July 3, 1934. R. H. GOODRICH 1,965,411

OIL BURNER

Filed Aug. 25, 1931 2 Sheets-Sheet 1

Fig. 1.

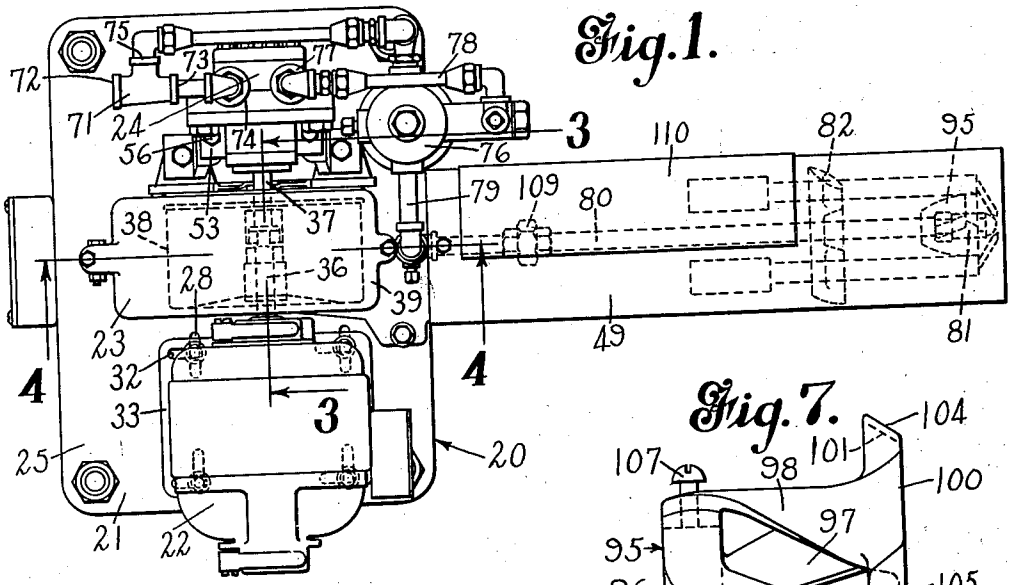


Fig. 7.

Fig. 2.

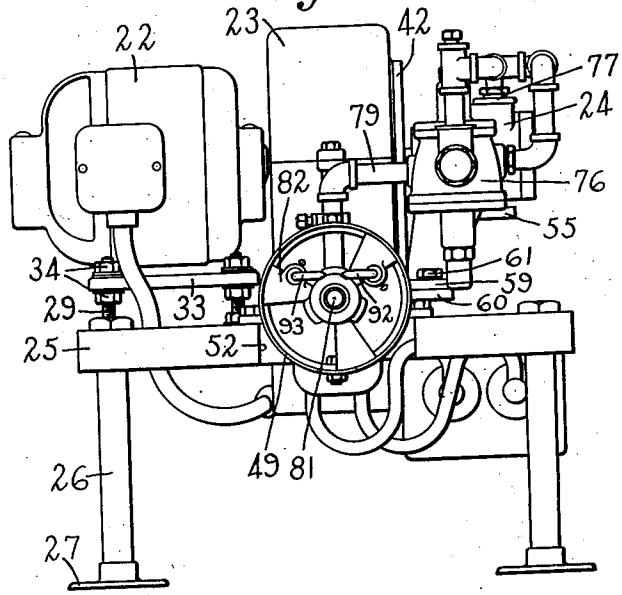
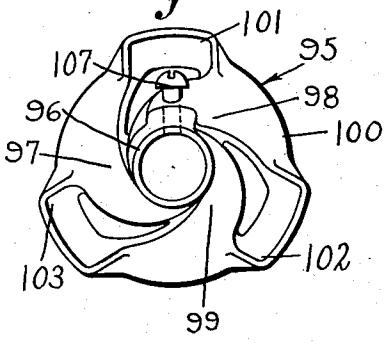


Fig. 8.



