

L. E. TRUESDELL.

BURNING PETROLEUM AND OTHER HYDROCARBON OILS.

No. 101,964

Patented Apr. 12, 1870.

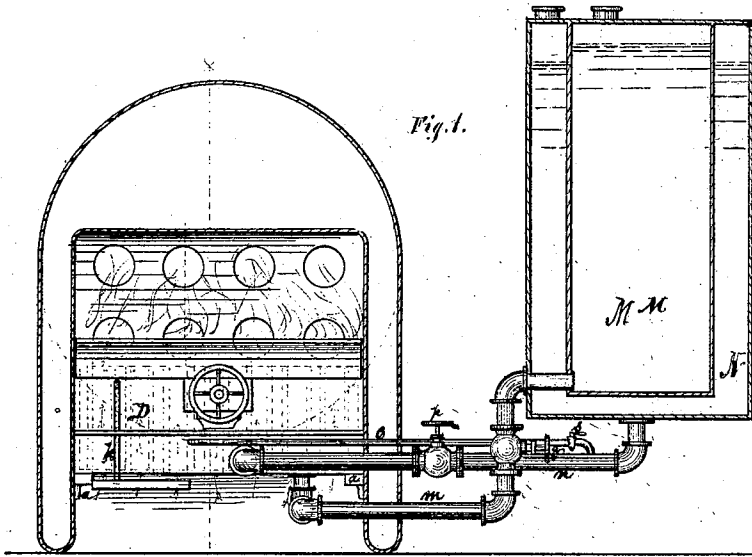


Fig. 1.

Witnesses:  
P. H. Conway  
G. J. Hankey.

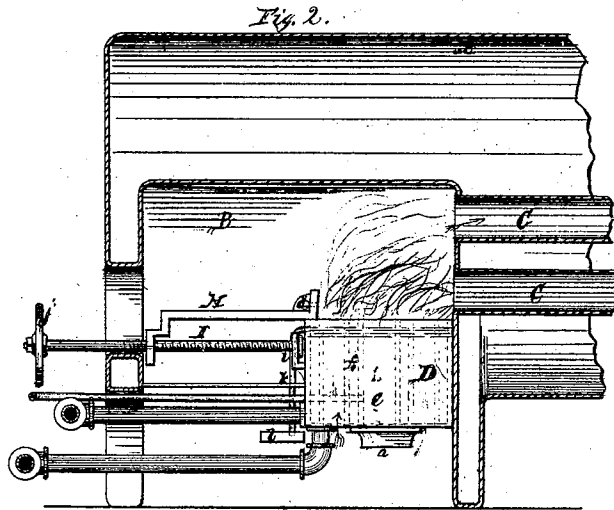


Fig. 2.

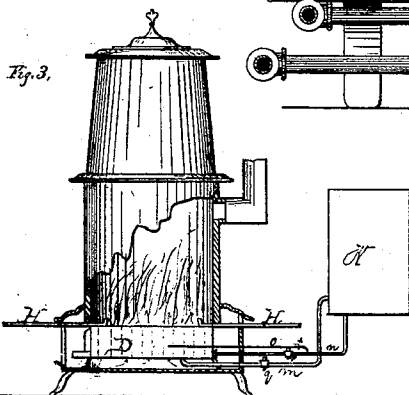


Fig. 3.

