Sept. 3, 1929. J. BENNIGER 1,726,640

OIL BURNER

Filed June 7, 1927 2 Sheets-Sheet 1

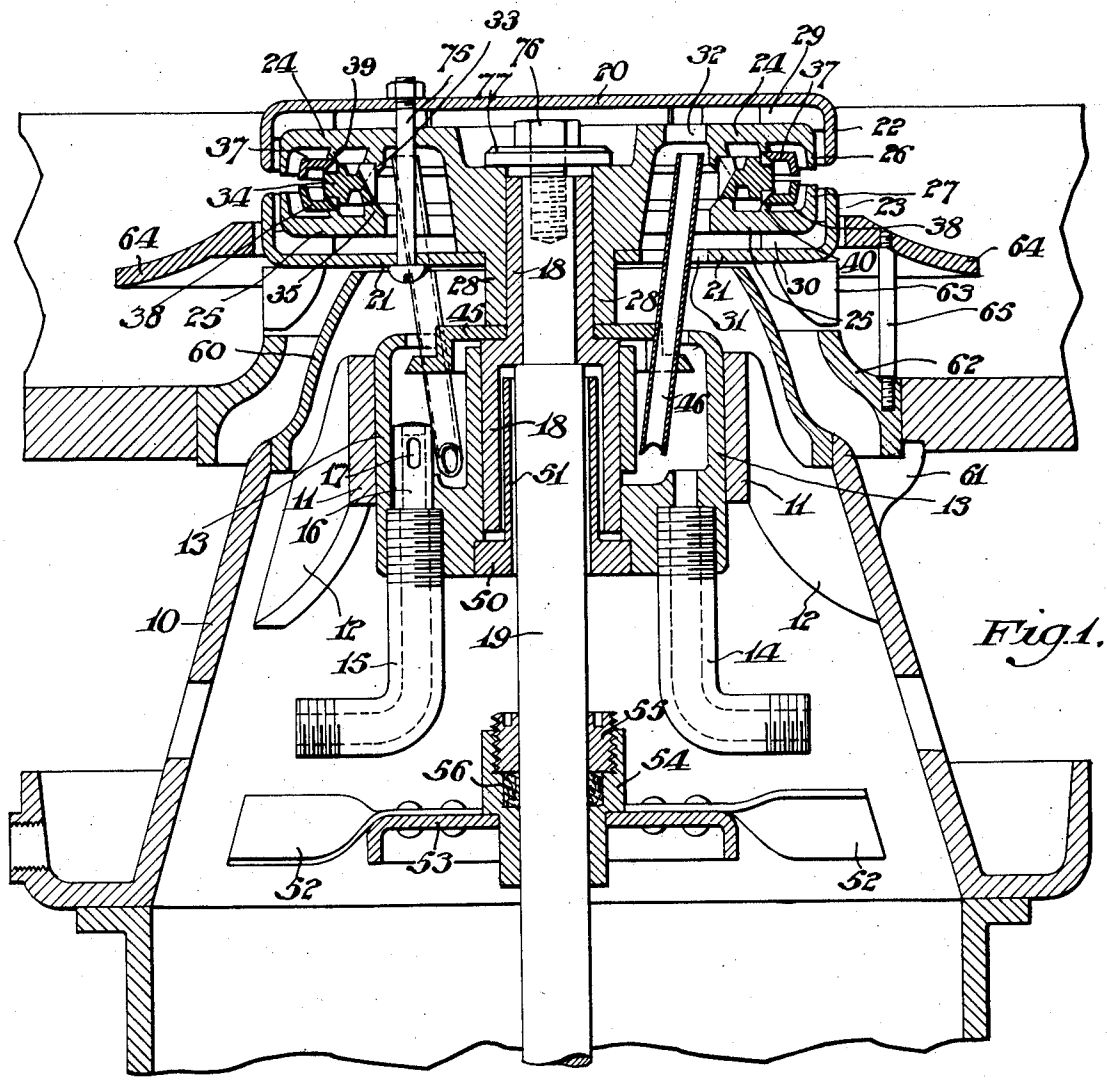


Fig. 1.

