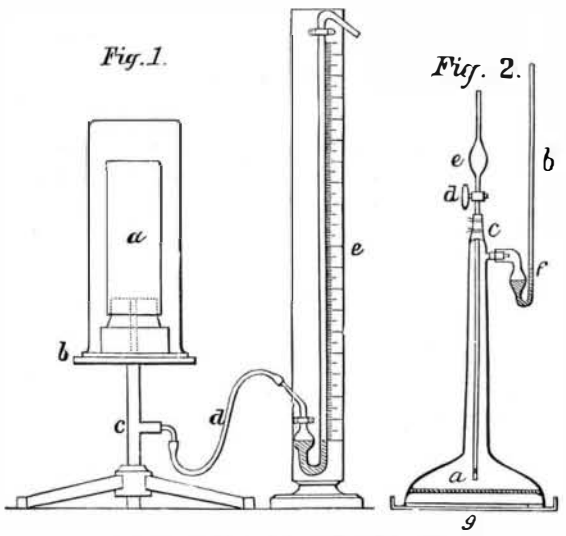
THE DETECTION OF GAS LEAKAGES.

The accompanying illustrations show the principles of construction of two instruments designed by Herr C. Von Thau, for estimating and discovering gaseous mixtures in air. The first is called a diffusiometer (Fig. 1), and shows the proportion of illuminating gas existing at any time as a mixture with air. A porous earthenware cylinder, *a*, is closed with an India-rubber stopper. By means of a perforation of the stopper, which rests upon the table, *b*, the pipe, *e*, is put in communication with the interior of the tube. This pipe is closed at the bottom, but is connected at one side by the India-rubber pipe, *d*, with a gauge, *e*. The leg of the gauge is filled with litmus water. The vertical part of the gauge is eight millimeters in diameter, and is divided in millimeters, with the zero point at the water level. The



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calibration of the instrument is thus effected: A five liter gas-holder is to be half filled with air, and 100 cubic centimeters of common gas introduced therein. A plate of glass is then slipped under the bell when it is nearly drawn out of the water, and the contents lifted and shaken together. This process quickly and thoroughly mixes the air and gas, and the compound may then be applied to the porous cylinder by inverting the gas-holder over it. Immediately the action of diffusion causes the water in the gauge to rise, and in the course of from five to ten seconds it reaches the maximum, which is marked. This is the 2 per cent line, and similar proceedings with 250 and 500 cubic centimeters of gas in the same mixing vessel give the 5 per cent and 10 per cent data. The diffusive action through the porous cylinder is so quick that in half a minute after the gaseous mixture has been removed the water in the gauge falls to its normal level. The purpose of this arrangement is to give warning of the presence of an explosive mixture of gas and air in closed apartments.

The second figure represents the other apparatus designed by Herr Von Thau, and is called a diffusioscope, which is intended to facilitate the discovery of leaks in gas mains or pipes. A glass tube is fixed in a very much flattened funnel, which is closed at *a* by a porous but otherwise airtight diaphragm. A capillary gauge, *b*, is connected by means of a cock inserted in the side of the funnel as shown. The upper end of the funnel-shaped stand is fitted with a tube, *e*, provided with a cock, *d*, and connected at *e* with an India-rubber cap. In use the cock, *d*, is first opened for a short time, to establish equilibrium of pressures. This cock is then closed, the cover, *g* (usually kept on the bottom of the stand), removed, and the funnel is held over the suspected part of the gas main. Wherever there is a leak the gas collects under the porous plate, diffusion commences, and the gauge rises. To clear off the contained gas the gauge is taken off, and the cock, *d*, opened for a moment, when the instrument is ready for a new trial. When the delicacy of the apparatus is increased by the use of a diffusion diaphragm of large area in conjunction with a very small gauge, it is possible by it to discover leaks too small to ignite. The paper above referred to is given, *in extenso*, in the *Journal für Gasbeleuchtung*.

Asphalt as Fuel.

Inventors ought to find a good field in the study of some effective means to utilize asphalt as fuel. The solution of this question would be of great service to this country. It is said that many of what were thought to be coal mines, recently discovered in various parts of Mexico, are really deposits of bitumen. Now while asphalt is highly combustible there seems to be at present no practicable method to utilize it as fuel, owing to its melting when subjected to heat. It is likely, however, that with the demand for cheap fuel now felt all over the country for railway, mining, and other industrial purposes, some effective method can be devised to make practical use of its heat producing qualities; burning it, perhaps, after reducing it either to a liquid or vaporized form. The inventor of such a process could command a handsome fortune for the use of the right in this country. The products of the new oil wells in Vera Cruz, much of which are said to be too heavy for illuminating purposes, might also be utilized in the same manner.—*Mexican Financier.*

London as a Commercial Entrepot.

