Jan. 16, 1940. R. F. REGNIER 2,187,055

OIL BURNER

Filed March 30, 1938 2 Sheets-Sheet 1

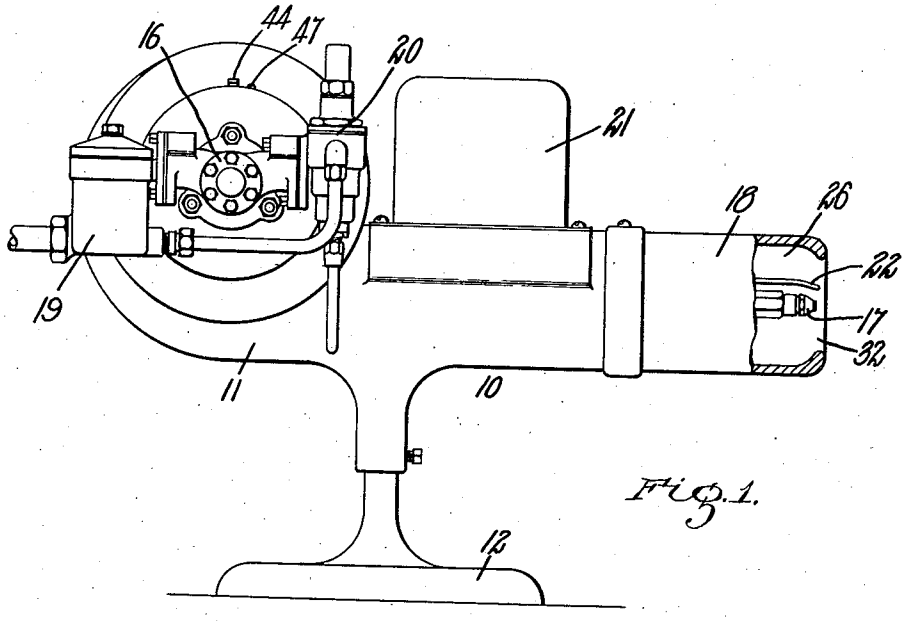


Fig. 1.

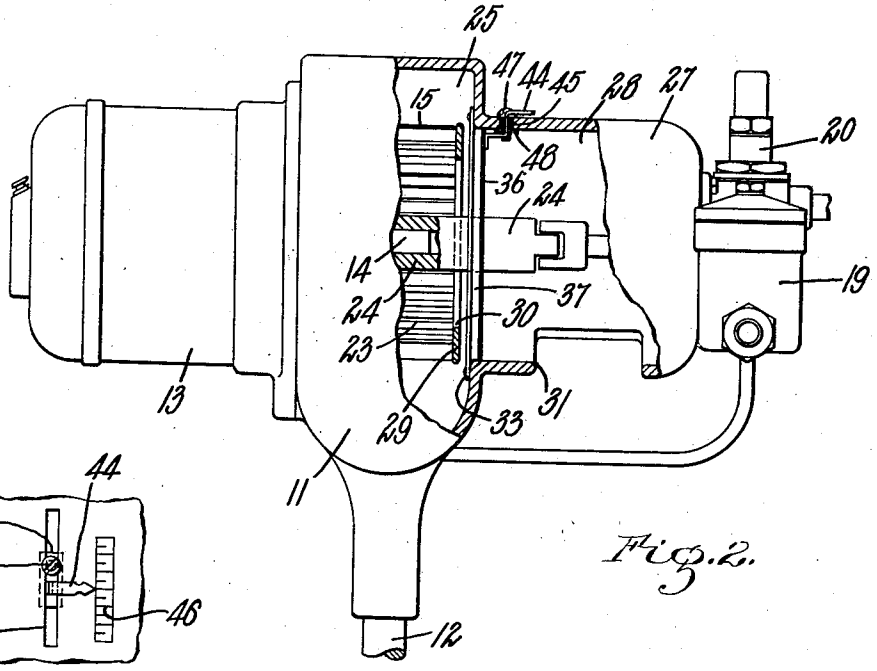


Fig. 2.

