

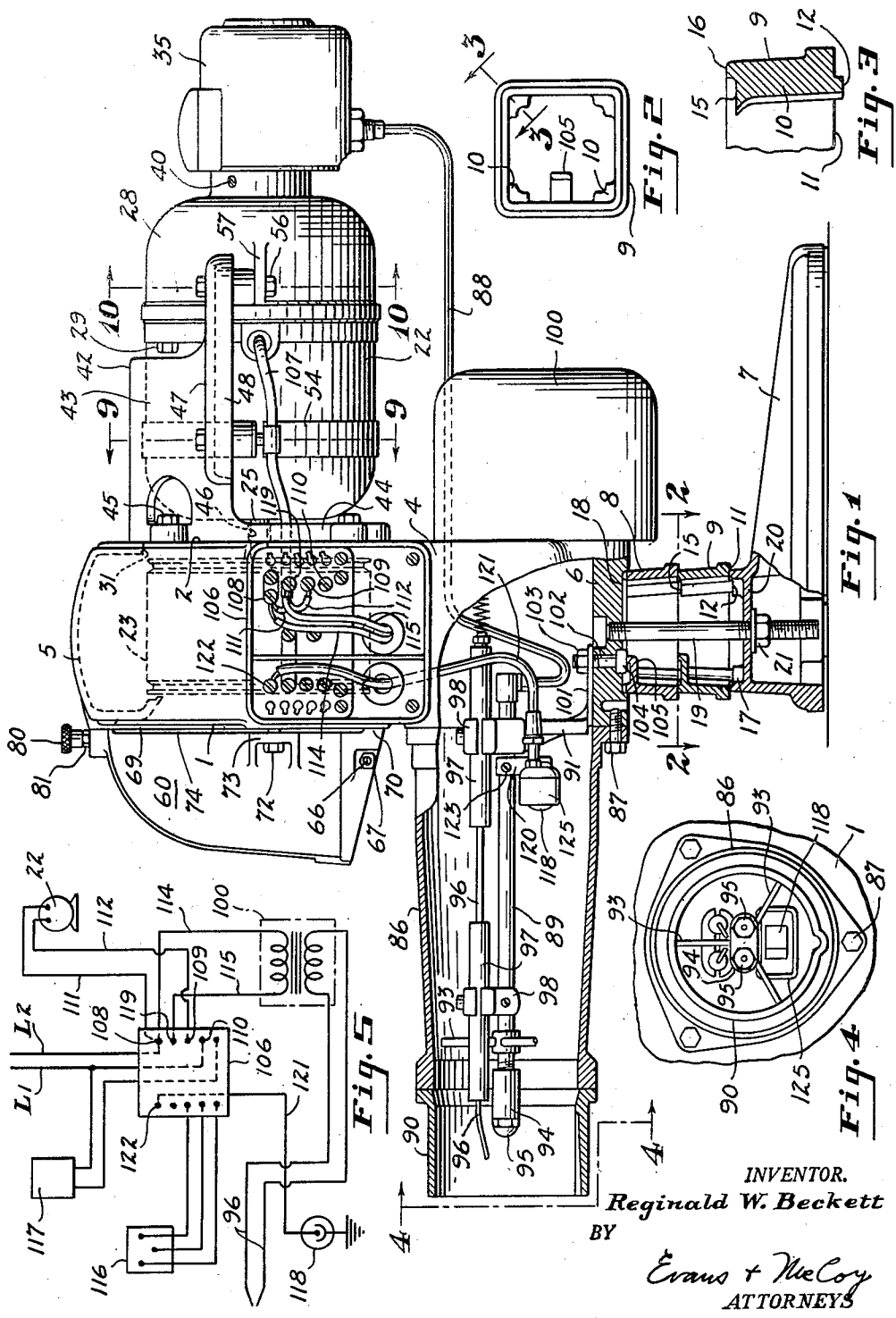
May 2, 1950

R. W. BECKETT
FAN REGULATOR

2,506,192

Filed Aug. 7, 1947

2 Sheets-Sheet 1



INVENTOR.
Reginald W. Beckett
BY
Evans & McCoy
ATTORNEYS

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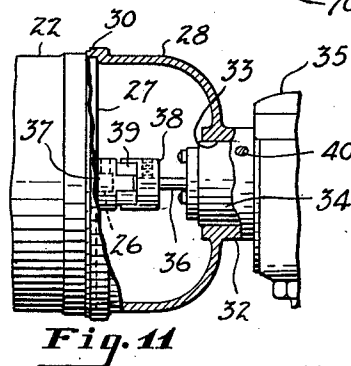
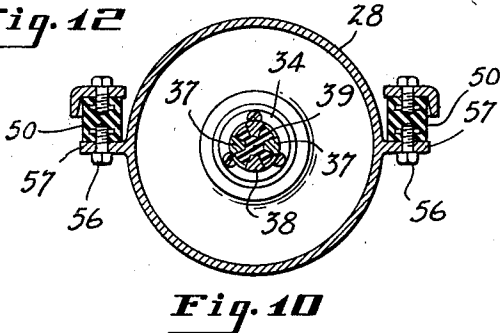
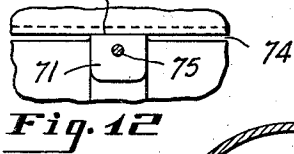
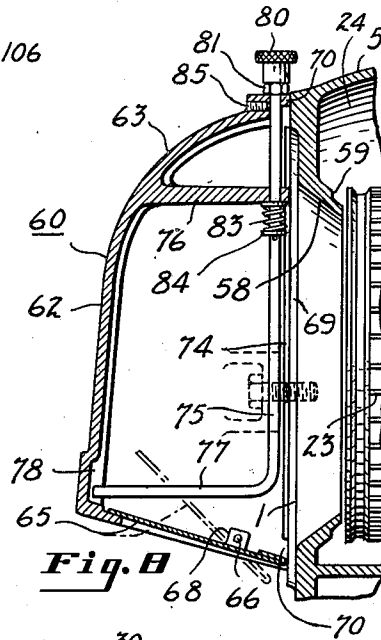
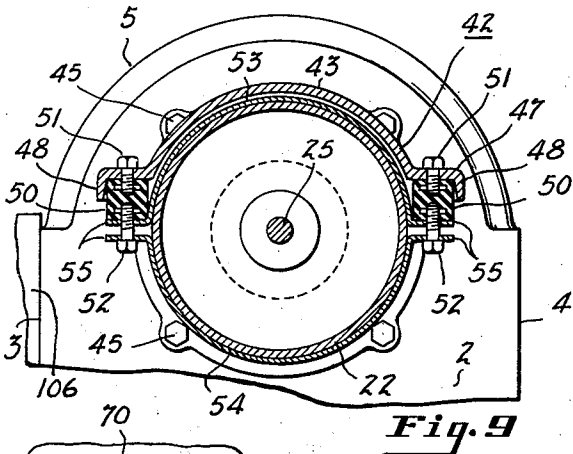
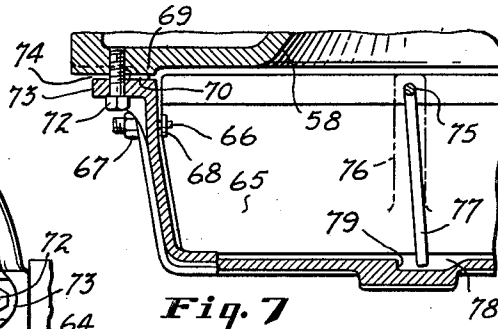
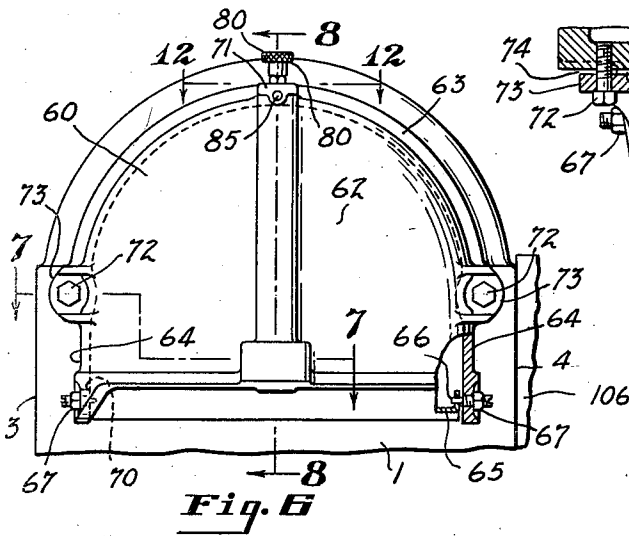
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2 Sheets-Sheet 2



INVENTOR.
Reginald W. Beckett
BY

Evans & Mc Coy
ATTORNEYS

UNITED STATES PATENT OFFICE

2,506,192

FAN REGULATOR

Reginald W. Beckett, Elyria, Ohio

Application August 7, 1947, Serial No. 766,967

11 Claims. (Cl. 230-114)

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This invention relates to oil burners and has particular reference to oil burners of the pressure atomizing type in which fuel oil is discharged under pressure through a small orifice or nozzle into a combustion chamber and is burned while suspended in the combustion air that is supplied by a power driven fan, the air being proportioned to the oil to obtain efficient combustion.

Oil burners of the type involved in the present invention have been highly developed and are presently in common use in large numbers. There are, however, a number of desirable improvements that are continuously being sought. Primarily it is desirable to reduce the cost of manufacture of these burners so as to make them more readily available to the public at large. Other improvements needed are along the lines of greater efficiency, quieter operation, and safety.

It is therefore the principal object of the present invention to provide a generally improved oil burner construction of the pressure atomizing type in which numerous advantageous features of construction and arrangements of parts have been incorporated to obtain economic manufacture and operation, relatively silent operation, and safety.

Economy is obtained by unique design features which facilitate assembly with a minimum of machining of parts and without special skill or the necessity for the use of special tools, jigs, and fixtures. Reduced cost is also obtained by the elimination of parts to simplify the design of the burner and the assembly and installation thereof.