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July 3, 1934. R. H. GOODRICH 1,965,411

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Filed Aug. 25, 1931 2 Sheets-Sheet 2

Fig.3.

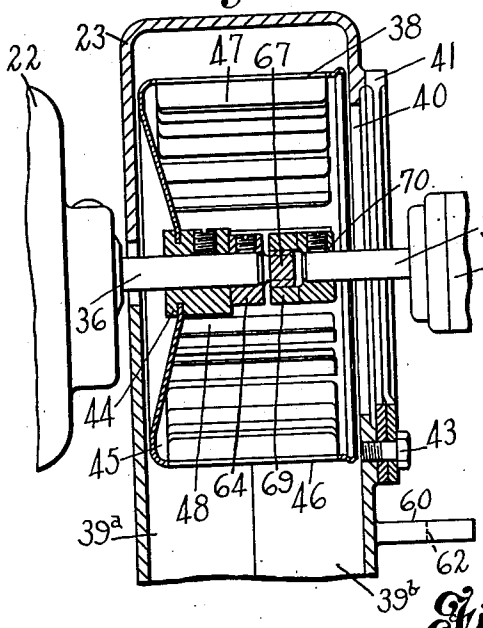


Fig.4.

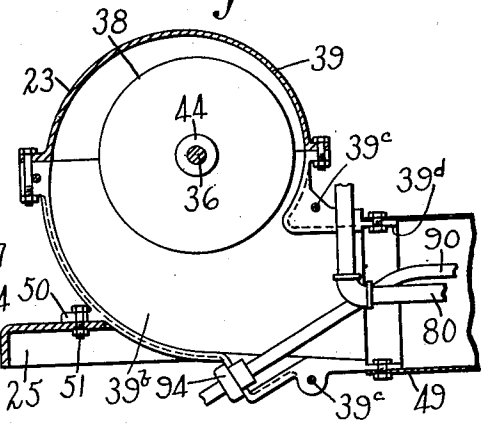


Fig.5.

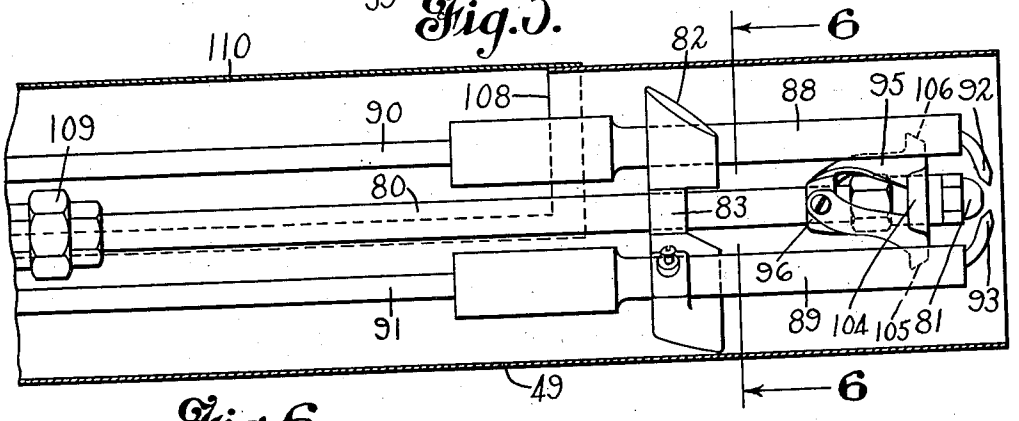
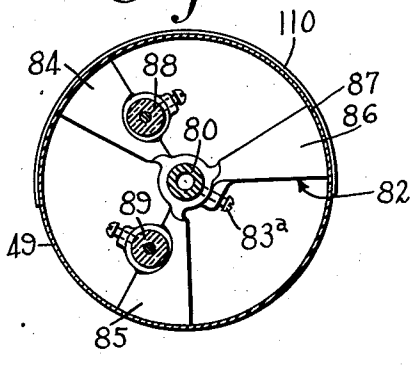


Fig.6.



