

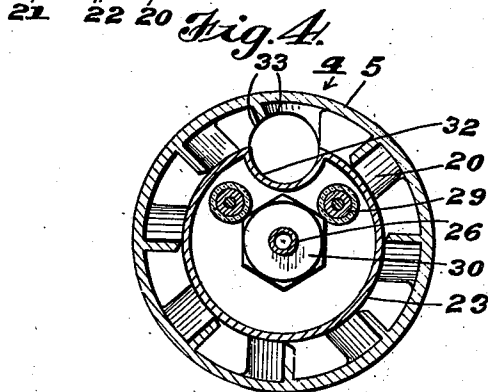
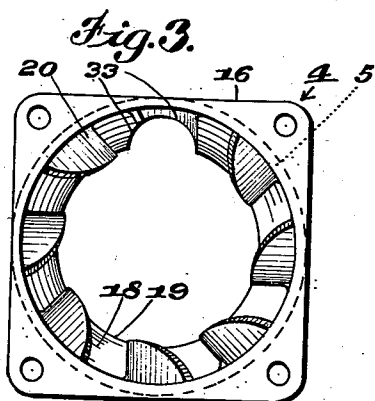
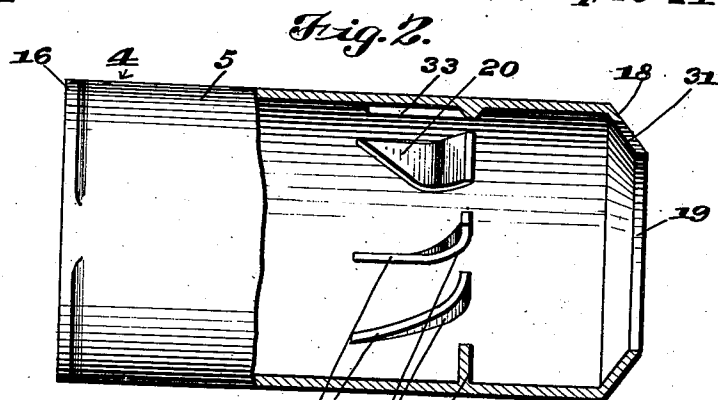
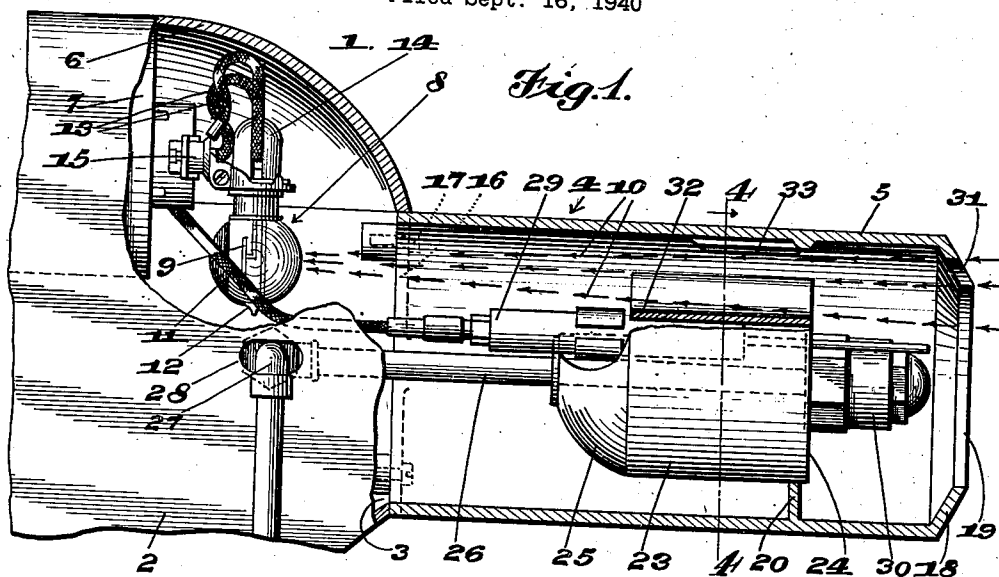
Dec. 9, 1941.