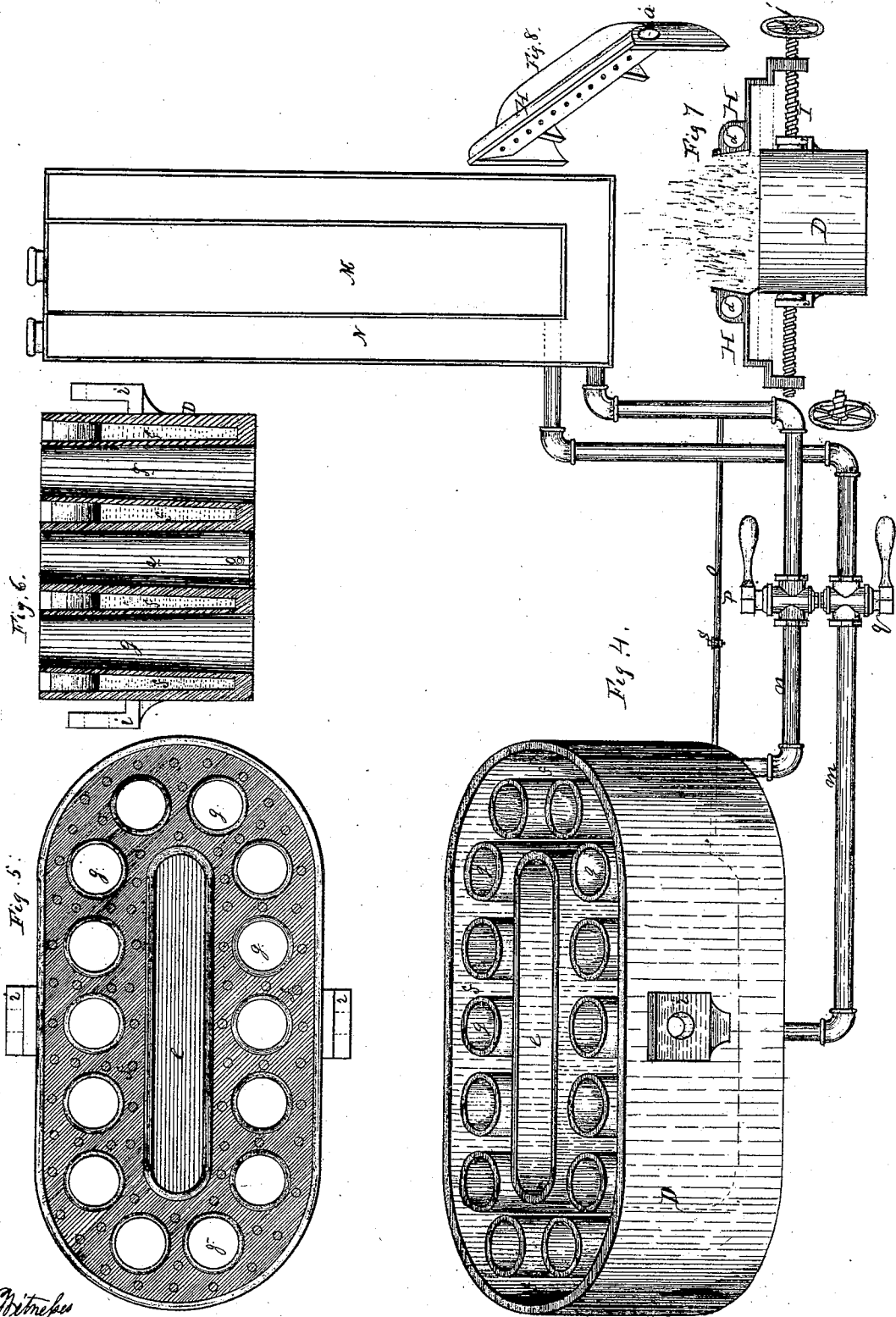
Inventor:  
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 C. H. May  
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# United States Patent Office.

LUCIUS E. TRUESDELL, OF WARREN, MASSACHUSETTS.

Letters Patent No. 101,964, dated April 12, 1870.

## IMPROVEMENT IN BURNING PETROLEUM AND OTHER HYDROCARBON OILS.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, LUCIUS E. TRUESDELL, of Warren, in the county of Worcester, in the State of Massachusetts, have invented certain Improvements in Apparatus for Burning Petroleum and other Hydrocarbon Oils, for the generating of heat and steam, and the reduction of ores, &c., of which the following is a full and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 represents a transverse sectional view of the fire-box of a steam-boiler having my improvements applied thereto, as also of the oil and water-chambers for feeding the fire.

Figure 2 represents a similar view, taken longitudinally through the boiler, a portion being broken off.

Figure 3 represents the application of my improvements to a stove for heating purposes, a part of the cylinder being removed to show the arrangement of the apparatus.