The East and West India Docks Company of London has boldly embarked in a gigantic enterprise, for which some commercial prophets predict a failure. This is the construction of docks at Tilbury, on the Thames, opposite Gravesend, of such magnitude that the *Globe* says: "On the whole, this dock extension promises to be the most remarkable that even London has ever witnessed, and will leave all other ports in the world far behind." They will have a tidal basin with a depth of forty-three feet, and the largest vessels afloat will go in and out without regard to the tide. The contracts call for four dry docks, with a total length of 1,730 feet, a floating derrick with a lifting capacity of 100 tons, special wharves and abattoirs for the cattle traffic, 15,000 lineal feet of quay berths, from forty to fifty miles of permanent railroad tracks, and a large hotel for the accommodation of passengers. "Tilbury is certainly at a considerable distance from London," says the *Globe*, "but with the railway facilities to be organized, a few miles more or less will really be a matter of no great importance, while it is undeniable that, with the huge ships of the present day —and they still seem to be continually advancing in dimensions—the avoidance of a few miles of river navigation, with its windings and shallows and fogs, and the necessary cost of tonnage and pilotage, must be an immense advantage." The contracts call for the completion of the work within two years and a half, of which one year has already elapsed.

Novel Mode of Making Electric Lamps.

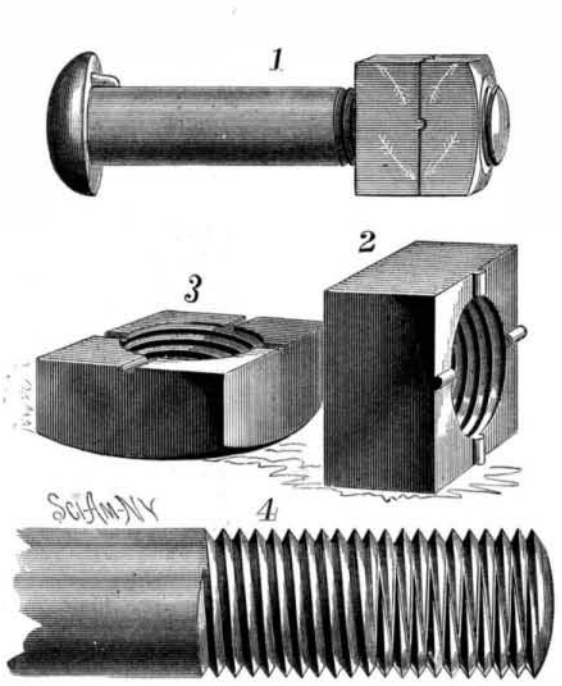
A new way of making incandescence lamps has been patented by Messrs. Soward, Probert, and Boulton. They take a glass bulb with two electrodes through it at a suitable distance apart, and either solid or tubular. A carbonaceous gas is then inserted into the bulb, and the electrodes connected to a generator of high tension. Sparks pass through the gas inside the globe between the electrodes and decompose the gas, so as to build up an arch or loop of carbon between the electrodes. This bridge is the filament, and after exhausting the globe of air the lamp is ready for use.

NEW NUT LOCK.

A right hand screw thread is first cut upon the bolt of any desired pitch. A left-hand screw thread is cut upon as much as is desired of the right-hand screw, and a right-hand or support nut is turned upon the right hand thread, and a left-hand or locking nut is turned upon the left-hand thread of the screw. When the right-hand nut is turned to its place and followed to a snug contact by the left-hand nut, any tendency of the right hand or support nut to unscrew will equally tend to tighten the left-hand or lock nut, so that the right-hand nut is positively and securely locked.

Projections are formed on the lock nut contact side of the support nut, and furrows or depressions are made in the contact side of the lock nut.

When the nuts are made in this form, the support nut must be turned past the point at which it is ultimately to rest to just half the length of the projections. The lock nut is then turned almost to contact with the projections of the support nut, and so that these projections correspond to their respective depressions, at which position, if the nuts



IMPROVED NUT LOCK.

have been properly constructed, their wrench surfaces will be in the same planes. Now, by turning both at once with the wrench, the support nut will turn down to its resting place, and the lock nut will turn up to a snug contact with the support nut, when, as in the former case, every tendency of the support nut to unscrew will only force the lock nut more snugly against it.

