

Oct. 23, 1956

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2,767,905

BLOWER UNIT FOR OIL BURNERS

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2 Sheets-Sheet 1

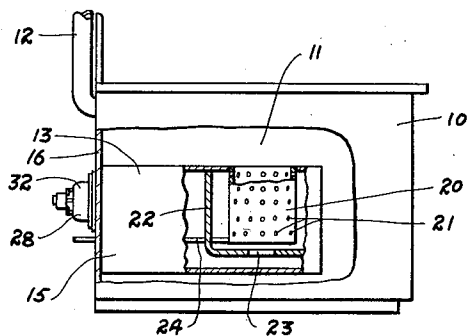


Fig. 1.

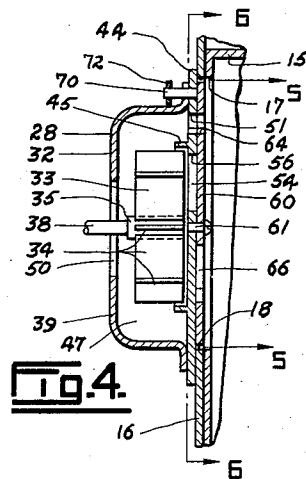


Fig. 4.

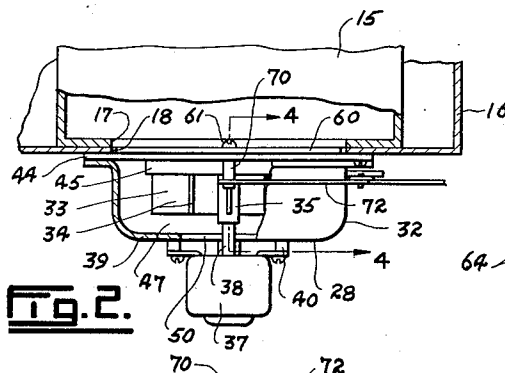


Fig. 2.

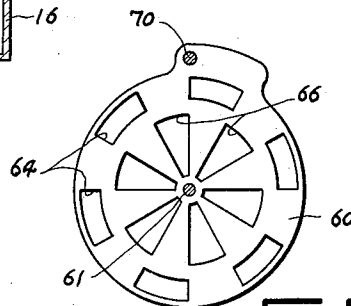


Fig. 5.

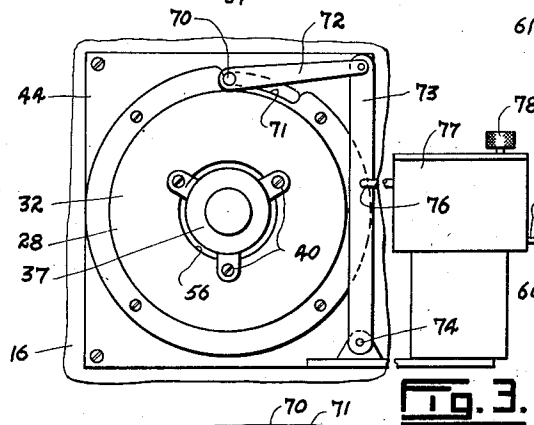


Fig. 3.

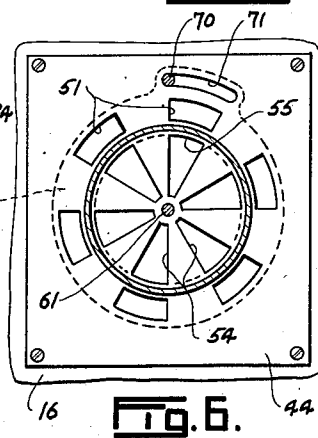


Fig. 6.

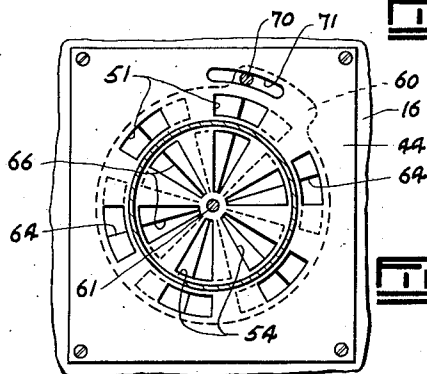


Fig. 7.