Noise reduction during operation of the burner is obtained through improved mounting means for supporting the so-called "power unit" of the burner, which comprises the electric drive motor and the fan and the fuel pump actuated thereby. Additional noise reduction is obtained through improved design of the air induction system and the provision of a balanced structure so supported as to minimize vibration and oscillation during operation.

Safety is enhanced by the use of a new type of electronic control system (not of the present invention) which includes a light or flame responsive phototube that is so mounted in the burner as to be enclosed and protected by the burner structure and continuously cooled by incoming combustion air, the phototube being connected by electrical wiring which also is wholly enclosed within the burner structure.

Other objects and advantages will become apparent from the following detailed description

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of a burner embodying the principles of the present invention, such description being made in connection with the accompanying drawings forming a part of this specification.

In the drawings:

Figure 1 is a side elevational view partly in section and with parts broken away and removed showing the oil burner structure;

Figure 2 is a plan view of one of the supporting and spacing blocks of the pedestal, this view being taken approximately on the line indicated at 2-2 of Fig. 1;

Figure 3 is a sectional detail through one corner of the supporting block of Fig. 2 being taken substantially on the line indicated at 3-3 of Fig. 2 and enlarged with respect to that figure;

Figure 4 is a fragmentary front end view looking into the air tube of the burner, this view being taken substantially along the line indicated at 4-4 of Fig. 1;

Figure 5 is a schematic wiring diagram showing electrical connections associated with the control for the oil burner;

Figure 6 is a fragmentary front view of the burner, partly in section, showing the air induction hood, other parts of the burner being broken away and removed;

Figure 7 is a fragmentary horizontal sectional detail taken substantially on the line 7-7 of Fig. 6 and enlarged with respect to that figure;

Figure 8 is a vertical sectional detail through the air induction hood of the burner, this view being taken substantially on the line indicated at 8-8 of Fig. 6 and enlarged with respect to that figure;

Figure 9 is a transverse sectional detail taken substantially on the line 9-9 of Fig. 1, parts of the burner being broken away and removed;

Figure 10 is a transverse sectional detail taken substantially on the line 10-10 of Fig. 1;

Figure 11 is a detail view partly in section and with parts broken away taken through the bell-shaped member which mounts the fuel pump on the end of the electric drive motor; and

Figure 12 is a fragmentary detail, partly in section, taken substantially on the line indicated at 12-12 of Fig. 6.

The oil burner of the present invention is generally of the type disclosed in my prior United States Patent No. 2,310,274 and the patents referred to therein, the present design being particularly suited for use at higher oil rates. Referring now to the drawings by numerals of reference which indicate like parts throughout the several views, the burner is seen to comprise an upright housing structure of generally ovate form

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having spaced substantially parallel front and rear walls 1 and 2 respectively, substantially parallel side walls 3 and 4, which join and are narrower than the front and rear walls, and a curved top wall 5. The housing is of cast metal such as iron or aluminum and includes a bottom 6 which is integral with the front and rear walls and is connected into the side walls 3 and 4 by curved wall portions.

Support shells

The housing is supported on a pedestal structure which comprises a cast metal base 7 and one or more supporting or spacing blocks or shells 8 and 9. One feature of the present oil burner construction that is of particular advantage relates to the spacing or supporting shells, the number of which can be increased or decreased to vary the height of the housing above the base 7. These shells or blocks, of cast iron or aluminum, are of square or other non-circular plan form as shown in Fig. 2.

In each corner of the spacing shell is an integral column 10 which projects below the level of the bottom edges 11 of the shell so as to provide depending foot portions 12 received in interlocking relation in mating recesses formed in the top of the base 7 or in the top of the next lower spacing shell. In the shells 9 upper ends 15 of the columns 10 are disposed below the level of the upper edge 16 so as to provide the mating sockets in the corners for receiving the foot portions 12 of the surmounting spacing shell or block. The foot portions 12 of the columns of the spacing shell 8 bear on the upper ends 15 of the columns of the spacing shell 9 so that the weight of the burner is carried largely by the columns of the shells. The base 7 is formed with thick sectioned bosses 17 having flat tops recessed below the level of the square top of the base and which serve as footings for the spacing shell columns 10, the latter interfitting in the square base to permit relative turning.

The upper shell 8 differs slightly from the spacing shell 9 in that the columns 10 thereof extend upwardly above the level of the top edge 16 of the side walls providing lugs 18 which interfit in mating recesses formed in the corners of a square socket in the bottom 6 of the housing. The interfitting feet and sockets on the ends of the columns 10 prevent relative turning of the spacing shells on one another, on the base 7, and in the housing bottom 6 so that the housing structure is maintained in pre-determined non-rotative position relative to the base. Although only two shells are shown it is contemplated to use an additional number of the shells 8 if greater height is desired, or to lower the housing, the spacing shell 9 may be eliminated or the burner can be mounted directly on the base 7.

The housing is secured to the base by a vertical stud or through bolt 19 the upper end of which is threadedly secured in the housing bottom 6 and the lower end of which extends downwardly through and is centered in an opening in platform portion 20 of the base. A nut 21 is tightened against the underside of the base platform to hold the assembly together.

