June 17, 1930. W. D. HARVEY 1,763,779

OIL BURNER

Filed Oct. 25, 1928 2 Sheets-Sheet 1

Fig. 1.

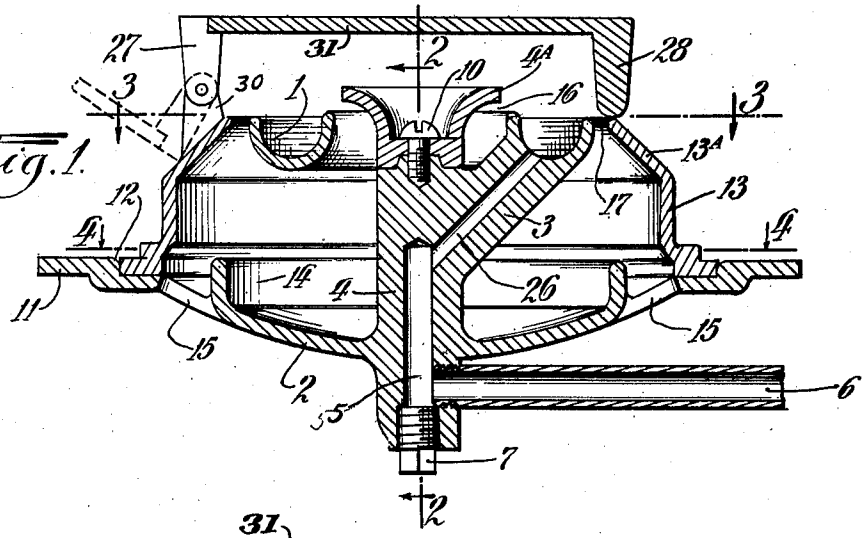


Fig. 2.

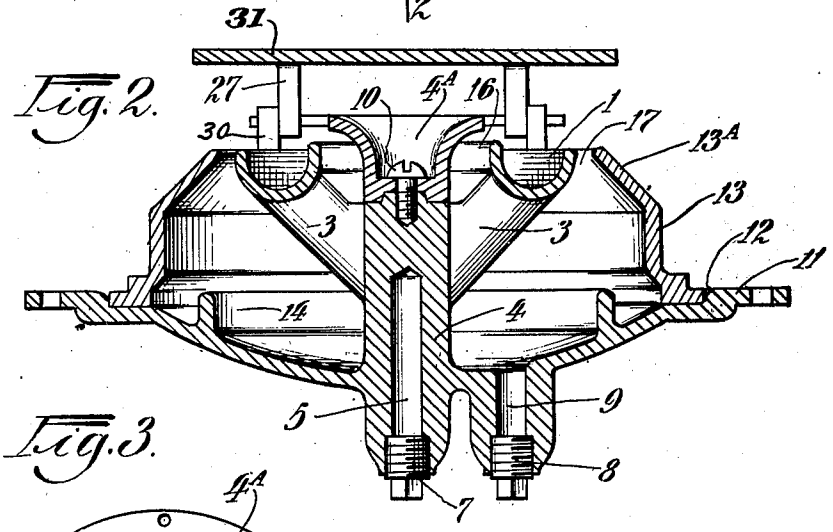
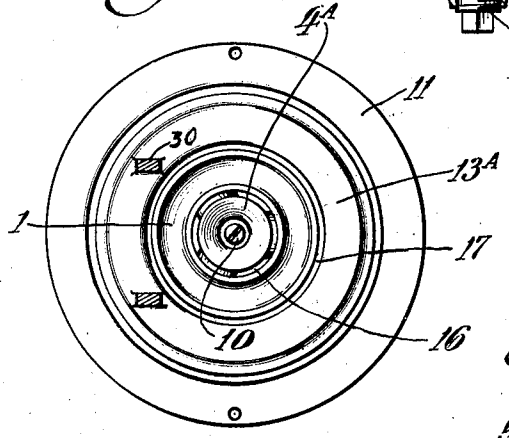


Fig. 3.



Inventor:
William Dow Harvey
By Albert Scheible
Attorney.

June 17, 1930. W. D. HARVEY 1,763,779

OIL BURNER

Filed Oct. 25, 1928 2 Sheets-Sheet 2

Fig. 5.

