

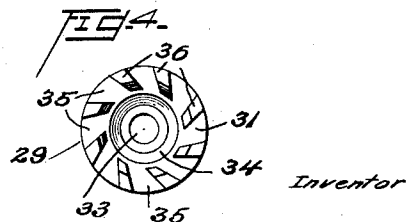
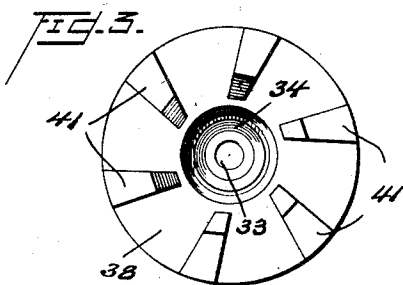
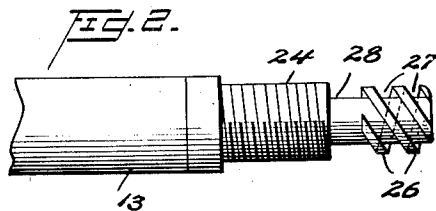
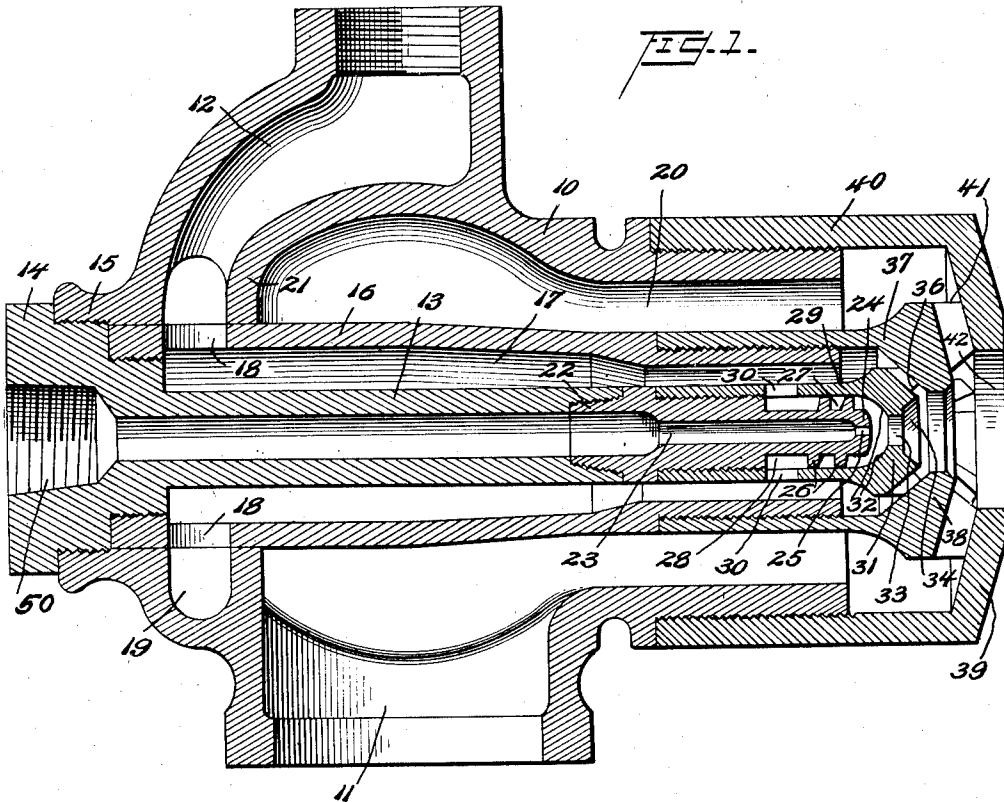
May 5, 1925.

1,536,046

A. R. ANTHONY

OIL BURNER

Original Filed Aug. 7, 1920



A. R. Anthony,

BY Watson, Toip, Morse & Grindle,
ATTY'S

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UNITED STATES PATENT OFFICE.

ALFRED R. ANTHONY, OF FORT PIERCE, FLORIDA.

OIL BURNER.

Application filed August 7, 1920, Serial No. 401,872. Renewed March 2, 1925.

To all whom it may concern:

Be it known that I, ALFRED R. ANTHONY, a citizen of the United States, and residing at Fort Pierce, county of Saint Lucie, State of Florida, have invented certain new and useful Improvements in Oil Burners, of which the following is a specification.

The present invention relates to hydrocarbon burners, particularly of the type wherein the air and fuel are admixed by producing whirling air streams intersecting the jet of fuel.

The principal object of the present invention is to provide an improved construction at the tip of the fuel tube for obtaining a complete atomizing of the fuel and at the same time obtain a relatively short flame.

Another object of the invention aims to provide a tip for the fuel tube which will not become clogged with carbon or other foreign matter.

Another object is to make the fuel tube in a plurality of parts, the tip or jet part preferably being of steel.

