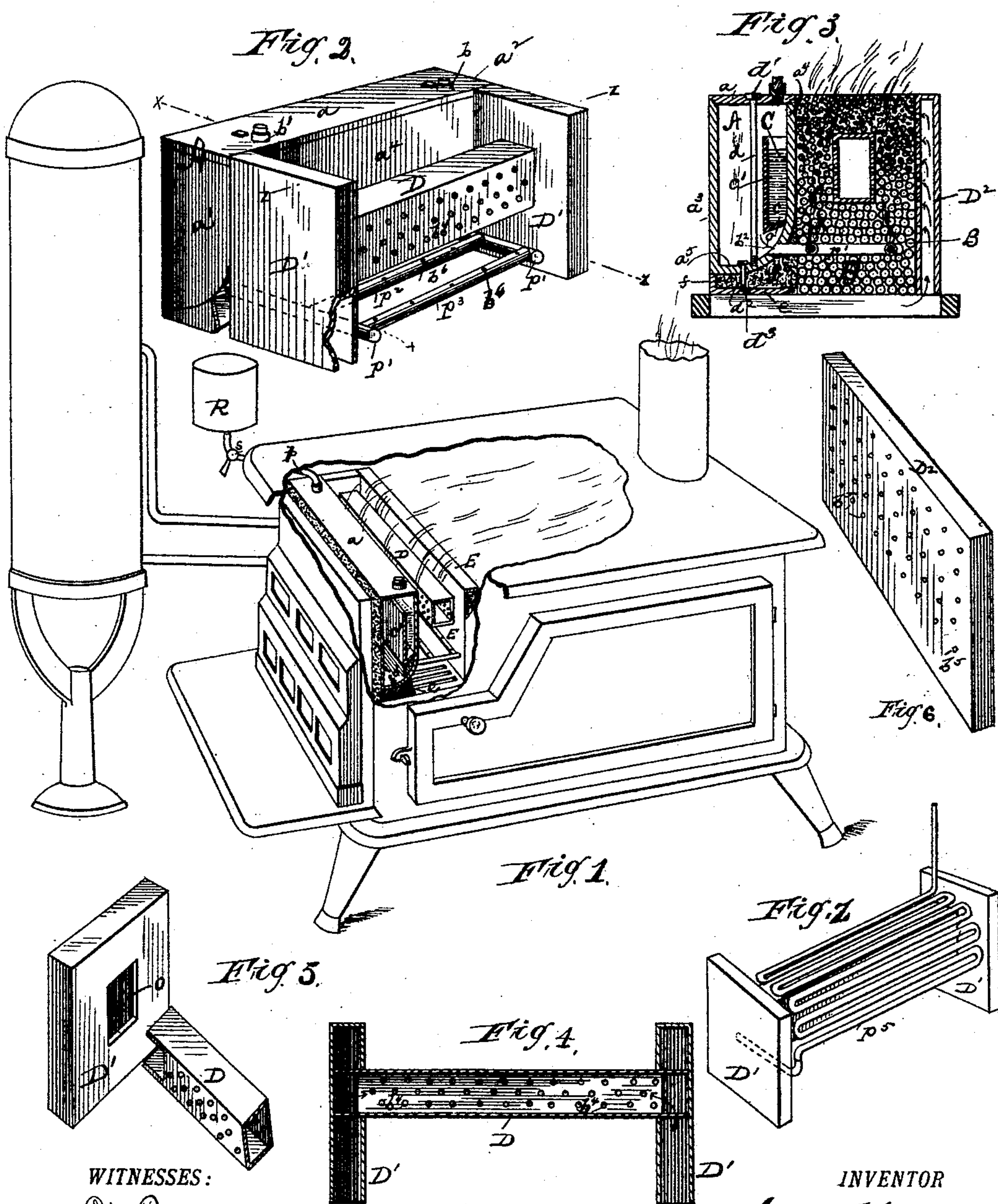


(No Model.)

E. F. EDGAR.
HEATING APPARATUS.

No. 500,228.

Patented June 27, 1893.



WITNESSES:

On Benjamin
Peter A. Vermilye.

INVENTOR

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UNITED STATES PATENT OFFICE.

ELLIS F. EDGAR, OF WOODBRIDGE, NEW JERSEY.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 500,228, dated June 27, 1893.

Application filed August 6, 1888. Serial No. 282,036. (No model.)

