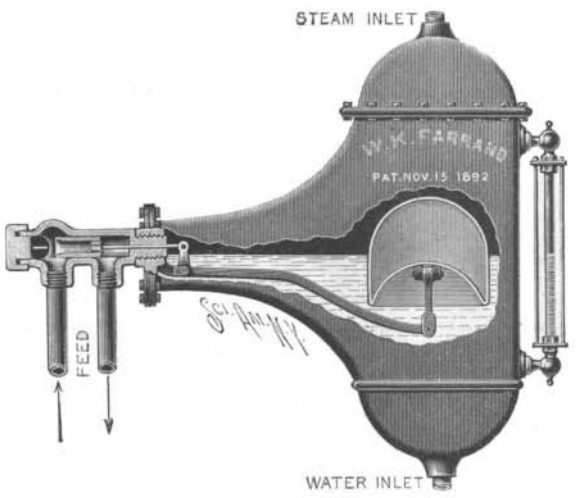
Prize for Red Cross Improvements.

The King and Queen of Italy, as is well known, have been interested for many years in all improvements for the care of the sick and wounded. They have now offered a prize of 10,000 lire, or $2,500, for the best apparatus for carrying the wounded and sick to places where they may be cared for. The offer is a result of the recent meeting of the Society of the Red Cross in Rome. Inventors of all countries are invited to enter the competition for the prize. Models, not less than one-fourth the size of the originals, must be sent to Rome, in care of Signor L. delli Sanaglia, not later than June 30, 1893. The models must be accompanied by detailed descriptions in French or Italian, or translations into one of those tongues. An exhibition of the apparatuses will be held in Rome from August 11 to September 15. A jury, consisting of fourteen representatives of the countries which took part in the congress of the Red Cross, will award the prize.

EXPERIENCE in electrically welding shows the metal is **strengthened at the point of welding.**

AN IMPROVED AUTOMATIC BOILER FEED.

The feed regulating valve shown in the illustration, and which has been patented by Mr. William K. Farrand, is positive in operation, not liable to get out of repair, and operates automatically to preserve the exact correct height of water in the boiler. The water column is for convenience made in two parts, a nipple at the top connecting with the steam space of the boiler and one at the bottom with the water space, so that the water will always be at the same height in the column as in the boiler, and will be thus indicated on the water gauge. In an extension at one side of the



FARRAND'S FEED REGULATING VALVE.

water column screws the stem of a valve casing, in which is a water inlet and a water outlet, as shown by the arrows, there being at the outer end of the casing a removable cap, on the inner surface of which is secured a semispherical seat, preferably of rubber. Opposite this seat is a cylindrical valve, fitting snugly in the casing and adapted to move horizontally, the valve being beveled on its inner edge to fit smoothly and tightly upon the seat. The valve is open at both ends, and its stem extends through the stem of the casing to a pivotal connection with one arm of a bell crank lever fulcrumed at its elbow on a suitable support, the other long bent arm of the lever having a float secured to its free end. The float has a chamber in its bottom, designed to create an excessive suction, so that, should the valve stick as the water in the column dropped, the suction created by reason of the chamber would cause the float to be pulled down with force to start the valve from its seat. This valve may be used for regulating the supply of water in receptacles other than boilers.

Further information relative to this improvement may be obtained by addressing Mrs. Elizabeth Riley, No. 452 Classon Avenue, Brooklyn, N. Y.

The Old Saugus Iron Works.

An old fashioned iron pot, said to be the first iron casting made in America, in 1642, was lately presented to the city of Lynn, Mass., on which occasion C. J. H. Woodbury, of Boston, delivered an address on the Saugus Iron Works, where the casting was made.

The Saugus Iron Works were an important factor in the inception and early development of American industries.

The site of the works was situated at the head of navigation, by the ford in the highway from Boston to Salem, at a water power, and near to the bog iron ore deposits, whose exact location is unknown, save that they were in Adam Hawkes' meadows. The whole iron works tract probably covered 3,000 acres.

The works contained a blast furnace, in which bog iron ore was reduced by means of charcoal, using as a flux lime, which in the earliest days of the works was obtained from the oyster shells which then abounded on the coast of Massachusetts Bay. Cannon were also melted at this foundry, far in advance of the time when swords were to be beaten into plowshares or spears into pruning hooks.

The iron from the blast furnace was run into straight trenches in the sand, and thereby cast into long triangular bars called "sowe iron," which were converted into wrought iron and steel. Castings were made directly from the metal flowing from the blast furnace into a pool, whence it was dipped by crucibles and poured into the moulds. The cupola furnace was not invented until 1790.

The wrought iron and steel were made in a blomary, which may be described as a charcoal fire four feet thick in a blacksmith's forge. The end of a bar of sow iron was plunged into the fire, and in time a pasty mass of wrought iron would settle to the bottom. Other portions of the bar would be converted into steel when the process stopped at the intermediary stage between cast and wrought iron. This process of steel making is still used throughout the Oriental nations, and also in the mountainous region south of the Ohio River.

The iron works also included a machine shop, in which the first fire engines made in America were built for the town of Boston, in accordance with a vote of the town meeting, March 1, 1654.

When Governor John Endicott began the oak tree and pine tree coinage, in 1652, the dies were made by Joseph Jenks at the Saugus Iron Works.

It is stated by Judge James R. Newhall that the designs were made by Elizabeth, the wife of Joseph Jenks, the master mechanic.

Joseph Jenks also invented a sawmill, which received a patent for fourteen years from the General Court, on June 10, 1646, being the first patent granted in America, and also a water engine for mills, which was undoubtedly a form of water wheel, and not the hydraulic engine which that term would now signify.

He also invented the modern American scythe, long and narrow, and stiffened by a ridge along the back, a marked improvement "for the more speedie cutting of grasse" over the broad, short bushwack scythe made from a thin plate of steel, and richly deserved the patent for seven years which was granted by the General Court, May 23, 1655.

In 1667 he petitioned the General Court relative to a wire manufactory, and May 15, 1672, his petition for authority to coin money was refused.

The works are not known to have been in operation after 1688, when the tract had diminished to 600 acres and passed into individual ownership.

The Stimson Institute, New York.

The institute was founded four years ago to provide American labor with the facilities for acquiring skill and taste in design. In four years over four hundred students have been educated.

At present the teaching force consists of twelve specialists, in charge of Mr. Stimson, and a numerous and enthusiastic body of pupils drawn from all parts of the United States is in attendance. The range of instruction embraces architecture, sculpture, painting, and drawing in all their forms, book illustration and covering, wood carving, wall paper designing and mural decoration; silk, calico, cretonne, and carpet designing; ceramic, tile, and porcelain work; meta and jewelry designing, with other ornamental domestic arts where now we are obliged to employ foreign skill if we require first-class work. What is immediately needed to put this institute on a sure foundation is practical support by men who appreciate what is being done abroad and what must be done at home in the line of the technical education of the artisan.