

No. 649,540.

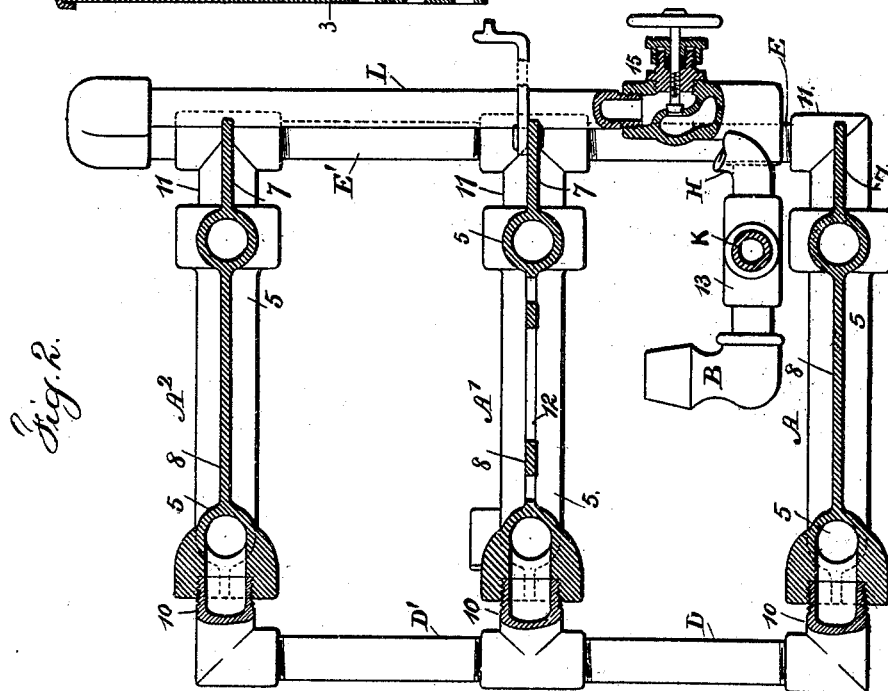
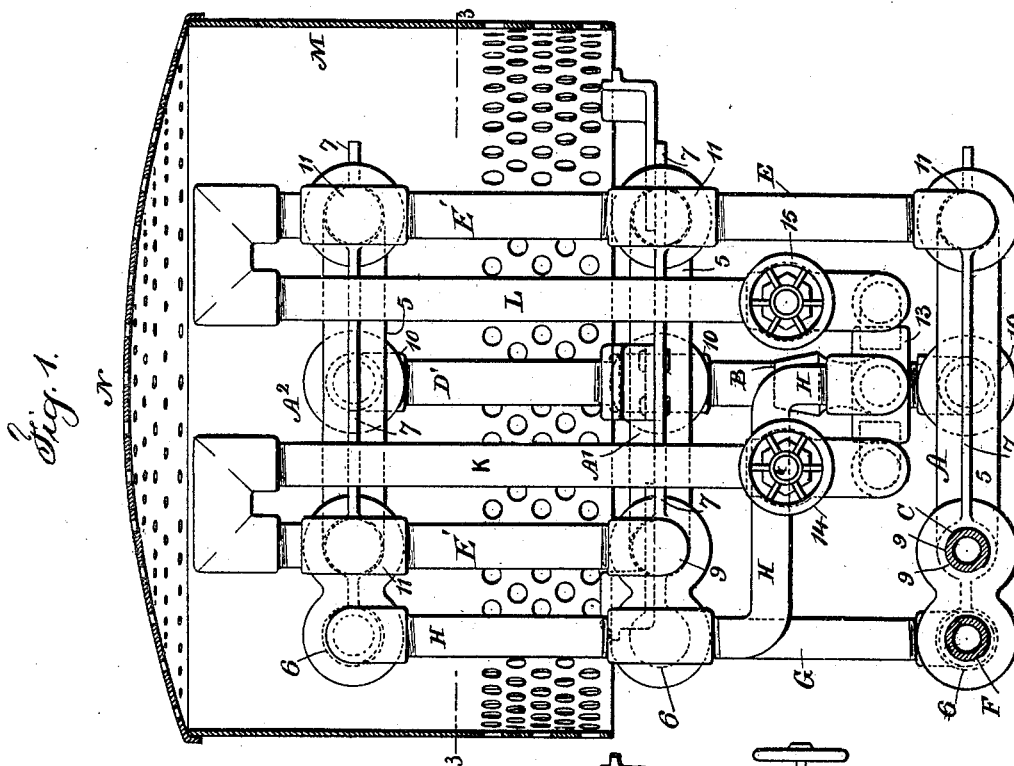
Patented May 15, 1900.