F. E. HERR

2,265,904

COMBUSTION TUBE

Filed Sept. 16, 1940



Inventor
Frank E. Herr

By *Munn, Anderson & Liddy*
Attorneys

UNITED STATES PATENT OFFICE

2,265,904

COMBUSTION TUBE

Frank E. Herr, Lancaster, Pa.

Application September 16, 1940, Serial No. 357,060

4 Claims. (Cl. 158—28)

This invention relates to improvements in oil burners but more particularly to combustion tubes such as are currently used in conjunction with oil burners. As is commonly known, it is on the inside and at the orifice of the combustion tube that the combustible mixture is respectively prepared and ignited.

Oil burners have always had a variety of controls for the elements of the combustible mixture but a recent improvement has introduced a specially made bulb which is responsive to the light from the flame (or lack of light) at the orifice of the combustion tube to produce a response in the burner controls. This bulb is commercially known as a Visaflame and it is adaptable to virtually all types of oil burners because provision can generally be made for its installation in such a manner that the light from the flame will shine upon it.

Although as just stated, the majority of currently known oil burners can accommodate the bulb of the foregoing type of control, yet in virtually every instance its installation introduces some objectionable feature which adds to the complication of the installation of the system rather than to keep it down to what should be normally expected.

Another feature commonly known in current oil burner combustion tubes is a series of fins located fairly close to the orifice and employed for the purpose of swirling the air generally at the immediate front or outside of the orifice. The presence of these fins is an obstacle to the easy installation of the foregoing control bulb since they obscure the orifice and make it necessary to set the bulb off to one side of the combustion tube in such a manner that the light can shine upon it. With this general preamble in mind, setting out current practices in a brief manner, the objects of the invention can more readily be understood, said objects being stated as follows:

First, to provide a combustion tube of the current internal fin type which is structurally arranged for an uninterrupted beam of light from the flame to the control bulb on the inside of the combustion tube, thus avoiding the necessity of any auxiliary duct or the like on the outside of the combustion tube for the accommodation of the control bulb.

Second, to provide a combustion tube wherein said light beam will not suffer any interruption regardless of any setting to which the cupped support may be adjusted.

Third, to provide a combustion tube wherein the electrode support and the internal fins by

which said support is adjustably carried have matching formations which provide a tunnel for the passage of the light beam back to the control bulb.

Fourth, to provide a combustion tube which has for its auxiliary a burner housing of sufficiently high dome shape to accommodate a transformer which comprises one of the elements of the oil burner control, said transformer being employed as the mount for the foregoing control bulb, and because of the fact that said burner housing is sufficiently high domed to accommodate the transformer provision is thereby made for supporting the bulb directly and conveniently on the axis of said tunnel, thus to be in the path of the beam of light.

Other objects and advantages will appear in the following specification, reference being made to the accompanying drawing in which:

Figure 1 is a partially elevational and sectional view of enough of an oil burner to fully disclose the elements of the improved combustion tube.

Figure 2 is a partially elevational and sectional view of the shell of the combustion tube.

Figure 3 is a rear elevation of the structure in Fig. 2.

Figure 4 is a cross section taken on the line 4—4 of Fig. 1.

In considering the aspects of the instant invention, it is desired to point out that the combustion tube herein disclosed is an improvement on the combustion tube invented by F. E. Herr and disclosed in an application for U. S. patent filed Jan. 25, 1939, Serial No. 252,835. That application is generally dedicated to the disclosure of a combustion tube which has an arrangement of vanes or fins very close to the flame opening or orifice of the shell of the tube, there being an independent internal support for the oil feed pipe and the electrodes.