Power unit

An electric motor 22 supplies the energy for driving squirrel cage fan or sirocco type blower 23 which is received in a chamber 24 formed in the upper portion of the housing. The fan, inserted into the blower chamber through a large

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diameter opening 31 provided in the rear wall 2 of the housing, is secured on one end 25 (Fig. 1) of the motor shaft.

Motor shaft portion 26 (Figs. 10 and 11) which projects from the other or flat end 27 of the motor is surrounded by a bell-shaped support member 28 that is secured to the motor end 27 by diametrically located cap screws, one of which is indicated at 29. The bell member 28 is formed with an offset circular flange 30 which embraces the motor end 27 and provides a circumferentially extending internal shoulder against which the motor end is seated and located.

The small end of the bell member 28 is formed with a centrally located integral cylindrical sleeve 32 having an internal cylindrical bore 33 that is substantially co-axial to the rotational axis of the motor shaft. Received within the bore or socket 33 is a mating cylindrical plug member 34 formed on a fuel oil pump 35.

The pump plug 34 contains a central journal for pump shaft 36 which is thus disposed in end to end co-axial relation to the motor shaft end 26. A flexible drive coupling connects the shaft ends, one coupling part 37 being secured by a set screw on the motor shaft end 26 and another coupling part 38 being secured, also by a set screw, on pump shaft 36. A resilient deformable element 39 is interposed between the coupling parts 37 and 38 to transmit the torque while providing for slight misalignment or displacement of the shafts. One or more set screws 40 threaded through the bell sleeve 32 are engaged in detents in the pump plug 34 to lock the latter in the bell member sleeve and to retain the pump in pre-determined upright position.

The motor 22, together with the fan 23 and the pump 35 secured on opposite ends thereof, are collectively referred to and comprise a removable "power unit." This unit operates the oil burner, the pump feeding oil under pressure and the fan supplying combustion air. It is therefore extremely desirable to be able to replace the "power unit" should a failure occur in either the pump fan or motor so that the oil burner can be continued in service with a minimum of delay or interruption.

Resilient suspension

In the present burner design a unique suspension means is provided for the "power unit." Reference is made to my copending application for patent Serial No. 118,313, filed September 28, 1949, for Motor suspension for oil burners and the like in which this feature is described and claimed. A bracket 42 having a transversely curved body portion 43 is concave on its underside so as to fit over and partially embrace the top of the motor. The body of the bracket is generally concentric to the curvature of the motor, the latter being suspended in spaced relation underneath the bracket as will later appear. At one end of the curved body 43 the bracket is formed with an integral depending flange 44 which is disposed flatwise against the rear wall 2 of the housing structure and is secured to the latter over the opening 31 by cap screws 45. The bracket flange 44 thus closes the relatively large rear opening in the housing wall 2 through which the fan 23 is inserted into the fan chamber 24, the bracket flange having a relatively small opening 46 which closely surrounds the motor shaft end 25.

Along opposite sides of the bracket at the lower edges of the arcuate or curved body 43 are hori-

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zontal portions or lateral extensions 47 which terminate in depending flanges 48. Rubber tension type suspension members 50 are secured by bolts 51 to the underside of the lateral bracket extensions at the front and rear ends of the latter, the bolts being threaded into metal elements embedded in the rubber of the suspension members.

One pair of the resilient rubber members 50 are attached by bolts 52 to half straps 53 and 54 which cooperatively embrace the motor 22, the bolts 52 passing through radial ears 55 on the ends of the half straps, and being threaded into metal elements embedded in the rubber of the suspension members. The half strap 53 passes over the top of the forward portion of the motor and is disposed underneath the curved body portion 43 of the bracket, while the half strap 54 extends underneath the forward portion of the motor to support the latter. The bolts 52 draw the half straps tightly about the frame of the motor so as to clamp the motor in place and prevent longitudinal movement thereof. The other pair of the resilient rubber suspension members 50, which depend from portions of the bracket extensions 47 that project rearwardly of the curved body portion 43 of the bracket, are secured by bolts 56, threaded into embedded metal elements, to diametrically disposed integral ears 57 which extend outwardly from opposite sides of the bell-shaped support member 28.

Thus the "power unit" is resiliently suspended from the bracket 42 by a plurality of resilient rubber members in tension. Extremely quiet burner operation results from this type of mount and the attachment of the resilient elements 50 to different zones along the length of the motor minimizes lateral displacement of the motor and serves to hold the motor in pre-determined relative position with respect to the burner housing structure.

In manufacturing the burner, the motor, bell member, pump and fan are assembled together on the bracket 42 and this sub-assembly is then mounted as a unit on the housing simply by inserting the fan into the chamber 24 through the opening 31 in the housing wall 2 and securing the bracket flange 44 in place by the cap screws 45. The arrangement of the power unit and the attaching bracket as a sub-assembly facilitates economical mass production, the parts being interchangeable, and also permits replacement of the power unit in the field should it become desirable to retain the burner in continuous service while repairs are being made on the motor or fuel pump.

