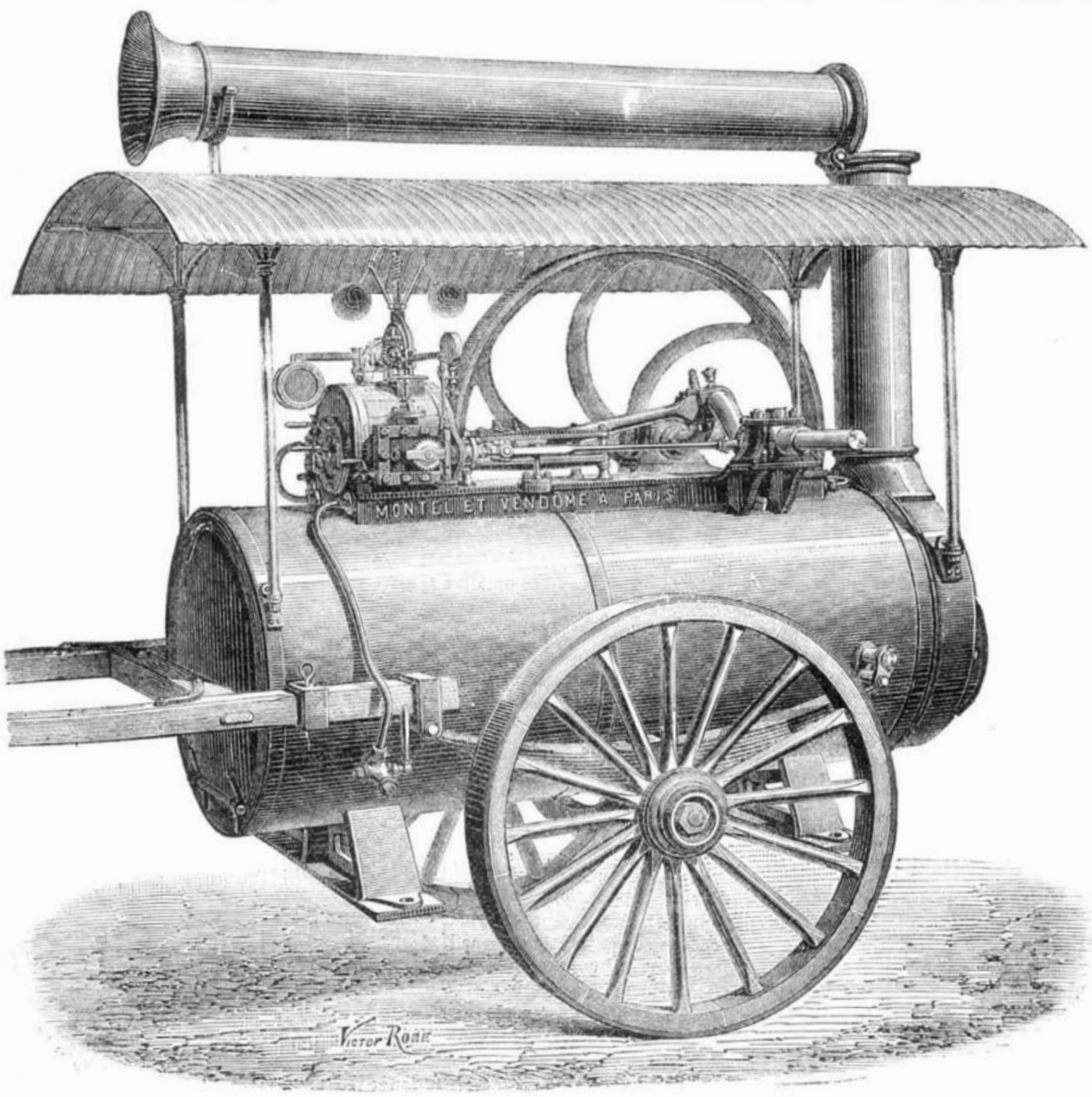
NEW PORTABLE ENGINE.

We publish herewith an engraving of a portable engine (constructed by Messrs. Montel and Vendome, of Paris, France), which has several novel features. It is mounted on two wheels only, with springs, and can be readily drawn by horses, shafts being attached to the springs. When at the place where its services are required, the wheels are readily taken off, and the machine allowed to rest on its two bed plates, in which are holes for securing it to a foundation, if necessary.

The boiler is cylindrical in form and tubular. The fire box, which is wholly within the shell of the boiler, can be removed; the shafts are then attached to move the engine from place to place. An efficient superheater is placed at the upper part of the boiler, the cylinder of the engine is steam jacketed, and the cut-off is controlled by the governor. The feed water is heated by an appliance with the shell of the boiler.



