June 23, 1942. R. W. BECKETT 2,287,595

APPARATUS FOR CONTROLLING AIR FLOW

Filed Feb. 5, 1940 3 Sheets-Sheet 1

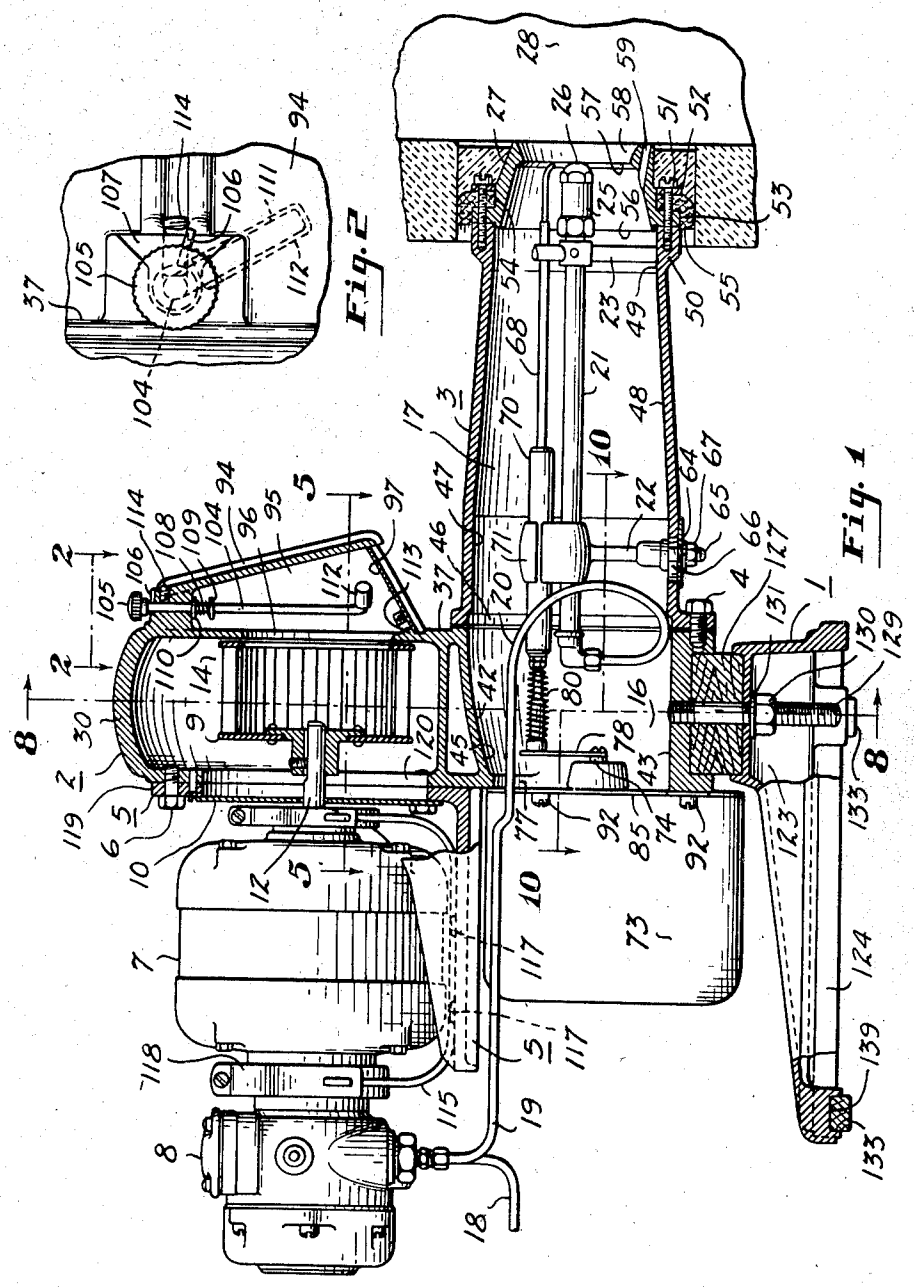


Fig. 1

Fig. 2

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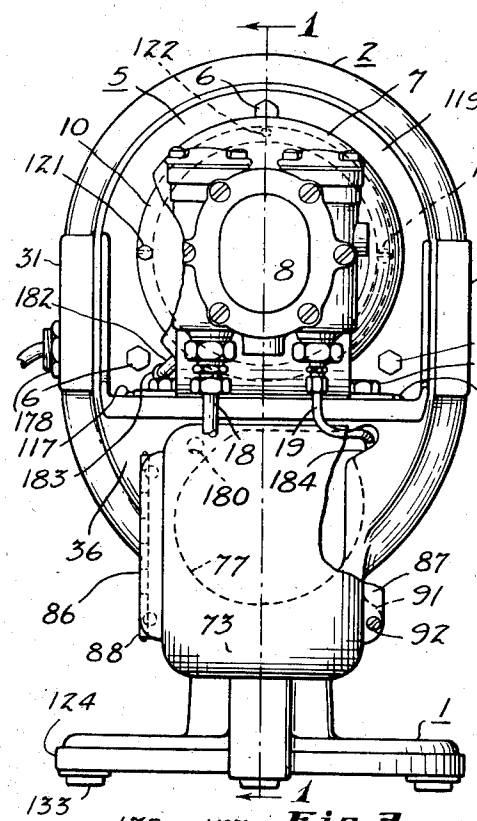