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Patented July 3, 1934

1,965,411

UNITED STATES PATENT OFFICE

1,965,411

OIL BURNER

Raymond H. Goodrich, Woodbridge, Conn., assignor to Goodrich Oil Burner Manufacturing Corporation, New Haven, Conn.

Application August 25, 1931, Serial No. 559,190

7 Claims. (Cl. 158—76)

My invention relates to an oil burner and more especially to a burner for liquid hydrocarbons for heating steam, hot air or hot water furnaces, generators, or the like.

Generally speaking, the improved oil burner includes a pump for hydrocarbons, an air blower, and an electric motor by means of which the pump and blower are driven, and one of the objects of the invention is to provide a relatively simple form of support or supports for these members, wherein they may be adjusted relatively to one another to be brought into proper alignment so that the various moving parts are relieved from strains and wear.

Another object of the invention is to provide a form of burner or flame control for a burner in which the flame is out of contact with the burner structure to thereby prevent undue carbonizing and erosion.

A feature of the invention resides in the novel form of air control by means of which the amount of air delivered may be varied to produce a proper mixture.

Another feature of the invention resides in a novel form of burner nozzle wherein air and oil are mixed and ignited.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a plan view of an oil burner according to my invention;

Fig. 2 is a side elevational view taken from the right-hand end of the burner as viewed in Fig. 1;

Fig. 3 is a cross-sectional view taken along line 3—3 of Fig. 1, but on an enlarged scale;

Fig. 4 is a cross-sectional view along line 4—4 of Fig. 1;

Fig. 5 is a cross-sectional view of the burner nozzle on an enlarged scale;

Fig. 6 is a cross-sectional view along line 6—6 of Fig. 5;

Fig. 7 is a fragmentary view showing on an enlarged scale the flame controller, and

Fig. 8 is an end view taken from the left-hand end of Fig. 7.

Referring now to the drawings in which I have illustrated my invention by showing a preferred embodiment of the same, the reference numeral 20 indicates, in general, the improved burner which, generally speaking, comprises a base 21, an electric motor 22, a fan or blower 23, and an oil pump 24. The base 21 comprises a relatively flat plate 25 having depending flanges on its edge portions and supported on suitable legs, as for example, rods 26, terminating at their lower ends in flat feet 27.

The plate 25 is provided with longitudinally directed slots or openings 28, through which threaded rods 29 pass, rods 29 being secured in any position of adjustment lengthwise of slots 28 by suitable means. The rods 29 extend upwardly through transversely extending slots 32, in base 33 of motor 22, and are secured to base 33 by means of nuts 34. The rods 29 may be threaded throughout their length so that by adjustment of nuts 34 the base 33 of motor 22 may be positioned at any desired height above the base 21, while by adjusting rods 29 longitudinally in slots 28 or transversely in slots 32 the shaft 36 of motor 22 may be brought into proper alignment with shaft 37 of oil pump 24, in this instance, the rotor 38 of blower 23 being mounted directly on motor shaft 36.

The blower 23 comprises a spiral casing 39 in which a rotor 38 is mounted, the casing being provided at one end with an air inlet opening 40, the passage of air through which is controlled by relatively flat shutters 41 and 42, generally semi-circular in shape and having a common pivotal mounting 43 about which they may be swung to vary the size of opening 40 as may be necessary. The rotor 38 comprises a hub 44, to which is attached a generally cup-shaped body 45, having a generally cylindrical periphery 46 from which blades 47 are struck inwardly, the openings 48 between the blades providing for the outward passage of the air, as the rotor is rotated due to centrifugal force, the air passing outwardly through the delivery tube or nozzle 49, which is secured to the fan casing. The fan may be mounted on the base 21 in any suitable manner, herein being provided with flange-like feet 50 resting on the upper face of the base, and secured thereto by bolts 51, the base being provided with an opening 52 into which the fan casing extends.

