

June 11, 1935.

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2,004,346

OIL BURNING APPARATUS

Filed Nov. 1, 1932

2 Sheets-Sheet 1

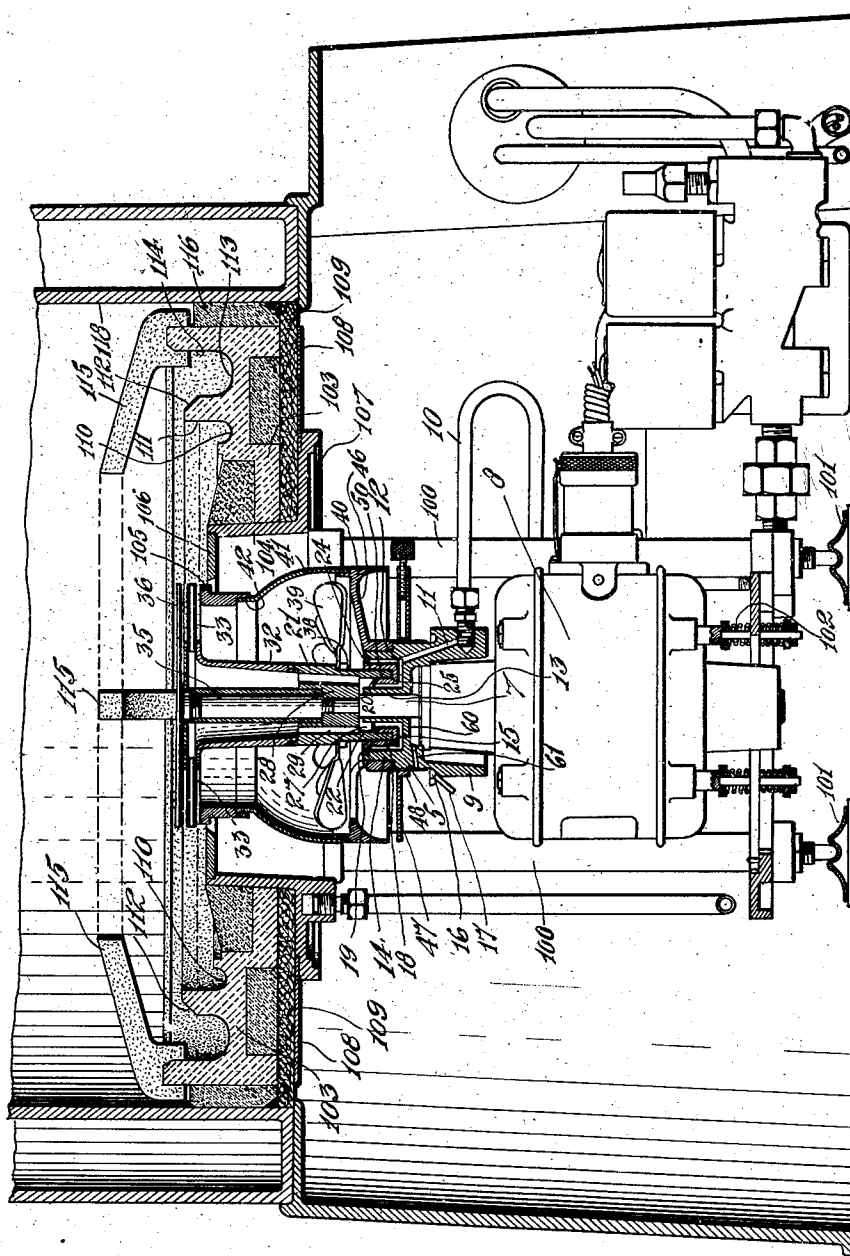


Fig. 1

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**June 11, 1935.**

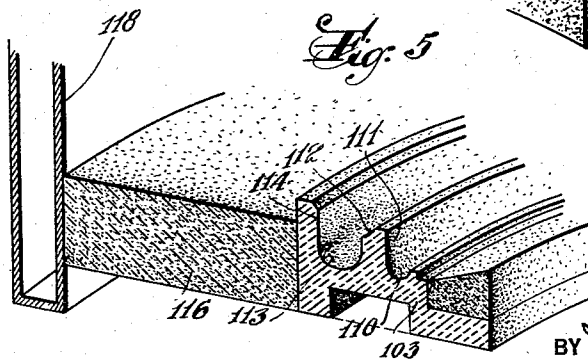
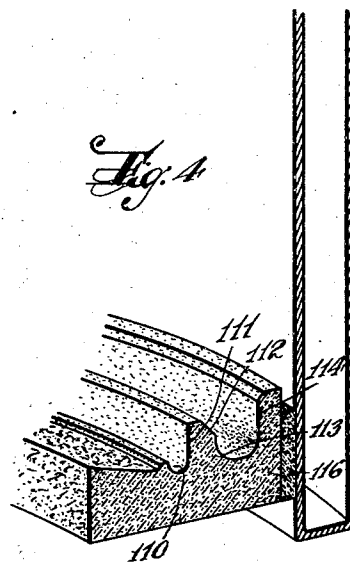
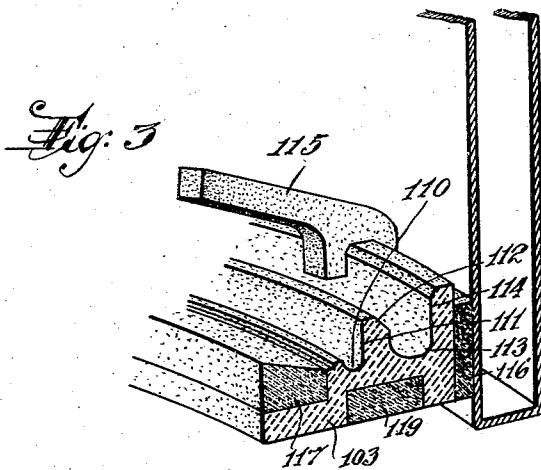
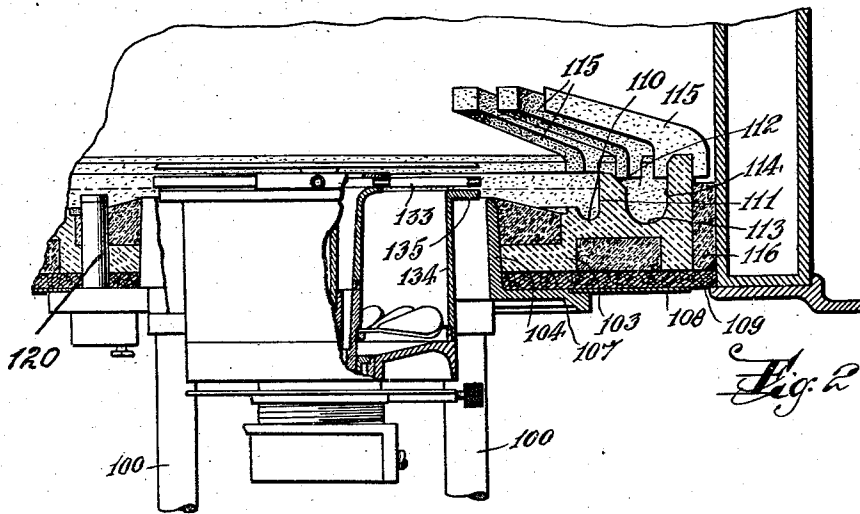
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## OIL BURNING APPARATUS

Filed Nov. 1, 1932

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,004,346

## OIL BURNING APPARATUS

Hilmer F. Rodler, Woodcliff, N. J., assignor, by direct and mesne assignments, to Oil Equipment Laboratories, Inc., a corporation of New Jersey

Application November 1, 1932, Serial No. 640,596

2 Claims. (Cl. 158—77)

This invention relates to oil burning apparatus for household heating purposes, and more particularly to means for enabling the installation of an oil burning device in furnaces of any size without in any way affecting the efficiency of the oil burning device.