Fig. 3.

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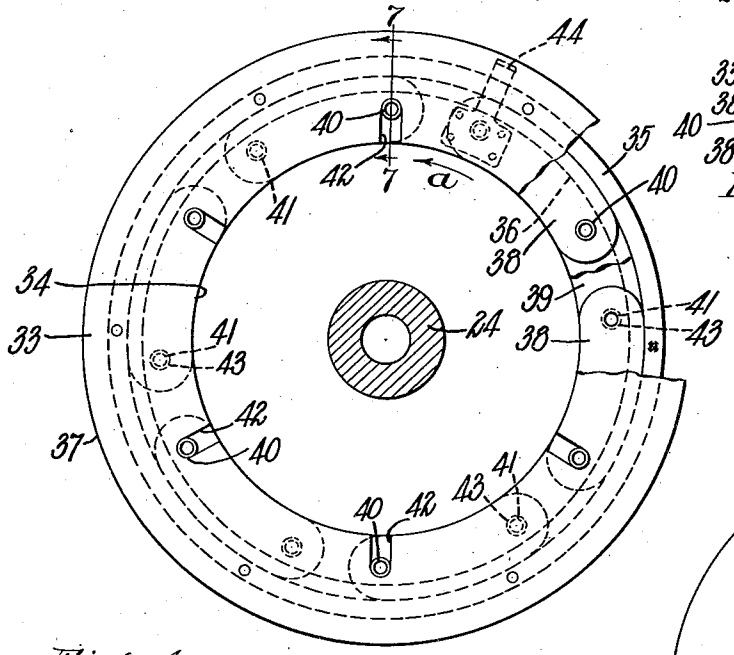


Fig. 4.

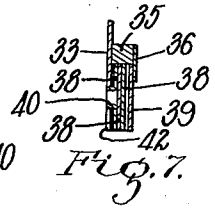


Fig. 7.

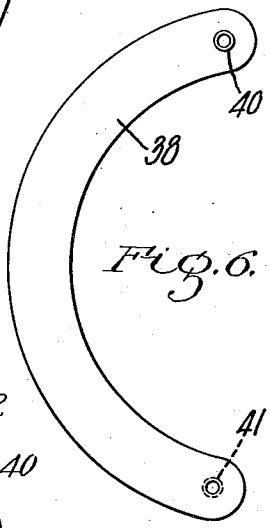


Fig. 6.

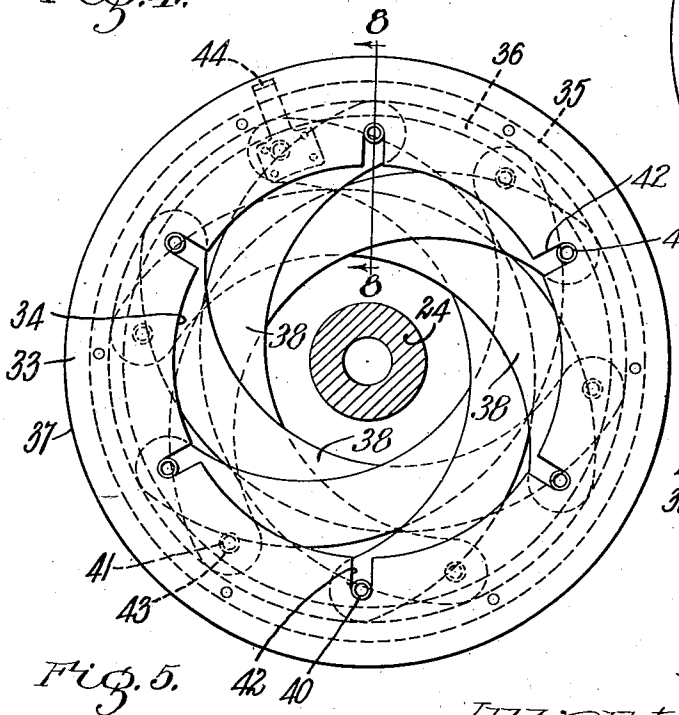


Fig. 5.

