

operations—an idea which has already called forth a number of inventions.

The lumps prepared, as already stated, are dipped into a bath of benzine, in which rosin has been dissolved. The object of this operation is to render them impervious to moisture. The solution penetrates the lumps to the extent of about a quarter inch; and upon the evaporation of the benzine, which takes place rapidly upon exposure to a current of air, a film of rosin is left behind, which so effectually stops up all crevices, that in the experiments made by the Committee on Science and Arts in investigating the process, masses which had lain in water for twelve hours were found to have lost none of their compactness and to be still dry in the interior. The consumption of the artificial fuel took place very satisfactorily, all the specimens burning till completely ashed.

With regard to the heating power of the material, the committee's report show this to be somewhat below the average of bituminous or anthracite, as would naturally be anticipated from the admixture of clay. The compactness of the material will, in their opinion, allow of its transportation, with ordinary handling, with as little loss from breakage, as is suffered by many kinds of bituminous and semi-bituminous coals which are brought to market.

It would seem, therefore, that the plan of Mr. L. is one of the most practical which has yet been made public for utilizing this waste product. Its ability to withstand disintegration by the action of rain is certainly a great point in its favor. The main question after all, however, resolves itself into one of economy, and it is clear that, however well adapted it may be for many purposes in the arts, no artificial fuel can ever become of practical value to consumers, until the cost of its preparation is less expensive than the cost of mining coal. Should this prove to be the case with the plan here described, it will doubtless prove in every way worthy of the attention of those interested in the production of a cheap fuel.

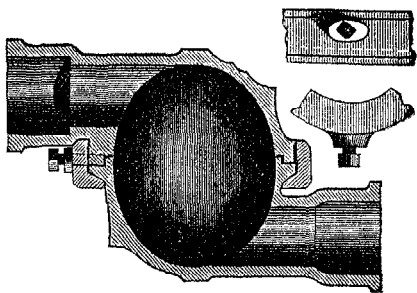
The Patent Diamond Drill is a tube of iron, like gas pipe, the lower end of which is faced with small diamonds. The drill generally stands upright, but may be used in other positions. We speak here of the vertical drill. The drill is revolved rapidly by steam machinery, and is fed downwards into the rock by a screw-feed, somewhat in the manner of a drill in an ordinary drilling press used in machine shops. The hole cut by the drill is a *ring*, leaving a *core* standing inside of the tube. To prevent heating by friction, a con-

stant stream of water is forced down the inside of the tube, and reascends outside, bringing up the dust or borings. The steam engine used to actuate the drill resembles in general appearance an ordinary portable steam hoisting engine. The cylinders and the machinery are bolted to the vertical face of the end of the boiler. The apparatus for turning the drill, feeding, and causing the drill to return out of the hole when desired, is ingenious and effective, but need not be minutely described here. The writer saw a two-inch hole put down about two feet into hard rock, perhaps at the rate of four feet per hour. The diamonds are said to last a long while, and to be self-sharpening. The hole, for small holes, may be about three-quarters of an inch more in diameter than the core; in large holes the difference is probably somewhat greater, but the proportion of the diameters more nearly equal. The core of small holes breaks off by raising the drill, and there is an ingenious and effectual method of causing the core to come up with the tube when the tube is withdrawn from the hole. It is said that large cores are broken loose at the bottom by means of blasting, the cartridge being sent down the hollow ring left by the drill.

J. W.

Steam-Pipe Joint.—We subjoin an engraving showing a neat form of flexible joint for steam-pipes, designed by Messrs. Wöhrman & Son, of Mülenhof, Russia, and which has been successfully employed by them for the pipes of steam pile-driving machines.

In spherical joints, as ordinarily constructed, the pressure tends naturally to force apart the surfaces which fit together, and which form the steam-tight joint.* In the engraving here illustrated this action is reversed, the pressure of the steam tending to force the joint surfaces together.



The illustration herewith presented explains the construction and operation so clearly that a further description is unnecessary. The joint is declared to answer well, and there are many situations where it could doubtless be usefully applied.

* *English Mechanic*, xiv, 246.