As is well known, it is the common practice to install oil burning devices in household furnaces which were designed for the burning of coal and similar fuels. Inasmuch as such furnaces vary considerably in size, it is obvious that each installation of an oil burning device has to be designed to accommodate the particular furnace in which it is installed; with the result that it has, heretofore been impracticable to provide an oil burning device of standard structure which will operate efficiently in all furnaces.

Also, oil burning devices heretofore produced have been objectionable in that oil conducting parts of such devices are overheated, that is, heated above the cracking point of the oil, before the oil is properly vaporized or gasified and ignited, resulting in excessive and undesirable deposits of carbon due to the pre-carbonization of the oil before ignition.

It is therefore, an object of this invention to provide an oil burning apparatus of standard structure and dimensions which may be installed in a furnace of any size without in any way impairing the efficiency of the apparatus.

A further object is the provision of an oil burning apparatus in which the oil conducting parts are maintained below the cracking point of the oil prior to vaporization and ignition so that there will be no premature carbonization or undesirable carbon deposits which seriously affect the efficiency of oil burning apparatus.

A further object is the provision of an oil burning apparatus having a hearth structure forming an essential and definite part thereof, which hearth structure is formed of a fire brick having a peculiar shape whereby heating of the oil beyond the cracking point prior to vaporization and ignition is prevented.

A further object is the provision of an oil burning apparatus in which the oil is thrown out from a plurality of tubes in the form of a continuous annular film, said apparatus having means to cool the tubes by air to a temperature below the cracking point of the oil to prevent carbonization in the tubes.

A further object is the provision of an oil burning apparatus having a hearth structure provided with means to prevent combustion of the oil at a point too far away from the point at

which it is vaporized and mixed with air, and to prevent the combustible mixture from contacting the walls of a furnace.

These and other advantageous objects, which will later appear, are accomplished by the simple and practical construction and arrangement of parts hereinafter described and exhibited in the accompanying drawings, forming part hereof, and in which:

Fig. 1 is a sectional elevational view showing my oil burning apparatus installed in a furnace,

Fig. 2 is a sectional view showing details of the burner and hearth structure,

Fig. 3 is a fragmentary perspective view showing a hearth structure relatively close to a furnace wall,

Fig. 4 is a fragmentary perspective view of a modified form of hearth structure, and

Fig. 5 is a similar view showing a hearth structure considerably spaced from the furnace walls.

Referring to the drawings, the oil burning apparatus is shown to include a vertically mounted motor 8 having a shaft 7. Mounted on the upper end of the motor is a cylindrical block 5, having a skirt 9 provided with inclined passages 11 to which oil is introduced by a pipe 10 communicating therewith. The inclined passages 11 lead to an annular oil chamber 12, also formed in the block 5, one wall 13 of the chamber 12 surrounding the shaft 7.

Resting on the upper edge of wall 14 of the chamber 12 is a flange 19 of an annular trough member 15, the walls of which are spaced from the walls 13 and 14. Positioned in the member 15 is a cylindrical flange 50 of a head 21, the latter having a central core 28 threadedly connected to the end of shaft 7. The flange 50 is externally threaded at 24 and internally threaded at 25 for a purpose hereinafter explained.

The internal wall of the flange 50 is flared at 22 providing a throat 27. The head 21 is provided with a plurality of passages 29 communicating with the throat 27.

Fixed to head 21 is a tubular member 32 which is flanged at its upper end and has projecting therefrom four equally spaced tubes 33. Secured to the member 32 by a threaded nut 38 is a fan 39.

The tubular member 32 is covered by a plate 36, which is spaced from the tubes 33 and attached to a shaft 35, the latter being threadedly connected to a core 28.

Attached to the block 5 are spaced struts 46, integral with a cylindrical base 40, upon which is mounted a hood 41 having its upper portion 42 cylindrical in shape. A collar 48 is threadedly

mounted on block 5, and has integral therewith a plate 47 spaced from the lower edge of the base 40. By adjusting the plate 47, the volume of air entering the hood may be controlled.

