F. HUNGERFORD.

Oil-Burning Boiler Furnaces.

No. 142,468. Patented September 2, 1873.

Fig. 1.

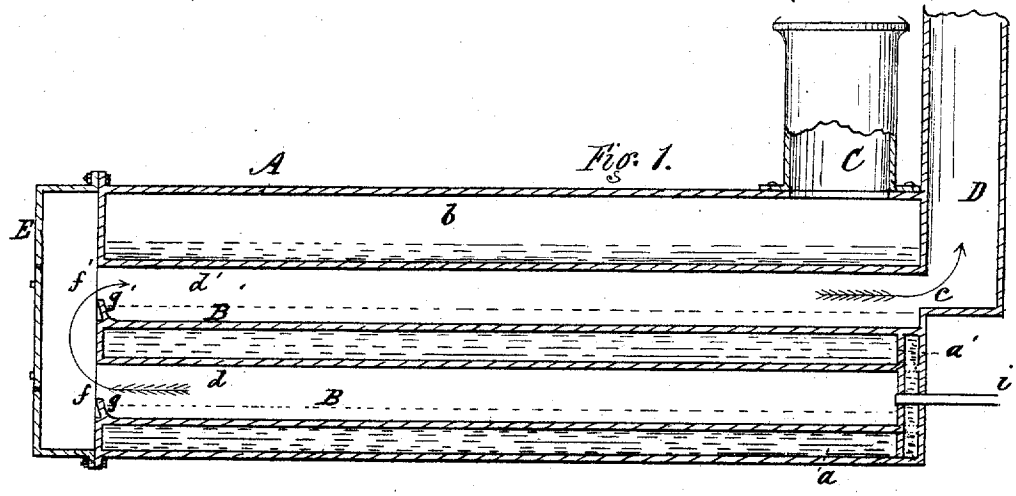


Fig. 2.

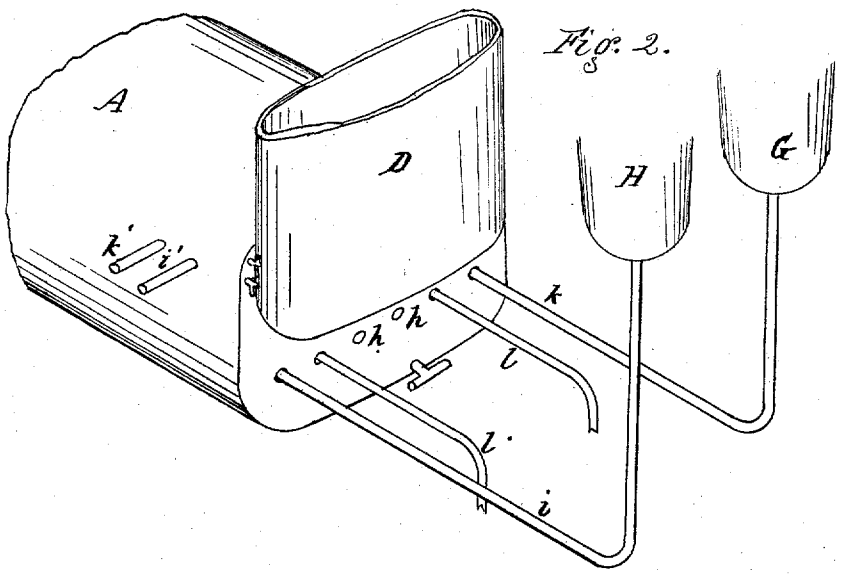
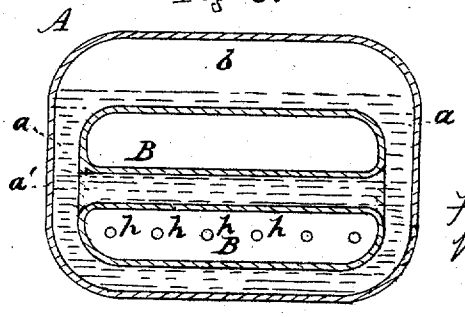


Fig. 3.



Witnesses.
Wm J Ruston
A. H. Norris

Inventor.
Fayette Hungerford
per R. F. Osgood
atty

UNITED STATES PATENT OFFICE.

FAYETTE HUNGERFORD, OF ROCHESTER, ASSIGNOR TO AMOS CARLTON STEARNS, OF CORNING, N. Y.

IMPROVEMENT IN OIL-BURNING BOILER-FURNACES.

Specification forming part of Letters Patent No. **142,468**, dated September 2, 1873; application filed April 8, 1873.

