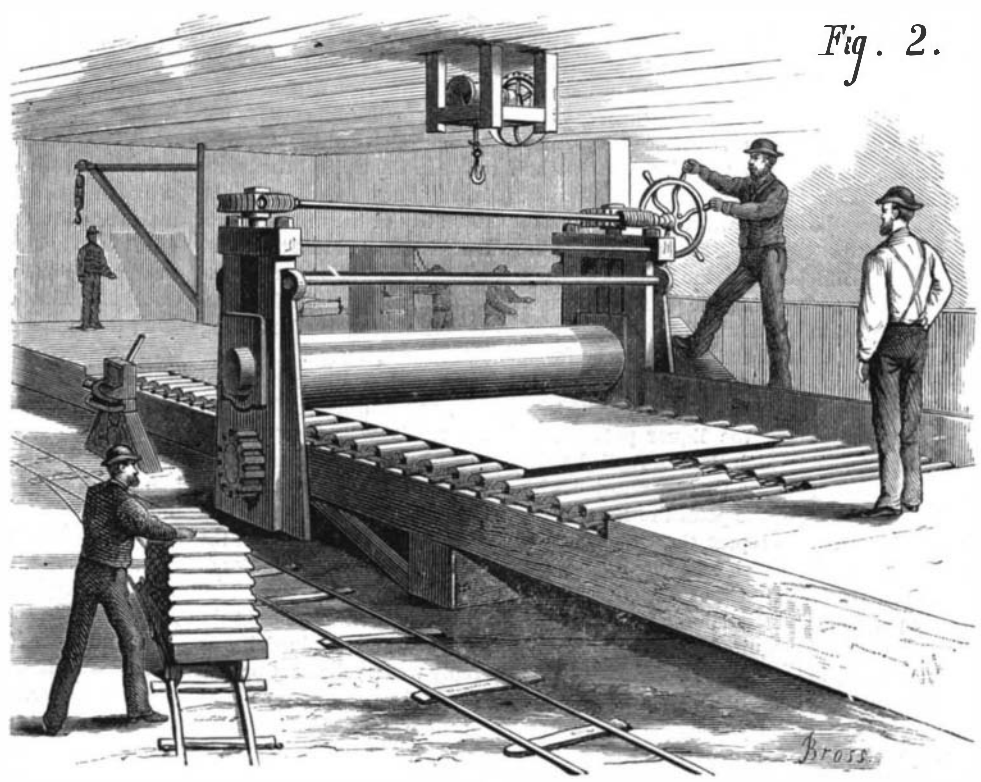
[*Continued from first page.*]

receptacle, C. This is a heavy cylinder having an annular chamber formed in it to receive the steam by which it is kept hot. D is the press plunger working downward, and in it is inserted the core, E, which enters the die aperture. The metal is drawn off directly from the kettle, and the plunger is at once brought down upon it, so that it may be kept under moderate pressure until sufficiently congealed. The press is then set in operation, and the lead is forced through the annular space between the core and die, and emerges in the form of pipe. The process is quite rapid, and there is nothing further to do but reel up the pipe as it is drawn. As soon as one charge is exhausted or rather partially so, as a portion is left in the chamber to which the new charge unites, more lead is admitted from the furnace, and the operation is repeated. The amount of pipe made at a single pressure depends upon the weight of the same when finished. Thus an extra light one-inch pipe weighs 2 lbs. to the foot, and the chamber may, for example, hold 135 lbs. Therefore 67½ feet of pipe are produced at each descent of the plunger. Different sizes of pipes are produced by substituting suitable dies and cores. The die is easily reached by lifting the chamber, C, which is done by attaching the same to the press plunger and elevating the latter.