In the instant invention there is an oil burner 1 which has a casing or housing 2 according to custom, said housing having an outlet 3 where the air current is discharged into the combustion tube generally designated 4. The term "tube" is herein employed to comprise all of the structure which is embodied in the shell 5. But it will be perceived that in order to convey the full import of the invention it is necessary to relate back to the interior of the oil burner housing 2 because it is there that auxiliary structure is embodied as an item of necessity for the completion of the function of the combustion tube.

With the latter statement in mind it is observed that in Fig. 1 the housing 2 includes a

dome 6 of considerable proportions; not excessively large, but of sufficient height to cover a transformer 7. This transformer is shown only in part, but it comprises one of the elements of what has been generally herein termed the oil burner control. It is not necessary to go into the details of the mechanism which constitutes this control, it being sufficient to state that said mechanism includes a variety of relays and switches and also the transformer 7.

Another and important element of the oil burner control is the bulb 8. This bulb is commercially known as a Visafame. No part of this bulb is concerned with the instant invention excepting that the latter provides for the exposure of the bulb to the flame of the oil burner. Briefly describing the control bulb 8, there is a bimetallic coil 9 which when affected by the light from the beam 10 when concentrated by the reflector 11 maintains the closure of an electrical circuit through a mercury pool 12 and the requisite contacts which terminate in wires 13 which emerge from the socket 14 of the bulb and connect at appropriate clips 15 to the transformer terminals.

Reverting to the combustion tube 4 it is seen in Fig. 3 that shell 5 has a flanged base 16 which is adapted to be screwed at 17 onto the housing 2 over the outlet 3. Said shell has a frusto-conical terminal 18 with an orifice 19 at which the air and oil spray are discharged to support a flame. The air is given a pronounced swirl on the inside of the shell, behind the terminal 18 by an arrangement of fins 20 (Fig. 2) which are substantially of the shape shown. Each fin has a fairly straight component 21 which merges into a rounded portion 22 which when impinged by the air current causes the latter to swirl in the manner stated.

The internal edges of the fins provide mounts for an electrode support 23. This support is in the form of a cup open at the forward edge as at 24 and closed at the back as at 25. Said cup has the oil feed pipe 26 attached to it along its axis, said feed pipe including a bend 27 that goes through the housing 2 at a slot 28. The slot provides for the longitudinal adjustment of the support 23 on the edges of the fins.

At least two electrodes 29 are affixed to the back 25 of the cup. The latter thus constitutes the carrier for the electrodes as well as the nozzle 30 of the oil pipe 26. The illustration in Fig. 1 depicts the result of considerable experimentation with the relative positioning of the fins, oil nozzle and orifice of the combustion tube. It has been found highly desirable to maintain the nozzle 30 about half an inch inside of the end of the tube. It is here that the oil spray is picked up most effectively by the air current which is immediately disseminated in a swirl that is fully and strongly formed by the fins 20 that are set well back from the orifice 19 in the shell 5 to accomplish this purpose.

Now a feature of considerable importance, and one which is fundamental with the invention, consists of insuring the continuity of the light beam 10 regardless of the adjustments of the support 23, and establishing said light beam without making any additions to the tube 4 such as extra ducts and the like to accommodate the control bulb 8. This feature in its collective form comprises notching the terminal 18 at 31. This notch is of arch shape (Figs. 3 and 4) and being such it constitutes the top, in a sense, of a curved

depression 32 along the top of the support 23. Inasmuch as said support has a close but movable fit in the fin series 20, it follows that there would not be any passage through for a full beam of light were it not for the cutting of some of the fins. This is done as seen at 33. At least two of the fins are cut down at the place thus designated, the cutting being of arch form to match the shape of the notch 33.