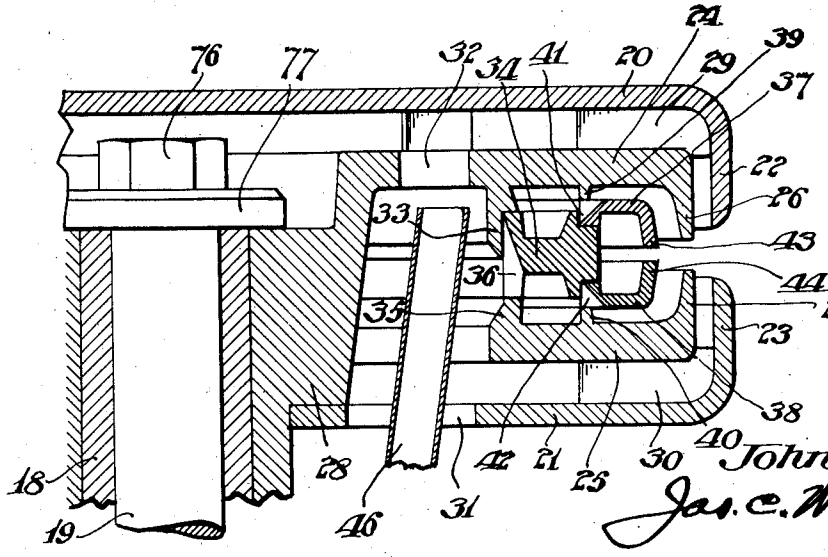


Fig. 4.

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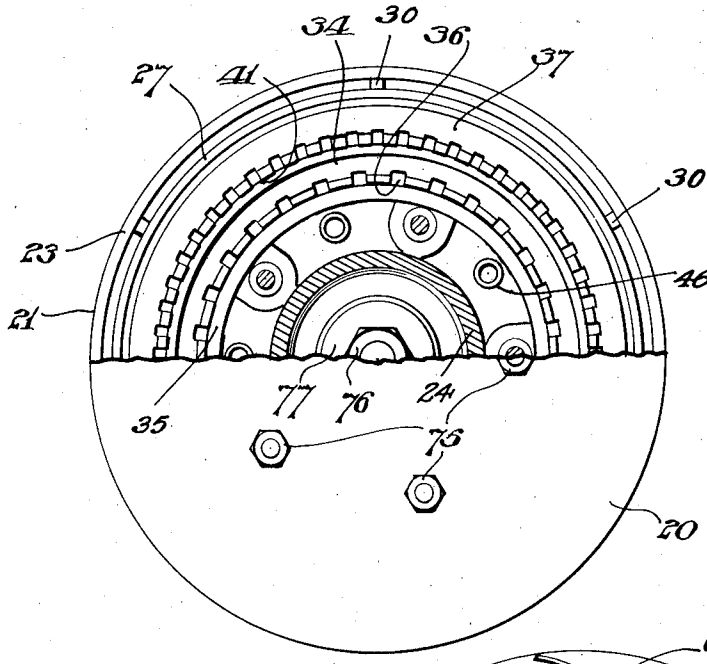


Fig. 2.

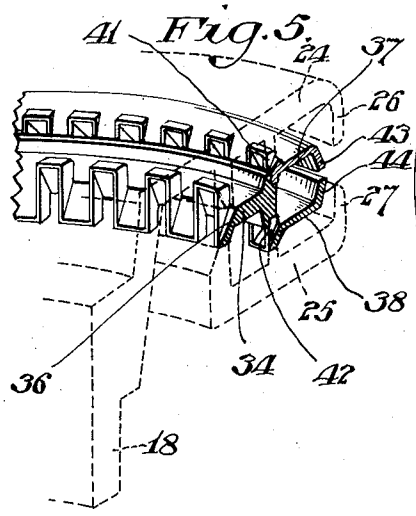


Fig. 5.