Tin-lined lead pipe is produced somewhat differently. Before the lead is run into the chamber, a mandrel is inserted, which closes the die aperture and extends up through the receptacle. This mandrel consists of a central stem, around which are grouped dovetailed sections, so that when the central portion is removed the sections are easily taken out, leaving a hollow space in the lead which is run in while the mandrel is in place. The sides of the mandrel are tapered, or rather crenelated, there being three or four shoulders and a different taper from each. The object of this is that after the mandrel is removed, the tin which is poured into its place may have several purchases against the lead which surrounds it. Of course before the tin is let in, the core, as already described, is inserted. Afterwards the pressure is applied in the usual manner, the result being that the pipe emerges with a thin lining of tin. Tin-lined lead pipe and plain lead pipe weigh the same.



ROLLING THE LEAD.

There are some trade peculiarities about the sale of lead pipe which are worth remembering. That which is termed tubing measures from ⅛ and ¼ inch in diameter, and weighs 2 and 5 ounces to the foot. Ordinary lead pipe varies ⅛ inch in diameter from ⅜ to ¾ inch, inclusive; then ¼ inch from 1 to 1½ inches, and lastly there is a 2 inch size. Beginning at 1½ inch, and ranging at ½ inch increase to 5 and then to 6 inches, comes lead waste pipe. Of ordinary pipe there are, besides, several classes depending on weight and ranging from extra strong to "fountain" size. The Colwell Lead Company, of this city, has courteously offered us the facilities or the preparation of the foregoing description and illustrations.

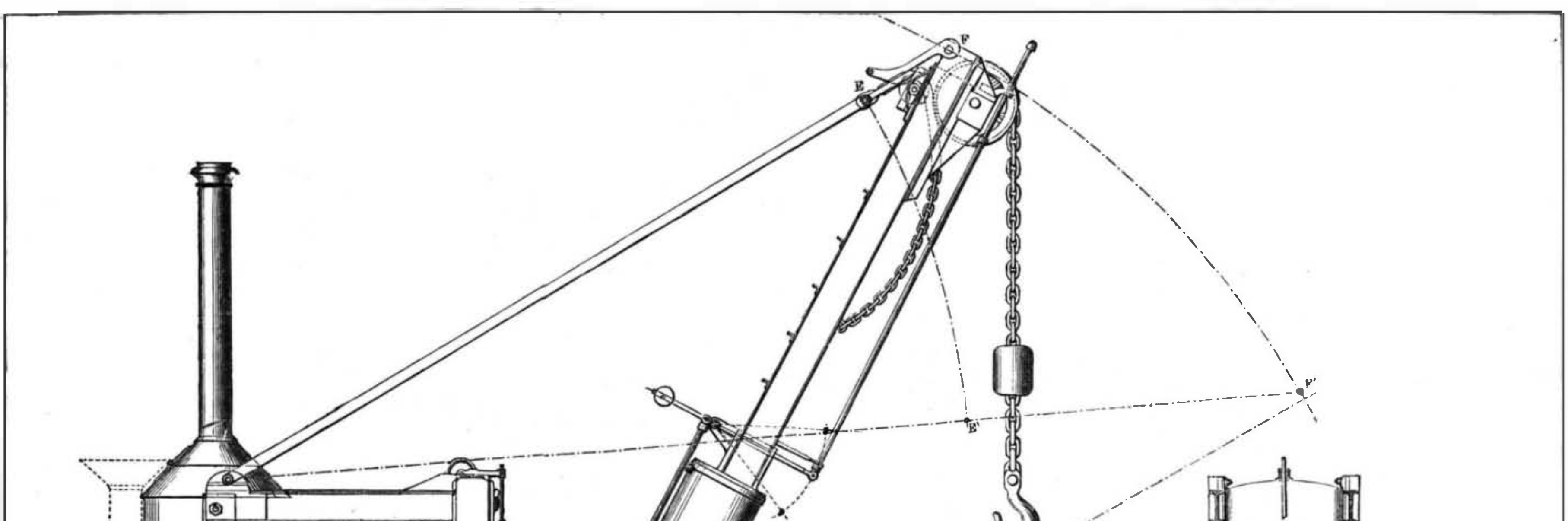
THE following compound is recommended by the *Revue Industrielle* as an artificial fuel well suited for cooking purposes: To 176 lbs. of small charcoal made from light wood add 44 lbs. of pulverized charcoal, 11 lbs. of nitric acid, 4·4 lbs. of nitrate of potash, and 11 lbs. of gum arabic. The gum serves as agglomerating material. A rather expensive fuel this!