Air induction and control

Air is drawn into the fan chamber 24 through a large inwardly tapered opening formed in the front wall 1 of the housing and having circular converging walls 58 to provide a smooth non-turbulent inflow of air. A circular flange 59 of generally conical shape is integrally formed on the inside of the front wall of the housing and extends around the opening and into the fan chamber 24, forming part of the tapered inlet wall 58. The inner edge of the flange 59 is disposed closely adjacent the open inlet end of the fan 23, there being a running fit between the parts to permit rotation of the fan and such vibration as occurs in normal use without contact between the fan and the flange.

Disposed against the outside of the front wall

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1 of the housing and over the air inlet opening into the fan chamber so as to control the flow of air through such opening, is a hood 60 which may be of cast metal. The construction and mounting of this hood on the burner is one of the important features of the present invention since it is very economical to manufacture, assemble, and service, and yet provides for accurate control of air flow into and through the burner.

The hood has an inclined front wall 62 spaced from the front wall 1 of the housing structure by a curved top wall 63 and side walls 64. Across the bottom the hood is open to permit the inflow of air under the control of a sheet metal gate 65 pivotally mounted off center for turning movement about a horizontal axis. The gate is supported on pins 66 that are threaded through aligned openings in bottom portions of the side walls 64, the pins being held against turning by lock nuts 67. Reduced diameter pivot ends of the pins 66 are received in openings in upstanding ears 68 that are formed or welded on the opposite ends of the gate 65. The folded overportion along the rear marginal edge of the gate, weights or counter-balances the latter so that the gate can be moved upwardly to open position by relatively small force such as that of inflowing air.

The rear edges of the curved top wall 63 and the side wall 64 of the hood are directed toward an integral outstanding rib 69 which is formed on or characters the front wall 1 of the housing and has the same contour or outline shape as the edges of the hood walls. The hood does not make peripheral contact with the housing rib 69 but is spaced therefrom by three integral bosses or raised portions 70 that are integrally formed on the edges of the hood walls in spaced relation to one another. One of the bosses is at the center of the top wall 63 and the other two are at the bottoms of the side walls 64, providing a three-point contact for the hood against the housing. Cap screws or bolts 72 pass through openings in ears 73 provided one on each side of the hood and are threaded into the front wall 1 of the housing structure. Each of the cap screws 72 is located between the top spacing boss and one of the side spacing bosses so that the hood is held by three-point contact tightly against the housing structure, there being a clearance 74 between the edges of the hood walls and the rib 69 on the front wall 1 of the housing around substantially the entire extent of the hood except for the three-points of contact between the bosses 70 and the housing rib. Although the spacing bosses 70 are shown to be integral with the walls of the hood 60 they may, in the alternative, be formed on the rib 69 of the housing or the rib 69 may be eliminated and the spacing bosses formed either on the front wall of the housing or on the edges of the hood walls.

The hood and housing combination of the present invention can be readily assembled even though made by a casting process. The clearance 74 provides for slight irregularities such as might be caused by shrinkage and casting defects and the use of a pair of attaching bolts or screws in combination with the three-point contact between the hood and the housing insures a rigid assembly without requiring special machining of the parts other than drilling and tapping the housing for the screws or bolts 72.

In adjusting the burner for different oil rates

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the quantity of combustion air drawn into the fan chamber through the opening in the bottom of the hood 60 is regulated by controlling the extent to which the gate 65 opens. Customarily the amount of opening of the air inlet control gate is adjusted while the burner is in operation and the present construction provides means to facilitate this operation. A rod 75 extends vertically through the interior of the hood and is guided for turning movement in an integral extension arm 76 formed on the inside of the hood and in an opening formed through a thick sectioned boss 71 formed in the top wall 63 of the hood. An angular extension 77 is formed on the bottom of the control rod 75 to swing horizontally in an arc above the level of the air inlet control gate 65. The extension 77 is of such length that when it is in forward position, as shown by the full lines of Fig. 7, it extends into a recess 78 formed in the front wall 62 of the hood.

Shoulder or stop 79 formed at one side of the recess 78 is engaged by the end of the rod extension 77 and limits the turning movement that can be imparted to the control rod. When the end of the rod extension 77 is against the shoulder 79 the rod is disposed immediately above the edge of the air inlet control gate 65 in position to engage and restrict the opening movement of the gate, this being the minimum gate opening adjustment. Upon turning of the control rod 75 so as to move the extension 77 thereof away from the stop 79 the end of the rod extension is carried to a position in which it is more widely spaced above the control gate 65 and the latter is permitted to open to a greater extent, such as to the broken line intermediate position illustrated in Fig. 8 or even to a full open position in which the gate is substantially vertical and not restricted in opening movement by the control rod.

To facilitate the turning of the control rod in adjusting the air induction system of the burner a knurled thumb wheel 80 is threaded onto the top of the rod 75 above the top wall 63 of the hood and is held against turning on the rod by lock nut 81. A helical coil spring 83 under compression between a washer 84, supported on the rod 75 by pinched out projections, and a washer which bears upwardly against the underside of the guide extension 75, serves to draw the control rod 75 downwardly to hold the lock nut 81 against the top of the boss 71 and also to serve as a frictional restraint which temporarily holds the control rod in adjusted position. A set screw 85 threaded through the boss 71 may be tightened against the control rod to retain the latter in adjusted position, thus preventing loss of the adjustment of the control rod during long periods of use.