T. B. FERGUSON, JR.
HEATER FOR STOVES.

(Application filed Feb. 3, 1899.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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per L. W. Perrell & Son

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Fig. 3.

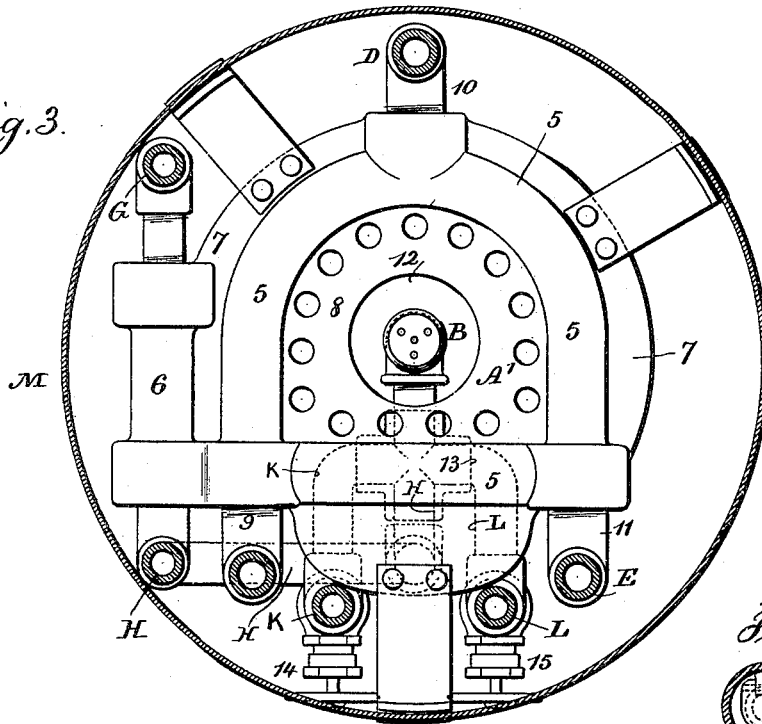


Fig. 7.

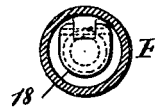


Fig. 4.

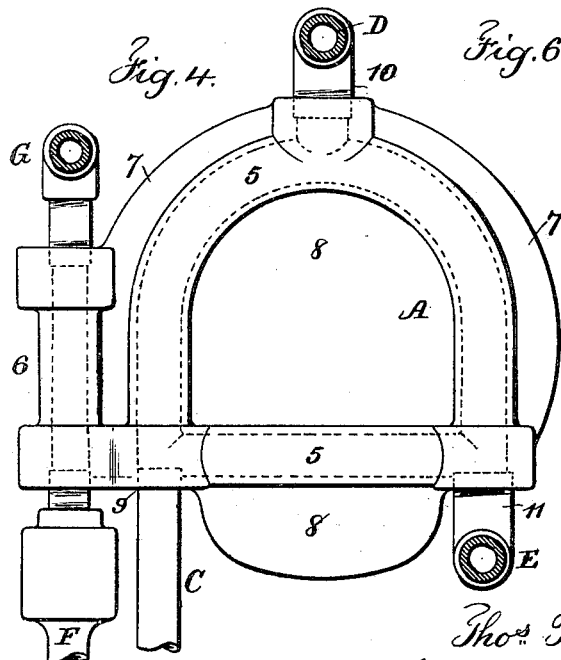
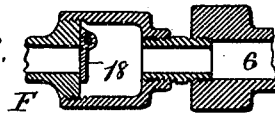


Fig. 6.