Figure 4 represents an enlarged view, in perspective, of my improved apparatus, as detached from the stove, furnace, or boiler, the reservoirs with which it is connected being shown in section.

Figure 5 represents a plan of the fire-pot, as detached from the stove, and its covers, and

Figure 6 a transverse section of the same.

Figure 7 represents an end view of the fire-pot, together with its covers or blowers, as also the machinery for operating the same, and

Figure 8 a detached view, in perspective, of one of the blowers or covers.

My invention relates to that class of stoves, furnaces for smelting ores, glass, &c., as of furnaces for generating steam, &c., in which petroleum and its products, and other hydrocarbons, are used as fuel.

For such purposes these oils and their products have heretofore been used, and in two distinct ways, one of these methods being by generating a vapor and burning it in that form as you would gas, and the other by the direct combustion of the oil.

The first method is necessarily expensive, as it requires costly and complicated machinery as an adjunct, while the second has been so far (comparatively speaking) a failure, arising principally from the imperfect modes adopted for burning it, thereby involving great waste of fuel. My present improvements are designed to remedy that defect; and it consists—

First, in combining the vapors of water or steam with the vapors of the petroleum, as generated, while in the act of being mixed with air and burnt, which I find of vast service and utility, as it renders the combustion perfect, the steam-vapor probably expanding the denser vapors of the oil, and thereby materially assisting in the more intimately commingling of the

air with the hydrocarbon vapors, and thus insuring its combustion.

Secondly, in combining with the chambers used in the fire-pot for the generating of the vapors of water and of oil, a series of pipes or flues, so arranged as to supply air sufficient for the combustion of the oil, in such manner as to mix with the vapors as generated.

Thirdly, it consists in a peculiar arrangement of fire-covers or blowers in combination with the fire-pot and air-conduits, whereby the combustion of the oil may be regulated, or the fire totally extinguished, at will.

Fourthly, in combining with the fire-covers or blowers, an air-conduit, which may or may not be connected with a fan-blower, whereby a column, or jet or jets of air can be projected through them into the flame of the burning oil to aid in its more perfect combustion.

Fifthly, in the combination of an oil and water-reservoir, either combined or detached, and their respective pipes, with the several chambers of the fire-pot, for their relative and proper supply of water and oil.

Sixthly, in the combination, with the oil-chamber of the fire-pot, of a drip-vessel to receive such oil as may happen to be in excess of its demand for consumption.

To enable others skilled in the art to make, construct, and use my invention, I will now proceed to describe its parts in detail, omitting a particular description of such parts of a stove, furnace, or steam-boiler as are common to others, and unnecessary for the full understanding of my invention.

In the drawings my improvements are represented as applied, in figs. 1 and 2, to a steam-boiler, in which the shell A, fire-box B, and flues C are constructed in the usual manner.

Into the fire-space or box B is arranged my improved fire-pot D, which is made to rest on projections *a* attached to the inner sides of the fire-box. Thus arranged it is removable at pleasure.

The fire-pot is represented as being of an ovoid form, but it may be made of any convenient or suitable form, and consists of a trough or vat divided into two compartments, *e* and *f*, the central one, *e*, being intended to be filled with water, while the outer one, *f*, (and which, in this case, entirely surrounds the other,) is intended to be partially filled with water, and then supplied with the petroleum or other suitable hydrocarbon oil, which is to constitute the fuel for running the engine. Here it may be observed that the reason for placing the water in the central vat or chamber is, that it may be subjected to the action of the burning oil, so as to generate steam, which, mixing with the vapors of oil generated alongside, and with the air supplied through the flues *g*, so expands or dilutes the vapors of oil, as it were, as to enable them to be consumed entirely without emission of smoke. It will,

therefore, be apparent that any number of chambers containing water and of chambers containing oil may be used in the same fire-pot, when arranged alternately, as may be deemed advisable, consistent with a proper supply of air, which, for the perfect combustion of the oil, should pass up in flues or air-conduits *g*, through the oil-chamber *f*, as shown in figs. 2, 3, 4, 5, and 6.