It is significant that the parts of the air induction control system of the present burner are mounted in the hood 60 so that in manufacturing the burner the control rod 75 and the air gate 65 are assembled in position in the hood while the latter is removed or separate from the main housing structure. The piecing together and adjusting of the parts into the hood sub-assembly is thus facilitated by reason of accessibility and the fact that the hood is relatively light in weight. Thereafter the hood sub-assembly complete with control rod and air gate, is mounted on the housing front as a unit simply by placement of the pair of cap screws 72. This arrangement lends itself to economical

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mass production with obvious advantages. Servicing of the air induction controls is likewise facilitated since the hood and related parts can be removed as a unit without disturbing the burner installation and either conveniently repaired away from the furnace or boiler and then replaced, or a new unit can be substituted and the burner kept in service with minimum interruption.

Below the air induction hood 60 an elongated tapered tube 86 of circular cross section is attached by bolts 87 to the front wall 1 of the housing structure over an opening which communicates with an air passage formed in the housing structure below the fan chamber 24. Combustion supporting air drawn into the housing through the hood 60 is forced by the fan 23 down into the air chamber in the bottom of the housing and thence out through the circular passage in the air tube 86 and through a burner head 90 which extends through the walls of the fire box of the combustion chamber, not shown.

Fuel oil atomization and electrical ignition

Fuel oil from a source not shown is supplied by the pump 35 and forced from the latter through a bendable conduit 88 which may be of copper to a rigid conduit 89 supported by a bracket 91 so as to extend longitudinally through the center of the air tube 86. Forwardly of the bracket 91 the fuel conduit 89 carries a spider 93 that locates the conduit in the center of the air tube. A hollow manifold 94 is threaded on the end of the conduit 89 and mounts a pair of nozzles 95 which are screwed into threaded openings in the manifold and are arranged in parallel side by side relation so as simultaneously to project fuel forwardly through the open mouth of the burner head 90 of the combustion chamber.

Each of the nozzles 95 is of the type that projects a cone shaped spray of fine oil particles from the orifice thereof. These spray cones from the two nozzles intersect one another immediately in advance of the nozzles, producing an effective commingling of the fuel from the two nozzles, particularly in a vertical zone just ahead of the nozzle. Into or toward this zone extend the sparking ends of ignition electrodes 96 which are received through pairs of spaced insulators 97 supported by clamps 98 mounted on the rigid fuel conduit 89.

Electrical current for energizing the ignition spark across the ends of the electrodes 96 is supplied by a transformer 100 hinged along one edge to the housing for turning movement about a vertical axis. The transformer is normally disposed across an opening through the rear wall 2 of the housing structure and has a pair of electrical terminals which extend into the air chamber in the bottom of the housing. The transformer serves as a closure for the opening in the rear wall and the electrodes 96 carry contact elements that automatically make electrical connection between the electrodes and the transformer terminals when the transformer is swung to closed position across the housing opening.

The rigid fuel conduit 89 and the electrodes 96 and the other parts carried thereby comprises an assembly which is removable as a unit from the air tube for replacement or adjustment. The bendable conduit 88 extends through a lateral extension of the rear opening in the housing structure to one side of the transformer

100 and is disconnected from the fuel pump 35 when it is desired to remove the fuel conduit and ignition electrode assembly from the burner. A base portion 101 on the bracket 91 is contoured to correspond to the curvature of the bottom of the air chamber of the housing and is apertured to receive an upstanding bolt 102 that extends upwardly through a hole in the bottom 6 of the burner housing. A nut 103 on the bolt 102 is tightened down against the base 101 of the bracket to secure the latter in place, the bolt having a square or non-circular head 104 that is received in a mating recess formed in the underside of the housing bottom 6 so as to prevent turning of the bolt when tightening or loosening the nut 103.

An integral finger 105 which extends inwardly from one of the walls of the uppermost spacing block 8 engages the head 104 of the bolt to prevent the bolt from dropping out of the hole provided therefor in the housing bottom 6. Thus the bolt is retained in place when the nut 103 is removed for withdrawal of the ignition electrode and fuel conduit assembly. This particular arrangement for retaining the bracket locking bolt 102 reduces the assembly cost of the burner, since machining of the casting which constitutes the burner housing is avoided. Furthermore, the bolt 102 can be readily replaced should it be broken or damaged.

Electrical control and wiring

Control of the electrical current to energize the motor and the transformer is effected by means such as the electronic combustion safety system manufactured by Minneapolis-Honeywell Regulator Company and known as the R177A relay and the series 10 controller. The side wall 4 of the burner housing is formed to receive a junction box 106 to which is mounted the control mechanism (not shown). Electrical leads or wires 111 and 112 from the motor 22 are contained in an insulated conduit 107 which runs through an opening in the rear wall of the housing and through an internal chamber of the housing, the leads being brought into the junction box and connected to terminals 108 and 109. Leads or wires 114 and 115 from the transformer 100 are also contained in an insulated conductor or conductors which extend through an internal chamber in the burner housing and are brought into the junction box and connected one to the terminal 108 and the other to terminal 110.