The lower portion of the casing 39 is divided into two substantially equal sections 39^a and 39^b along a plane transverse to the shaft 36. These sections are secured together by bolts 39^c passing through lugs formed on these parts. This arrangement results in a great economy in the manufacture of the parts and they can be readily assembled with the upper portion of the casing to form the complete casing. The portions 39^a and 39^b also include the outlet portion 39^d to which the tube 49 is secured.

The pump 24 may be of the geared type or of any other suitable form and herein is provided

with flange-like feet 53 which rest on the upper face of a bracket 55, being secured thereto by means of bolts 56, the bracket 55 being secured to the upper faces 59, of arms 60 on the fan casing, by means of bolts 61, which pass through longitudinally directed slots 62 in arms 60. The pump shaft 37 is driven from motor shaft 36 by means of a flexible coupling herein taking the form of hubs 64 and 70 secured to shafts 36 and 37 respectively, and a leather disk 67 interengaged with fingers 69 provided upon the hubs.

The reference numeral 71 indicates a T fitting, to the end 72 of which the oil supply may be connected, the end 73 being connected to the inlet 74 of pump 24, while the end 75 is connected to a by-pass 76 of any general type and not shown herein in detail, the outlet 77 of pump 24 being connected to the by-pass by means of pipe 78. From the by-pass 76 the oil flows under pressure through pipe 79 and into pipe 80 which extends axially through the air delivery tube 49 and into oil nozzle 81, which may be of any preferred type.

Mounted within tube 49 is an air deflector 82 of screw or propeller shape having a hub 83 through which the pipe 80 passes, the deflector 82 being adjustable along pipe 80 and secured in any position of adjustment by set screw 83a. Deflector 82 is provided with radially directed blades 84, 85 and 86, the outer ends 87 of which fit against the inside surface of tube 49. Blades 84 and 85 are provided with hollow bosses in which sleeves 88 and 89 are mounted, sleeves 88 and 89 being made of fireproof insulating material and serving to support conductors 90 and 91, the outer ends of which terminate in points 92 and 93 separated from one another and spaced axially slightly beyond the end of nozzle 81. The opposite ends of conductors 90 and 91 pass through blower casing 39, being supported in suitable insulating sleeves 94.

Mounted on pipe 80 adjacent nozzle 81 is a flame controller 95, having a hub 96 through which the pipe 80 passes, and blades 97, 98 and 99 which extend spirally around the axis of the controller and forwardly and radially outwardly therefrom, terminating in a ring 100 provided with pockets 101, 102 and 103, the outer faces 104, 105 and 106 of which incline towards the end of nozzle 81. Controller 95 may be adjusted along pipe 80 and held against movement in any position of adjustment by set screw 107. The tube 49 is provided with a relatively large inspection opening 108 in its side wall opposite which a union 109 is connected in pipe 80, the opening 108 being normally closed by a cover plate 110.

The operation of the oil burner may be readily understood from the above description but will be briefly described as follows. The operation of motor 22 is controlled by a thermostat as in the usual oil burner and upon the temperature becoming reduced to the proper degree the motor is set in operation, driving blower 23 to furnish a blast of air through tube 49 and driving oil pump 24 to force oil under pressure through nozzle 81. As the oil passes out of nozzle 81, the spark passing between points 92 and 93 ignites the combustible mixture, the flame formed at the end of the nozzle 81 passing into the firebox of the heater or generator. As the air passes through tube 49 it is given a whirling motion by means of blades 84, 85 and 86, while adjacent the nozzle 81 the flame controller 95 directs a blast of air towards and beyond the nozzle 81, providing an air pressure zone which drives the flame beyond the end of the nozzle, in practice it having been found that the flame forms about four inches away from the nozzle.