Fig. 3

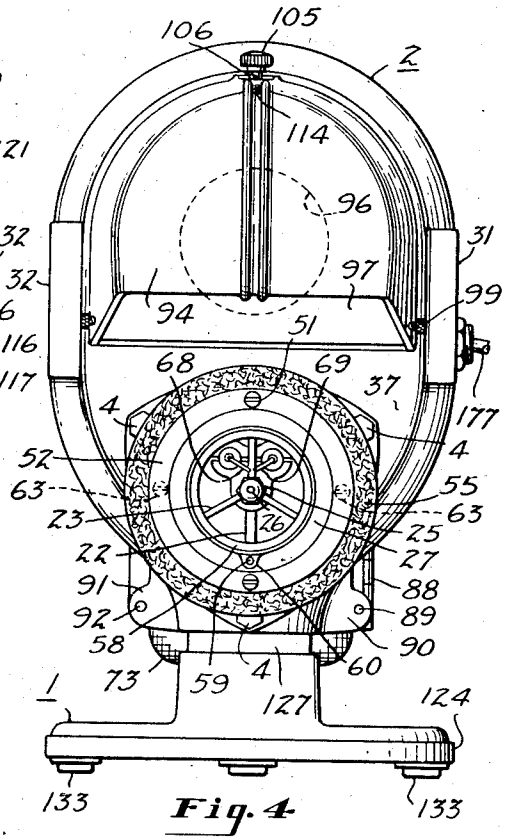


Fig. 4

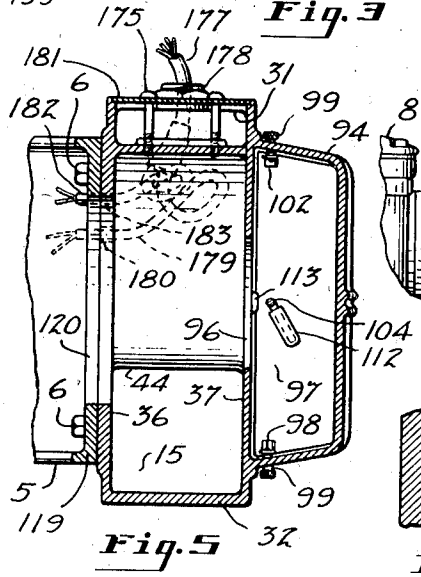


Fig. 5

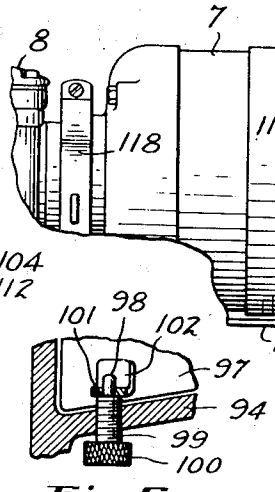


Fig. 6

Fig. 7

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Filed Feb. 5, 1940 3 Sheets-Sheet 3