MONTEL AND VENDOME'S PORTABLE ENGINE.

Non-Combustible Wood.

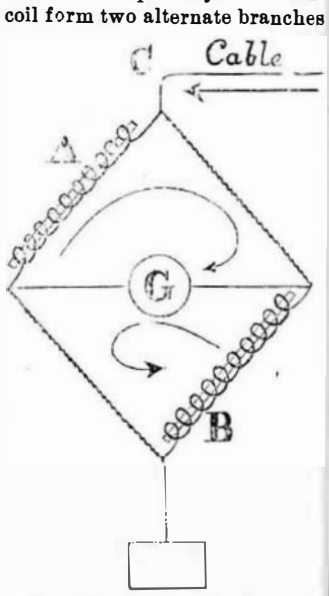
The English Admiralty have recently made some quite satisfactory experiments at Plymouth, upon a wood rendered uninflammable by treatment with a solution of sodium tungstate. The results prove that wood thus prepared is very much less inflammable than ordinary wood; chips and shavings made of it, though, of course, capable of being destroyed by fire, cannot be themselves inflamed, and cannot, of course, communicate fire to masses of wood thus prepared; so that framework made of this wood resists flame perfectly, at least when not exposed for a long time to a fierce fire. These advantages, however, are diminished by the considerable first cost of preparation, as well as by the increased weight of the wood after treatment.

IMPROVEMENT IN CABLE TELEGRAPHY.

My chief object in writing the present paper* is to make known an important improvement I have made in the use of the induction coil in cable signaling. The great disadvantage in the use of the induction coil is the so-called magnetic retardation experienced by the cable current in passing through the primary wire. This magnetic retardation is caused by self-induction in the primary wire; any change in the current passing through the wire tends to produce a current in the opposite direction to such a change, and in this way rapid changes are, as it were, clogged, the effect being very similar to an increase in the length of the cable, so that magnetic retardation seems a very appropriate name for expressing the effect.

I have, however, been able not only to eliminate this magnetic retardation, but to cause the self-induced currents, which are its cause, to aid in the formation of signals.

The method is briefly as follows: The primary and secondary wires of an induction coil form two alternate branches of a Wheatstone's bridge; say A and B, Fig. 2, are these branches. The other branches are simple resistance, which may be made to produce balance when a constant current is flowing. G is the galvanometer or other receiving instrument. The current entering at C divides between the resistance and the primary wire. The increase of the current through the primary wire, A, not only induces a current in B, the secondary wire, in the direction shown by the lower arrow, but also causes a self-induced current to flow in the direction of the upper arrow; again, the increase of the current through B not only causes an induced current in A, in the direction of the upper arrow, but also causes a self-induced current to flow in the direction of the lower arrow. During the decrease of the cable current, the direction of the induced currents is reversed, It is this reversal of the induced currents during the decrease of the cable current which gives value to the induction coil in cable signaling. Now the self-induced currents, which, in my plan, aid the formation of signals, are the very cause of magnetic retardation in the ordinary way of using the induction coil.



One great advantage in the use of the induction coil, over the condenser plan, is the much greater safety the cable is placed in during the prevalence of those intense earth currents which accompany magnetic storms. In the way in which cables are usually worked at present, the sending end of the cable is either connected directly or through a small battery to earth, while the other end is insulated by the condenser. In this way the cable is, at the receiving end, submitted to the greatest strain possible. On some lines, however, the cable is kept completely insulated between two condensers, one at each end. It is not difficult to show that at each end of an insulated conductor, the electric strain (if we may so call it) between the conductor and the earth, produced by earth currents, would be just half that which would be produced at an insulated end when the other end is joined to earth. When using the induction coil, or my modification of it, as a receiving apparatus instead of the condenser, the cable is joined to earth at each end through a moderate resistance, and is therefore nearly in its safest possible state.

* Paper read before the British Association, at Belfast, Ireland, by G.K. Winter.

Isaac Craig Buckhout.

Mr. Isaac Craig Buckhout, chief engineer of the New York and Harlem Railroad, and chief of the Board of Engineers of the Fourth Avenue Improvement, died at his residence in White Plains, N. A., September 27, in the forty-fourth year of his age. Among his principal engineering works were the Grand Central depot, and that portion of the Underground Railway system of this city extending along Fourth avenue from the Grand Central Depot, at 42nd street to Harlem river, 4½ miles, now nearly completed. To his arduous labors in connection with this great work is attributed the illness which has unfortunately resulted in his premature decease.

Two Wrinkles.