LARGE LOCOMOTIVE CRANE.

We illustrate herewith a new 10-ton locomotive crane, the invention of M. J. Chretien, and designed for use on the Northern Railway of France. The principal feature of novelty in the machine is that the load is lifted by the direct pull of the piston in a long steam cylinder, the piston rod being attached to the lifting chain or to pulleys of the same. A D slide valve admits steam and is changed automatically in time to prevent the piston meeting the end of the cylinder by a simple stop mechanism.

The machine consists of a strong cast iron frame mounted on wheels, and having at its center a column which serves as a pivot for the traverse which supports the turning portion of the crane. The boiler is placed in rear and serves as a counterpoise. The derrick arm consists, first, of a cylinder 15·6 inches in diameter, and 111 inches long, and a double T arm which supports the chain pulley. The apparatus may be used not only for handling heavy loads, but as a locomotive for hauling cars. Means are provided for lowering both smoke stack and derrick so that bridges may be passed under.

The locomotive engine is placed under the platform, as shown. It has a single cylinder connected with the boiler by a pipe passing through the crane pivot. Simple gearing serves for the transmission of power to the driving wheels. For rendering the apparatus stationary four jack screws, placed at the corners of the carriage, are employed. These press the traverse to which they are connected firmly against the ground, and thus render the machine immovable. For raising or lowering the arm, the mechanism for elevating the load is easily employed. When the arm is in normal position, as indicated in the engraving, the guys are retained above by two catches. Two small chains attached to the guys are pendant or fixed to retaining hooks. To lower the arm, the lower ends of these chains are taken to the piston, and there secured to hooks provided for the purpose. Steam is then admitted above the piston. As soon as the chains are tautened the arm rises slightly, and the disengaged catches lift. Then the steam is allowed to escape slowly, and the arm is thus permitted gradually to descend until stopped by the piston reaching the end of the cylinder. During this operation the point, F, travels to F', E to E'.



NEW 10-TON LOCOMOTIVE CRANE.

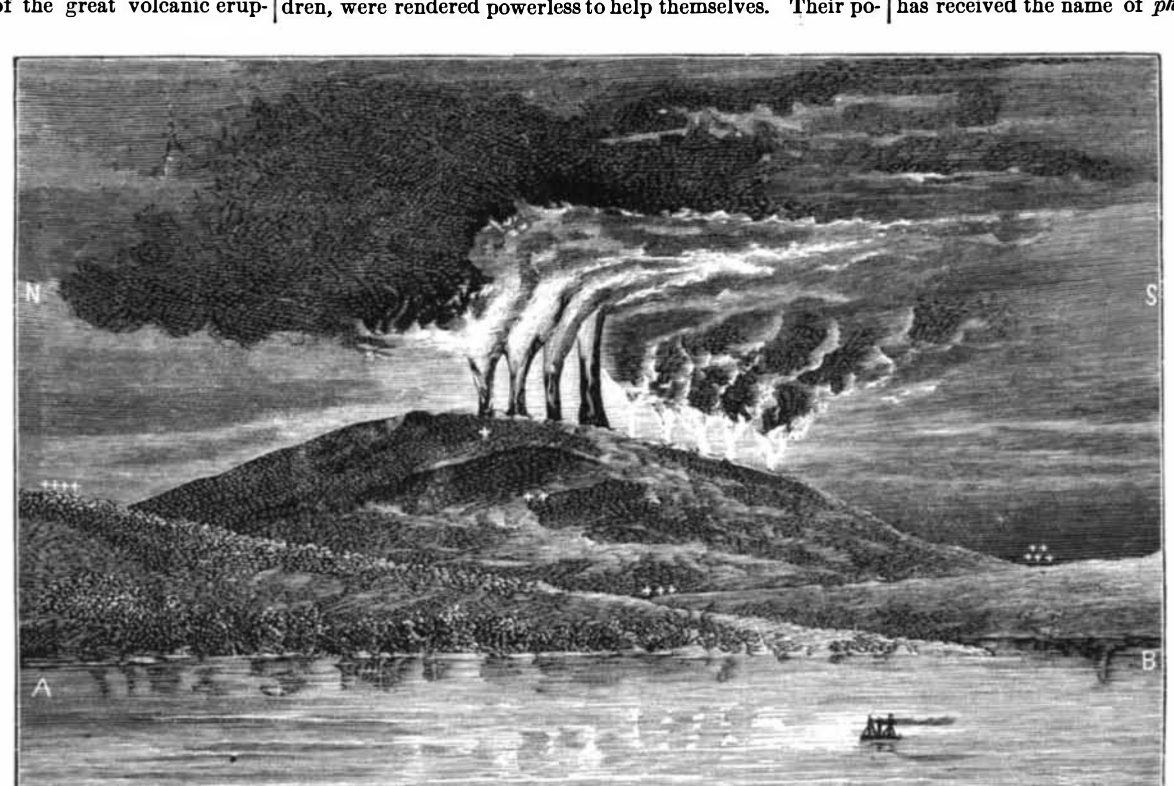
and the guys are elongated by the intermediation of the chains over the distance, E' F'. The arm is lifted by the reverse operation. Steam is admitted into the cylinder, and the crane is swung upward until caught as before by the catches. We extract our engraving from the *Revue Industrielle.*