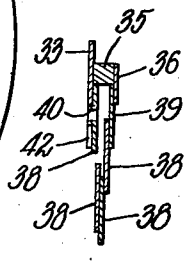


Fig. 8.

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UNITED STATES PATENT OFFICE

2,187,055

OIL BURNER

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Application March 30, 1938, Serial No. 198,827

2 Claims. (Cl. 230—114)

This invention relates to oil burners, and particularly to a means of controlling the passage of air through oil burners of the air blast type.

Up to the present time but little scientific thought has been given to the question of controlling the admittance and passage of air through oil burners of the air blast type wherein a draft is created by an electrically operated blower which is driven at a uniform predetermined speed when the motor therefor is energized. In some structures it has been considered sufficient if an inlet orifice has been provided in the casing at an entrance to an air passage leading to the blower, and to provide a damper at said inlet orifice. This method of furnishing air to the blower is not satisfactory. In other structures a damper has been positioned in the draft passage between the blower and the fuel nozzle. This method is also objectionable because it causes a back pressure to be set up in the draft passage which seriously affects the vaporization of the fuel and thereby prevents the burner from operating at maximum efficiency.

The primary object therefore of this invention is to provide an oil burner and air control mechanism therefor so associated one with the other that the burner may always be operated at maximum efficiency.

Another object of the invention is to provide a structure for effectively controlling the volume of the air stream within the draft passage of the burner from the inlet or suction side of the blower and in close proximity thereto.

Another object of the invention is to provide an oil burner and air control mechanism therefor embodying therein an adjustable annular diaphragm positioned in parallel relation to the inlet face of the blower in close association therewith and upon an axis co-incidental with the axis of said blower, thereby providing an even radial distribution of the intake air to the blades of the blower through an inlet orifice which extends entirely around the hub of the blower concentric with the periphery of said hub, the area of said inlet orifice being increased and decreased concentrically to vary the volume of air permitted to enter the blower.

Another object of the invention is to provide an air control mechanism positioned in such close association with the blower that the air leakage from the outlet to the inlet side of the blower is reduced to a minimum.

The invention also contemplates a construction wherein combustion noises are baffled and reduced to a minimum; wherein the size of the flame zone may be controlled and the correct air and fuel ratio obtained by regulating the amount of air entering the blower; wherein an invisible air control mechanism located within the casing may be accurately adjusted from the exterior of the casing; wherein a complete closing of the air intake orifice is prevented; and wherein a diaphragm may be locked in any position to prevent accidental displacement.

The invention consists of an oil burner and air control means therefor as set forth in the following specification and particularly as pointed out in the claims.

Referring to the drawings:

Fig. 1 is a side elevation of an oil burner apparatus embodying my invention and in which the air control means forming a part of the invention is mounted, the front end portion of the draft tube being broken away and exposing the extremities of the fuel nozzle and electrodes.

Fig. 2 is a rear elevation of the oil burner apparatus as viewed from the left of Fig. 1, a portion of the casing being broken away and thereby exposing the draft producing blower together with the air control mechanism which is closely associated with said blower.

Fig. 3 is a detail view illustrating the indicator and gauge for the air control mechanism together with the means for locking the indicator at a chosen location.

Fig. 4 is a front elevation of the air control mechanism of this invention as viewed from the left of Fig. 2, illustrating the shutter members in their open position and the hub of the blower in section.

Fig. 5 is a front elevation similar to Fig. 4 illustrating the shutter members in their closed position and the hub of the blower in section.

Fig. 6 is a front elevation of one of the shutter members of the air control mechanism.

Fig. 7 is a detail transverse section through the air control mechanism as taken on the line 7—7 of Fig. 3.

