Sept. 6, 1927. 1,641,581

J. EGAN

OIL BURNER

Filed May 1, 1926

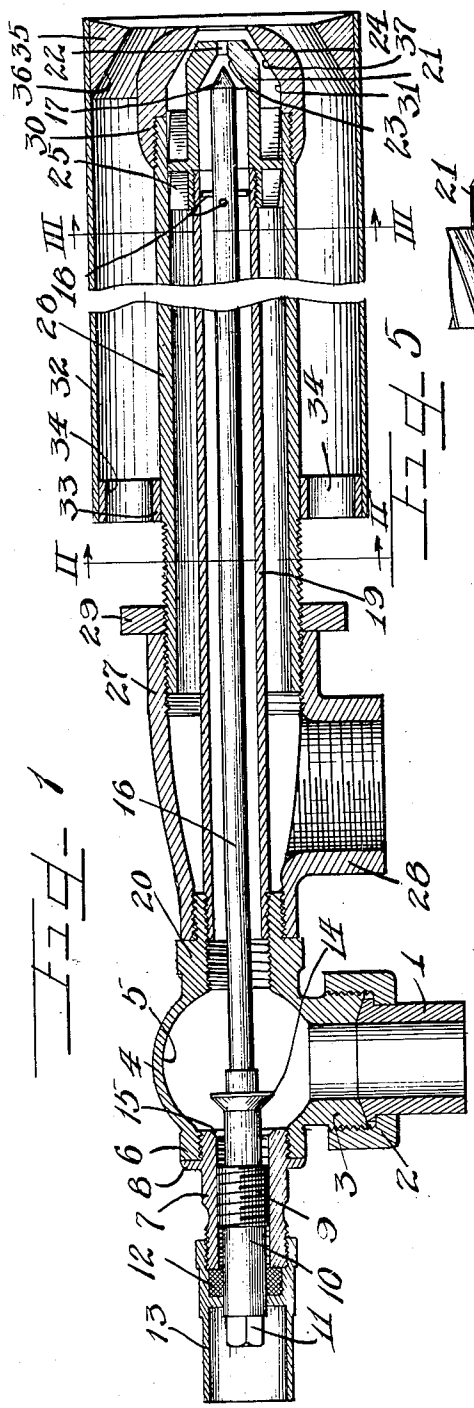


Fig. 1

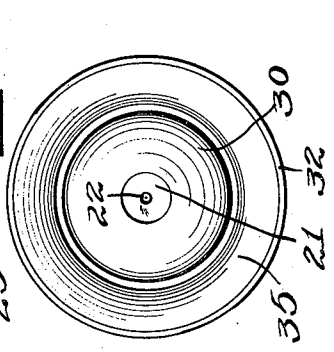


Fig. 4

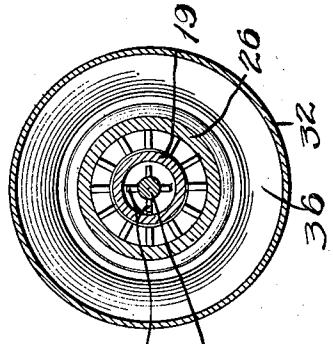


Fig. 3

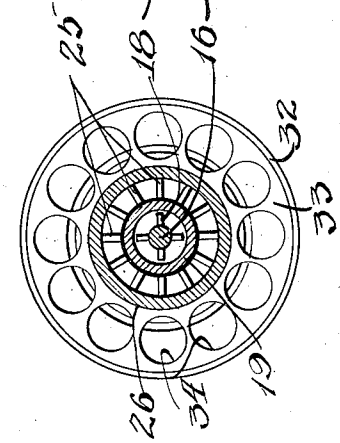


Fig. 2

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# UNITED STATES PATENT OFFICE.

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## OIL BURNER.

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This invention relates to burners and more particularly to an improved oil burner and the nozzle thereof which is adapted to provide a thorough mixture of fuel oil and air and then augment the supply of air after the initial mixture thereof with free air in the required proportion to bring about not only a proper combustion mixture but an arrangement whereby the various parts of the discharge nozzle are automatically cleaned to prevent accumulation of carbon and other obstructing substances in the end of the burner.

It is an object of this invention to provide an oil burner, the discharge nozzle of which is provided with a free air jacket to facilitate the proper mixing of additional air to a fuel mixture produced by carbureting air under pressure with oil.

