

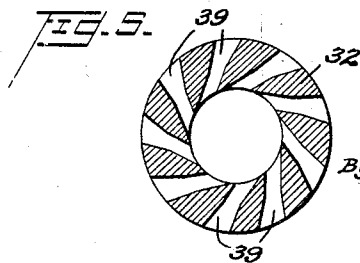
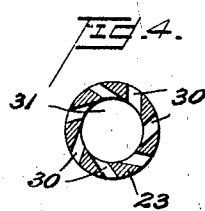
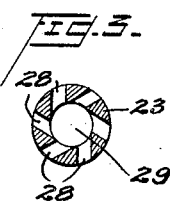
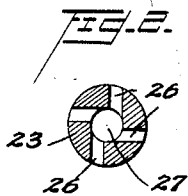
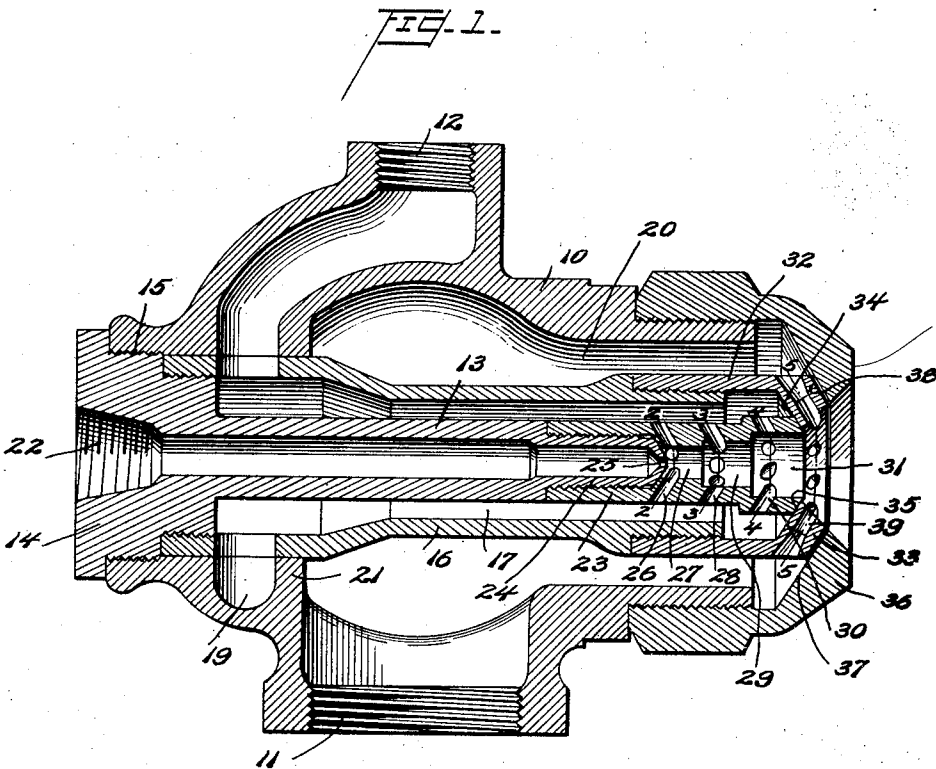
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A. R. ANTHONY

BURNER

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UNITED STATES PATENT OFFICE.

ALFRED R. ANTHONY, OF DETROIT, MICHIGAN.

BURNER.

Application filed November 12, 1920. Serial No. 423,707.

To all whom it may concern:

Be it known that I, ALFRED R. ANTHONY, a citizen of the United States, and residing at Detroit, Wayne County, State of Michigan, have invented certain new and useful Improvements in Burners, of which the following is a specification.

The present invention relates to oil burners. The principal object of the present invention is to provide an improved construction at the front end of the burner for thoroughly atomizing the fuel and mixing it with the air and at the same time obtain a relatively short flame. To these ends the fuel tube is provided at its front end with a plurality of series of holes spaced along the length thereof adapted to discharge air to intersect the jet of fuel. These holes may be inclined so as to give the air a whirling motion to thereby restrict the length of the flame obtained with the burner.

Another feature of novelty resides in the structure of the tip of what may be termed the air tube. This tip is provided with a circular series of holes at its front end so that air is discharged into the stream of mixture issuing from the end of the fuel tube. Preferably the holes in this tip are inclined both to the axis of the burner and circumferentially so that the air is given a whirling motion as it issues from these holes.

Other objects and features of novelty will be apparent from the description taken in connection with the drawings in which,

Fig. 1 is a longitudinal sectional view through a burner having the present invention incorporated therein;

Fig. 2 is a sectional elevation taken substantially on the line 2—2 of Figure 1;

Fig. 3 is a sectional elevation taken substantially on the line 3—3 of Figure 1;

Fig. 4 is a sectional elevation taken substantially on the line 4—4 of Figure 1; and

Fig. 5 is a sectional elevation through the tip of the air tube taken substantially on the line 5—5 of Figure 1.