To all whom it may concern:

Be it known that I, FAYETTE HUNGERFORD, of the city of Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Steam-Boiler Furnaces for Burning Oil; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same.

This invention relates to certain improvements in that class of furnaces using oil as the fuel; and it consists of a boiler in which is located shallow pans, one above the other, and communicating by means of ports, a water-sheet being arranged between the two, which opens at the sides into the outer jacket, the construction and operation of which will be fully hereinafter described.

In the drawings, Figure 1 is a longitudinal vertical section of my improvement; Fig. 2, a view in perspective of one end of the boiler and the pipes and tanks connected therewith; Fig. 3, a vertical cross-section.

This apparatus is intended for any and all kinds of engines. It is especially of service in those regions where petroleum is produced, as the crude oil can be used together with the escaping gas at much less cost than the burn-of coal.

In carrying out my invention, I employ an external boiler, A, in the interior of which are located two shallow pans, B B′, one above the other, which extend longitudinally the whole length, and also cover the whole cross area with the exception of a water-jacket, *a*, which extends all around, being closed at the ends. A water-sheet, *a′*, also extends between the pans, covering the whole surface, but opening at the sides into the outer jacket. At the top is left a steam-space, *b*, which communicates with the dome C, from which the steam is carried in a suitable pipe to run the engine. At the front the lower pan is closed, and the top one communicates with the chimney or stack D through the throat *e*. At the rear end the two pans communicate with each other through the flues *d d′* and ports *f f′*, as indicated by the arrow. A head, E, which leaves sufficient passage, is bolted in rear, and this head may have a door or man-hole for communicating with the interior. The pans in rear may have lips *g g′* turned up, as shown in Fig. 1, to form the receptacles for the oil. At the front are a number of holes, *h h*, produced by inserting thimbles therein, or in any other way that will allow no leakage of the water. Any desired number of the holes may be used, six being shown in the drawing. Through one of these holes passes a pipe, *i*, which supplies the oil. Through another passes a pipe, *k*, which supplies a jet of water. These pipes connect with suitable reservoirs G H. Other pipes *l l* may carry gas to the interior of the furnace. The remaining holes are used simply as draft-holes to admit air to support combustion, and they may be stopped by suitable register-thimbles. The pipes open directly into the pan and spread their contents over the surface. Similar oil and water pipes *i′ k′* may be used on the side opening into the upper pan, as shown in Fig. 2.

A constant stream of oil and water is let into the pans to supply the combustion. The liquids spreading over the large surface in a thin sheet burn rapidly and create an intense heat. The draft entering the lower flue passes its entire length, then ascends and passes the full length of the upper flue before escaping. This heat is expended upon the water-space of the boiler, which surrounds the fire in a thin body, and hence is rapidly converted into steam. The water-sheet between the pans is subject to heat on both sides. This arrangement of two flat pans in the body of the boiler, with a thin water-jacket outside and a water-sheet between them, constitutes one of the novel features of my invention. By this means the maximum of fire surface is attained while the water lies in a thin body at all points. By this means, also, the liquid is so spread that it lies in a thin film on the bottom of the pan, and can therefore obtain from the air sufficient oxygen to support a perfect combustion, which could not be the case if it were concentrated more in a body.

In this apparatus I can burn the oil perfectly clean, leaving no sediment. In this connection the injection of the water is of great advantage, for by producing a more perfect combustion by the mingling of its

gases it prevents the gathering of sediment, and also keeps the flues clean. In addition to the above it causes the oil to diffuse and spread through the flue-space by its contact and rebound against the hot surface, thereby burning more thoroughly.

A single pan might be used with a similar effect instead of two pans; or a greater number than two might be employed; or the pans might be used in a different kind of boiler from that shown in the drawings. The use of the pans would not be changed by such a difference.

The surrounding of the pans by the water-space prevents burning out, which has been a great difficulty heretofore where the oil has been simply passed into the interior, and its receptacle exposed to the full force of the intense heat.

In my arrangement a water surface surrounds the pan at all points, and furnishes full protection, and there is no liability of coking and clogging by sediment.

Having thus fully described my invention, I do not claim, broadly, the burning of oil as fuel, as I am aware that the same is not new; but

What I claim is—

1. The combination of the pans B B′ with the ports *f f′* and the water-sheet *a′* between them, arranged as herein shown and described, for the purpose specified.

2. The arrangement of the boiler A, pans B B′, flues *d d′*, ports *f f′*, and head E when used in connection with the oil and water pipes *i k*, in the manner and for the purpose specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FAYETTE HUNGERFORD.

Witnesses:
R. F. OSGOOD,
J. HORACE MCGUIRE.