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

Figure 1 is a longitudinal sectional view through a burner constructed in accordance with the present invention;

Figure 2 is an elevation of the outer end of the fuel tube;

Figure 3 is an outer end view of the fuel tube and air cap in assembled relation and as removed from the body of the burner; and

Figure 4 is an outer end view of the fuel tube and the parts carried thereby.

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 preferably 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 with an enlargement 14 at one end thereof, and the enlargement is threaded into the opening at one end 15 of the body 10 to close 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 an air passage 17, the air tube 16 having near its inner end apertures which open into an annular chamber 19 communi-

cating with the by-pass air inlet 12, which latter is adapted to continuously supply air to the passage 17 surrounding the fuel pipe 13. The air tube 16 is spaced from the walls of the burner body 10 to provide a second air passage 20 communicating with the main air inlet 11 and which is separated from the by-pass air inlet 12 by the partition or diaphragm 21 formed in the burner body 10. The inner end of the fuel tube or pipe 13 is provided with a suitably threaded aperture 50 for connection to a fuel supply.

The outer or discharge end of the fuel tube 13 may be in the form of a separate part or section, the sections being threaded or otherwise suitably secured together as at 22 to provide the fuel tube 13. The outer end portion of the fuel tube 13 is of reduced internal diameter, as at 23, and has an outer end wall 24 having a discharge orifice 25 of relatively small diameter as compared with the inner passage or bore 23 and which is preferably arranged in coaxial alignment with the fuel tube.

The tip of the end section of the fuel tube 13 is preferably of reduced external diameter and the outer extremity thereof has a thread cut therein forming a helical passage 27, extending from the annular groove 28 to the tip of the tube. The cylindrical part 24 of the fuel tube tip is threaded to receive a cap 29 which has an internal diameter equal substantially to the external diameter of the thread 26 so that the helical passage 27 is practically sealed or closed by the inner surface of the cap 29 and consequently is open only at its opposite ends.

The cap 29 is provided with one or more perforations or apertures 30 through its wall in line with the annular groove or passage 28 to admit air from the air passage 17 into the helical passage 27 formed in the head of the fuel tube. The air thus admitted to the interior of the cap 29 is given a whirling motion and is delivered in such whirling condition from the outer end thereof. The cap 29 has an end wall 31, the inner surface of which is curved as at 32 on a desired radius to form a guiding surface adapted to deflect the whirling air streams across the axis of the tube and toward an axial aperture 33 formed in the wall 31 and in axial alignment with the fuel tube 13.

The curvature of the inner wall 32 of the cap 29 is designed to gradually change the

direction of the air through an angle of nearly 90° . The nearer the direction of flow of the air is to an angle of 90° to the tube axis, the greater the divergence of the mixture when issuing from aperture 33 in the cap. The mixture will be discharged from aperture 33 in the form of a hollow cone, and the greater the angle at the apex of the cone, the thinner the walls of the conical stream, and hence the more thorough the atomization obtained when the second stream of air (described later) intersects the same. The outer face of the end wall 31 of the cap is provided with a flaring bevel or counterbore 34 of sufficient diameter to admit the spreading of the conical film of air and fuel without interference from the aperture 33.

As shown in Figure 4, the front or tip end of the cap 29 is of increased diameter as compared with the inner end portion of the cap and said enlarged part of the cap has a substantially frusto-conical end wall 35 formed with vanes or fins 36 arranged at an angle to the elements of the conical surface and adapted to impart a whirling motion to the stream of air discharged to intersect the jet issuing from the aperture 33. This feature is described and claimed in my application Serial No. 343,701, filed December 10, 1919.

The vanes of the conical surface of the cap 31 engages the interior of an outer cap 37 carried upon the air tube 16, thus closing the channels between vanes 36 except at their ends. The cap 37 is formed with an end wall 38, the inner and outer surfaces of which are substantially frusto-conical in form but preferably at different angles, one example being illustrated in Figure 1 wherein the inner surface of the end wall 38 is substantially parallel to the outer surface 35 of the cap 29 of the fuel tube and being disposed at forty-five degrees to the axis of the burner. The outer surface of the wall 38 of the second cap 37 is shown at an angle of substantially 80 degrees to the axis of the burner and parallel to the end wall 39 of an outer cap 40 mounted on the body 10. This difference in angles of the surfaces of the end walls 38 and 39 causes the various whirling streams of air and fuel to intersect and consequently to thoroughly intermix and break up the fuel particles. As shown in Figure 3, the conical end wall 38 of the air tube cap 37 has a plurality of vanes or fins 41 which are circumferentially inclined as described in connection with cap 31. The vanes 36 and 41 of the caps 29 and 37 may be inclined as described and may be disposed in opposite directions as shown for thoroughly breaking up the oil and obtaining the desired length of flame. The outer or body cap 40 has an outlet aperture 42 in the end wall

39 thereof and in axial alignment with the fuel tube and air tube caps 29 and 37. By proper choice of the angles of the conical ends of the caps the length of the flame may be varied to meet any desired conditions. Thus in the present instance, the angle of 45 degrees of the inner cap permits the film of mixture to spread out, while the steep inclination of the outer stream of air causes it to intersect said mixture almost at right angles. This forms an air obstruction to the mixture which not only further atomizes the oil but will also check its forward velocity and shorten the flame.