Wrought Iron Girder Work.

Mr. Graham Smith, in a paper read before the Liverpool Engineering Society upon wrought iron girder work, stated that one of the first and principal requirements in designing wrought iron girder work, was to have a proper sense of the limits of application of theoretical deductions. He then showed that, in order to be able to design an iron girder, something more than proficiency in mechanical calculations was necessary, many circumstances having to be taken into account which experience has shown materially affect the structure, when exposed to variations of strain and temperature. In the designing of their bridges, American engineers compared very favorably with their English brothers. The life of an iron girder depended upon the strains to which it was subjected being kept well within the elasticity of the iron; and when engines and rolling stock were increased in weight beyond what was originally estimated, and this limit was passed, we ought not to be surprised if a bridge did give way now and then. Another point upon which the durability of an iron structure depended, was the state of efficiency in which the paintwork was maintained. He gave some valuable remarks upon preparing ironwork for painting, laying special stress upon care being taken with work for abroad, in situations where it would subsequently receive but little attention. Mr. Smith thought engineers did not sufficiently consider the sizes of iron to be employed in executing their designs. It was well known to manufacturers that iron above certain sizes and weight commanded extra prices, and it was shown that carelessness in this matter would sometimes double the cost of a structure. It was considered very desirable to test all the iron to be used in constructing girders; and he showed how this was to be done in an efficient manner. Various small matters connected with the riveting and construction generally, were brought forward in an amusing manner, fully demonstrating the necessity of having a working inspector always on the ground. Mr. Smith then went at some length into the preparing of drawings and specifications, and concluded by referring to Barff's process of coating iron with magnetic oxide.

THE GREAT ERUPTION AT HAWAII.

M. Ballieu, Consul of France at Honolulu, has sent to his government a detailed account of the great volcanic eruption which occurred at Hawaii on February 14 last. The phenomenon took place on Mauna Loa, at about nine o'clock in the evening. Nine great jets of flame and smoke burst from the crater of Mokuaweoweo, and united in an immense column which rose to a height of 16,000 feet. The nine fires appeared to form two groups—one of four, the other of five columns, the latter being the more brilliant. The scene is depicted in the engravings herewith given, which we extract from *La Nature.* Fig. 1 also conveys an excellent idea of the location of the volcano. N and S respectively indicate the north and south points, + is the crater of Mokuaweoweo, + + is Mauna Loa, + + + the central plateau, + + + + is the town of Kaw; A represents Kawaihe, and B Hualailai. Viewed from Hilo the jets all seemed joined in one vast spout of fire, as represented in Fig. 2.