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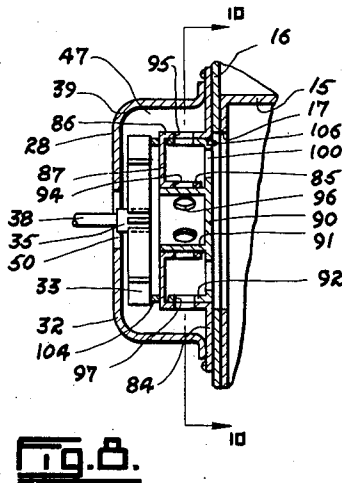
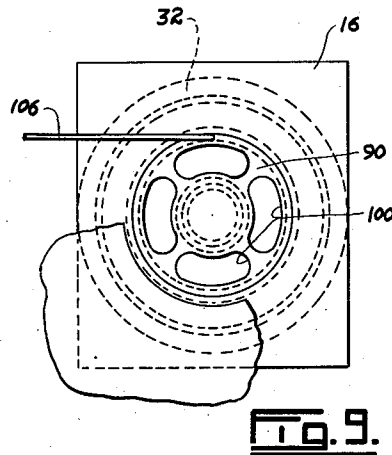
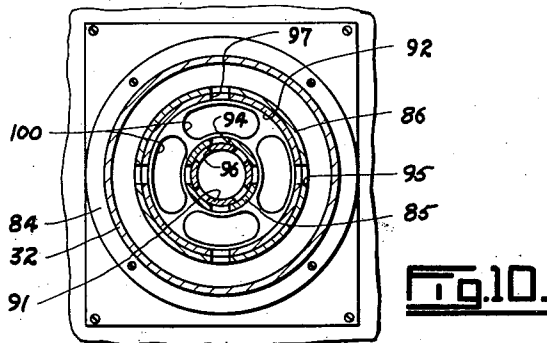
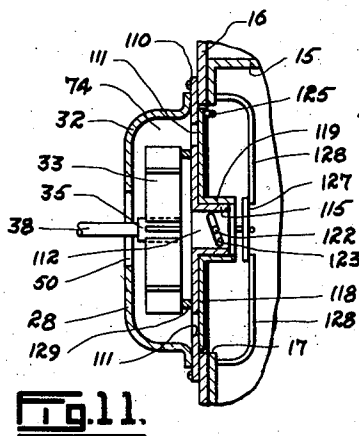
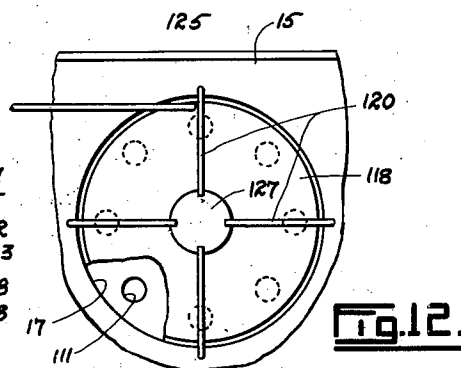
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2 Sheets-Sheet 2



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BLOWER UNIT FOR OIL BURNERS

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14 Claims. (Cl. 230—114)

This invention relates to improvements in blower units for oil burners.

This blower unit is particularly designed for oil burners in cooking stoves, but it may be used with burners for any other desired purpose.

The blower unit supplies air to a burner in varying degrees depending upon the amount of oil being supplied thereto. When the burner is full on, the full output of a draft fan is supplied to it. As the burner is turned down, the quantity of air is reduced accordingly. It is possible to have the burner going with only a pilot light with the fan turned off.