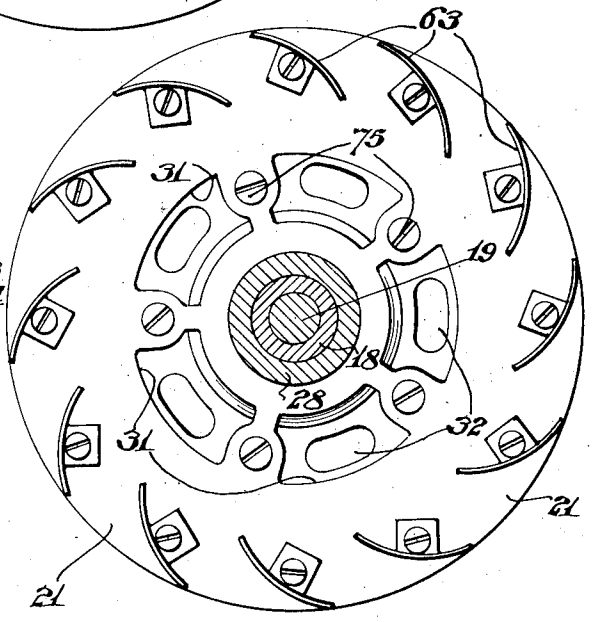


Fig. 3.

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Patented Sept. 3, 1929. 1,726,640

UNITED STATES PATENT OFFICE.

JOHN BENNIGER, OF PHILADELPHIA, PENNSYLVANIA.

OIL BURNER.

Application filed June 7, 1927. Serial No. 197,024.

My invention relates to an oil burner, that is to say, to a device adapted for the burning of fuel oil to utilize the heat of combustion thereof in boilers and heaters of various types.

As is well known, fuel oil is of such nature that it is difficult to burn the same so that the combustion will be complete. In the use of various types of oil burners, a great deal of smoke frequently results and quantities of soot are deposited, due to the incomplete combustion of the oil, with the consequent loss of efficiency.

The object of my present invention is to provide an oil burner in which the fuel oil will be so manipulated that all parts thereof will be fully exposed to the air, whereby the combustion will be complete and greater efficiency will result.

The nature and characteristic features of my present invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Fig. 1 is a vertical central sectional view of an oil burner embodying the main features of my present invention;

Fig. 2 is a plan view of a burner head, certain parts being broken away and other parts being shown in section to illustrate the internal arrangement;

Fig. 3 is an underneath plan thereof, certain parts being shown in section;

Fig. 4 is an enlarged detail view of a portion of the burner head; and

Fig. 5 is a fragmentary perspective view illustrating the co-relation of certain rings employed for dividing and subdividing the fuel oil.

Referring to the drawings, in the particular embodiment of my invention therein shown, 10 is a housing, preferably frusto-conical in shape. At the upper inner portion of the housing 10 there is provided a ring 11, supported by brackets 12. The housing 10, ring member 11 and brackets 12 are preferably made integral with each other in a single casting.

The ring member 11 supports an annular cup member 13. A pipe nipple 14 is mounted in the lower portion of the annular cup member 13, being adapted to be connected by suitable piping (not shown) with the source of fuel oil supply. There is also provided a pipe connection nipple 15, mounted in the lower portion of the annular cup member 13, and having an extension 16 projecting into the interior of the annular cup member 13. The extension 16 of the nipple 15 is provided with an aperture 17, which is so located as to drain off any excess of oil within the annular cup member 13, while at the same time permitting a proper amount to remain therein, for a purpose which will hereinafter be more fully set forth. The pipe nipple 15 is also preferably connected by means of piping (not shown) to the oil reservoir, whereby the excess oil may be returned to the source of supply.

The annular cup member 13 also serves as a bearing in which a sleeve 18 is journaled. The sleeve 18 is mounted on the end of a vertical shaft 19, which in the operation of the device is rotated at a high speed, preferably by means of an electric motor (not shown). The upper end of the sleeve 18 is preferably reduced in diameter, and upon this reduced portion there is mounted a rotatable burner head. The burner head is provided with an upper housing plate 20 and a lower housing plate 21, each having a peripheral rim 22 and 23 respectively. The rims 22 and 23 extend toward each other, being separated a slight distance to provide an annular outlet through which the fuel oil is projected in such manner as will be hereinafter more fully set forth.