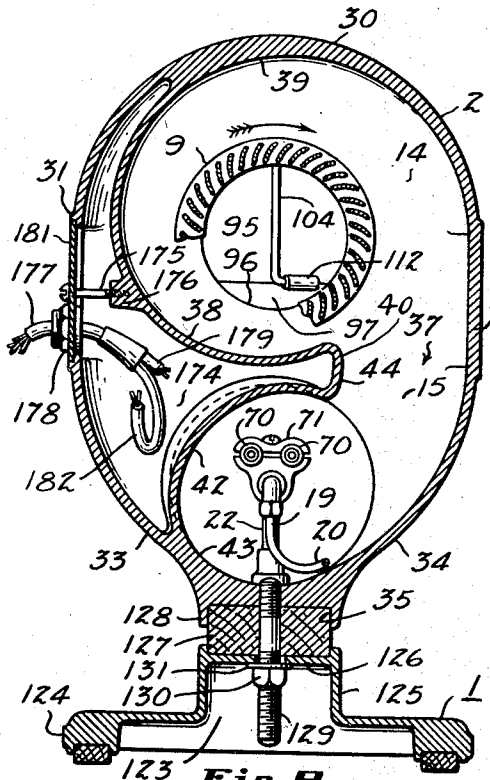


Fig. 8

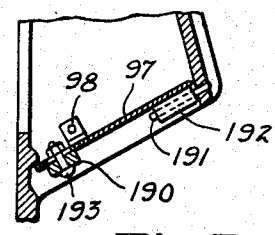


Fig. 9

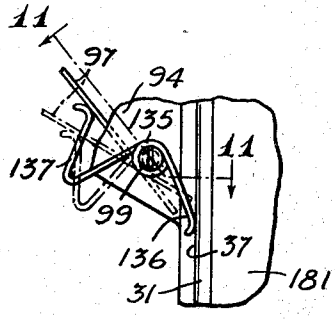


Fig. 10

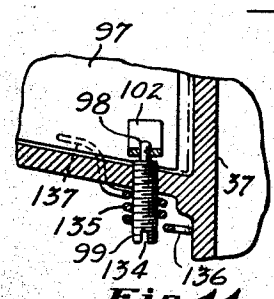


Fig. 11

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UNITED STATES PATENT OFFICE

2,287,595

APPARATUS FOR CONTROLLING AIR FLOW

Reginald W. Beckett, Elyria, Ohio

Application February 5, 1940, Serial No. 317,243

12 Claims. (Cl. 230—114)

This invention relates to oil burners, and more particularly to an improved method of and apparatus for controlling the flow of combustion air through the burners. The present application is a continuation in part of my copending application Serial No. 188,731, filed February 4, 1938.

It is an object of the invention to provide a generally improved burner having improved operating characteristics that make it more efficient and economical.

Another object of the invention is to provide an oil burner having an improved air control for regulating the admission of air to be used for combustion. More specifically, the invention aims to provide an oil burner having air inlet control means which can be adjusted to secure the optimum burner performance.

A still further object of the invention is to provide an improved method of and apparatus for regulating the flow of combustion air into and through an oil burner so that, while providing an adequate supply of oxygen to support combustion, the flow of air through the burner is reduced when the latter is not in operation.

A still further object is to provide a fuel burner having a generally improved appearance and performance, which is relatively simple in design and construction, and inexpensive to manufacture.

Other objects and advantages will become apparent from the following detailed description of suitable embodiments of the invention made in connection with the accompanying drawings, in which like parts throughout the several views are indicated by the same numerals of reference.

Figure 1 is a side elevational view, partly in section and with parts removed, showing a burner embodying the invention connected to a furnace. The plane of the sectioned portion of the figure is indicated at 1—1 of Fig. 3;

Fig. 2 is a fragmentary enlarged detail view, in plan, showing the control for the air inlet door. This view is taken substantially on the line indicated at 2—2 of Fig. 1;

Fig. 3 is a rear elevational view of the burner, with parts broken away;

Fig. 4 is a front elevational view of the burner;

Fig. 5 is a fragmentary sectional view taken substantially on the line 5—5 of Fig. 1;

Fig. 6 is an enlarged fragmentary detail, in section, showing the pivotal mounting for the air inlet control door;

Fig. 7 is a detail view, with parts broken away, showing the movable parts of the burner assembled as a unit;

Fig. 8 is a transverse vertical sectional view, with parts removed, taken substantially on the line 8—8 of Fig. 1;

Fig. 9 is a fragmentary sectional view showing a modification of the invention having a counterweighted closure;

Fig. 10 is a fragmentary elevational detail showing a further modification in which a spring is employed to retain the air inlet control door in open position; and

Fig. 11 is a fragmentary sectional detail taken substantially on the line 11—11 of Fig. 10.

Referring to the drawings by numerals of reference, which indicate like parts throughout the several views, the burner comprises a pedestal or base, indicated generally by the numeral 1, which is surmounted by and supports a main body portion or housing, indicated generally by the numeral 2. A horizontally disposed air or blast tube 3 is secured to the lower portion of the housing 2 at one end thereof by cap screws or studs 4 which extend through a radially directed flange formed at the inlet end of the air tube. On the upper portion of the housing 2 at the end thereof opposite the blast tube 3 a supporting member or bracket 5 is removably secured by cap screws or studs 6.

The bracket 5 carries a removable unit which comprises all the movable parts of the burner including motor 7, fuel pump and pressure regulator 8, blower 9 of the sirocco type, and cover plate 10. The blower 9 is actuated and supported by shaft 12 of the motor 7 which also actuates the fuel pump. The circular cover plate 10 has a running or clearance fit on the shaft 12 between the motor 7 and blower 9.

The blower 9 is received in a chamber 14 formed in the upper portion of the housing 2 and forces air downwardly through a throat 15 tangentially into inlet end 16 of combustion air passageway 17 extending longitudinally through the bottom of the housing 2 and the air tube 3.