Referring to the drawings the numeral 10 designates the hollow body of the burner having its opposite ends open and formed at one side with a main air inlet 11 and at another side with a by-pass air inlet 12, as described in my application Serial No. 245,930 filed July 20, 1918. A fuel tube 13 is provided and has an enlargement 14, at

one end thereof, this enlargement being threaded into the opening 15 at one end of the body 10 thereby closing said opening. An air tube 16 is disposed around the fuel tube 13 being threaded on the enlargement 14 and being spaced from the fuel tube 13 to form the air passage 17, the air tube 16 near its inner end having apertures which open into an annular chamber 19 communicating with the by-pass air inlet 12, which latter is adapted to continuously supply air to the passage 17 surrounding the fuel tube 13. The air tube 16 is spaced from the walls of the burner body to provide a second air passage 20 communicating with the main air inlet 11 and separated from the by-pass air inlet 12 by the partition 21 formed in the burner body. The inner end of the fuel tube or pipe 13 is provided with a suitably threaded aperture 22 for connection to a fuel supply. The fuel tube may be in two parts, the forward end being in the form of a cap 23. As shown this cap is threaded on a reduced section 24 of the tube. The wall of the cap is provided with a plurality of series of holes through which air from the passage 17 is discharged to intersect the jet of fuel issuing from the aperture 25 at the end of the reduced portion 24 of the fuel tube.

In the form of the invention illustrated, three series of holes are formed in the wall of the cap. One series of holes 26 is located just in front of the fuel aperture 25. As clearly shown in Figure 2 of the drawings, the holes 26 are inclined to the radial so that the air issuing from the same is given a whirling motion in the chamber 27 of the cap. Furthermore from an inspection of Figure 1 it will be seen that the holes 26 are inclined to the axis of the tube so that the air is discharged with a forward component of velocity as well as tangentially or whirling. A second series of holes 28 is disposed a slight distance in advance of the series 26. Preferably the bore of the cap is slightly enlarged as at 29 in order to accommodate the greater volume of mixture. It will be noted that the holes 28 are inclined both to the axis of the cap and circumferentially. Preferably in order to get a better atomization and a shorter flame, the circumferential inclination of the holes 28 is opposite to that of the holes 26. In other words, the air discharged from holes 28 is given a whirling motion in an opposite

direction to that issuing from the holes 26. In the form of the invention shown there is another series of holes through the wall of the cap, these holes being indicated at

5 30. Like the other holes they are inclined both to the axis of the cap and circumferentially and discharge into a chamber 31 which is of larger diameter than the chamber 29.

10 A cap 32 is adjustably mounted on the air tube 16 and has a conical end wall 33, the inner surface 34 of which is parallel and adapted to contact with the conical tip 35 of the cap 23. In a similar manner the body

15 of the burner has a cap 36 provided with an inner conical surface 37 which may contact with the outer conical surface 38 of the cap 32. The end wall of the cap 32 is provided with a series of holes 39 which are inclined

20 both to the axis of the burner and circumferentially, so that the air discharged therefrom is given a whirling motion in accordance with the circumferential inclination of said holes.

25 In the operation of the burner the jet of fuel issuing from the aperture 25 is intersected by the whirling air discharged through the holes 26. This whirling air, of course, atomizes the jet and reduces its forward velocity. Then the mixture is intersected by the whirling air from the next series of holes, that is, the holes 28, and as this air is preferably whirling in the opposite direction, the forward velocity of the mixture is again retarded. A similar action

30 results from the holes 30. It will be observed that the chambers 26, 29 and 31 increase in diameter, this being desirable in order to accommodate the quantities of air discharged through the holes in the cap. As the mixture leaves the cap 23 it is further broken up by the air issuing from the holes 39 in the cap 32. If desired, the holes 39

35 may be disposed so as to whirl the air in the opposite direction from that of the holes 30 which results in a further slowing up of the forward velocity of the mixture. Of course these alternate whirlings of the air tend to shorten the flame from the burner

40 and at the same time give a very efficient and thorough mixing of the fuel and air. The plurality of series of holes disposed so that the air is fed successively, breaks up the

45 oil much finer and mixes it better with the air than if a single series of holes were employed. The air issuing from the holes 39 further mixes the air and fuel and the final regulation as to the length of the flame may be obtained by discharging a conical stream

50 of air from between the caps 32 and 36. In designing the burner the number of series of holes in the cap on the fuel tube will be determined in accordance with the pressure

55 of the air. If the burner is to be used with

high pressure, a less number of series of holes is required than when a lower pressure is employed.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. An oil burner including in combination, a body, a fuel tube therein said tube having a chamber at its forward end open at the tip of the tube and said tube also having an aperture for discharging a jet into said chamber, the wall of the fuel tube surrounding the chamber having a plurality of series of holes therethrough spaced along the length of the chamber, each series comprising a plurality of holes spaced circumferentially of the wall one series being inclined forwardly toward the axis of the chamber and one series being inclined in a circumferential direction to discharge the air into the chamber with a whirling motion.

