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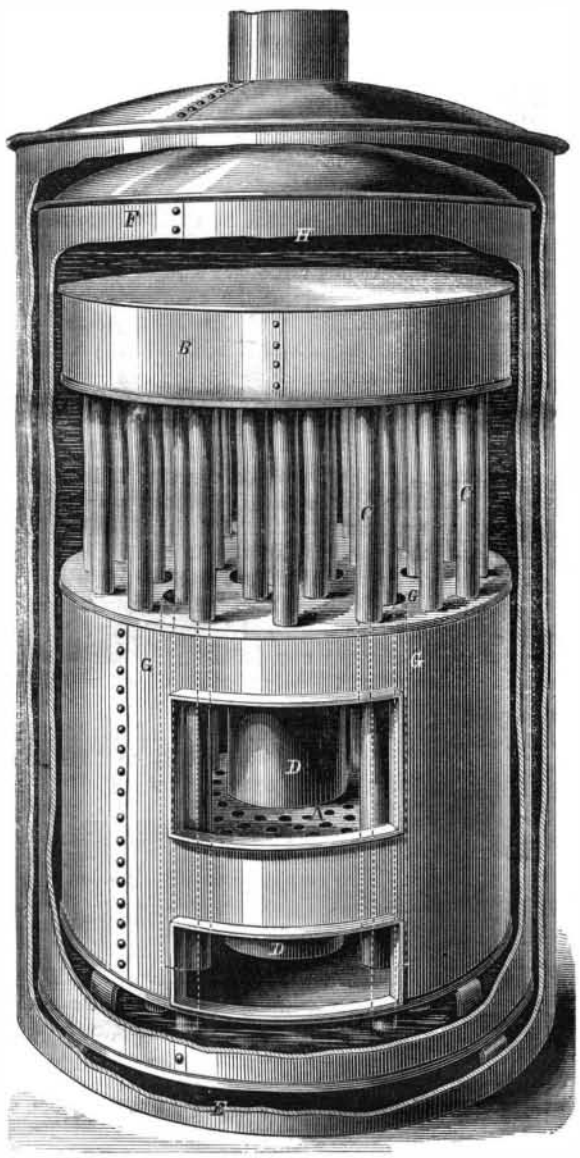
### Improved Steam Boiler.

Economy in fuel is one of the greatest things to be desired in a steam boiler, and when we have joined to this quality strength of parts, and a thorough circulation of the feed water, we shall obtain a first-class apparatus. In the engraving published herewith a steam boiler, constructed on peculiar plans, is represented. It is designed to not only obtain great area of heating surface, but to so direct the products of combustion that they shall unite or combine at high temperatures, and thus give off heat which would otherwise be lost.




MILES'S STEAM BOILER.

In the engraving, A is the fire-box (the outer shell of the boiler is cut away entirely in order to show more important parts), and B the combustion chamber, connected to the fire-box by the tubes, C. Through these tubes the heat ascends to the chamber, and returns downward through a central flue, D, which extends from the combustion chamber above, to the chamber, E, below. From the latter part the heat rises and envelopes the sides of the inner cylinder, F, which contains water. It will be seen that the water is all about the tubes, C, and that they are surrounded with other tubes, G (as shown by dotted lines), of a greater diameter, where they pass through the fire-box; these other tubes, G, are therefore full of water, which is heated directly in the fire, and also by the return of the gases which entered the combustion chamber. The tubes, G, not only maintain a perfect circulation of the feed, but by having comparatively large area they obviate the tendency to foam, which vertical water wheels are liable to, and deliver the water heated, without violent ebullition, into the solid water contained in the larger part of the boiler. The inner water and tube chamber sets upon legs, and is adequately stayed in its place by ratchet bolts, etc., as usual. We have omitted these and the stays, to avoid making the engraving complex. The hight of water over the crown of the combustion chamber is shown by the dotted line, H.

The plan of this boiler appears to be good and economical, and we have no doubt but that excellent results will be obtained in its use. It was patented through the Scientific American Patent Agency, on April 19th, 1864, by Chas. M. Mills, of Vineland, N. J., and assigned to himself and C. F. Jones; for further information address either of the above parties.