The amount of air passing through the tube 49 may be readily adjusted by means of the blades 41 and 42 of the air shutter, the oil being normally forced through the nozzle 81 at a pressure of about 100 pounds per square inch, the by-pass 76 opening when the pressure exceeds this amount to permit the flow of oil back into fitting 71.

The motor 22 may be readily brought into alignment with the axis of pump 24 by adjusting its position vertically on studs 29 and by movement of the latter in slots 32, while the motor 22 and pump 24 may be axially adjusted with respect to air pump 23 by movement of studs 29 in slots 28 and bolts 61 in slots 62.

While I have shown and described a preferred form of my invention, it will be understood that it is not to be limited to all the details shown but is capable of modification and variation within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. In an oil burner, an air pump provided with a delivery tube, an oil pump provided with a delivery pipe extending axially through the air tube and having a nozzle on the end thereof, means within the air tube and spaced from said nozzle to impart a whirling motion to the air passing through the tube and means for preventing the flame resulting from the combustion of the mixture of air and oil from forming in close proximity to the air nozzle, said means including a member mounted on the delivery pipe adjacent the end thereof for directing a stream of air towards the nozzle end at an angle to the nozzle axis.

2. In an oil burner, an oil nozzle through which oil under pressure may be forced, means for supplying air adjacent said nozzle to provide in conjunction with the oil a combustible mixture, means for igniting the combustible mixture, and means for preventing the flame resulting therefrom from forming in close proximity to the oil nozzle, said last named means including a member mounted adjacent the oil nozzle, said member comprising a plurality of blades spirally arranged with respect to the nozzle axis and extending forwardly and outwardly therefrom, and also comprising a plurality of pockets adjacent the ends of said blades, said pockets having faces inclined at an angle to and directed toward the nozzle axis.

3. In an oil burner, an oil pipe having a delivery nozzle, means for supplying air adjacent the nozzle to promote combustion, a flame control member mounted in the air stream adjacent the nozzle, said member comprising a plurality of blades spirally arranged and diverging outwardly toward the nozzle, members connecting the outer ends of said blades, and said members having inner surfaces inclined toward the nozzle outlet to direct a current of air thereacross.

4. In an oil burner, an oil pipe having a delivery nozzle, means for supplying a stream of air adjacent the nozzle to promote combustion, and a flame control member mounted in the air stream adjacent the nozzle, said member comprising a pair of spaced coaxial rings, blade members joining said rings, one of said rings being larger than the other whereby said blades diverge toward one end thereof, said larger ring having inclined inner faces between said blades,

and said faces being inclined toward the axis of the rings.

5. In an oil burner, an air pump provided with a delivery tube, an oil pump, a delivery pipe extending axially through the air tube and having a nozzle on the end thereof, a deflector mounted on said pipe within the tube and spaced from said nozzle, and means for preventing the flame resulting from the combustion of the mixture of air and oil from forming in close proximity to the oil nozzle, said means comprising a bladed member positioned between the deflector and the nozzle.

6. In an oil burner, an air pump provided with a delivery tube, an oil pump, a delivery pipe extending axially through the air tube and having a nozzle on the end thereof, a deflector mounted on said pipe within the tube and spaced from said nozzle, and means adjustably mounted between the deflector and nozzle for preventing the flame resulting from the combustion of the mixture of air and oil from forming in close proximity to the air nozzle, said means including a member mounted on the delivery pipe for directing a stream of air towards the nozzle end.

7. In an oil burner, an oil nozzle through which oil under pressure may be forced, means for supplying air adjacent said nozzle to provide in conjunction with the oil a combustible mixture, a deflector mounted on said pipe within the tube and spaced from said nozzle, means for igniting the combustible mixture, and means for preventing the flame resulting therefrom from forming in close proximity to the oil nozzle, said means including a member adjustably mounted between the deflector and nozzle to direct the air across the nozzle outlet.

RAYMOND H. GOODRICH.