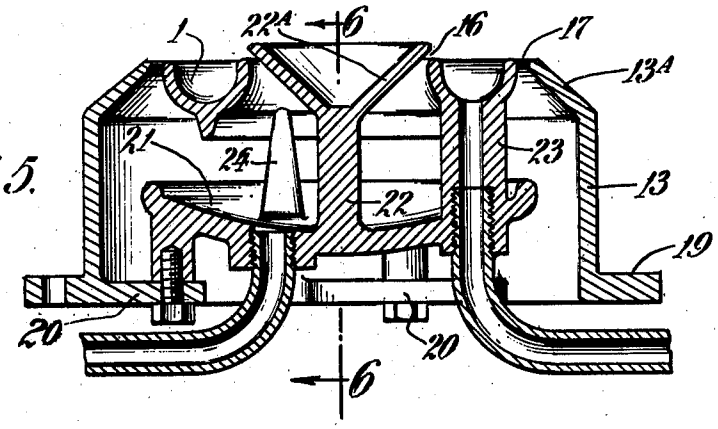


Fig. 6.

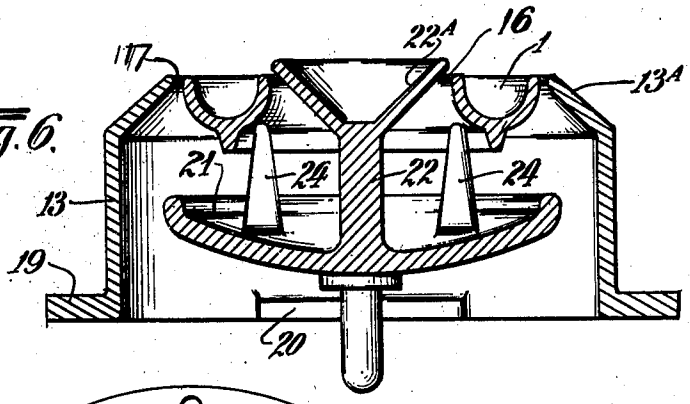
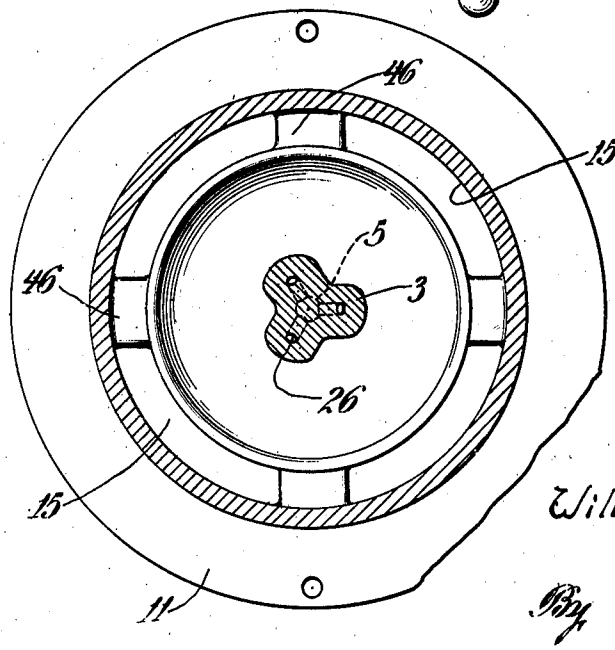


Fig. 4.



Inventor:
William Dow Harvey
By Albert Scheible
Attorney.

Patented June 17, 1930 1,763,779

UNITED STATES PATENT OFFICE

WILLIAM DOW HARVEY, OF MACOMB, ILLINOIS, ASSIGNOR TO AMERICAN STEEL PRODUCTS CO., OF MACOMB, ILLINOIS, A CORPORATION OF ILLINOIS

OIL BURNER

Application filed October 25, 1928. Serial No. 314,866.

My invention relates to the class of burners in which fuel oil or the like is burnt from a trough without the interposition of a wick. Generally speaking, the objects of my invention are those of providing a simple, inexpensive, compact and efficient burner which will produce a steady and efficient annular flame free from smoky spots, and which will readily permit the resulting flame to be spread out to a large radius without reducing the efficiency of the burner. Furthermore, my invention aims to provide a burner of this class in which all of the major parts may be formed of castings, so as to avoid the lack of durability encountered when sheet metal parts are employed, which can readily be shipped when completely assembled and installed as a unit in heaters or the like, which will be unusually compact in proportion to the spread of the flame and the heating capacity, and which can easily be cleaned.

Still further and also more detailed objects will appear from the following specification and from the accompanying drawings, in which—

Fig. 1 is a central and vertical section through an oil burner embodying my invention and equipped with a flame spreader.

Fig. 2 is a central and vertical section through the same burner, taken at right angles to Fig. 1.

Fig. 3 is a reduced horizontal section taken along the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary horizontal section taken along the line 4—4 of Fig. 1.