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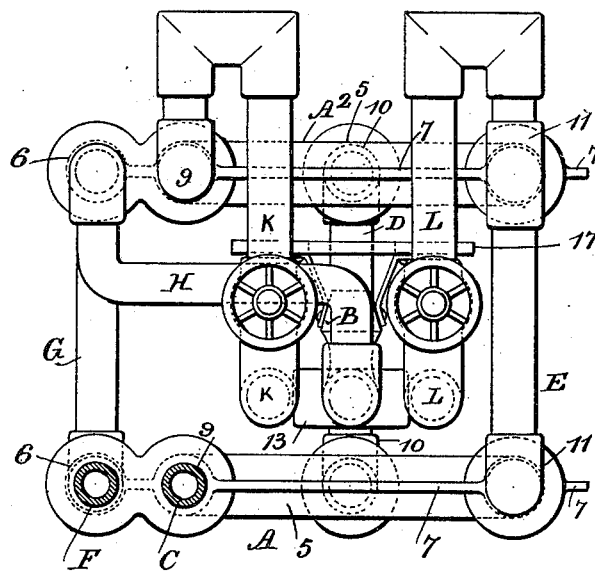
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Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS B. FERGUSON, JR., OF NEW YORK, N. Y.

HEATER FOR STOVES.

SPECIFICATION forming part of Letters Patent No. 649,540, dated May 15, 1900.

Application filed February 3, 1899. Serial No. 704,342. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. FERGUSON, Jr., a citizen of the United States, residing at New York, (Brooklyn,) in the county of Kings and State of New York, have invented an Improvement in Heaters for Stoves, of which the following is a specification.

The object of this invention is to provide a means for burning petroleum or other hydrocarbon liquid in a stove or range for heating the same, thereby dispensing with the use of solid fuel.

In the present invention I make use of a superposed series of at least two generators of peculiar construction, one above the other, and I pass the liquid hydrocarbon into the lower generator and therefrom up vertical pipes in the upper generator, and it is vaporized as it passes into the upper generator, wherein it is also highly heated, and I also use water, which is admitted into a lower generator and passes into an upper generator, where the heat adapts the water-vapor or dry steam to thereafter mix with the hydrocarbon vapors, so that the carbon of the hydrocarbon and the oxygen of the water combine, liberating the hydrogen of the water, which combines with the oxygen of the air, so as to obtain an intense heating-flame with a minimum expenditure of hydrocarbon, and the combustion is rendered as perfect as possible for obtaining the greatest heat, and the gases pass off through the flues of the stove in a highly-heated condition for cooking or warming purposes.

In the drawings, Figure 1 is a front elevation with the cap in section. Fig. 2 is a vertical section at right angles to Fig. 1, with the cap omitted. Fig. 3 is a section below the line 3 3, Fig. 1. Fig. 4 is a plan view of the lowest generator. Fig. 5 is a side elevation illustrating the construction of the article when one of the generators is left out. Fig. 6 is a longitudinal section of the water-pipe and check-valve, and Fig. 7 is a cross-section of the pipe and elevation of the valve.

Each generator is approximately in the form of a horseshoe, with the curved tubular portions 5, through which the liquid hydrocarbon and the vapors thereof are caused to pass, and the tubular portion 6 for water and the flange 7 surround the generator midway,

or nearly so, and the web or diaphragm 8 is within the tube 5, and there are tubular coupling-connections at 9 10 11, preferably nearly equidistant around the generator. The tubular and straight portions 5 and 6, independent of one another, the flange 7 between the same, and the web 8 are preferably a single integral casting.

I have shown in Figs. 1 and 2 three generators A A' A², the bottom and top generators A A² having the web or diaphragm 8 integral, while the generator A' has an opening 12 centrally, or nearly so, in said diaphragm and above the burner B, and all the generators having integral flanges 7. The pipe C is to supply coal-oil or other liquid hydrocarbon to the coupling 9 of the connection or end 5 of the lower generator A, and the vertical pipes D E rise from the generator A to the generator A', and the vertical pipes D' and E' rise from the generator A' to the generator A², and these pipes D D' and E E' are connected at the couplings 10 and 11, respectively. Water is supplied by the pipe F to one end of the lower water-tube 6, and from the other end of this water-tube 6 the pipe G rises to the similar water-tubes in the generators A' and A², and the return-pipe H for steam leads to one arm of the cross-coupling 13 near the burner B, and the pipes K L descend from the upper generator to the other two arms of the coupling 13, conveying the oil-vapors, so that the vapors of the oil and of the water entering the coupling mix thoroughly at the burner and passing out from such burner are consumed, the flame passing up through the opening 12 and striking against the under side of the generator A², and it is advantageous to have regulating-cocks 14 and 15 in the return vapor-pipes K L, so as to only admit the proper proportion of vapor to the burner, and it is also advantageous to provide outside the apparatus and outside the stove into which it may be introduced a cock in the water-pipe and another one in the oil-pipe by the turning of which the volume of flame may be regulated or entirely extinguished. It will now be understood that the entire apparatus becomes very hot, the lower generator A being somewhat heated by both conduction and radiation, and that the heated gases and the flame come into contact with