### Gun-cotton.

Professor Abel, of London, who has so carefully investigated the gun-cotton, thus sums up the peculiar properties of this explosive substance:—"When inflamed, or raised to a temperature ranging between 137° and 150° centigrade, it burns with a bright flash and a large body of flame, unaccompanied by smoke, and leaves no appreciable residue. It is far more readily inflamed by powerful percussion than gunpowder; the compression of any particular portion of a mass of loose gun-cotton between rigid surfaces will prevent that part from burning when heat is applied. The products of combustion of gun-cotton redden litmus, and contain nitric oxide, hence they have a corrosive action on gun-metal. In the open air it may be inflamed, when in actual contact with gunpowder, without igniting the latter; in a confined space (as in a shell, or the barrel of a gun) the almost instantaneous rapidity of its explosion produces effects which are highly destructive, as compared with those of gunpowder, while the projectile force exerted by it is comparatively small." For these reasons Professor Abel—who is chemist to the War Department—does not think we are yet in a position to use gun-cotton as a substitute for powder."

THE boat in which Hammill was to row against Ward on the 19th instant, on the Monongahela river, in Pennsylvania, weighs only thirty-seven pounds, although nearly thirty feet long. It is built of Spanish cedar, and fore and aft is covered with oil silk. The sculls are nine and a half feet long, and both together only weigh four pounds.

### BURDICK'S FLASK LOCK.

It is well known to molders and persons connected with machine-works that the common flasks for casting metals in are very imperfect in their construction, so far as regards accuracy and facility of adjustment. It very often occurs that complicated castings or even simple ones are spoiled from the cores being thrown on one side, or the two parts of the flask being shifted when put together after the pattern has been molded. In any case care is requisite to prevent accidental misplacement of the parts.

The lock herewith represented is intended to prevent the evils referred to, and is a simple and secure attachment for the purpose. It consists of two metallic plates, A and B, the lower one, B, having

*Fig. 1.*

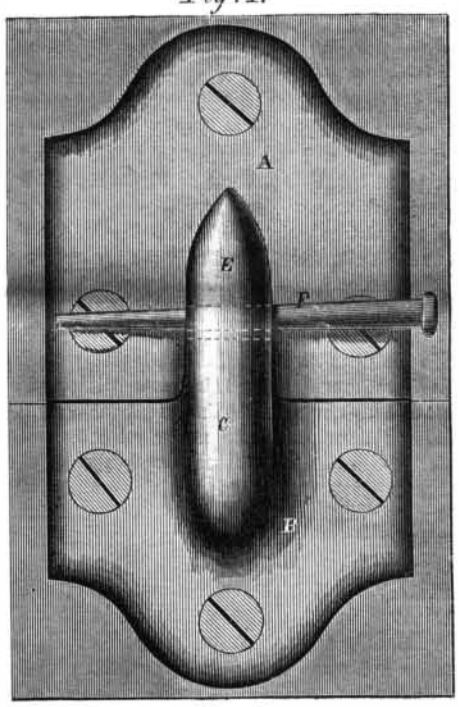
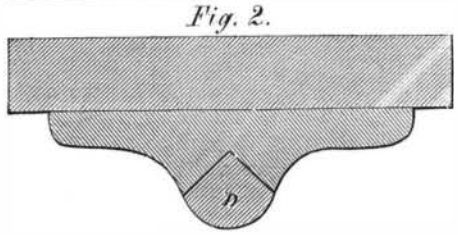



*Fig. 2.*




a tooth, C, projecting upward. This is fitted to the casting, A, by a beveled face, D (see section Fig. 2). There is also a shoulder, E, cast on the inside of the tooth, C, as shown by the dotted lines in Fig. 1, and a key, F, is fitted to the recess, so that it bears upon the tooth at the top and on the plate, A, at the bottom, thus binding (when the key is driven) both halves of the flask together. It will also be seen that the V-shaped faces, D, prevent any lateral motion of the flasks one upon the other, so that the parts must be true when put together, and always in exactly the same relation to each other. These V-faces also match easily so that the flasks need not be jarred from one side to the other to find the proper place to unite them. This practice often causes pieces of the sand in the upper flask to fall into the lower one and injure the outline of the casting when it is poured. The expansion of the flask from heating when the metal is poured does not derange this