Fig. 8 is a detail transverse section through the air control mechanism as taken on the line 8—8 of Fig. 4.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 represents an oil burner apparatus of the well known blast tube type and embodying therein a casing 11 mounted upon a pedestal 12 and having an electric motor 13 mounted thereon provided with a shaft 14 upon which a blower 15 is rigidly mounted in a well known manner to be rotated continually at a

uniform speed whenever the motor is energized. The oil burner apparatus also embodies therein a fuel pump 16 driven by the motor 13 and by which fuel oil is supplied to a fuel nozzle 17 positioned within the forward end portion of a draft or blast tube 18 which is secured to and constitutes an extension of the casing 11. Included in the equipment of the apparatus is a fuel strainer 19, a fuel regulating valve 20, and a spark transformer 21 for electrodes 22 which are positioned adjacent to the discharge orifice of the fuel nozzle 17.

The blower 15 previously mentioned is of a type well known in the art and embodies therein a plurality of blades 23 which are arcuate in cross sectional contour and which are positioned in parallel relation one with another and with a hub portion 24 of said blower at a uniform distance therefrom. The blower 15 is located within a chamber 25 provided in the casing 11 at the rear thereof, and said chamber communicates with a draft passage 26 provided in the draft tube 18. A portion 27 of the casing 11 is located upon the opposite side of said casing from that upon which the electric motor is mounted and is provided with an area 28 therein which communicates with the chamber 25 at a location adjacent to a side 29 of said blower in which there is an inlet orifice 30 which communicates with the interior of the blower. Air enters the area 28 through an opening 31 provided in the under side of the portion 27 of the casing 11. The area 28, chamber 25 and passage 26 all combine to form a continuous air passage which extends entirely through the casing 11 from the inlet orifice 31 to a discharge orifice 32 located at the forward end of the draft passage 26.

The volume of air entering the blower 15 from the area 28 is controlled in a novel manner by means of a shutter mechanism as follows: Mounted within the casing 11 at the point where the area 28 merges with the blower chamber 25 is an annular member 33 which is positioned in parallel relation to the intake face 29 of the blower in close proximity thereto. The member 33 in effect constitutes a partition between the area 28 and the chamber 25 in order that incoming air may be deflected into the intake orifice 30 of the blower in an effective manner. The partition 33 is provided with a circular opening 34 through which the hub of the blower protrudes, said opening being positioned concentric with the opening 30 provided in the face 29 of the blower located adjacent thereto. Other annular members 35 and 36 are secured to the member 33 in a suitable manner to form a holder 37 for a plurality of arcuate shutter members 38, one of which is illustrated separately in Fig. 6. The shutter members 38 are formed of thin, resilient, non-corrodible material, and are nested side by side within the holder 37 beside a rotatable operating ring 39 of the same width as clearly illustrated in section in Figs. 7 and 8. The shutter members 38 are also positioned in lengthwise overlapped relation one with another in the holder 37 and said members are each provided with oppositely projecting circular pivotal portions 40 and 41 formed integral therewith and positioned adjacent to their opposite ends. The pivotal portions 40 project into radial slots 42 provided in the annular member 33 at equidistant points therearound and form sliding pivots for the shutter members in said annular member. The pivotal portions 41 project into holes 43 provided in the ring 39 at equidistant points therearound and are thereby interlocked with said ring. When the shutter members 38 are positioned as illustrated in Fig. 4, the inner edge of each member aligns with the edge of the opening 34 of the annular member 33 and with the edge of the opening in the ring 39, and the shutter members are then located in their open position concealed within the holder 37.