A wiring diagram showing suitable electrical connections for the burner is illustrated in Fig. 5, the showing being purely diagrammatic and relating to the above mentioned electronic safety system. Power or electrical current is supplied to the system through line conductors L-1 and L-2 which are brought into the junction box 106 and connected respectively to terminal 119 and the terminal 108 therein. The relay of the safety combustion control mechanism for governing the burner operation is contained in a metal box which fits over the junction box 106. Electrical connection is made with the various terminals in the latter by captive screws or other means not shown. Besides the motor and transformer, other devices such as the above mentioned series 10 controller indicated at 116, and a limit control indicated at 117 may be connected into the control mechanism through the junction box 106, the leads or wires from these devices being attached to terminals in the junction

box that are contacted by the captive screws of the relay box.

Phototube mount

The control system mentioned above employs a conventional photoelectric or phototube cell 118 to monitor the operation of the burner. In starting up the burner, the photocell responds to the establishment of a flame by effecting de-energization of the electric ignition while maintaining the motor in operation to feed oil and air. Upon flame failure, the photocell functions to effect energization of the electric ignition and to place the electric heater of a thermal safety switch in the motor circuit. The safety switch shuts down the system if ignition is not re-established within a pre-determined time interval. Establishment of a lasting flame, however, stimulates the photocell to effect ignition cut-off and to shut out the heater of the safety switch so that burner operation continues.

The photoelectric cell or phototube can be located in any suitable position where it is exposed to the light rays emanating from the burner flame. As a particularly advantageous location the present invention provides means for mounting the photocell 118 in the air tube 86, in a container 125 which faces toward the open mouth of the burner head 90. The container is supported on a bracket 120 which is slidable to different positions along the rigid fuel conduit 89.

A flexible electric conductor 121 is connected to the anode of the photocell 118 through the rear of the casing 125 and extends through the air tube and the air chamber in the bottom of the housing, thence through the aforesaid internal chamber of the housing and into the junction box 106 where it is connected to terminal 122. The phototube cathode is grounded to the burner housing structure through the adjustable bracket 120 and the ignition electrode and fuel conduit assembly. Thus the photocell conductor is contained wholly within the housing structure of the oil burner so as to be protected against displacement and damage. Furthermore the photocell, located in the air tube adjacent the rear end thereof is customarily cooled by the air flowing thereover while the burner is in operation.

Although the photocell mount is shown closely adjacent the supporting bracket 91 the bracket 120 may be moved forwardly on the conduit 89 to a position in which the photocell is closer to the burner head. The particular location of the photocell along the length of the fuel conduit 89 supporting the same may be varied to suit the particular conditions and requirements of any one burner installation. For example, the air tube 86 may be considerably longer than shown and in lengthy air tubes it may be desirable to move the photocell forwardly, relatively closer to the burner head and away from the ignition electrode bracket 91. A set screw 123 is provided in the photocell bracket 120 to retain the latter in adjusted position on the rigid oil conduit so that the bracket does not become displaced upon removal of the assembly in service. Reference is made to my copending application for patent Serial No. 149,550, filed March 14, 1950, for Fluid fuel burner which describes and claims certain of the above mentioned features.

The principles of the present invention may be utilized in various ways, numerous modifications and alterations being contemplated, sub-

stitution of parts and changes in construction being resorted to as desired, it being understood that the embodiment shown in the drawings and described above is given merely for purposes of explanation and illustration without intending to limit the scope of the claims to the specific details disclosed.

What I claim is:

1. In an oil burner of the pressure atomizing type, a housing structure defining a fan chamber and having one wall formed with an air inlet opening, an assembly comprising a removable open bottomed hood disposed against said wall over said air inlet opening to control the flow of air into the fan chamber, a gate disposed across the open bottom of the hood, means carried by the hood and supporting the gate for shiftable movement about a substantially horizontal axis to regulate the size of the hood opening and govern the flow of air into the hood, a control rod supported by the hood and extending through the latter, a portion of said rod being disposed to engage the gate and limit the pivoting thereof, and means for retaining the rod in different positions of adjustment, said hood assembly, including the pivoted gate and the adjustable rod, being removable as a unit from said wall of the housing structure to provide access to the fan chamber through said wall opening.

2. In a pressure atomizing oil burner having a supporting housing structure defining an air inlet opening, a movable gate for controlling the flow of air into the burner through said opening, a rod mounted in the supporting structure for turning movement, said rod having an angularly disposed portion on one end engageable with the gate to limit the movement of the latter, and means on the supporting structure providing a shoulder engageable with the angularly disposed portion of the rod to limit the turning movement of the latter, said shoulder being disposed to engage the rod upon movement of the latter to that adjustment providing minimum opening of the air gate.

3. In combination in an oil burner, a housing having a fan chamber and a concave open sided hood unit disposed against the housing and removable therefrom, the hood unit having walls with edges directed toward the housing, means securing the hood unit on the housing for facile removal therefrom, and means spacing the major portion of the length of the edges of the hood from the housing to accommodate slight irregularities in the hood unit and the housing.