The fuel pump and pressure regulating device 8 draw liquid fuel through supply conduit 18 and force it under relatively high pressure through fuel pressure conduit 19 having a flexible loop 20 into fuel pipe 21 supported by bracket 22 and spider 23 in the air tube 3. A vaporizing or spray nozzle 25 is secured on the end of the fuel pipe 21 at the discharge end of the air tube 3 so that its outlet orifice 26 is disposed substantially in the plane of the smallest cross-sectional area portion of a burner head 27, to be later de-

scribed. Air forced through the passageway 17 by the blower 9 and moving in a helical path commingles with the oil spray emerging from the nozzle orifice 26 to form a mist of finely dispersed oil particles which burn in combustion chamber 28 of a heating unit such as a domestic furnace.

The housing 2 is symmetric in external appearance and of generally ovate form as viewed from either end. It is carried in an upright position on the base 1, being of a materially greater height than width and of a materially greater width than length. The housing is of substantially uniform length from top to bottom and has a top wall 30 of generally rounded form merging into relatively straight vertical side walls 31 and 32. Inwardly curving or rounded bottom walls 33 and 34 extend downwardly as continuations of the side walls 31 and 32 and terminate in a downwardly directed socket 35, to be later described. Rear end wall 36 carries the bracket 5 which supports the removable motor unit, and front end wall 37 carries the air tube 3 as mentioned above.

The blower chamber 14 (Fig. 8) is of the form commonly employed with rotary blowers of the sirocco type have axially extending blades, and is partially defined by a curved internal wall or partition 38 which extends between the end walls 36 and 37 of the housing 2 from a point 39 where it is formed into the top wall 30 of the housing at substantially the center thereof downwardly to the left in a circular fashion and then to the right, as viewed in Fig. 8. The lower end of the wall 38 extends beyond the middle of the housing and to cutoff 40 of the throat 15. The radial space between the peripheral margin of the rotary margin of the rotary blower 9 and the walls of the chamber 14 progressively increases from the cutoff 40 in a clockwise direction around the rotational axis of the blower substantially to the throat 15. This increase in the free radial cross-sectional area of the housing available for the flow of air is in the direction of rotation of the blower rotor 9, indicated by the arrow of Fig. 8.

One side of the inlet end 16 of the passage, opposite the throat 15, is defined by an internal wall or partition 42 which starts substantially at the bottom center of the housing 2 where it is connected to the lower part of the bottom wall 33, as indicated at 43, and is then curved upwardly to the left and then to the right in a clockwise direction following the general curvature of the passage 17 as defined by the tube 3. The upper end of the partition 42 and the lower end of the partition 38 are joined by a short, vertically disposed partition 44 which partially defines the throat 15. The partition 42 is curved or sloped longitudinally of the inlet portion 16 of the air passage. This curvature is progressively increased from the lower portion 43 to the top portion where the partition 42 joins the vertical partition 44. The margin 45 of the partition 42, adjacent the end wall 36 of the housing 2, progressively approaches the axis of the air passage 17, while the margin 46 of the partition 42, adjacent the end wall 37 of the housing, remains substantially flush with the internal wall of the air tube 3.

Tube 3 is substantially circular in cross section throughout its length and has a portion 47 of cylindrical form and uniform diameter adjacent the housing 2 which merges into a tapering portion 48 which extends toward the discharge end of the tube where a second cylindrical portion 49 of uniform internal diameter and relatively short axial length is formed. The walls of the tube 3 are relatively thick and of heavy section at the discharge end thereof, preferably being in the form of an integral, thick-sectioned, annular collar 50 which reinforces the tube end and receives the screws which hold the head 27. A circular, radially directed flange 53 is integrally formed about the large diameter end of the head 27 and circumferentially abuts against the annular collar or thickened section 50 on the discharge end of the tube 3. A pair of screws 63 extend through suitable drill holes in the flange 53 and are threadedly secured in the collar 50 to clamp the head 27 in heat exchanging circumferential contact with the collar.

Another pair of screws 51 extend through an annular holding ring 52, disposed about the head 27, through the flange 53 and are threadedly received in the annular thickened collar portion 50 at the discharge end of the tube 3. The ring 52 and flange 53 preferably have substantially the same outside diameter and the ring is axially movable over an external cylindrical portion 54 of the head 27 which extends forwardly from the base of the flange 53. Between the ring 52 and flange 53, and seating on the cylindrical portion 54 of the head, is an annular ring 55 of fireproof fibrous material such as asbestos. This ring is clamped between the holding ring 52 and flange 53 by the screws 51 which also hold the head 27 to the tube 3.

The head 27 is formed to present a substantially continuous circular shoulder 56 to the advancing air and effects an agitation thereof which is beneficial in forming a suitable combustible mixture with the fuel oil. This shoulder 56 is adjacent the small diameter cylindrical portion 49 of the passageway 17 in which is located the spider 23. From the shoulder 56 the head 27 is tapered and the internal walls thereof converge to provide a progressively decreasing, substantially circular cross-sectional area in the direction of air flow. At substantially the region of smallest cross-sectional area the head 27 is formed with a shoulder 57 which further turbulates or agitates the moving air. From the shoulder 57 to the extreme end of the head 27 there is an outwardly tapering outlet or mouth 58.