the pipes D', E', and G, highly heating them, as well as heating the generators A' A², and the liquid hydrocarbon is volatilized by passing through the generator A', and so also is the water as it passes through the upright tube G and tubes 6 of the upper generators, and the vapors rise and are intensely heated in both the generators A' and A², and such water and hydrocarbon vapors descend and are intimately commingled at the burner, and the flame envelops, or nearly so, the generator A², and according to the volume of such flame so it spreads and passes beneath the generator A'.

I find it advantageous to employ a cylindrical shield M, having perforations around the lower portion, and the cap N, which is full of holes for the passage of the flame; but such shield and cap confine the heat sufficiently for raising the generators to the required temperature. In comparatively-small heaters the central generator A' may be left out, as illustrated in Fig. 5, the connecting-pipes being shortened; but the apparatus is otherwise unchanged, except that it is generally advantageous to put a guard 17, in the form of a flat ring, around the burner and slightly above the same to prevent the risk of the flame being extinguished by any downward rush of flame or vapors within the shield in cases where the supply of oil or water is turned on too suddenly.

It will be observed that in this apparatus the vapors passing upward from the lower generator A accumulate and their pressure is regulated either by the opening of the burner or by the cocks 14 and 15, or by both, and under all circumstances this pressure acts to prevent the liquid hydrocarbon or the water rising in the upright pipes and filling the generator A² and so overflowing the burner, because such pressure sustains and holds back the column of liquid in the upright pipes G, D, and E. This burner is adapted to being placed into the fire-chamber of an ordinary stove or range, and it is advantageous generally to remove the grate, so that the burner may be in the proper position, and the supply-pipes leading to such burner can pass in at the end door of the fire-chamber or through openings especially provided in the stove.

By the present improvement the volume of heat can be regulated with facility by the supply-cocks, and the heat is so confined by the shield and cap that the hydrocarbon vapors cannot escape unconsumed and the proportion of water to the hydrocarbon liquid can be easily regulated, so as to obtain a blue heating-flame or a more or less luminous flame, the latter being best adapted to stoves that are used for heating purposes and the blue flame for cooking stoves and ranges.

At the coupling between the water-supply pipe and the water-tube 6 a valve is applied to prevent the pressure of steam displacing the column of water between the water-tube and the supply. This valve 18 is preferably

fastened to the end of the pipe before it is screwed into the coupling, and the hinge is horizontal, so that the valve falls by gravity and closes against the end of the supply-pipe by any accumulation of pressure in the water-tube 6.

I claim as my invention—

1. The combination in a heater of a superposed series of at least two generators having tubular portions for water and for liquid hydrocarbon and their vapors, pipes for supplying water and liquid hydrocarbon to the lower generator, vertical pipes connecting the respective tubular portions of the generators, return-pipes from the upper generator for the steam and oil vapors and a burner located between the generators and to which such return-pipes are connected, substantially as set forth.

2. The combination in a heater of a superposed series of at least two generators, each generator comprising a casting having tubular semicircular and straight portions for oil, and an independent tubular portion for water, substantially as set forth.

3. The combination in a heater of a superposed series of at least two generators, each generator comprising a casting having tubular and straight portions for oil, an independent tubular portion for water, a flange outside the tubular portion for water, a web or diaphragm within the tubular portions, substantially as set forth.