Very often a screw hole gets so worn that the screw will not stay in. Where glue is handy, the regular carpenter makes the hole larger and glues in a large plug, making a nest for an entirely new hole. But this is not always the case, and people without tools, and in an emergency, often have to fix the thing at once. Generally leather is used, but this is so hard that it does not hold well. The best of all things is to cut narrow strips of cork, and fill the hole completely. Then force the screw in. This will make as tight a job as if driven into an entirely new hole.

Another hint of a similar character may be useful. One often desires to put a staple into a block of stone. The hole is made, the staple inserted, and lead melted and run in. But unless the hole is made with the bottom larger than the top, the lead will in time work out, if there is much jar or side strain on the iron. Besides, the lead itself is liable to some compression, which admits of looseness, especially after being subjected to very hot fires. A much better article is sulphur. If this be melted and poured in around the staple instead of lead, it makes a much more durable job. Besides, it is often more easy to procure sulphur than lead, as every store keeps it that deals in general variety.—*American Builder.*

NEW INSTRUMENT FOR ESTIMATING UREA.

Dr. W. J. Russell, F.R.S. and Mr. S. H. West publish the following in the *Journal of the Chemical Society*:

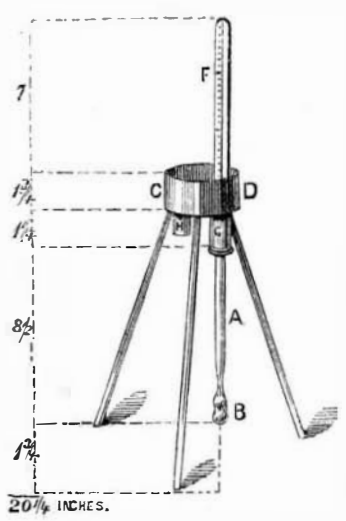
We find it most advantageous to use a solution of hypobromite, prepared by dissolving 3·5 ounces of common solid caustic soda in 15 cubic inches of water, and adding 1·5 cubic inches of bromine. This mixture gives a rapid and complete decomposition of the urea.

The form of the apparatus is shown in the accompanying engraving. A tube, A, about 9 inches long, is narrowed 2 inches from the closed end, and a bulb, B, holding about 0·75 cubic inch, blown on it. The upper part of the tube contains about 1·5 cubic inches, This is fitted, by means of an india rubber cork, into a small elliptic tin trough, C D, about 3 inches long, standing upon three legs. In using the apparatus a 0·3 cubic inch pipette is filled with the urine, and the liquid is allowed to flow into the bulb of this tube. Water is added, thus washing down the urine which adheres to the sides of the tube, and filling the bulb up to the top of the constriction. A glass rod, with a piece of india rubber tubing about half an inch long drawn over the end of it, is then introduced, so that the india rubber plugs up the constriction. The hypobromite solution is then poured into the upper part of the tube until it is full, and the trough is afterwards half filled with ordinary water.

A graduated tube, F, is filled with water, the thumb placed on the open end, and the tube then inverted in the trough. The glass rod is then pulled out, and the graduated tube slipped over the mouth of the bulb tube.

The reaction commences immediately, and a torrent of gas rises into the measuring tube. To prevent any of the gas being forced out by the reaction, the upper part of the bulb tube is slightly narrowed, so that the gas is directed to the center of the tube. With the strength of hypobromite solution which we suggest, the reaction is complete in the cold in about ten or fifteen minutes; but in order to expedite it, the bulb is slightly warmed. This causes the mixing to take place more rapidly, and the reaction is then complete in five minutes. The reaction will be rapid and complete only when there is considerable excess of the hypobromite present. After the reaction the liquid should still have the characteristic color of the hypobromite solution.

The measuring tube is graduated so that the amount of gas read off expresses at once what may be called the percentage amount of urea in the urine experimented upon, that is, the number of grains in 6 cubic inches, 0·3 cubic inch being the quantity of urine taken in each case.



Three tenths of a cubic inch of a 2 per cent standard solution of urea gave, without correction: 2·25, 2·22, 2·22, 2·23, 2·215, 2·25, 2·22, 2·215, 2·22, 2·226, 2·215, 2·225, 2·225, 2·22, showing a mean of 2·225 cubic inches.

If the urea had given off the whole of its nitrogen, we ought to have obtained 2·232 cubic inches. Even under these circumstances the difference between these two numbers represents only 0·001078 of a grain of urea. And even this error may be obviated by taking 2·225 cubic inches, as the basis for the graduation of the measuring tube, instead of 2·24. The presence of sugar in the urine does not affect the reaction