Immediately over the fire-pot *D* is arranged a sliding cover or blower, *H*, as shown in figs. 1 and 2, or of two covers, as shown in fig. 6, which, by means of a screw-rod, *I*, attached to a bracket, *i*, on the side of the fire-pot, may be made to extend either partially or entirely over the fire, according as it is required to regulate the size of the blaze, or to extinguish it entirely, the screw-rod *I*, for this purpose, being provided with a hand-wheel, *j*, with which to operate it.

Through the covers *H*, in a longitudinal direction, is formed an air-conduit, *d*, from the inner face of which emanate a number of jets, through which air is projected on the outside of the flame, to aid in its more perfect combustion. If deemed advisable or desirable, a force-blast may be used in connection with this conduit.

The air-flues *g*, it will be observed, are made to pass entirely through the fire-pot, thus communicating with the open air in the lower part of the fire-box proper, and may, if desired, be used in connection with a fan-blower or force-blast to promote combustion, if desired.

The oil-chamber *f* of the fire-pot *D* is made to communicate with two reservoirs by means of two pipes, *m* and *n*, the one reservoir, *M*, containing the oil intended for the fuel of the fire, and the other, *N*, water. Each of these pipes is provided with stop-cocks, by means of which the flow, either of water or oil, is regulated.

From the pipe *m* a branch-pipe, *o*, is led, and made to communicate with the central chamber *e*, in which the vapors of water are generated. This pipe is also provided with a stop-cock to shut off or regulate the flow.

The operation is substantially as follows:

The reservoirs *M* and *N* are first filled, the one, *M*, with oil, and the other, *N*, with water. As illustrated in the drawing, the oil-reservoir *M* is arranged in the inside of the water one, *N*, in order to protect the oil from the heat, although it need not, necessarily, be so arranged for the purposes of my present improvement. Thus prepared, the cock *p* of the pipe *n* is then turned so as partially to fill the oil-vat *f* of the fire-pot *D* with water, and again closed, when the oil-cock *q* of the pipe

*m* is opened, so as to allow the oil to pass into the chamber *f* at the bottom, whence it passes to the surface of the water because of the superior specific gravity of the latter, where it floats, and, being there ignited, is burnt, the necessary air for its consumption passing up through the flues *g*. Meanwhile, the cock *s* has also been turned so as to admit water into the central chamber *e*, for the generation of the steam-vapors before referred to. Once the whole has been started, each cock is regulated so as to admit the necessary quantity of water and of oil to each of the compartments of the fire-pot, and no more; but should there be a greater flow of oil than can be burnt advantageously, the excess is allowed to escape at the top, by means of a pipe, *k*, into a closed drip-pan, *l*, whence it may be taken at intervals and returned to the reservoir *M*. This waste, however, as far as possible, should be regulated by means of the stop-cock *q*.

From what has been said, it will be clear that the apparatus described can be applied as well to the heating of houses by stoves or furnaces as to the generating of steam, and also to the reduction of ores, to glass-furnaces, and to a great variety of other useful purposes.

Having thus described my invention,

What I claim as new and desire to secure by Letters Patent is—

1. The combination of a water-chamber, *e*, with the oil-chamber *f* in the fire-pot *D*, for the purposes set forth.
2. The air-conduits or flues *g*, or their equivalents, in combination with the water-chamber *e* and oil-chamber *f*, for the purpose set forth.
3. The fire-cover or covers *H*, in combination with the fire-pot and air-conduits *g*, whether used in connection with or without a fan-blower or force-blast for the purposes described.
4. The arrangement of an air-conduit, *d*, in the fire-cover or covers, having a series of openings for projecting air upon the flame, as described.
5. The combination of a water-reservoir, *N*, and an oil-reservoir, *M*, and their respective pipes, *m*, *n*, and *o*, with the water-chamber *e* and oil-chamber *f* of the fire-pot, as described, for the purpose set forth.
6. The arrangement of the drip-pan *l* and pipe *k* in connection with the oil-chamber *f*, for the purpose specified.

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Witnesses:

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