Enclosed within the plates 20 and 21 is an upper auxiliary oil distributing plate 24, and a lower auxiliary oil distributing plate 25. The upper oil distributing plate 24 is provided with a downwardly extending peripheral rim 26, and the lower oil distributing plate 25 is provided with an upwardly extending peripheral rim 27. The central portion of the plate 24 is formed into a sleeve portion 28, which is mounted on the sleeve 18, whereby the burner head is secured to the upper end of the vertical shaft 19 and is rotated therewith.

The inner face of the burner head housing plate 20 is provided with a plurality of vanes 29, which serve to position the upper oil distributing plate 24 with respect to said housing plate 20, and also serve to impel air through the space thereby provided. Likewise, the lower burner head housing plate 21 is provided with vanes 30, which serve to position the lower oil distributing plate 25 with respect to said housing plate 21, as well as

to impel the air through the space thereby provided. To permit the air to circulate through the burner head, the lower housing plate 21 of the burner head is provided with openings 31, the lower oil distributing plate 25 is made annular, and the upper oil distributing plate 24 is provided with openings 32.

The under face of the upper oil distributing plate 24 is provided with an annular projection 33, the lower portion of which extends substantially to the medial plane of the burner head, and is provided with an annular recess which serves to position an oil dividing ring 34. The lower portion of the oil dividing ring 34 rests upon an annular projection 35 extending upwardly from the upper face of the lower oil distributing plate 25. The oil dividing ring 34 has its inner portion notched or serrated, as at 36, thereby to provide a plurality of channels extending alternately to the top and bottom of the ring 34, it being noted that the medial line of the serrated inner portion of the ring 34 lies approximately in the plane of the lower edge of the annular projection 35.

At the top and bottom of the serrated portion of the oil dividing ring 34, there are provided annular recesses in which are mounted oil subdividing rings 37 and 38, respectively, the same being held in place in said recesses by means of annular projections 39 and 40, carried respectively by the upper oil distributing plate 24 and the lower oil distributing plate 25. The oil subdividing rings 37 and 38 also have their inner portions notched or serrated as at 41 and 42, similarly to the oil dividing ring 34, and it should be noted that the top surface of the oil dividing ring 34 lies in the plane of the medial line of the serrated inner portion of the subdividing ring 37, and likewise the lower surface of the oil dividing ring 34 lies in the plane of the medial line of the serrated inner portion the oil subdividing ring 38. The outer portion of the subdividing ring 37 is provided with a downwardly extending rim 43, and likewise the outer portion of the subdividing ring 38 is provided with an upwardly extending rim 44, the rims 43 and 44 extending in proximity to each other, as shown in Figs. 1 and 4 of the drawings.

The various parts of the burner head are held together by means of bolts 75 passing therethrough, and the burner head proper is held in place on the reduced portion of the sleeve 18 by means of a bolt 76 and a washer 77.

Clamped between the sleeve portion 28 of the plate member 24 and a shoulder portion of the sleeve 18 is a bracket member 45, which serves to support a plurality of tubes 46. The tubes 46 are inclined at an angle to the axis of the shaft 19, and the lower ends of these tubes are cut at an angle and extend into the cup member 13, being adapted to scoop up a portion of the oil contained therein and carry the same upward when the burner head is rotated, due to the centrifugal action. The upper ends of the tubes 46 terminate below the lower surface of the plate member 24, but above the plane of the rim of the annular projection 33 thereof, so that as the oil is thrown outward from the top of the tubes 46, the same will be delivered to the annular projection 33.

A bushing 50 is mounted in the lower end of the cup member 13, being provided with a sleeve 51 which extends upwardly between the shaft 19 and the sleeve 18 which is mounted thereon. The upper end of the sleeve 51 extends above the normal level of the oil in the cup member 13, and consequently serves to prevent leakage of the oil, which might otherwise run down the shaft 19.

The shaft 19 may be provided with a fan structure mounted thereon, comprising a plurality of blades 52 carried by a ring member 53, which is secured to a sleeve 54, a collar 55 being threaded in the sleeve 54 and serving to compress suitable packing 56, thereby to clamp the fan structure to the shaft 19.