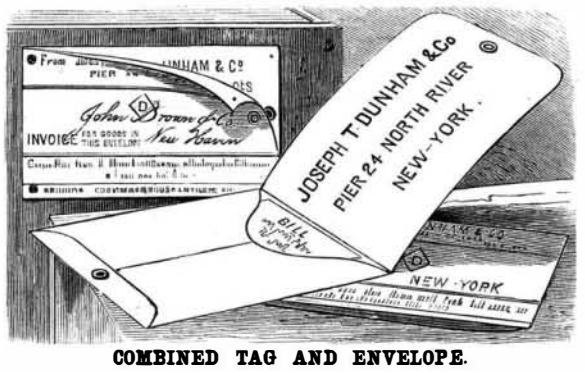
In the engraving Fig. 1 shows the nuts in place on the bolt, and Figs. 2 and 3 show the contact faces of the nuts.

This invention has been patented by Mr. B. S. Cocker. Further information may be obtained by addressing Messrs. Cocker & Hill, Topeka, Kan.

COMBINED TAG AND ENVELOPE.

We give an engraving of a novel device which permits of sending the bill or invoice with the goods in all classes of business, a matter which is often of great importance, especially when the goods are of a perishable nature, the object being to enable the dealer to know at once the cost of the merchandise, so that the goods can be sold without delay. The greatest advantage is the saving of stamp and envelope, as this combined tag and envelope does the whole thing for simply price of tag. Another advantage is that the address is concealed, and dealers cannot ascertain the address of the customers of their competitors, while at the same time railway and express companies can readily obtain the address when necessary.

The invention consists of an envelope made of tough paper—preferably waterproof—and provided with a long flap capable of covering one side of the envelope, and both envelope and flap are provided with an eyelet. The bill or invoice is inserted in the envelope, and a string, wire, or hook is passed through the eyelets, securely fastening the envelope. The tag may be tacked to a barrel, box, or other package, and the flap may be secured by means of a rubber



COMBINED TAG AND ENVELOPE.

or oilcloth strip, or other device. It is stated that there are over 150,000 now in use.

This useful invention has been patented by Mr. Jos. T. Dunham, and is manufactured by Jos. T. Dunham & Co., Pier 24, North River, New York city.

Improved Method of Producing Printing Surfaces from Gelatine Reliefs.

Messrs. Brown, Barnes and Bell, of England, have lately made an improvement on the Woodbury plan of producing printing surfaces. The method of working is to take a plate or sheet of lead and place above and beneath it flat sheets of steel; outside of the steel are placed sheets of cardboard, to give elastic pressure. On top of the cardboard another sheet of lead is placed, on it a lead plate, then a steel plate, and lastly a second sheet of cardboard. The sheets as thus arranged are passed between an adjustable spring metal roller press, set to a certain thickness. The sheets of lead are reduced to the thickness of the set of the press when passed through the same. This action produces a true, even, and proper surface for receiving the impression from the gelatine relief.

The gelatine relief is obtained in the well known manner of sensitizing with bichromate of potash.

To imprint the gelatine relief upon the sheet of lead prepared as described, the relief is placed upon the lead plate, then covered on both sides with a sheet of steel and cardboard, and all are passed through the spring roller press, which has the same set or adjustment as before; the addition of the gelatine relief causes an impression from the relief to be produced upon the lead sheet, which serves, when backed up, as the type for printing from.

When it is desired to print with greasy or fatty inks a grained surface is used, which is first obtained in the production of the original gelatine relief by placing between the positive and sensitive gelatine sheet a gauze or perforated sheet. A grained surface is thus incorporated into the original gelatine relief during the process of light printing. As thus prepared the relief is laid upon the lead sheet, and both are passed through the press as before stated. The grain of the gelatine relief is thus transferred to the lead sheet.

In place of producing the grained surface as above described, after the gelatine relief has been impressed upon the lead sheet, a sheet of fine wire gauze, muslin soaked in glue and dried, sand paper, or their like is laid upon the impressed lead sheet and backed with a soft cloth, and all are passed through the press between the steel plates and cardboards.

A roughened surface is thus imparted to the lead plate. The advantage claimed for the general method as described is, that the gelatine relief is more easily impressed upon thin sheets of lead than upon thick plates by hydraulic pressure. Large sheets can be easily prepared, and less expensive machinery is required.

VESUVIUS.—Letters from Naples say that the condition of the volcano has again become an object of serious attention to Professor Palmieri, and of wondering interest to ordinary spectators. Since the 21st June the activity of the crater has been steadily increasing, the first symptom being the upburst of a column of flame, visible at a great distance. Every night a fiery glow, like a gigantic crown, hovers over the summit, forming in the clear summer night a spectacle of mingled picturesqueness and terror.