To all whom it may concern:

Be it known that I, ELLIS F. EDGAR, a resident of Woodbridge, in the county of Middlesex and State of New Jersey, and a citizen of the United States of America, have invented a new and useful Improvement in Heating Apparatus, adapted for use in devices arranged to secure the economical combustion of petroleum and other hydrocarbons, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same, in which—

Figure 1, is a view in perspective of an apparatus embodying said invention placed in a cooking stove, a portion of the stove and other parts being cut away to more fully exhibit the interior arrangement. Fig. 2, is a similar view of the apparatus removed from the stove. Fig. 3 is a vertical cross sectional view of the same on line x, x , Fig. 2. Fig. 4, is a vertical longitudinal sectional view of the air supplying attachment in which lies the special novelty of this invention. Fig. 5, is a view in perspective of one end piece and a broken portion of the cross bar of said attachment. Fig. 6 is a view of a side piece sometimes employed in the absence of a water back, and Fig. 7 is a view of said attachment shown in Fig. 4, and a modification of one vapor discharge pipe, adopted when it is desired to superheat the vapor.

In the apparatus shown, A, is the reservoir in which the fuel, if an oil, is to be held and converted into vapor. It may be formed to suit the shape of the space where it is to be placed, but as usually made and as shown consists of a cast iron box about ten inches long nearly six inches deep and about two inches wide with a flat top a , vertical ends a' a^2 , a vertical side a^3 , and another side a^4 , curved for a portion of its depth as is the bottom a^5 . It is preferably provided with two apertures in its top, one b , for the insertion of a feed pipe p , and the other b' , for introducing a small quantity of fuel in order to start the fire. Within and upon one side I preferably provide a long deep and narrow pan C, for holding the fuel, open at the top and having its bottom c , set at an acute angle to the side c' , that any overflow may not run from it back upon the interior of side a^4 , below said pan. The cover or top a , is usually

made separate from and then secured to the other parts of A, by a bolt d and nut d' , as shown, but A, might be formed of fire clay and all in one piece.

Just below the bottom c of pan C, apertures b^2 , are formed in the wall a^4 , to permit the escape of vapor from the interior of A, into the combustion chamber, and in the bottom a^5 , other apertures b^3 , are formed to allow of the passage of fuel to initiate the heating. To this end I also secure to said bottom, (by a bolt d^2 , and nut d^3 , or otherwise) a shelf e , here closed at one side and the ends and open at the other side as shown in Figs. 1 and 3, and I pack the space between said shelf and the bottom a^5 , with mineral fiber f . The apparatus thus arranged, I place in the fire box of a stove or other desired location and pack it tightly at the side a^3 , and ends a' , a^2 , with mineral fiber or other incombustible material, and I then prefer to connect to it an auxiliary reservoir R, by means of a feed pipe p , leading to the pan C, through aperture b , and provided with a valve or stop cock s .

Between A and the wall of the fire box or the water back, I place a hollow cross bar D, perforated at its sides (as at b^4) supported by and connecting with end pieces D', which are hollow, open at the bottom and provided with openings o , in their inner walls for the insertion of the ends of D, which are cut away at the sides for a short distance from each end to more freely admit air to the interior.

The water back E, of the stove or the wall of the fire box forms a rear wall to the combustion chamber, otherwise surrounded by walls a^4 , D', and D', but if the apparatus be placed where there is no water back or fire box wall then I provide a separate piece D², for that purpose, which piece I prefer to make hollow, open at the bottom like D' and with its inner wall perforated as at b^5 , below its top and above its bottom walls D, and D', are preferably made of fire clay, but other incombustible material may be used. From apertures b^2 , I prefer to extend pipes p' , joined together by pipes p^2 , and p^3 , which are provided with apertures b^6 , and so located that vapor issuing therefrom will pass up on the respective sides of D. The combustion chamber aforesaid I fill to about the level of a ,

with balls of fire clay, B, or other refractory material of sizes preferably decreasing toward the top.