5 In operation, oil is supplied by the pipe 10 to the passages 11, and thence to the chamber 12 in which the oil rises to the upper edge of wall 20, and falls over the edge when the surface tension has been overcome. The oil is then picked up  
10 by the uppermost thread of the threads 25 on the flange 50, and thrown upwardly against the inclined surface 22 and into the passages 29, it being understood that the motor is in operation and the parts are rotating at a predetermined  
15 speed. The threads 24 prevent the leakage of oil upwardly over the inner surface of wall 18 of the trough member 15.

In the event that the oil should accumulate in the chamber 12 excessively, due to improper  
20 functioning of the apparatus, it will rise over the upper edge of wall 13 and fall down along the shaft 7 into a chamber 60 in the block 5, and thence through a passage 61 to a gutter 16 integral with and surrounding the block. The gutter  
25 15 communicates with a tube 17, through which the excess oil is drained into any suitable receptacle, such as a bucket, or the like (not shown).

As the head 21 rotates the oil is drawn up through the passages 29, and forced up along  
30 the walls of the member 32 into the tubes 33, at which time the oil is thrown outward by centrifugal force in the form of a spray through the tubes 33.

Referring to Fig. 1, it will be seen that the  
35 atomizing structure and motor, are mounted on a frame having vertical supports 100, which rest on resilient bases 101, the motor being prevented from excess vibration by spring supports 102.

The oil burning apparatus is readily installed  
40 into the fire box of a furnace, a hearth of fire brick 103 being built upon the frame. The hood 41 and other parts of the atomizing structure are protected from heat by a metal casting 104, and by a ring 106 which rests on the casting 104.

45 The cylindrical portion 42 of the hood has attached thereto a cylindrical member having a flange 105 which is positioned beneath and spaced from the tubes 33. By varying the distance between the flange 105 and the top plate, the velocity of the air stream through the hood may be regulated. The ring 106 is positioned adjacent  
50 and spaced from the flange 105, thus providing a space through which an additional supply of air passes, at the same time providing an effective heat shield which at no point contacts with the hood or the oil spraying apparatus, thus preventing heating of such parts by conduction, without  
55 interfering with the efficient action of the main air supply.

60 The casting 104 is angular in shape and is supported by a ring 107 fixed to the vertical supports 100. Attached to the horizontal portion of casting 104 are a plurality of metal segments 108, which vary in size depending upon the size of the furnace. The segments 108 support segmental sheets  
65 109 of insulating material, such as asbestos, which extend to the furnace wall, and mounted on the insulating sheets 109 are the fire bricks 103.

70 The fire bricks 103 engage the vertical portion of casting 104 and spaced from said portion at a predetermined distance, the brick 103 has a rounded groove 110 adjacent a vertical wall 111, which has its top surface horizontal and its opposite inclined at 112, leading into a second rounded  
75 groove 113 adjacent a second vertical wall 114.

The fire brick 103 may be all in one piece or be formed of a plurality of segmental sections. One manner of forming the fire brick 103 is to mount on the casting 104 and insulating segments 109, a quantity of fire brick material in a plastic state.  
5 Then by means of a properly shaped tool, the grooves and walls may be readily formed.

The oil is ignited by a pair of diametrically arranged pilots 120 passing through the fire brick, (see Fig. 2). The pilots may be of the gas flame  
10 or electric spark type.

Mounted on the wall 114 and projecting inwardly and inclined upwardly are a plurality of bars 115, of fire brick material which serve as flame stabilizers, as hereinafter explained.  
15

The walls 111 and 114 are formed at definite and predetermined distances from the center of the oil spraying apparatus, that is, from the center of shaft 35, regardless of the size of the furnace in which the apparatus may be installed.  
20

The space between the wall 114 and the wall 118 of the furnace is filled with a spacer 116, of insulating material. In some cases, as shown in Figs. 3, 4, the spacer is relatively narrow, and in other cases where a large furnace is used, the  
25 spacer will be relatively wide, as shown in Fig. 5.