The collective effect of the notch 31, depression 32 and cut outs 33 is a tunnel through which the light beam 10 can pass from the flame (not shown) in front of the orifice 19, back to bulb 8 where it is focused upon the reflector 11 to the ultimate effect already stated. In the event the flame goes out the effect upon the bulb 8 is to open the electrical circuit and thus secure a response elsewhere in the system for the stopping of the burner motor.

The thing upon which particular emphasis is laid is that provision is made for the light beam without having to add any supplemental features whatsoever to the burner structure for the accommodation of the control bulb 8, such as ducts, housings and the like either extending off to one side of the oil burner or embodied in the combustion tube itself. Such ducts, especially when embodied in the combustion tube, are prone to eventually fill to some degree with soot, and thus obscure the flame at the front as it is related to the control bulb. According to the present arrangement a full beam of light will always be focused upon the control bulb, and no part of the conveniently termed tunnel will ever become so clogged with soot as to interfere with the effectiveness of the beam. Moreover, the support 23 is capable of being adjusted to the fullest extent without diminishing the cross sectional size of the light beam.

In conclusion note is made of the function which the bend 27 plays in the assemblage. By virtue of the fact that this bend occupies the slot 28 it is impossible for the support 23 to turn on its axis when a longitudinal adjustment is made, thereby putting dependence on the relationship of the bend to the slot to always keep the depression 32 where it belongs, never to interrupt the continuity of the so-called tunnel.

I claim:

1. In an oil burner, a housing having an air outlet, a control bulb located in said housing and having a light-sensitive member for the control of an electrical circuit, a combustion tube affixed at one end over said outlet and having a flanged terminal at the other end having an orifice, a support included in said tube for carrying an oil pipe and electrodes, fins also included in said tube on which said support is mounted, said electrode, support and fins having portions formed to delineate a tunnel for the passage of a beam of light from a flame in front of the orifice to the light-sensitive member of said bulb, and means embodied in the housing supporting said bulb permanently in position for the impingement of the light beam upon said member.

2. In an oil burner, a housing having an outlet for the passage of air, a control bulb situated in said housing and having a light-sensitive member for the control of an electrical circuit, a dome included in said housing completing a full enclosure of said bulb, a combustion tube shell affixed at one end over said outlet and at the other end having a flange defining an orifice, said flange having an arched notch, a cup located in the shell for the support of electrodes and an

oil pipe, said cup having a longitudinal depression, fins in the shell for swirling the air, at least one of the fins being cut out in arch form, said notch, depression and cut-out being assembled around an axis originating at the light-sensitive member and extending out of the orifice, thus to roughly define a tunnel for the passage of a beam of light from a flame at the orifice to said member, and means contained by the dome, permanently supporting the bulb so that its light-sensitive member remains in position on said axis.

3. For use on an oil burner, a combustion tube consisting of a shell open at each end, one of said ends having an inwardly directed flange defining an orifice and having a notch in its rim defining an arch in the top portion of the orifice, fins located in the shell in an annular series, at least one of the fins being cut out in the top of the series and being in arch-form to match the notch, and an electrode and oil pipe support mounted upon the edges of the fins, said support having a longitudinal top depression formed on an axis common to the matching arches, thus to outline

the elements of a tunnel providing an unobstructed light beam-passage from one end of the shell to the other.

5 4. In an oil burner, a housing having an air outlet on one end and a slot on one side, a control bulb situated in said housing and having a light-sensitive member for the control of an electrical circuit, a combustion tube shell, affixed at one end to the housing over said outlet, the other end of the shell having an orifice, a cup shaped support in the shell having electrodes and an oil pipe with a nozzle affixed thereto, said support having a longitudinal depression exposing said bulb in a straight line to the orifice, fins in the shell upon the edges of which the cup is mounted and on which the cup is longitudinally adjustable to vary the position of the nozzle in respect to the orifice, and a bend in said oil pipe occupying the slot, allowing the adjustment of the cup but preventing turning thereof on said fins and thereby permanently keeping the depression in line with the light-sensitive member.

FRANK E. HERR.