A downwardly sloping passage or drill hole 59 extends through the bottom wall of the head 27 from the inside thereof between the annular shoulders 56 and 57, through a depending boss 60 integral with the head, to the foremost edge of the head. This hole serves as a drain for fuel oil that may drip from the nozzle 25 and directs the same into the combustion chamber 28. Preferably the end of the hole 59 inside the head is enlarged or dished to more effectively drain off the oil.

The bracket 22 which holds the fuel pipe 21 has a curved or cylindrical bottom surface 64 which corresponds in curvature to the internal cylindrical surface of the portion 47 of the tube 3. This curved surface 64 assists in aligning the bracket in the air passageway 17 and affords a snug fit between the bracket and tube. The bracket is held in place by a depending threaded stud 65 which extends through an elongated slot 66 formed in the bottom of the cylindrical portion 47 of the air tube 3. Preferably, the stud 65 is made separately from the bracket 22 and threadedly secured therein. Accordingly, the bracket 22 may be adjusted longitudinally in the tube 3 so as to vary the position of the nozzle

25 with respect to the head 27. A nut 67 on the stud 65 locks the bracket in adjusted position and the novel shape of the tube 3 which provides a cylindrical portion for holding the bracket 22 retains the fuel pipe 21 centered in the air passageway 17 in all positions of adjustment. The cylindrical portion 49 at the discharge end of the air tube which has a uniform internal diameter permits the spider 23 to move longitudinally in the passageway 17 while the ends of the spider legs maintain sliding engagement with the walls of the tube. Thus both ends of the fuel oil pipe 21 are supported and retained centrally in the air passageway 17 regardless of the movement of the bracket 22 and spider 23 in adjusting the nozzle 25.

A pair of ignition electrodes 68 and 69 are disposed longitudinally through the passageway 17 slightly above and on opposite sides of the oil pipe 21. These electrodes are mounted in porcelain insulators 70 held in a clamp 71 on the top of the bracket 22. The forward ends of the electrodes 68 and 69 are directed toward one another in the region of the orifice 26 of the nozzle 25 so that a spark across the electrodes ignites the atomized fuel.

A transformer, carried in a box 73 disposed against the rear end wall 36 of the housing, furnishes high tension current to the electrodes 68 and 69. Conductors 74 enclosed by insulators extend into the inlet end 16 of the air passageway 17 from the transformer box 73 through an opening 77 formed in the rear wall 36 of the housing which is normally covered by the transformer box 73. Each of the conductors is provided with a springlike brush 78 formed of suitable sheet metal such as bronze or brass and which extends upwardly and at right angles across the axes of the electrodes 68 and 69.

Electrical contact is made between the brushes 78 and the electrodes by means of contact sleeves slidably received on the electrodes and urged toward the brushes 78 by helical compression springs 80. Each of the springs 80 has one end adjustably retained on the electrode by a reduced diameter portion which grips the electrode, and a nut which is threaded onto the electrode.

The transformer box 73 has a flat plate 85 which is arranged to cover the opening 77 in the rear end wall 36 of the housing 2. Flange portions 86 and 87 of the plate 85 extend beyond the sides of the box 73 and are utilized in attaching the box to the housing. The flange 86 has a vertically disposed piano type hinge 88 secured thereto by suitable means such as spot welding. The flange 87 of the plate 85 is secured to the housing 2 and an ear 91 by fillister head screws 92 (Fig. 1).

Air is drawn into the burner by the blower 9 through a downwardly directed inlet opening in a hood 94 formed on the front wall 37 of the housing 2. An air chamber 95 in the hood 94 communicates with the blower chamber 14 through a circular opening 96 formed in the front wall 37 and concentric with the shaft 12 of the blower and motor.

An air gate 97 is mounted off center on reduced diameter pins 98 (Fig. 6) of adjustable pivot screws 99 which are threadedly carried in aligned holes through the side walls of the hood 94. The screws 99 preferably have enlarged knurled heads 100 on the outside of the hood 94 so that they may be adjustably screwed toward or away from one another and shoulders 101 thereof may be made to frictionally engage apertured pivot brackets 102 which are secured to the air gate 97 to support the same and are received on the pin ends 98 of the pivot screws. Thus, by tightening the screws against the brackets 102 the gate 97 may be retained in either opened or closed or in intermediate adjusted position, as desired, to regulate the flow of air through the burner. Upon loosening the screws 99, the gate 97 is freely pivoted and falls by gravity to close the inlet opening into the hood except when held in open position by air pressure.