It is also an object of this invention to provide an oil burner having an oil discharge valve mechanism mounted within an adjustable air or steam supply nozzle adapted to carburet the air with the oil to form a fuel mixture which after being produced is adapted to be supplied with an additional quantity of free air aiding combustion and received from an air jacket surrounding the nozzle and having the discharge end thereof arranged so that the various surfaces of the parts forming the ejecting end of the burner are automatically cleaned, thereby obviating the accumulation of carbon and other foreign matter at the ignition end of the burner.

It is an important object of this invention to provide an improved oil burner of a type wherein the ignition or nozzle end of the device is provided with an air cooling jacket adapted not only to supply an additional quantity of free air to a fuel mixture, but also serving as a means of keeping the nozzle parts cool, thereby obviating the accumulation of carbon.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is an enlarged fragmentary longitudinal section of an oil burner embodying the principles of this invention and showing parts in elevation.

Figure 2 is a transverse sectional view taken on line II—II of Figure 1.

Figure 3 is a transverse section taken on line III—III of Figure 1.

Figure 4 is an end view of the ignition end of the oil burner.

Figure 5 is a fragmentary detail view of the oil discharge nozzle, including the air distributing vanes.

As shown on the drawings:

The reference numeral 1 indicates an oil pressure supply pipe adapted to be connected with any suitable source of fuel oil under pressure. Connected to the outlet end of the supply pipe 1 by means of a coupling 2 is the threaded end of an arm 3 which is integrally formed upon one side of a three-way globe union 4 having an oil receiving chamber 5 therein. Threaded into an arm 6 of the union 4 is one threaded end of a sleeve 7 having a stop flange 8 thereon adapted to seat against the end of the arm 6. The sleeve 7 is internally threaded to receive a threaded shank 9 which is formed on a shank portion 10 which projects axially through the sleeve 7. A nut 11 or other suitable means is formed on one end of the shank 10 to permit adjustment of said shank within the sleeve 7. The shank 10 also projects through a packing 12 seated within a pipe cap 13, one end of which is threaded onto one end of the sleeve 7. Access to the nut 11 on the end of the shank 10 is adapted to be had through the open end of the pipe cap 13 as clearly illustrated in Figure 1. Formed on the inner end of the shank 10 is a stop 14 which is adapted to coact with a seat 15 in the inner end of the sleeve 7. Formed on or secured in the inner end of the shank 10 is a long valve stem 16, the end of which is pointed to afford a needle valve 17. Projecting through suitable diametric openings near the end of the valve stem 16 are a pair of pins 18 which are disposed at right angles to one another. These pins serve as guides for the valve stem 16 and have the ends thereof positioned to slide along the inner face of an oil supply tube or pipe 19, one end of which is threaded into the third arm 20 of the union 4.

Threaded onto the other end of the oil pipe 19 is one end of an inner oil nozzle 21 having an oil discharge aperture 22 in the end thereof. The apertured end of the oil nozzle 21 is provided with a conical

chamber 23 which connects the interior of the pipe 19 with the oil discharge aperture 22. The chamber 23 affords a valve seat for the needle valve 17. The apertured end of the oil nozzle 21 is bevelled at 24 with the bevelled surface 24 being substantially parallel to the surface of the valve seat 23. Formed on the exterior of the oil nozzle 21 are a plurality of spiral vanes 25, the outer edges of which fit within the externally threaded outer end of an air pressure supply pipe 26 which surrounds the oil pipe 19 and is spaced therefrom. The other end of the air pipe 26 is also externally threaded and is adjustably engaged in an air supply elbow 27, one arm of which is threaded on to the arm 20 of the union 4. The other arm 28 of the elbow 27 is adapted to be connected with any suitable source of air or steam under pressure. A locking nut 29 is engaged on the threaded end of the air pipe 26 and is adapted to contact against the end of the air elbow 27 into which the pipe 26 is engaged. This arrangement permits the air pipe 26 to be adjusted with respect to the oil nozzle 21. Threaded onto the outer end of the air sleeve 26 is an air nozzle or cap 30 which encloses the oil nozzle 21 and is provided with a mixing chamber 31 having a bevelled inner wall 37 which is substantially parallel to the bevelled surface 24 of the oil nozzle 21. The oil discharge aperture 22 is positioned a short distance away from the open end of the air nozzle 30 to afford a suitable mixing chamber for the oil and air.

Surrounding the air sleeve 26 is an outer housing or air jacket 32, the inner end of which is provided with a collar or ring member 33 having a plurality of air inlet openings 34 therein arranged in a circle as clearly shown in Figure 2. The apertured ring member 33 fits tightly around the air pipe 26 and affords a means whereby free air is adapted to be drawn through the apertures 34 into the jacket 32 to surround the air pipe 26 and the air nozzle 30. The outer end of the air jacket 32 is provided with a ring member 35 having a bevelled surface 36 which is substantially parallel to the bevelled surfaces 24 and 37 of the oil and air nozzles. The ring member 35 is also provided with a bevelled surface 38 at the outer end thereof. The bevelled surfaces 36 and 38 of the ring member 35 intersect in the plane of the outer end of the air nozzle 30.