GREAT VOLCANIC ERUPTION AT HAWAII.—Fig. 1.

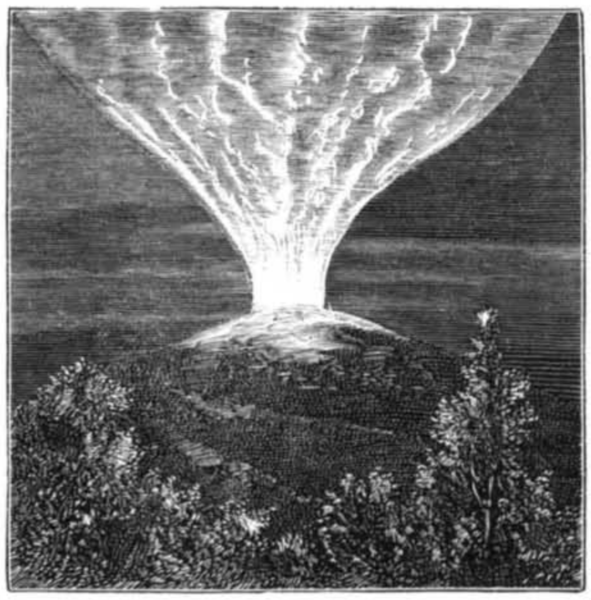
The eruption, a full description of which we published some time ago, lasted but six hours, and was followed nine days afterwards by earthquakes and a submarine eruption near Heei Point.

Singular Balloon Accident.

A fearful accident lately occurred at Hull, Eng., by which a large number of persons were seriously injured.

It appears that for several years a gala has been held every Whit Monday, in a large field in the Beverley Road, and this year one of the attractions advertised was the ascent of a balloon. Arrangements were made with the British Gas Company for a supply of gas, it being estimated the balloon would require for its inflation about 18,000 cubic feet. There being a strong wind at the time it was filled, the balloon, although securely fixed to the ground with ropes, swayed vigorously from side to side. We learn from the local papers that close to the ring in which the filling took place there was a "striking machine," against which, just as the ascent was about to take place, the balloon was driven, and a long slit was made in the silk, through which the gas began to escape rapidly. Close to the striking machine which had caused so much damage there was a stall for the sale of hot peas, a kind of refreshment greatly in demand at entertainments of this kind. Very shortly before the balloon drove upon this stall a naphtha lamp had been suspended thereon, and the escaping stream of gas coming in contact with this naked light, a fearful explosion followed.

Spectators of the scene state that what they saw was a vivid flash, as of lightning, followed by a dense white smoke,



VOLCANIC ERUPTION AT HAWAII.—Fig. 2.

this in turn being followed by a blaze which lasted so long as there was any of the varnished silk of which the balloon was composed remaining to be consumed. From the midst of this mass of smoke and flame there arose a mighty cry of anguish, and the excitement amongst the spectators was most intense. The policemen on duty at the gala, with many others who were not too much excited to act, at once rushed to the rescue, and soon one and another were hauled out from amongst the burning mass. When the balloon collapsed, owing to the escape and ignition of the gas, it fell upon quite a crowd of persons, who were completely covered by the silk and the netting in which it was inclosed, and these people, mostly young men and women and children, were rendered powerless to help themselves. Their position was, besides, rendered the more awful by the fact that the varnish with which the silk composing the balloon was covered, when it became heated, caused the burning material to stick to the hands and faces of the sufferers, and in numberless instances the skin was torn away from hands and faces as the unconsumed material was removed. Amongst the injured was a little girl, who was so frightfully burned that she expired the next day.

Five Centuries Buried.