Fig. 5 is a central and vertical section through another oil burner embodying my invention.

Fig. 6 is a central and vertical section through the last named burner, taken at right angles to Fig. 5.

In the embodiment of Figs. 1 to 4 inclusive, the oil burner of my invention includes a horizontal oil ring 1 having a groove in its upper face to afford an annular oil trough. This oil ring is supported above a drip pan 2 by upwardly diverging arms 3 on a central riser 4 which extends upwardly from the drip pan, the drip pan desirably being shaped like a saucer and sufficiently larger in diameter than the oil ring 1 to catch the possible overflow of oil from the groove in this ring.

The riser 4 has a passage 5 connected to a fuel supply pipe 6 and at least one of the arms 3 has a longitudinal duct 26 connecting the riser passage 5 with the groove in the oil ring so as to supply oil to this groove. To facilitate a cleaning of these oil passages I desirably provide a drain plug 7 at the lower end of the riser passage 5, and I also desirably provide a second drain plug 8 at the bottom of an overflow discharge passage 9 leading downwardly from the drip pan.

The upper end of the riser 4 effectively extends higher than the top of the oil ring and is flared out toward that ring so as to leave a contracted annular air space 16 between the two and so as to deflect upwardly moving air outwardly and upwardly over the top of the oil ring. To facilitate the manufacturing, I am showing this riser top as constructed of a separately made casting 4A of inverted bell shape, fastened to the main riser portion 4 by a screw 10.

To provide a convenient and inexpensive support for the drip pan which in turn supports the oil ring, I preferably extend the base of this pan radially to afford an outer supporting flange 11, here shown as having an annular offset 12 for centering the base of a detachable tubular casing 13. This casing has its upper portion 13A tapering upwardly inward and terminating at approximately the same height as the top of the oil ring, so as to leave a narrow annular air space 17 between the upper end of the casing and the outer edge of the oil ring. Then I provide air inlets radially outward of the rim 14 of the drip pan and desirably adjacent to the lower end of the casing 13 to admit air upwardly into the casing. These air inlets desirably extend close to the bore of the lower part of the casing and are uniformly spaced circumferentially, for which purpose Fig. 1 shows such air inlets in the form of arcuate apertures 15 which leave relatively narrow and symmetrically disposed metal parts 46 connecting the drip pan with the supporting flange 11.

When oil or other liquid fuel (supplied to

the groove in the oil ring under pressure) is lit, the suction produced by the heat of the flame draws air into the casing through the air inlets 15 and this air issues through the annular passages 16 and 17 which are respectively radially inside and outside the oil ring. Owing to the mounting of the riser within the casing, the air chamber through which the air is supplied is effectively an annular casing, and the sloping of both the riser top 4A and the upper casing end 13A toward the oil ring contracts the two annular air outlets of the casing to a much smaller total cross-section than that of the lower portion of the casing.

Consequently, the velocity of the upwardly moving air is increased as it approaches these annular air outlets (16 and 17) between the oil ring and the parts 4A and 13A (each of which acts as air deflector), particularly when the total area of the air inlets 15 is at least equal to the joint area of these outlets, or somewhat greater than the latter as shown in the drawings. This increase in the velocity of the air is also augmented by having the inner and outer walls of the oil ring converge upward respectively toward the inner and outer air deflectors.

Owing to this increase in velocity and to the deflecting of the inner and outer portions of the air supply for the oil toward each other, I secure a thorough intermingling of the air with the vaporized oil, so that I obtain much better combustion than would be obtained with air supplied only from the interior or exterior of the oil ring. Since the drip pan must be larger in diameter than the oil ring, the air inlets are vertically outside that ring and the draft would tend to produce a greater effect from the outside of the oil ring than from its interior if the inner and outer air deflectors were both at the same height. By disposing the flaring inner air deflector 4A at a greater height than the outer deflector 13A, I compensate for this and secure a flame with no smoky spots (or ring or smoky spots) in it, thus attesting the complete and effective combustion of the oil.

If my burner is to be used for purposes where a flame of wide radial spread is desired, as for example in an oil-burning heater of the drum type, I mount a flame spreader at a suitable height above the oil ring and the air deflectors. Thus, Figs. 1 and 2 show a horizontal flame spreader 31 of somewhat larger diameter than the upper end of outer air deflector, this flame spreader being supported by pivot arms 27 hinged to lugs 30 on the outer deflector 13A and by a downwardly directed arm 28 spaced circumferentially from the pivot arms and normally resting on the top of the outer deflector.