4. The combination in a heater of a superposed series of at least two generators having tubular portions for water and for liquid hydrocarbon and their vapors, pipes for supplying water and liquid hydrocarbon to the lower generator, vertical pipes connecting the respective tubular portions of the generators, return-pipes from the upper generator for the steam and oil-vapors, and a burner located between the generators and to which such return-pipes are connected and valves in the return oil-vapor pipes for regulating the supply of such oil-vapors to the burner in relation to the steam-supply, substantially as set forth.

5. The combination in a heater, of a lower generator having a curved tube and a water-supply tube, a similar upper generator and tubular connections from the bottom to the top generator, an intermediate generator, each generator having a flange around it and an intermediate diaphragm, the diaphragm of the central generator having an opening in the middle, a burner, tubular connections between the three generators and the burner respectively, and a valve in the vapor-pipe leading from the upper generator to the burner, substantially as set forth.

6. The combination in a heater, of a superposed series of at least two generators having tubular portions for water and liquid hydrocarbon and their vapors, of a pipe for supplying water to the tubular portion for water of the lower generator, a vertical pipe con-

necting the same to the tubular portion for water or steam of the upper generator, a pipe therefrom and a burner connected to said pipe and located between the generators, a
 5 pipe for supplying liquid hydrocarbon to the tubular portion for oil of the lower generator, a pipe from the said tubular portion to the tubular portion of the second generator, a pipe therefrom to the burner and a valve in
 10 said pipe for regulating the quantity of the oil-vapors passing to the burner, substantially as set forth.

7. The combination in a heater, of a superposed series of generators, each having a tubular portion for water and curved or semi-circular and straight tubular portions for liquid hydrocarbon, a pipe for supplying water to the tubular portion of the lower generator and vertical pipes connecting the respective
 15 tubular water portions of the generators, and a pipe for steam from the tubular portion of the upper generator and a burner connected therewith and located above the lower generator, a pipe for supplying liquid hydrocarbon to the tubular portions of the lower generator, pipes rising therefrom and connecting the said tubular portions of the lower generator to the like tubular portions of the generators above, return-pipes from the ends of
 20 the tubular portions of the upper generator for conveying downwardly the oil-vapors, the lower ends of said return-pipes being connected to the aforesaid burner and valves in said return-pipes for regulating the quantity
 25 of oil-vapors passing to the burner, substantially as set forth.

8. The combination in a heater, of a superposed series of generators, each having a tubular portion for water and curved or semi-circular and straight tubular portions for liquid hydrocarbon, a pipe for supplying water to the tubular portion of the lower generator and vertical pipes connecting the respective tubular water portions of the generators, and
 30 a pipe for steam from the tubular portion of the upper generator and a burner connected therewith and located above the lower generator, a pipe for supplying liquid hydrocarbon to the tubular portions of the lower genera-

tor, pipes rising therefrom and connecting
 50 the said tubular portions of the lower generator to the like tubular portions of the generators above, return-pipes from the ends of the tubular portions of the upper generator for conveying downward the oil-vapors, the
 55 lower ends of said return-pipes being connected to the aforesaid burner, and valves in said return-pipes for regulating the quantity of oil-vapors passing to the burner, an imperforate diaphragm 8 within the tubular
 60 portions of the upper generator and a perforated diaphragm 8 within the tubular portions of the intermediate generator and coming above the burner, substantially as set forth.

9. The combination in a heater of a superposed series of generators, each having a tubular portion for water and curved or semi-circular and straight tubular portions for liquid hydrocarbon, a pipe for supplying water
 65 to the tubular portion of the lower generator and vertical pipes connecting the respective tubular water portions of the generators and a pipe for steam from the tubular portion of the upper generator, and a burner connected
 70 therewith and located above the lower generator, a pipe for supplying liquid hydrocarbon to the tubular portions of the lower generator, pipes rising therefrom and connecting the said tubular portions of the lower generator to the like tubular portions of the generators above, return-pipes from the ends of the tubular portions of the upper generator for conveying downward the oil-vapors, the
 75 lower ends of said return-pipes being connected to the aforesaid burner and valves in said return-pipes for regulating the quantity of oil-vapors passing to the burner, a cylindrical perforated shield surrounding the superposed generators and a perforated cap to
 80 said shield above said generators, substantially as set forth.

Signed by me this 31st day of January, 1899.

T. B. FERGUSON, JR.

Witnesses:

GEO. T. PINCKNEY,
 S. T. HAVILAND.