In operation, oil is thrown out through tubes 33 in the form of a spray and rides upon a stream of air passing between the tubes and flange 105, without mixing with the air. The oil travels until  
30 wall 111 is encountered at which time it is given a violent circular and turbulent action resulting from the groove 110 and the mixing with the air. The oil and air then pass over the wall 111, together with a small amount of oil from the tubes  
35 which does not strike the wall 111; and the mixture is thrown down into the groove 113 and up against the wall 114, at which time ignition takes place. The flame is diverted inwardly and prevented from contacting the walls of the furnaces  
40 by the members 115.

The height of the wall 111 must be definite with relation to the tubes 33, and the distances of the walls 111 and 114 from the center of the apparatus are definite and predetermined.  
45

The structure above described prevents carbonization of the oil in the tubes, as the tubes 33 are cooled by air passing above and below them, thus maintaining the tubes at a temperature below the cracking point of the oil. The fire brick is also  
50 maintained at a temperature below the cracking point of the oil by cutting out portions of the fire brick and filling such cut out portions with a poor heat radiating material as shown in Fig. 3 at 117, 119.  
55

It will be noted that the oil rides upon but does not mix with the air stream until it strikes wall 111. As the walls 111, and 114 heat up, they vaporize the oil striking them completely, the oil interrupted by wall 111 travels upward and over  
60 the wall 111 in a turbulent manner into the chamber formed by walls 111, 114 and groove 113, where mixing is complete, and the gas then rises in a combustible form and combustion takes place on an area adjacent and above the mixing chamber.  
65

The stabilizing bars 115 are used for the purpose of breaking the strong circular motion of the gas and to allow a sufficient area of broken surface to stabilize the gas. That is, the bars 115 prevent the gas from lifting entirely into the mixing and forming chamber upwardly into the furnace and burning too far away from its point of origination. It is desirable to keep the point of combustion low so that there is sufficient radiant heat to maintain a desired temperature of the fire brick, thus  
70 75

preventing the fire from fading out due to the oil being chilled below the point of vaporization.

In Fig. 2 is shown an arrangement for using tubes 133 which are longer than the tubes 33, and accordingly have a greater cooling effect to keep the temperature of the oil below the cracking point to prevent carbonization. In this form, the hood 134 is cylindrical and has a flange 135, spaced from and below the tubes 133, the flange being spaced from and adjacent the upper edge of the vertical portion of casting 104 so that the ring 106 is not needed.

The foregoing disclosure is to be regarded as descriptive and illustrative only, and not as restrictive or limitative of the invention, of which obviously an embodiment may be constructed including many modifications without departing from the general scope herein indicated and denoted in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an oil burning apparatus, a head having a plurality of vertical passages, a tubular member fixed to said head and having its upper end flanged, a plurality of spaced tubes supported by said flange and projecting from said member, a plate covering said member, said plate being spaced from said tubes, means connecting the plate and the head so they may be rotated in

unison, a hood enclosing said tubular member, a fan within said hood to create an air stream about the member and tubes, a plate covering the lower part of the hood, the last mentioned plate being threadedly mounted to enable it to be adjusted to control the volume of air entering the hood, a hearth frame surrounding the hood and tubular member, said frame being spaced from the hood and member, and means to rotate the head and tubular member to cause oil to pass upwardly through said passages and tubular member and outwardly through the tubes.

2. In an oil burning apparatus, a head having a plurality of vertical passages, a tubular member fixed to said head and having its upper end flanged, a plurality of spaced tubes supported by said flange and projecting from said member, a plate covering said member, said plate being spaced from said tubes, means to rotate the head and plate and member in unison, a hood enclosing said tubular member, a fan within said hood to create an air stream about the member and tubes, means to control the volume of air entering the hood, a hearth frame surrounding the hood and tubular member, said frame being spaced from the hood and member, the rotation of the head and tubular member causing oil to pass upwardly through said passages and tubular member and outwardly through the tubes.

HILMER F. RODLER.