An adjusting rod 104 is vertically disposed in the air chamber 95 and rotatably journaled in a drilled hole in the top of the hood 94. An enlarged knurled head 105 is secured on the top of the rod 104 above the hood 94 so that the rod can be manually rotated. An indexing pin 106 extends through the rod 104 and extends radially therefrom. This pin rides in a recess 107 formed in the top of the hood 94 and having approximately a 90° opening therein so that the rotational movement of the rod 104 is limited to about 90°. The rod 104 is urged downwardly by a helical compression spring 108 which seats on a washer 109 secured on the rod 104 and a washer 110 bearing upwardly against the inside of the top wall of the hood 94. A foot 111 is formed at the bottom of the rod 104 by bending the latter substantially through 90°. This foot is disposed a short distance above the air gate 97 when the latter is closed and it is preferably provided with a rubber covering 112 to silence the contact between the foot and the gate when the movement of the latter is arrested by the foot. When the pivot screws 99 are loosened so that the air gate 97 is free to pivot on the pins 98, the gate is opened by the air pressure on the underside thereof when the blower 9 is rotating. The amount that the air gate will open under the influence of air pressure can be varied or adjusted by rotation of the rod 104 which moves the foot 111 to various positions. For example, when the rod is rotated to its extreme counterclockwise position as viewed in Fig. 2 and as limited by the pin 106 in the recess 107, the gate 97 will be able to open only a minimum amount whereas movement of the rod 104 to its extreme clockwise position as viewed in Fig. 2 will carry the foot 111 to a position substantially parallel with the axis of the pivot screws 99 and a maximum opening of the gate 97 is permitted. In this manner, by means of the rod 104 the opening of the gate 97 which regulates the quantity of air forced through the passageway 17 by the blower 9 can be adjusted while the burner is in operation to give the most efficient and desirable type of flame in the combustion chamber 28. The frictional effects of the pin 106 and spring 108 are adequate to temporarily hold the rod 104 while adjustment of the burner is being made. After the adjustment is complete the rod 104 is locked in position by set screw 114. As long as the blower 9 is in operation the gate 97 is held open against the foot 111 of the adjusting rod 104. Upon shutting off the burner so that the blower 9 stops, the air gate 97 drops by gravity to the closed position illustrated in Fig. 1. Downward pivotal movement of the gate 97 is limited by a suitable stop 113, Fig. 5, or by engagement of the edges thereof which are parallel to the axis of the pivot screws 99 with the inside bottom edge

of the wall of the hood 94 or the end wall 37 of the housing 2.

The movable parts of the burner are carried by a substantially U-shaped cradle 115 secured to the floor of the supporting member or bracket 5 by studs 116 and centered thereon by raised tracks or bosses 117 (Fig. 3). The upstanding arms of the cradle 115 are provided with metal bands 118 which confine annular rubber rings or cushions (not shown) embracing the journal bosses on the bells of the motor 7. Accordingly, the motor, blower, and pump are resiliently cushioned and the single rotating shaft is supported intermediate its ends at a plurality of points by rubber cushioned journals.

An upright portion 119 of the supporting member 5 is disposed against the upper portion of the rear wall 36 of the housing 2 and a circular opening 120 is formed through the portion 119 and the wall 36 to permit passage of the blower 9 when removing or replacing the movable parts or motor drive unit. This opening is closed by the cover plate 10 which is secured to the portion 119 of the bracket 5 by screws 121 (Fig. 3).

The pedestal or base 1 has a relatively large footing portion 124 which affords a wide area support for the burner. Square or rectangular pads or cushions 133 are received in sockets 139 at marginal portions of the footing portion 124 of the base. Preferably, the pads 133 are three in number and formed of resilient cushioning or vibration-absorbing material such as wood, cork, or rubber, thus effecting a quieting three point mounting for the burner. In the event that the surface on which the burner is to be supported is irregular or of uneven height, the pads 133 can be made shorter or longer, as required, so as to carry the base 1 evenly and firmly. Upwardly directed wall portions 125 formed integrally at the central portion of the front end of the base are surmounted by a substantially horizontally disposed platform portion 126. This platform is thus disposed a material distance above the surface on which the footing portion 124 of the base rests. A vibration absorbing block 127 formed of suitable material such as wood or cork is carried on the platform portion 126 and is surmounted by the housing 2. Preferably, the block 127 fits into the socket 35 formed in the bottom of the housing so that the top sides of the block are embraced by depending portions 128 of the socket. Similarly, the upwardly directed walls 125 of the base extend above the level of the platform 126 to embrace the bottom sides of the block 127.

In plan form the block 127 is non-circular in shape, preferably being square or rectangular. The depending portions 128 of the socket 35 are formed to a corresponding shape as are also the upwardly projecting portions of the walls 125 of the base so that when the block 127 is properly seated on the platform 126 and in the socket 35 the burner housing 2 is correctly aligned with respect to the base 1.

A stud 129 is secured in the central portion of the socket 35 and extends downwardly through an aperture in the center of the block 127 and has a loose fit in the central hole formed in the platform 126. The parts are drawn together by a nut 130 which forces a washer 131 of a material having the capacity to deaden vibrations, such as lead, upwardly against the bottom of the platform portion 126.