4. In combination in an oil burner, a housing having a fan chamber and a concave open sided hood unit disposed against the housing and removable therefrom, the hood unit having walls with edges directed toward the housing, ears on the hood unit, means interconnecting the ears and the housing to secure the hood unit on the housing for facile removal therefrom, and means spacing the major portion of the length of the edges of the hood from the housing to accommodate slight irregularities in the hood unit and the housing.

5. In combination in an oil burner, a housing having a fan chamber and a concave open sided hood unit disposed against the housing and removable therefrom, the hood unit having walls with edges directed toward the housing, means securing the hood unit on the housing for facile removal therefrom, means spacing the major portion of the length of the edges of the hood

from the housing to accommodate slight irregularities in the hood unit and the housing, and the hood unit including adjustable gate means wholly supported by the hood walls within the concavity of the hood.

6. In combination in an oil burner, a housing having a fan chamber and a concave open sided hood unit disposed against the housing and removable therefrom, the hood unit having walls with edges directed toward the housing, means securing the hood unit on the housing for facile removal therefrom, and means interposed between the hood and the housing at spaced intervals to hold the wall edges away from the housing and maintain a clearance therebetween.

7. In combination in an oil burner, a housing having a fan chamber and a concave open sided hood disposed against the housing and removable therefrom, the hood interior comprising a chamber substantially closed on one side by the housing and communicating with the fan chamber through an opening in the housing, a gate pivotally mounted in the hood chamber and movable to different open positions for regulating the flow of air through the hood chamber, a rod wholly supported by the hood and extending into the hood chamber for controlling the movement of the gate, said rod being mounted to swing over an arcuate path to different positions of adjustment in varying the open positions of the gate, means on the hood in the path of the rod to engage the latter and serve as an indexing stop therefor, and means securing the hood on the housing for facile removal for access to the gate and the control means through the open side of the hood for repair and replacement.

8. In an oil burner, a housing having walls defining a fan chamber and an opening into the chamber through one of the walls, a hood and means mounting the hood against said one wall for facile removal and replacement in servicing and assembling the burner, the hood and housing providing an air chamber in communication with the fan chamber through the opening, an opening across the bottom of the hood through which air flows upwardly in entering the air chamber, a closure gate disposed across the bottom opening, means mounting the gate for turning movement about a substantially horizontal axis between open and closed positions, a control rod, and means mounting the rod to turn about a substantially vertical axis, the rod being disposed within the hood and including an element engageable in different positions with the gate to vary the opening movement of the latter, the gate and rod mounting means being carried wholly by the hood for removal and replacement therewith as a unit.

9. In an oil burner, a housing having walls defining a fan chamber and an opening into the chamber through one of the walls, a motor and fuel pump unit mounted on another wall of the housing, a fan in the chamber and means drivingly connecting the fan to the motor, a one piece hood and means mounting the hood against said one wall for facile removal and replacement in servicing and assembling the burner, the hood and housing providing an air chamber in communication with the fan chamber through the opening, an opening across the bottom of the hood through which air flows upwardly in entering the air chamber, a closure gate disposed across the bottom opening, means mounting the gate for turning movement about a substantially horizontal axis between open and closed posi-

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tions, a control rod, and means mounting the rod to turn about a substantially vertical axis, the rod being disposed within the hood and including an element engageable in different positions with the gate to vary the opening movement of the latter, the gate and rod mounting means being carried wholly by the hood for removal and replacement therewith as a unit, and independently of the motor and fuel pump unit.

10. For use in an oil burner structure having a fan housing with an air inlet opening in one wall, an air control unit comprising in combination a concave hood having an open side, means to attach the hood to the housing over the inlet opening for facile removal and replacement of the unit with the open side of the hood toward the housing wall to provide an air chamber interiorly of the hood in communication with the fan housing interior through the air inlet opening, a gate and hood supported means mounting the gate in the hood for pivotal movement about one axis, a rod extending through the hood and journaled in the hood for turning movement about another axis, an element in the hood air chamber movable with the rod and engageable with the gate to limit the pivotal movement of the gate, means on the rod exteriorly of the hood chamber for manually manipulating the rod to different positions in adjusting the element to vary the gate movement, and means carried by the hood for holding the rod in adjusted position.

11. For use in an oil burner structure having a fan housing with an air inlet opening in one wall, an air control unit comprising in combination a concave hood having an open side, and an open bottom, means to attach the unit to the housing with the open side of the hood over the inlet opening, a gate and means carried wholly

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by the hood mounting the gate across the open bottom of the hood for pivotal movement about a substantially horizontal axis between a normal gravity maintained closed position in which the gate is substantially horizontal across the hood bottom and an air pressure maintained open position displaced from the closed position, a rod extending through the hood, means carried wholly by the hood mounting the rod for movement to different positions, an element movable with the rod and engageable with the gate in the different positions of the rod to vary the open displaced position of the gate, and means carried by the rod exteriorly of the hood for manually manipulating the rod to different positions in adjusting the unit to vary the air admission to the burner, the attaching means being arranged for facile mounting and demounting of the unit on the housing in assembling and servicing the burner.

REGINALD W. BECKETT.

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