2. An oil burner including in combination, a body, a fuel tube therein said tube having a chamber at its forward end open at the tip of the tube and said tube also having an aperture for discharging a jet into said chamber, the wall of the fuel tube surrounding the chamber having a plurality of series of holes therethrough spaced along the length of the chamber, each series comprising a plurality of holes spaced circumferentially of the wall and one series being inclined in a circumferential direction to discharge the air into the chamber with a whirling motion.

3. An oil burner including in combination, a body, a fuel tube therein having a discharge aperture near its end, a cap also within said body and on the end of the tube said cap having an axially extending chamber open at its tip, said chamber increasing in diameter from the fuel discharge opening of the tube to its other end, the wall of said cap surrounding the chamber having a plurality of series of holes spaced along the length of the chamber, each series comprising a plurality of holes spaced circumferentially of the cap.

4. An oil burner including in combination, a body, a fuel tube therein having a discharge aperture near its end, a cap also within the body on the end of the tube said cap having an axially extending chamber open at its tip, the wall of said cap surrounding the chamber having a plurality of series of holes spaced along the length of the chamber, each series comprising a plurality of holes spaced circumferentially of the cap and inclined forwardly toward the axis of the cap and one series being inclined in a circumferential direction to discharge the air into the chamber with a whirling motion.

5. An oil burner including in combination

tion, a body, a fuel tube therein having a discharge aperture near its end, a cap on the end of the tube having an axially extending chamber open at its tip, and increasing in diameter from said aperture to the tip of the cap, the wall of the cap surrounding the chamber having a plurality of series of holes spaced along the length of the chamber, each series comprising a plurality of holes spaced circumferentially of the cap.

6. As an article of manufacture a fuel tube cap of tubular form having an axial opening therethrough consisting of a plurality of sections of different diameters and the wall of the cap having a plurality of series of holes, there being a series for each of said sections and each series comprising a plurality of holes spaced circumferentially of the cap.

7. As an article of manufacture a fuel tube cap of tubular form having an axial opening therethrough and the wall of the cap having a plurality of series of holes spaced along its length, each series comprising a plurality of holes spaced circumferentially of the cap, the holes of one series being inclined to the axis of the cap and the holes of one series being inclined in a circumferential direction to radii of the cap.

8. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air passage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube, and means to discharge air from said passage to intersect the mixture comprising a circular series of holes at the end of the air tube.

9. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air passage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube, and means to discharge air from said passage to intersect the mixture comprising a circular series of holes at the end of the air tube inclined circumferentially to the radial.

10. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air passage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube, and means to discharge air from said passage to intersect the mixture comprising a circular series of holes at the end of the air tube inclined to the axis of the tube.

11. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air pas-

sage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube, and means to discharge air from said passage to intersect the mixture comprising a circular series of holes at the end of the air tube inclined both circumferentially and axially from the radial.

12. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air passage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube, a hollow cap on the end of the air tube having a conical end surface and formed with a circular series of holes adjacent said end to deliver air to intersect the mixture, and a cap on the body having a conical surface the elements of which are substantially parallel to corresponding elements of said first mentioned conical surface.

13. A fuel burner including in combination, a body, a fuel tube therein, an air tube around the fuel tube, and an air passage between the air tube and body, means to discharge air from the air tube to intersect the fuel jet issuing from the fuel tube and means to discharge air from said passage to intersect the mixture comprising a circular series of holes at the end of the air tube, and means to deliver an annular conical stream of air into the mixture.

14. As an article of manufacture a hollow air cap for fuel burners comprising a hollow cylindrical part, said part having a thin conical wall extending inwardly at one end thereof, said wall having a central aperture and formed with holes extending there-through from the cylindrical surface to said aperture.

15. As an article of manufacture a hollow air cap for fuel burners comprising a hollow cylindrical part, said part having a thin wall extending inwardly at one end thereof, said wall having a central aperture and formed with holes extending there-through from the cylindrical surface to said aperture, said holes being inclined circumferentially to the radial.

16. As an article of manufacture a hollow air cap for fuel burners comprising a hollow cylindrical part, said part having a thin wall extending inwardly at one end thereof, said wall having a central aperture and formed with holes extending there-through from the cylindrical surface to said aperture, said holes being inclined to the longitudinal axis of said cap and also inclined circumferentially to the radial.

In testimony whereof I affix my signature.

ALFRED R. ANTHONY.