PAIGE'S PATENT IMPROVEMENT IN STEAM BOILER FURNACES.

Where bituminous coal is used as a fuel to generate power, for steam engines or other purposes, much of the carbon, of a volatile character, is carried off and left to settle down through the atmosphere, to the annoyance of everybody in its vicinity and to the direct loss of the consumer. For want of legal enactments, such as exist in England, some of our towns and cities are rendered unpleasant to their inhabitants and unattractive to strangers. The unconsumed carbon, which vitiates the atmosphere, where bituminous coal is the fuel, is neither healthy nor comfortable. The object of the device shown in the accompanying engraving is to provide for the complete and entire combustion of the gases and of the volatile, but solid particles of fuel, usually carried off by the draft to be deposited in a solid form.

Fig. 1

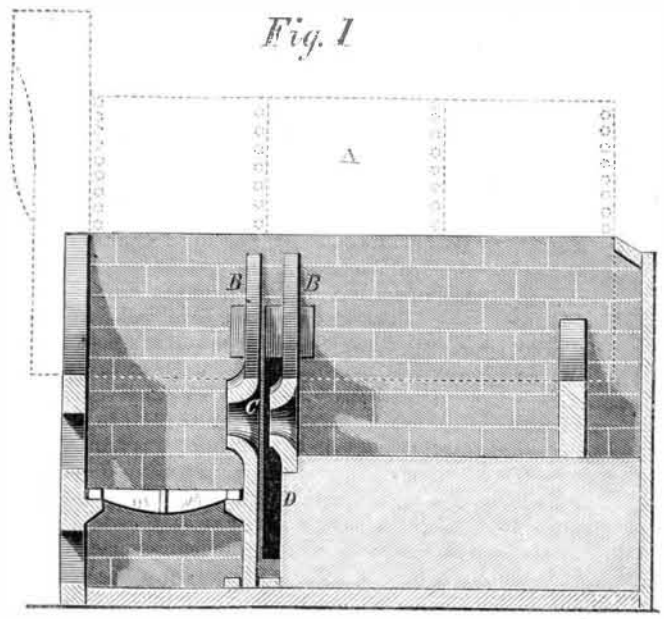
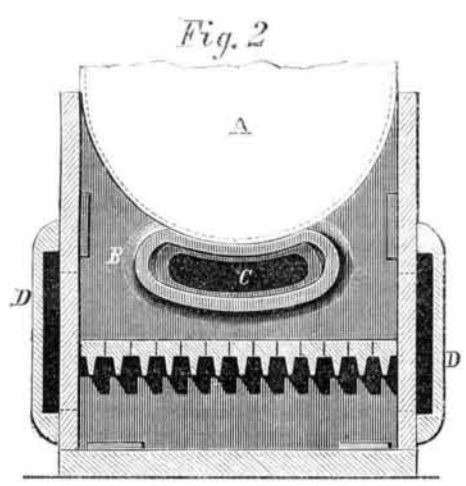


Fig. 1 is a vertical longitudinal representation of a furnace and boiler, and Fig. 2 is a cross section, taken on a transverse line at the rear of the grate. Similar letters refer to similar parts in both engravings. The furnace is of the ordinary style, its back, however, being an upright plate fitting the convexity of the boiler and the level of the grate, and having an opening of an elliptical form, but curved on its upper surface, to the circumferential line of the boiler. Another upright plate, similarly formed, is placed just behind the first, having a similar projection. These are seen in both figures: A is the boiler in Fig. 1 extending to the horizontal dotted line, and in Fig. 2 being shown in transverse section. B, in Fig. 1, shows the sections of the plates. The same in both figures show the form of the plates; and, in Fig. 2, at C, the whole contour of the openings is shown, also in section in Fig. 1, same letter—C.

The gases of combustion are met at a point between the two plates by a column of atmospheric air (oxygen) admitted through side apertures—seen plainly at D Fig. 2—to the space between the plates, B. It is evident that the outer air passing into the chamber, formed by the space between the

Fig. 2



two plates, and meeting the heated gases, smoke, etc., from the furnace, is at once expanded and intimately mixed with these products of combustion; not passing through the opening in the rear plate in a direct line, but deflected against the surface of the plate, and thus receiving a recoil or revolution before passing off with the draft. Thus perfect combustion is assured, and an intense heat results, that passes along the bottom of the boiler and envelops its sides. The inventor believes that not only is the smoke all consumed, but that the power of the heat and, consequently, the economic use of the fuel are increased twenty per cent. Where, as on vessels, the bulk and weight of the fuel carried are important elements in calculating the capacity of a ship, the advantage of such a device is apparent; and also where the cost of the fuel is an important item. This improvement may be applied to any ordinary furnace as well as to those built specially for its reception.

The inventor and patentee guarantees that the improvement will accomplish all that he claims, and invites those who desire further information to address J. L. Paige, No. 7 Howell street, Rochester, N. Y.