Attached to a face of the operating ring 39 is an operating member 44 which also functions as an indicator. The operating member or indicator 44 projects through a slot 45 provided in the portion 27 of the casing and is adapted to align with graduations 46 provided upon the surface of the casing. The indicator 44 is locked in any desired position and in alignment with the graduations 46 by means of a screw 47 and clamping member 48 through which said indicator projects, the head of said screw being located upon the exterior of the casing and the screw threaded portion thereof projecting through the slot 45 and through said clamp member. The shutter members 38 are moved from the positions they assume in Fig. 4 to the positions illustrated in Fig. 5 by moving the indicator 44 in a manner to rotate the ring 39 in the direction of the arrow *a* Fig. 4, whereupon the intermediate portion of each shutter member will be caused to move inwardly toward the hub 24, and said members will assume the positions illustrated in Fig. 5, thereby reducing the area of the annular opening around the hub through which the air flows. During this movement of the shutter members the pivot portions 40 thereof will slide radially a slight amount in the slots 42 and the movement of the shutter members toward the hub 24 is restricted by the final contact of said pivot portions with the closed ends of the slots as the indicator 44 reaches the position illustrated in Fig. 5. During the movement of the shutter members from one extreme position to another, the side surfaces of said members are in close sliding contact one with another, and in the position illustrated in Fig. 5 and also at intermediate positions the shutter as a whole in effect constitutes an annular diaphragm provided with an expandible and contractable central orifice which expands and contracts radially and always provides an even radial distribution of the incoming air to the blades of the blower.

The general operation of the oil burner apparatus and air control mechanism hereinbefore described is as follows: When the burner is installed at a heater the burner is placed in operation and the fuel is ignited at the fuel nozzle 17 in a well known manner. It is then the duty of the persons making the installation to regulate the flow of air to the blower 15 in order that the burner will function at maximum efficiency in the type of heater for which the burner is being provided. To this end the indicator 44 is released by loosening the screw 47 and clamping member 48 and the indicator is then moved to vary the size of the air opening in the shutter until the correct size of opening has been obtained, it being understood that the decision should be made by persons skilled in the art. The screw 47 is then manipulated to tighten the clamping member 48 against the interior surface of the casing and thereafter prevent accidental movement of the indicator and consequent movement of the shutter. During the operation of the burner the blower 15 is rotated at a continuous uniform speed and the incoming air is delivered to the suction side of said blower in a manner to provide an even radial

distribution of said air to the blades of the blower through an inlet orifice which extends entirely around the hub of the blower concentric with the periphery of said hub and in close association with the inlet face of the blower.

Although it is preferable that the air control mechanism be regulated by persons skilled in the art and familiar with the apparatus it is evident that said mechanism may be actuated by unskilled persons without danger of causing accidents or blowups, for although the shutter mechanism is entirely enclosed within the casing of the burner and invisible from the exterior thereof the size of the air intake opening may always be ascertained by observing the position of the indicator with respect to the graduations of the gauge, and it is, furthermore, impossible to completely close the intake orifice in the shutter. In addition to controlling the flow of air to the blower the shutter also acts to effectively muffle combustion noises.

I claim:

1. In a burner of the character described a casing provided with an air passage therein, a blower rotatably mounted in said casing in communication with said air passage and provided with an intake opening for air in a face thereof and with a hub portion protruding through said opening, a shutter surrounding said hub at the entrance to said opening and positioned parallel to said face of the blower at an intermediate location in said casing, said shutter embodying therein a plurality of arcuate members positioned in overlapped relation one to another and co-operating with said hub to form an annular opening therearound, means including an indicator to move said shutter members to vary the area of said annular opening, whereby the volume of air entering the blower is controlled and means to gauge the position of said indicator.

2. In a burner of the character described a casing provided with an air passage and inlet orifice for said air therein, a blower rotatably mounted in said casing in communication with said air passage and provided with an intake opening for air in a face thereof and with a hub portion protruding through said opening, a partition extending transversely of said air passage and parallel to said face of said blower and provided with an opening therein aligning with said intake opening, a shutter mounted upon said partition and at a distance from said air inlet orifice, said shutter embodying therein a plurality of arcuate members positioned in overlapped relation one to another and co-operating with said hub to form an annular opening therearound, means including an indicator to move said shutter members to vary the area of said annular opening, whereby the volume of air entering the blower is controlled, means to lock said indicator and thereby lock the shutter members against displacement, and means to gauge the position of said indicator.

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