The *Ariégeois* relates as follows the finding of the body of a bishop at Saint Lizier, France: "The discovery was made in the wall of the cathedral cloister. The skin is yellow, but not mummified. The arms were crossed over the breast, and the head slightly inclined to the left. The hands were still gloved, sandals were on the feet, and having been carefully removed, the members were found to be in a perfect state of preservation. No article of value was found in the tomb. A leathern cord around the neck must have carried the pastoral cross, which was sought for in vain. The body is proved to be that of Mgr. Auger II., of Montefalcone, Bishop of Couserans, who died in 1303."

New Method of Detecting Potash.

Ad. Carnot publishes a new and delicate test for potash. Dissolve one part (10 grains) of subnitrate of bismuth in a few drops of hydrochloric acid; then dissolve separately two parts (20 grains) crystallized hyposulphite of soda in a small quantity of water; pour the second solution into the first and add an excess of strong alcohol. If a portion of this reagent be brought into contact with a few drops of a soluble potash salt, a yellow precipitate is immediately formed; if the potash salt is not in solution a light yellow, but very distinct coloration is produced. All potash salts of the mineral acids give this reaction. Barium and strontium are the only metals that might be mistaken for potash, as they form white double salts with this reagent. As these bases seldom occur along with potash, it is easy to recognize and remove them. If a solution contains but a few grains of potash, it should be evaporated to a small volume or to dryness in order to obtain the reaction more distinctly. Another way is to saturate a strip of filter paper with this solution and dry it. The yellow color will be seen on the edges of the paper.

Owing to the remarkable solubility of all the simple and most of the double salts of potash, its detection has been quite difficult. The usual reagents hitherto in use were a solution of tartaric acid, which must be freshly prepared, and chloride of platinum, which is expensive and not very satisfactory, owing to the difficulty of perceiving a slight yellow precipitate in a deep yellow liquid.

The Preservation of Flowers.

A new method of preserving flowers, successfully adopted by Dr. Miergues, is reported in the *Gardener's Magazine.* Each flower, held by the extremity of the stalk, is plunged into a vessel of paraffin, quickly withdrawn, and twirled rapidly between the finger and thumb, so as to shake off the superfluous oil. Bouquets of flowers thus treated have been kept upwards of a twelvemonth without losing their shape or colors. Whether the smell of paraffin be equally persistent, the doctor has forgotten to inform us.

An Electrical Plant.

In a recent number of the *Hamburger Garten- und Blumenzeitung,* Levy describes a plant, which, if the statements of this traveler are true, must be a most remarkable wonder. It is one of the *phytolacca* which seems to be new, and has received the name of *phytolacca electrica.* The curious fact about this plant is its strongly marked electro-magnetic properties. On breaking off a twig a sensation is produced in the hand like that given by a Ruhmkorff induction coil. This sensation was so marked that he began to experiment with a small compass. The compass began to be affected by it at a distance of seven or eight paces. The needle vibrated on approaching nearer to it, and finally began to revolve rapidly. On receding, the phenomena were repeated in reversed order. In the soil where this plant grew, there was not a trace of iron or other magnetic metal, like nickel or cobalt, and there is no doubt that the plant itself possesses these peculiar properties. The strength of the phenomena varied with the time of day. During the night it is almost nothing, and reaches its maximum about two o'clock in the afternoon. When the weather is stormy the energy increases still more, and when it rains the plant appears withered. Levy also states that he never saw any insects or birds on or about this electrical plant.

Nathan R. Smith.

Professor Nathan R. Smith, the distinguished surgeon and medical practitioner, died in Baltimore in the eighty-first year of his age. For many years he had been the acknowledged head of the profession in that city, and up to within a few years past has been in full practice. The deceased was a native of Cornish, N.H. In 1825 he was appointed professor of surgery and anatomy in the University of Vermont, and organized the medical school of that institution. In 1827 he accepted the chair of surgery in the medical department of the University of Maryland, which he filled for many years. He was well known as a writer in various medical journals, and published a voluminous work on the surgical anatomy of the arteries, which was well received in this country and Europe.