In use, air under pressure in the passage 17 passes through the apertures 30 into the annular groove 28, thence to the helical groove 27 in the head of the fuel tube, and is delivered therefrom in a whirling stream at the forward end of the fuel tube head. The inner curved or converging surface 32 of the cap 29 directs the whirling streams across the aperture 33, and the air so whirled is caused to intersect the jet of liquid fuel issuing from the aperture 25 and thoroughly atomize the same. Air also issues from the passage 17 into the channels between the vanes 36 in the cap 29 and is delivered in a whirling stream to intersect the conical jet issuing from the fuel tube cap 29. The aperture 33 is of such size as to maintain the air in the chamber formed by the cap 29 at full pressure and always whirling at the highest speed.

The main air feed or inlet 11 delivers air to the body 10, and the air passes out between the air tube cap 37 and the body 40 through the channels between vanes 41 being given a whirling motion thereby, and intersecting the jet from the cap 37.

The oil tube 13 is preferably, though not necessarily, made in the two parts shown, in order that the outer end or tip of the tube 13 may be of steel, brass, or the like material which will not break or deteriorate when subjected to heat and when handled. If a burner is desired that will give a long flame, one or more caps without the channels, may be substituted.

Although the invention has been described in detail it is not intended to be thus limited, but includes modifications and changes which come within the scope of the appended claims.

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

1. A liquid fuel burner, including in combination a hollow body having an air inlet and a fuel tube mounted in the body having an orifice at its forward end, said tube at its forward end being formed with an annular groove and a helical groove leading from said annular groove to the end of the tube, a cap mounted on the fuel

tube enclosing said grooves and having openings affording communication between the interior of the body and said annular groove and having a discharge aperture in axial alignment with said fuel tube.

2. A liquid fuel burner, including in combination a hollow body having an air inlet, a fuel tube arranged within the body, said fuel tube at its tip end being formed with an exteriorly disposed helical groove, a cap fitting upon the forward end of said fuel tube over said groove and provided with an aperture leading from the interior of the body to said helical groove and a discharge opening in axial alignment with the fuel tube, said tube having an orifice in its forward end through which the liquid fuel is discharged, whereby air is conveyed from the body through said aperture to said groove and is discharged from said groove as a whirling stream across the jet from said orifice.

3. A liquid fuel burner, including in combination, a hollow body having an air inlet, a fuel tube mounted in the body having a discharge orifice at its forward end and an exterior helical groove, and a cap mounted on said forward end of the tube enclosing said groove and projecting beyond the forward end of the tube forming a chamber in the cap between the end of the tube and the cap, the latter having a discharge aperture in its outer end and a curved inner wall leading to the aperture for concentrating and deflecting the whirling stream of air from said groove, said wall being curved on a radius to project said whirling stream of air across the axis of the fuel tube, and the said aperture of the cap being relatively small to maintain the air within the cap under pressure for mixing with the liquid fuel and to effect the discharge of the mixture from the cap.

4. A liquid fuel burner, including in combination, a hollow body having an air inlet, a fuel tube structure mounted in the body having a head portion with a helical

passage communicating at its inner end with the hollow body to receive air therefrom, said head portion having an interior chamber into which said passage discharges and an outlet for said chamber, said head also having an orifice through which the fuel is discharged into said chamber, and the walls of said chamber being shaped to guide the whirling stream of air from the passage across the fuel jet issuing from said orifice.

5. A liquid fuel burner, including in combination, a hollow body having an air inlet, a fuel tube structure projecting into the body, said fuel tube structure having a head portion at its forward end with a helical air passage concentric to the axis of the fuel tube structure and communicating with the body for receiving air therefrom, and said structure having a chamber in its forward end into which a jet of fuel is discharged and also adapted to receive the whirling stream of air from said passage and provided with an axial outlet through which the mixture is discharged, the inner wall of said chamber being curved to deflect the air stream across said jet.

6. As an article of manufacture, a fuel tube structure for hydrocarbon burners comprising a tube having an exterior annular channel spaced from the tip thereof and a helical passage concentric with the axis of the tube leading from said channel to the tip of the tube, a cap fitting over the tip end surrounding said channel and passage and having an aperture in its wall affording communication between the channel and exterior of the cap, the end wall of the cap having a discharge opening and being spaced from the end of the tube to form a mixing chamber, the tube having an orifice in its tip and the interior of said wall being inclined to deflect the stream of air issuing from said passage across the jet of fuel.

In testimony whereof I affix my signature.

ALFRED R. ANTHONY.