In Fig. 9 is illustrated a modification of the invention in which the air inlet control door 97 has a counterweight 190 adjustably attached thereto, as by screw 193, so that the door or shutter is substantially balanced on the pivot pins 98, there being slightly more weight to the right of the pivots, as viewed in Fig. 9, than to the left so that the door or shutter 97 normally tends to pivot downwardly in a clockwise direction to close the opening into the hood 94.

In this modification, the downward pivotal movement of the air shutter or door is arrested by a suitable stop element or pin 191 which is secured to the front wall of the hood adjacent the bottom edge thereof, as by a pressed fit into a drilled hole, or by being threaded into a drilled hole. If desired, the pin 191 may be covered by a short length of rubber tubing 192 having a frictional fit thereon, which serves as a silencer, preventing metal to metal contact between the pin and the shutter or door 97.

Figs. 10 and 11 illustrate a modification in the operation of the air inlet gate 97 when it is desired to retain the latter open at all times so that a flow of air through the burner is permitted after the blower 9 stops. In this modification the enlarged knurled head 100 is eliminated from one of the pivot screws 99 and the latter provided with a screwdriver slot 134 for turning the same. The pivot screw is of increased length to receive on the portion thereof extending outside of the hood 94 a spring 135. One end 136 of the spring bears against the front wall 37 of the housing 2 to prevent rotational movement of the spring on the pivot screw 99 and the opposite end 137 of the spring is bent underneath the side wall of the hood 94 into engagement with the underside of the air gate 97 to urge the latter in a clockwise pivotal movement as viewed in Fig. 10 into engagement with the foot 111 of the adjusting rod 104. Accordingly, the spring 135 retains the gate 97 open as far as is permitted by the particular adjustment of the rod 104, preventing the gate from dropping by gravity to closed position when air is no longer forced through the burner by the blower 9.

The unique design of the burner housing 2 provides a wiring box 174 between the outside walls of the housing and the internal partitions 38 and 42. A removable plate or plates 181 held in place by a screw or screws 175 secured in a boss 176 formed on the partition wall 38 close the opening in the side wall 31 leading into the terminal or wiring box 174. Thus, but a single electrical conduit 177 leads to the burner and enters the wiring box 174 through a fitting 178 in the removable side wall plate 31. The power leads 179 to the transformer extend through a cored hole 180 (Figs. 3 and 5) in the rear wall 36 of the housing and the power leads 182 to the motor 7 pass through a cored hole 183 extending through both the rear wall 36 of the housing and the upright portion 119 of the bracket 5. Accordingly, the wiring leads for the burner are substantially concealed and protected from injury.

The fuel pressure conduit 19 extends through a slot 184 formed in the rear wall 36 of the housing and which is formed radially from the opening 77. Accordingly, when the transformer box 73 is pivoted to open position, the conduit 19 may be readily removed longitudinally through the passage 17 and out the opening 77 merely by sliding it out of the slot 184. Preferably, a rubber grommet (not shown) fits around the conduit 19 in the slot 184 to prevent the flow of air therethrough and wear of the conduit on the walls of the slot.

The arrangement for controlling the admission

of air to the burner is advantageous in that the amount of air flowing when the blower is in operation can be regulated while the burner is operating, so that maximum operating efficiency of the burner can be quickly established. Additionally, the air inlet gate can be readily converted, from the type which remains open a predetermined amount at all times whether the burner is idle or in operation, to the type which is open only when the blower is operating and automatically closes by gravity when the blower is idle.

Other modes of utilizing the principles of the invention may be resorted to, change being made, as desired, in the particular construction and arrangement of parts shown and described, it being understood that numerous modifications and alterations are contemplated and that the embodiments disclosed are given for purposes of explanation and illustration only.

What I claim is:

1. In an oil burner having a housing structure providing a blower chamber and a blower in the chamber, means providing an air inlet opening for said chamber disposed in a generally horizontal position so that air entering into the housing flows in a generally vertical direction through the opening, a gate and means mounting the same for pivotal movement across said opening from a normal position in which the gate is generally horizontal to close the opening to an upright position in which the gate is displaced from the opening, whereby the force of inflowing air displaces the gate from normal position and the movement of the center of gravity of the gate toward the pivot axis thereof during said displacement effects a reduction in the air force required to move the gate, and means limiting the displacement.

2. In an oil burner having a housing structure providing a blower chamber, a blower in the chamber, means defining an air inlet opening for the chamber, a pivoted gate normally disposed across the opening to close the same and displaceable by the force of air entering the chamber, and means for limiting the displacement comprising a substantially vertical rod rotatably mounted in the housing and having a lateral extension formed thereon whereby rotation of the rod moves the extension over an arc to different operative positions, friction means for yieldingly holding the rod in different rotative positions, and screw means for locking the rod in one of said positions.