The operation is as follows:

The improved oil burner of this invention is adapted to be used in oil burning devices associated with furnaces and heating plants of various kinds. The three-way union 4 as illustrated in Figure 1 is adapted to be connected with a fuel supply pipe 1 through which oil under pressure is delivered into the chamber 5 and is then forced outwardly through the oil pipe 19. The needle valve 17 controlling the discharge of the oil from the nozzle 21 is adapted to be adjusted by means of the nut end 11 of the shank 10. Access to the nut 11 is had through the open end of the cap 13 so that the needle valve 17 may be moved toward or away from the oil discharge aperture 22 in the end of the oil nozzle 21. The valve stem 16 is adapted to be guided by means of the guide pins 18, the ends of which coact with the inner surface of the pipe 19. When the needle valve 17 is open, oil under pressure from the pipe 1 passes through the pipe 19 and is discharged through the oil outlet aperture 22 into the tapered outer end of the mixing chamber 31 provided in the air nozzle 30. With the ejection of oil from the aperture 22, air under pressure from the air pipe inlet arm 28 passes into the air pipe 26 around the pipe 19 and travels through the spiral passages between the vanes 25 formed on the exterior of the oil nozzle 21. The peculiar shape of the vanes 25 causes the air under pressure to circulate in the mixing chamber 31 around the oil nozzle 21, thereby assuming a whirling motion within the carbureting end of the air nozzle 30. This whirling action of the air under pressure at a point where the oil leaves the aperture 22 causes the whirling air to be carbureted with the oil to form a fuel mixture which is ejected from the oil burner and assumes a ball-shaped contour adjacent the end of the oil burner.

As the above action takes place, a suction action is created around the ignition end of the burner, thereby tending to create a partial vacuum which acts to draw free air through the apertures 34 of the free air jacket 32. The free air is thus drawn through the jacket 32 around the air pipe 26 and around the nozzle 30 and passes through the restricted space between the air nozzle 30 and the ring member 35 secured in the outer end of the air jacket 32. Additional air is thus fed to the fuel mixture in quantities depending upon the suction created by the volume of oil flowing from the aperture 22 and by the volume of the air passing through the air pipe 26.

The flow of free air through the jacket 32 does not only act to supply additional air to the fuel mixture, but also serves as a cooling medium to maintain the oil burner parts cool even when the oil burner has been in service a considerable length of time. The suction action created by the air and oil under pressure leaving the mixing chamber 31 serves as a means whereby the various inclined or bevelled surfaces of the needle valve 17, the oil nozzle 21 and the air nozzle 30 are automatically kept clean from carbon accumulations and other dirt which ordi-

narily tend to clog the burner and outlet openings.

It will thus be seen that the burner is adapted to keep itself cool when in operation and also acts to automatically clean itself and especially the bevelled surfaces against which the oil and air are brought into contact when leaving the discharge or ignition end of the oil burner. The whirling action of the air under pressure caused by the passage of the air between the vanes 25 causes the discharged oil to be completely broken up and carbureted with the whirling current of air to produce the desired fuel mixture which is provided with an additional supply of air from the air jacket 32. The needle valve 17 is adapted to be operated as hereinbefore described by operating the nut 11 formed on the outer end of the shank 10. The bevelled stop member 14 is adapted to seat against the seat 15 when the needle valve is in its extreme open position.

Attention is directed to the fact that the air pipe 26 is adapted to be adjusted with respect to the air elbow 27 thereby permitting the air nozzle 30 to be adjusted with respect to the oil nozzle 21. The volume of air under pressure passing through the pipe 26 is thus adapted to be controlled with changes in the supply of oil produced by adjustment of the needle valve 17.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

An oil burner comprising an oil nozzle, means for controlling the discharge of oil therefrom, an air nozzle surrounding said oil nozzle, vanes separating said oil nozzle from said air nozzle to cause the air issuing from said air nozzle to assume a whirling action to break up the oil leaving said oil nozzle and form a fuel mixture, and an apertured free air jacket surrounding said air nozzle adapted to supply an additional quantity of air for mixing with said discharged fuel mixture, said oil nozzle and air nozzle having bevelled parallel faces spaced from one another and adapted to be automatically cleaned due to the whirling action of the air when leaving said air nozzle.

In testimony whereof I have hereunto subscribed my name.

JAMES EGAN.