The upper end of the main housing 10 supports an annular air deflecting member 60, which serves to deflect the air passing from the interior of the housing to the openings 31 in the bottom of the plate 21, and the housing 10 may also be provided with brackets 61, which serve to support an annular member 62 which serves to provide, in conjunction with the annular member 60, an annular passageway extending from the outside of the housing 10 to a point below the lower housing plate 21 of the burner head, which may be provided on its lower face with vanes or fan blades 63. An annular plate 64 may be supported by means of pins 65 extending upwardly from the annular member 62, whereby the air which is impelled outward by the vanes 63 may be delivered into the burner chamber.

The operation of the device may now be described. The vertical shaft 19 is rotated at a high speed by means of an electric motor (not shown), and consequently the burner head which is attached thereto is also rotated at a high speed. Oil is fed to the cup member 13 by means of the pipe nipple 14. A constant level of the oil is maintained in the cup member 13, any excess being drained off through the aperture 17 in the extension 16 of the nipple 15. The lower ends of the pipes 46 extending into the oil contained within the cup member 13, a quantity of the oil will be scooped up by the lower ends of the said tubes and will be impelled upward due to the outward inclination of said tubes.

As the oil reaches the tops of the tubes 46, the same will be thrown off and will impinge against the annular projection 33, being im-

pelled outward from the lower end thereof by centrifugal action, and impinging against the serrated inner portion of the oil dividing ring 34. As the oil impinges against the serrated portion of the ring 34, the same will be divided, one-half passing to the upper surface of said ring and the other half passing to the lower surface of said ring, whence the same will be impelled outward.

The portion of the oil which passes over the upper surface of the ring 34 will impinge against the serrated portion of the subdividing ring 37, and the portion of the oil which passes over the lower surface of the ring 34 will impinge against the serrated portion of the subdividing ring 38. By reason of one-half of the serrations extending to the upper surface of the ring 37, one-half of the oil will pass to the upper surface thereof, and by reason of the other half of the serrations extending to the lower surface of said ring, the other half of the oil, which comes from the upper surface of the ring 34, will pass to the lower surface of the subdividing ring 37. The portion of the oil which passes to the upper surface of the subdividing ring 37 will be thrown outward and will impinge against the inner surface of the rim 26 of the distributing plate 24, and will be thrown outward therefrom through the annular opening provided by the rims 22 and 23 of the burner head housing plates 20 and 21 respectively.

In like manner, the portion of the oil which passes to the lower portion of the subdividing ring 38 will be thrown outward and will impinge against the inner surface of the rim 27 of the distributing plate 25, and will be thrown outward therefrom through the annular opening provided between the rims 22 and 23 of the burner head housing plates 20 and 21 respectively.

The oil which passes to the lower surface of the subdividing ring 37 will pass downward and be thrown off from the periphery of the rim 43 of the subdividing ring 37, and in like manner the oil which passes to the upper surface of the subdividing ring 38 will be thrown outward from the periphery of the rim 44 of the subdividing ring 38. In this manner, the oil will be divided into four thin sheets.

Most of the air which is forced upward through the main housing 10 by means of the fan 52 will find its way through the various passageways of the burner head, so that a plentiful supply of air will be provided for the surfaces of the sheets of oil, and the air passing through the various passageways of the burner head will also serve to maintain the burner head in a cool and efficient condition.

The additional air required to complete the combustion will pass upward in the air space between the members 60 and 62, and will be impelled outward from below the plate 64 by means of the fan blades 63 mounted on the lower surface of the lower housing plate 21 of the burner head.

By the foregoing arrangement, there will be provided a simple and efficient oil burner in which the fuel oil will be subdivided and thrown outward in a plurality of thin sheets, to all parts of which the air necessary to complete the combustion will be readily accessible, whereby the oil will be burned in an efficient and satisfactory manner.