3. In an oil burner having a pivoted air inlet gate, a rotatable rod adjustable to different positions for limiting the movement of the gate, spring pressed friction means for yieldingly holding the rod in adjusted position, and screw means having connection with the rod for locking the same in adjusted position.

4. In an oil burner having a housing structure providing a blower chamber and an inlet through which air flows upwardly to enter the housing, a gate disposed across said inlet to normally close the same, means mounting the gate for pivotal movement about a substantially horizontal axis so that entering air lifts the gate to open the inlet and whereby the center of gravity of the gate is shifted toward said axis, and means limiting the pivotal movement of the gate.

5. In an oil burner having a housing structure providing a blower chamber and an inlet through which air flows upwardly to enter the housing, a gate disposed across said inlet to normally close the same, means mounting the gate for pivotal movement about a substantially horizontal axis so that entering air lifts the gate to open the inlet, an adjustable rod extending through the housing in a generally vertical position and having one end disposed above the gate to engage the latter and thereby limit the pivotal movement of the gate, and resilient means for yieldingly holding the rod in adjusted position.

6. In an oil burner having a housing structure providing a blower chamber and an inlet through which air flows upwardly to enter the housing, a gate disposed across said inlet to normally close the same, means mounting the gate for pivotal movement about a substantially horizontal axis so that entering air lifts the gate to open the inlet, an adjustable rod extending through the housing in a generally vertical position and having one end disposed above the gate to engage the latter and thereby limit the pivotal movement of the gate, and a set screw threaded into the housing and having connection with the rod to lock the latter in adjusted position.

7. In an oil burner having a housing structure providing a blower chamber and an inlet through which air flows upwardly to enter the housing, a gate disposed across said inlet to normally close the same, means mounting the gate for pivotal movement about a substantially horizontal axis so that entering air lifts the gate to open the inlet, an adjustable rod extending through the housing in a generally vertical position and having one end disposed above the gate to engage the latter and thereby limit the pivotal movement of the gate, resilient means for yieldingly holding the rod to facilitate manual adjustment of the same in regulating the air inlet, and threaded means carried by the housing and having connection with the rod to lock the latter in adjusted position.

8. In an oil burner having a housing structure providing a blower chamber and an air inlet through which air flows to enter the chamber, a pivoted gate normally disposed across the inlet to close the same and movable by the force of entering air to open the inlet, an adjustable rod extending through the housing and rotatable therein to different positions for limiting the movement of the gate, a recess formed in the casing adjacent the rod and provided with spaced shoulders, and means carried by the rod and movable in the recess between the shoulders to indicate the position of the rod relative to the gate and to limit the movement of the rod by interengagement with said shoulders.

9. In an oil burner having a housing structure providing a blower chamber and including a downwardly directed hood having a bottom air inlet communicating with the chamber, a gate and means mounting the same in the inlet for pivotal movement about a substantially horizontal axis so that the force of air entering the housing through the inlet lifts the gate, a rotatable rod extending downwardly through the top of the housing and the hood and having a foot portion disposed above the gate to engage the latter and thereby limit the movement of the gate, means on the rod externally of the housing for rotating the rod about a substantially vertical axis to thereby shift the position of the foot portion, and means for holding the rod in rotated position.

10. In an oil burner having a housing structure providing a blower chamber and an air inlet through which air flows to enter the chamber, a gate normally disposed across the inlet to

close the same, and means mounting the gate for pivotal movement, said means comprising an apertured element on the gate and a pivot screw threaded through the housing, said screw having a reduced diameter end receivable in the aperture of the element and having a shoulder engageable with the element upon tightening of the screw to frictionally hold the element and the gate in fixed position in the air inlet.

11. In an oil burner having a housing structure providing a blower chamber and an air inlet through which air flows to enter the chamber, a gate normally disposed across the inlet to close the same, means mounting the gate for pivotal movement, said means comprising an apertured element on the gate and a pivot screw threaded through the housing, and spring means carried by the screw and engageable with the gate to yieldingly hold the latter in predetermined position.

12. In an oil burner having a housing providing a blower chamber and hood means on the housing forming an air inlet opening across the underside of the hood, a blower in the chamber and means for actuating the same to draw air upwardly through said opening and into the burner, an air gate and means pivotally mounting the same in the hood means for turning movement about a substantially horizontal axis to normally gravitate to a position across said opening to close the latter, said gate being so mounted that the pressure thereagainst of air drawn into the burner raises the gate to open position and the center of gravity of the gate moves toward said axis so that less air force is required to retain the gate in open position than to initially raise the gate and whereby the gate remains substantially stationary in open position during slight fluctuations in the pressure of the air flowing into the burner, and adjustable means engageable with the gate for limiting the turning movement of the latter during the raising thereof to open position, said last named means being movable to alter the open position of the gate whereby to control the flow of air into the burner.

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