With the burner thus constructed, access can instantly be secured to the oil and the drip pan by merely swinging the flame spreader back on its pivoted mounting, as partially shown in dotted lines in Fig. 1. Or, the casing together with the flame spreader can be lifted off bodily for this purpose, and can readily be replaced in its proper position owing to the centering of its lower end by the annular offset 12.

However, while I have heretofore described an embodiment of my invention in which the drip pan is integral with the supporting flange of the burner, in which the liquid fuel is fed through arms carried by a central riser, and in which the casing is detachable from the supporting flange, I do not wish to be limited to these or other details as thus disclosed. Obviously, many changes might be made without departing either from the spirit of my invention or from the appended claims.

For example, Figs. 5 and 6 show an embodiment in which the casing 13 has at its bottom an integral and outwardly directed flange 19 by which the burner is supported, and also has inwardly directed lugs 20 for supporting the drip pan 21. In this case, the riser 22 on the drip pan has an integral and upwardly flaring top portion 22A affording the inner air deflector. The drip pan also has a tubular riser 23 which carries the oil ring and through which the liquid fuel is supplied to this ring, while auxiliary supports 24 are interposed between the drip pan and other portions of the oil ring. The inner deflector 22A in this case has a conical air deflecting surface, and air is admitted between the bore of the casing 13 and the entire periphery of the drip pan, while the spacing of the inner deflector from the oil ring is somewhat differently proportioned than in Figs. 1 and 2, thus showing that the shape and proportions of various parts may be modified without materially affecting the operation of my burner.

In each of the illustrated embodiments, the air is admitted through a substantially annular air inlet arrangement of greater interior diameter than the oil ring and this air distributes itself within the casing, so as to discharge at an augmented velocity through the two annular air outlets 16 and 17, with the discharge through these outlets directed above the oil ring in relatively intersecting and substantially conical paths.

If a low level of oil is to be maintained in the fuel trough, the inner air deflector 22A need not extend above the top of the trough, hence I do not wish to be limited in this respect, nor to a particular proportioning of the air passages inside and outside of the fuel trough.

I claim as my invention:

1. A liquid fuel burner comprising an outer annular wall having its upper portion tapering upwardly, an upwardly flaring air deflector disposed within and concentric with the said upper portion of the outer annular

wall and presenting its upper edge at a height approximating that of the upper edge of the said outer wall, an annular fuel-burning trough disposed between the said wall and deflector and concentric with the said air deflector and supported with its upper edge at a height approximating the aforesaid height, the trough having its upper edges freely spaced by annular spaces from both the said wall and the air deflector; and means rigidly connecting the trough with the air deflector and the said outer wall, the said means being arranged for an air-admitting area between the air deflector and the outer wall below the said tapering portion of the upper wall.

2. A liquid fuel burner as per claim 1, in which the said air-admitting area is considerably greater than the joint area of the said annular spaces.

3. A liquid fuel burner as per claim 1, including a drip bowl underhanging the fuel trough and spaced radially inward from the said annular wall to afford the said air-admitting area therebetween.

4. A liquid fuel burner as per claim 1, including a drip bowl underhanging the fuel trough, and means for supporting both the air deflector and the trough from the drip bowl.

5. A liquid fuel burner as per claim 1, including a drip bowl underhanging both the air deflector and the fuel trough and of smaller diameter than the lower portion of the said wall, and a tubular member supporting the fuel trough and through which fuel is supplied to the trough.

6. A liquid fuel burner as per claim 1, including a drip bowl underhanging the fuel trough, and means for supporting both the air deflector and the trough from the drip bowl; the drip bowl, air deflector and trough constituting a rigid assembly detachable as a unit from the said wall.

7. A liquid fuel burner comprising an annular fuel-burning trough to which liquid fuel is supplied, an inner upwardly flaring conical air deflector disposed inside and concentric with the trough and having its upper edge freely spaced from the trough, an outer and upwardly tapering frustro-conical air deflector disposed outside the trough and having its upper edge freely spaced from the trough, each air deflector having its major portion disposed below the top of the trough.

8. A liquid fuel burner as per claim 7, in combination with an imperforate and disk-like flame spreader presenting a horizontal bottom face above and freely spaced from both air deflectors and from the top of the trough, the flame spreader being concentric with the trough and of larger diameter than the outside diameter of the trough.

9. A liquid fuel burner as per claim 7, in combination with a drip pan disposed below and concentric with the trough and of larger diameter than the trough, and a cylindrical riser wall carrying the outer air deflector and spaced radially outward from the edge of the drip pan to provide an annular air space therebetween.

Signed at Macomb, Illinois, September 27th, 1928.

WILLIAM DOW HARVEY.