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

1. In an oil burner, a rotatable burner head having an oil dividing ring the inner portion of which is serrated to provide a plurality of channels extending alternately to the top and bottom of said ring, a pair of subdividing rings concentrically arranged with respect to the oil dividing ring each having a serrated inner portion to provide channels in each of said subdividing rings extending alternately to the top and bottom of the same, the upper and lower surfaces of the oil dividing ring being arranged in the respective medial planes of the serrated portions of the subdividing rings, each of said subdividing rings being provided with a peripheral rim, said peripherial rims extending toward each other but separated a slight distance, each of said peripheral rims being adapted to throw off centrifugally the separated portion of the oil passing thereto, and means for delivering oil to the serrated portion of the oil dividing ring.

2. In an oil burner, a rotatable burner head having an oil dividing ring the inner portion of which is serrated to provide a plurality of channels extending alternately to the top and bottom of said ring, a pair of subdividing rings concentrically arranged with respect to the oil dividing ring each having a serrated inner portion to provide channels in each of said subdividing rings extending alternately to the top and bottom of the same, the upper and lower surfaces of the oil dividing ring being arranged in the respective medial planes of the serrated portions of the subdividing rings, each of said subdividing rings being provided with a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, each of said peripheral rims being adapted to throw off centrifugally the separated portion of the oil passing thereto, a member having an annular projection having its rim arranged in the medial plane of the serrated portion of the oil dividing ring, and means for delivering oil to said annular projection.

3. In an oil burner, a rotatable burner head having an oil dividing ring the inner portion of which is serrated to provide a plurality of channels extending alternately to

the top and bottom of said ring, a pair of subdividing rings concentrically arranged with respect to the oil dividing ring each having a serrated inner portion to provide channels in each of said subdividing rings extending alternately to the top and bottom of the same, the upper and lower surfaces of the oil dividing ring being arranged in the respective medial planes of the serrated portions of the subdividing rings, each of said subdividing rings being provided with a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, each of said peripherial rims being adapted to throw off centrifugally the separated portion of the oil passing thereto, a pair of auxiliary oil distributing plates each having a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, and each adapted to receive a portion of the oil from one of the subdividing rings and to throw the same off centrifugally, and means for delivering oil to the serrated portion of the oil dividing ring.

4. In an oil burner, a rotatable burner head comprising upper and lower housing plates having peripheral rims extending toward each other but separated a slight distance to provide an annular outlet, an oil dividing ring having its inner portion serrated to provide a plurality of channels extending alternately to the top and bottom of said ring, a pair of subdividing rings concentrically arranged with respect to the oil dividing ring each having a serrated inner portion to provide channels in each of said subdividing rings extending alternately to the top and bottom of the same, the upper and lower surfaces of the oil dividing ring being arranged in the respective medial planes of the serrated portions of the subdividing rings, each of said subdividing rings being provided with a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, each of said peripheral rims being adapted to throw off centrifugally the separated portion of the oil passing thereto, a pair of auxiliary oil distributing plates each having a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, and each adapted to receive a portion of the oil from one of the subdividing rings and to throw the same off centrifugally, and means for delivering oil to the serrated portion of the oil dividing ring.

5. In an oil burner, a rotatable burner head comprising upper and lower housing plates having peripheral rims extending toward each other but separated a slight distance to provide an annular outlet, an oil dividing ring having its inner portion serrated to provide a plurality of channels extending alternately to the top and bottom of said ring, a pair of subdividing rings concentrically arranged with respect to the oil dividing ring each having a serrated inner portion to provide chanels in each of said subdividing rings extending alternately to the top and bottom of the same, the upper and lower surfaces of the oil dividing ring being arranged in the respective medial planes of the serrated portions of the subdividing rings, each of said subdividing rings being provided with a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, each of said peripheral rims being adapted to throw off centrifugally the separated portion of the oil passing thereto, a pair of auxiliary oil distributing plates each having a peripheral rim, said peripheral rims extending toward each other but separated a slight distance, and each adapted to receive a portion of the oil from one of the subdividing rings and to throw the same off centrifugally, one of the oil distributing plates being provided with an annular projection having its rim arranged in the medial plane of the serrated portion of the oil dividing ring, and means for delivering oil to said annular projection.

In testimony whereof, I have hereunto signed my name.

JOHN BENNIGER.