When oil is used, the operation of the apparatus is as follows: The auxiliary reservoir R, being filled with oil, the valve *s*, is opened and the liquid flows out of R, into pan C, fills it and overrunning falls to the bottom of A, whence passing through *b*³, it is absorbed by the fiber *f*, on shelf *e*. As soon as there has been sufficient overflow to saturate or nearly saturate the fiber *f* I shut off the oil. [If preferred reservoir R, may be dispensed with and the pan C, filled and fiber *f*, saturated by pouring a sufficient quantity of oil through *b*, or *b'*, but of course this would be inconvenient for continuous burning.] The oil in the fiber is then ignited and the flame passing up through the combustion chamber, impinges upon the outer surface of *a*⁴ and heats it. This heat being communicated to the oil in pan C, speedily begins to convert it into vapor which escapes through *b*², *p'*, *p*², *p*³, is ignited by the flame of the already burning oil and increases the heat. Soon the oil in the fiber is exhausted and then by regulating the flow from reservoir R, so that it does not overflow C, the continuing combustion, is of the vapor mixed with air only, which of itself produces the heat necessary to convert more oil into vapor and thus supply more fuel. Thus far the general operation is similar to devices I have heretofore devised, but I found that the combustion was not absolutely perfect. Air introduced at the bottom of the combustion chamber alone would not suffice. More air directed into the flame over the top of the combustion chamber was some aid, but not until I introduced air into the burning fuel between the bottom and top of the combustion chamber did I attain the most perfect results and it is this feature that is the main novelty of the present invention. I introduced the bar D, and pieces D', and by supplying air to the burning fuel intermediate the top and bottom of the burning mass in the combustion chamber, I have produced an exceedingly hot flame, while consuming much less fuel.

The clay balls B, add to the efficiency of the apparatus and permit a nearer approach to absolute perfection by subdividing the flame and gases, causing the more perfect mixture of the air therewith and becoming white hot themselves will ignite any unconsumed fuel coming in contact with them. At the same time they render the heat more even, being in fact almost like a bed of coals, especially for purposes of broiling which when the balls are once well heated may be done with none or only a nominal addition of new fuel and accomplishes it without adding the peculiar taste ordinarily attendant upon oil fires. When the piece D², is used air may of course be introduced as specified through the apertures in its interior walls.

The pipes *p'*, *p*², *p*³ may be dispensed with

but I prefer to use them as I am thereby enabled to direct the columns of burning vapor one on one side and the other on the other side of bar D.

The flame and heat produced by introducing air as described is of such a character that it produces substantially no formation of scale upon the metal it comes in contact with, and if the combustion chamber were filled with coal instead of fire clay balls would cause it to be entirely reduced to ash without the formation of any clinkers.

By running an extra pipe *p*⁵, or *p'*, from A out and about D, as shown in Fig. 7, I have been enabled to so superheat the vapor produced in A, as to almost if not quite convert it into a gas which may be burned from the end of the pipe for illuminating purposes or conducted to *p*² and burned as set forth.

I do not intend to limit myself to the exact devices shown for it is obvious that many changes and adaptations of this apparatus might be made very different in appearance and specific arrangement from them and yet quite within the spirit of the invention.

The apparatus also might be practically duplicated by arranging a second combustion chamber on the other side of A, many parts now made separate might be formed in one piece and various other changes adopted. Much of it might be omitted altogether and yet leave the central idea intact.

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

1. In a heating apparatus, the combination of an oil vaporizing retort, a fuel holder within said retort, a combustion chamber adjoining said retort, substantially filled with pieces of incombustible material having air passages between the pieces and openings for the passage of vapor leading from said retort to and opening into said combustion chamber all substantially as set forth.

2. A heating apparatus provided with a combustion chamber, an oil vaporizing retort, a fuel holder within said oil vaporizing retort and apertures leading from said oil vaporizing retort into said chamber and an air conductor leading into the field of combustion at a point or points above the point of initial combustion and below the level of the exit from said chamber substantially as set forth.

3. A heating apparatus provided with a combustion chamber, an oil vaporizing retort, a fuel holder within said oil vaporizing retort apertures leading from said oil vaporizing retort into pipes extending into said chamber and connected by other pipes leading from one to the other of the first pipes, said latter pipes being provided with apertures as set forth, and an air conductor leading into the field of combustion at a point or points above the point of initial combustion and below the level of the exit from said chamber substantially as and for the purpose set forth.

4. A heating apparatus provided with a

combustion chamber, an oil vaporizing retort,
a fuel holder within said oil vaporizing re-
tort apertures in the bottom of said oil vaporiz-
ing retort, a shelf below said apertures, other
5 apertures leading from said oil vaporizing re-
tort into said chamber and an air conductor
leading into the field combustion at a point or
points above the point of initial combustion
and below the level of the exit from said
10 chamber substantially as set forth.

5. A heating apparatus provided with a
combustion chamber, an oil vaporizing retort,
a fuel holder within said oil vaporizing retort

apertures leading from said oil vaporizing re-
tort to said chamber, an auxiliary oil vapor- 15
izing retort and a connection from thence to
the fuel holder, and an air conductor leading
into the field of combustion at a point or points
above the point of initial ignition and below
the level of the exit from said chamber, sub- 20
stantially as set forth.

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Witnesses:

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