Treating Textile Fabrics.

M. Pierre Armand Neuman, of St. Denis, Paris, treats textile fabrics with sulphuric acid, for the purpose of rendering them impermeable. By this process the fibers on the surface of the fabric are partially dissolved, and converted into a glutinous substance, without the fibers in the body of the fabric being destroyed. The fabric, after being passed through the sulphuric acid, is quickly washed and rinsed in water, to stop the action of the acid, and remove all traces of it, and it is afterwards dried, when the part which has been acted on by the acid, having impregnated and coated the fibers of the fabric, and filled up the interstices between the warp and the weft, will convert it into a parchment-like and impermeable material.

Heat and Steam.

A correspondent writing to us on the subject of "Waste and Economy of Fuel," seems to misapprehend Joule and Tyndall. One cubic foot of water when transformed into steam, does not, as he supposes, only contain 1,169 units of heat, but contains 1,169 multiplied by 62½ pounds, or 73,062·5 units.

The steam engine furnishes a ready and convenient method of determining the mechanical equivalent of a unit of heat, and shows conclusively, we think, that Joule's figure is too low.

If we accept the results of the most careful physicists of our day, we may take the calorific value of one pound of good coal as equal to 7,500 Centigrade degrees.

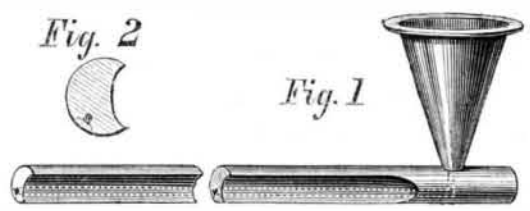
Two such pounds consumed in as perfect a steam engine as we can construct, gives us an indicated horse power of 33,000 foot-pounds per hour, so that twice 7,500 units, or 15,000, in this case, will produce in an hour an effect equivalent to 33,000 × 60 minutes, or 1,980,000 foot-pounds. One unit at atmospheric pressure of 14·706 pounds will then represent 132 foot-pounds.

Reducing the pressure to zero, we obtain the equivalent of 1,931·192 foot-pounds for each unit of heat. Had the calorific power of 1 pound of coal been 6,000 units of heat, our equivalent would have been 1,838·25; if 8,000 deg., 2,426·32. The average would be 2,065 foot-pounds. This result we *practically* obtain every day with engines which we know to lose 30 per cent of useful heat. Adding this 30 per cent to our equivalent, as above, we obtain 2,684·5 foot-pounds, as the real equivalent of one unit of heat as exhibited by the working of the modern steam engine.

SELF-LUBRICATING AND SELF-CLEARING DRILL.

Boring deep holes in metals, especially when the hole is of very small diameter, and it is necessary to have it drilled straight and true, is not always an easy matter. In boring pistol and rifle barrels, for instance, nearly as much time is employed in in removing the drill, clearing, and lubricating it, and replacing the barrel and drill, as in the drilling itself. The drill shown in the accompanying engraving was brought to our notice by Wm. A. Chapin, of White River Junction, Vt., and introduced by him into the U. S. Armory, at Springfield, Mass., and is intended to obviate the difficulties alluded to, and save this otherwise wasted time.

Fig. 2 Fig. 1



The drill is, as seen in Fig. 1, a "pod" drill, milled to crescent form, in transverse section, the milled semicircular score being for the reception of the chips. Throughout its whole length it has a channel, seen in both figures, but more plainly in Fig. 2, that terminates at the cutting end, or point, and near the other end connects with a funnel to receive the oil or alkaline water, which acts as a lubricant. This score is milled or planed in the body of the drill, and covered with a piece of sheet steel, held in place by soft solder. Fig. 2, the enlarged cross section, shows this arrangement.

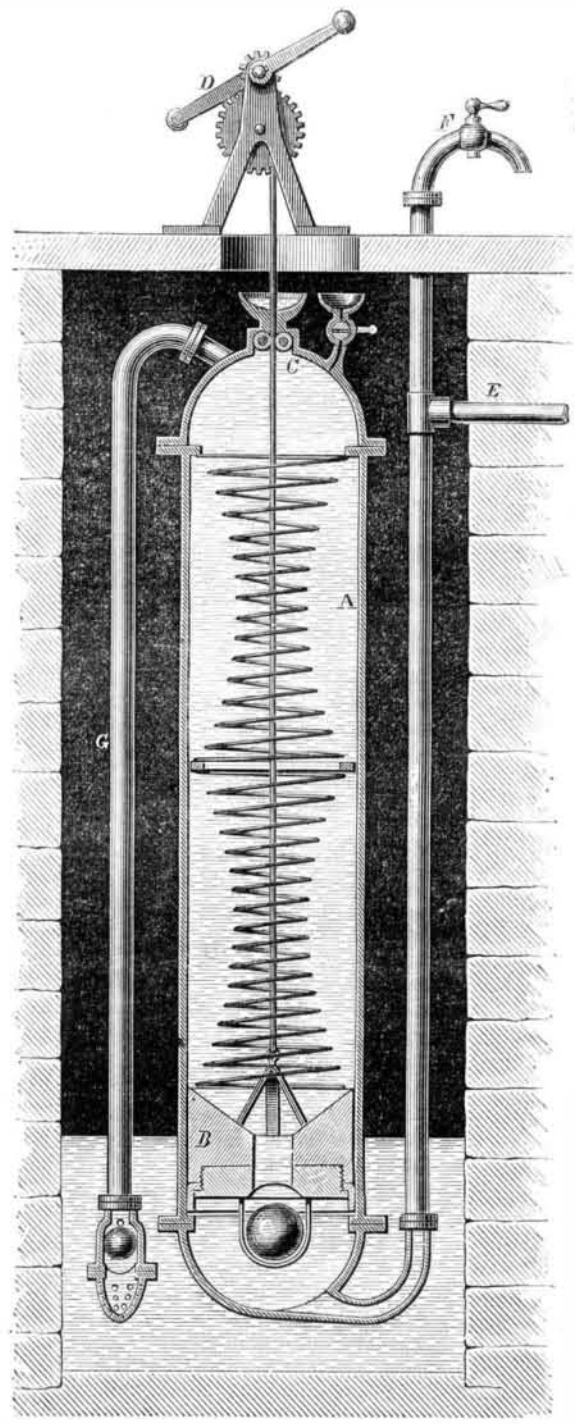
At the cutting end of the drill, the heat, caused by friction, will be greater than at any other point, and if the drill is used horizontally, the oil will be thinned and find its way to the point. If, at any time, the oil passage should become clogged, the hand end may be opened and a wire introduced for its cleansing. This end may be closed by any simple plug that may be readily removed for the purpose. This clogging, however, rarely occurs.

Tunneling Street Crossings.

Engineering speaking of the proposition to construct either bridge or tunnel crossings on the crowded streets of London, condemns both plans. Arguing against bridges, *Engineering* says: "We have sufficient experience, from a lengthened trial of the overhead bridge spanning the most crowded portion of Broadway, New York, that such a system of street crossings is of but little service; decrepit persons were unable to use it, business people too hurried, ladies were assisted over the street by the police, and the bridge was scarcely employed, save by idlers, while the only one who derived profit from it, till it was removed a few months ago, was a neighboring photographer. And if a bridge has proved itself objectionable in a situation where, of all others, a bridge should have proved itself most beneficial, a subway would be still more useless and objectionable." We certainly cannot see the force of this reasoning. In no single respect, but that of being on a different level from the street, is a subway like a bridge. But while the bridge must be high enough to allow vehicles and loads of all sort to pass under it, and its ascent and descent is consequently wearisome, the floor of a tunnel need not be more than eight or nine feet from the upper surface of the roadway. We have yet to hear any valid or even plausible objection to tunneled street crossings.

KOCH'S COMBINED AUTOMATIC LIFTING PUMP.

The object of this pump is to produce a continuous flow of water, by means of mechanical appliances brought into action by occasional exertion of force storing up power, for the time when required. The intention is to concentrate a force by a moment's application of physical power, to develop gradually into a power extending through a period much longer than that required for condensing or compressing it.



The cylinder, A, is suspended in a well, tank, or cistern, having inside it a piston, B, to which is connected a wire or other rope by which it may be lifted. This rope passes between rollers, C, at the top of the cylinder, made of elastic or flexible material, thus forming an air-tight joint, or packing. It is wound around a barrel by means of the double crank, D, and pinion and gear at the top of the well or cistern, or at any convenient point in the building. Connected with the piston is a series of spiral springs two or more in number, guided by means of diaphragms fitting the interior of the cylinder, but not necessarily air or water tight. In raising the piston, B, of course these springs must be compressed, and this compression is the means for furnishing the power necessary to re-depress the piston by their resilient force, and thus raise the water. Suppose the cylinder be, as represented, filled with water, the piston raised, and the springs contracted; it is evident, if pipes E and F, are furnished with cocks and they are closed, no air could enter the cylinder from these sources when the piston was raised, and a consequent vacuum would be formed under the piston. Then water passes from the pipe, G, to above the piston and rushes down through the cylinder and the central hole in piston, B, up through the upright pipe, to be delivered by the pipe, E, or the pipe, F. The descent of the piston will be governed entirely by the water drawn through these pipes, so that the amount of water that can be drawn, before again contracting the spring, is limited only by the capacity of the cylinder.

Patent pending through the Scientific American Patent Agency. Further information may be obtained by addressing Christian H. Koch, at Davenport, Iowa.