The burner unit comprises a housing having a fan rotatably mounted therein, a main air inlet in the housing, and an air outlet from said housing. A second air inlet is provided in the housing through which air from the outlet may return to the housing. Control means for the outlet and the second inlet is included by means of which the outlet is closed as the inlet is opened and vice versa. It is desirable to have the main inlet and second inlet opposed to each other on opposite sides of the housing. The unit is so constructed that when the fan is operating, it always draws air through the main air inlet regardless of the degree of opening or closing of the outlet and the second air inlet. What actually happens is that when the burner requires less air, some of the air from the fan is recirculated by it. However, as the fan always draws air from the outside, there is no danger of combustion gases or oil fumes being discharged outside the heating device. An important advantage of this unit lies in the fact that if the motor which drives the fan fails or the electric power is cut off, the burner still operates with natural draft.

Examples of this invention are illustrated in the accompanying drawings, in which:

Figure 1 is an elevation of a heating device, partly in section, with an oil burner including a blower unit installed therein,

Figure 2 is an enlarged plan view of the blower unit, shown partly in section,

Figure 3 is an outside end view of the unit,

Figure 4 is a vertical section taken on the line 4—4 of Figure 2,

Figure 5 is a cross section taken on the line 5—5 of Figure 4,

Figure 6 is a cross section taken on the line 6—6 of Figure 4 with the air inlets full open,

Figure 7 is a view similar to Figure 6 with the air inlets half open,

Figure 8 is a view similar to Figure 4 of an alternative form of the invention,

Figure 9 is an inner end view of the unit shown in Figure 8,

Figure 10 is a vertical section taken on the line 10—10 of Figure 8,

Figure 11 is a view similar to Figure 4 of another alternative form of the invention, and

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Figure 12 is an inside end view of the unit of Figure 11.

Referring to Figure 1 of the drawings, 10 is a heating device, such as a cooking stove, having a combustion chamber 11 therein from which a flue 12 extends. An oil burner unit 13 is installed in the combustion chamber. This unit consists of a closed casing 15 mounted on a wall 16 of the heating device. This casing has a large hole 17 at one end thereof registering with a similar hole 18 in the burner wall 16. A pot oil burner 20 is mounted in and opens outwardly through the top of the casing 15. This burner has the usual holes 21 in the wall thereof through which air passes to aid combustion in the pot. If desired, a baffle 22 may lie between the pot burner and the casing hole 17, said baffle having a hole 23 beneath the bottom of the pot through which air from the casing may pass. Oil is supplied to the bottom burner from a suitable source, not shown, by a pipe 24.

Figures 1 to 7 illustrate a blower unit 28 mounted on the outer surface of the heater wall 16 over the hole 18 thereof. This unit comprises a housing 32 having a fan 33 mounted therein centrally thereof. This fan is preferably a centrifugal fan having a plurality of blades 34 projecting outwardly from a central hub 35. The fan includes an electric motor 37 having a shaft 38 extending into the housing centrally thereof upon which the hub 35 is fixedly mounted. The motor is mounted on and spaced from the outer wall 39 of the housing by means of a plurality of brackets 40. The housing has an inner wall 44 having an annular ring 45 projecting inwardly thereof which partially overlaps the fan blades 34, said blades terminating just clear of the ring, see Figure 4. The fan is smaller in diameter than the housing 32 so that a pressure chamber 47 is formed within the housing around the fan.

A main air inlet opening 50 is formed in the outer housing wall 39. One or more air outlets 51 are formed in the inner housing wall 44 beyond the periphery of the fan, said opening or openings communicating with the pressure chamber. In this example, there are a plurality of these outlets arranged in a circular path with the axis of the fan shaft 38 as the centre thereof. One or more second air inlets 54 are formed in the inner housing wall opposite the main inlet 50. In this example, there are a plurality of these second inlets radiating from the centre of the wall. By referring to Figure 6, it will be noted that there is one opening 54 for and in line with each outlet 51. It is desirable that the combined area of these inlet openings be substantially the same as the combined area of the outlet openings. The openings 54 are radially arranged with their outer ends 55 farther from the axis of rotation of the fan than the outer edge 56 of the main inlet. The combined area of the second inlets 54 is substantially equal to that of the main inlet 50.

Suitable control means is provided for opening the outlets 51 while the second inlets 54 are being closed, and vice versa. This may be done by means of a control plate 60 rotatably mounted on the inner housing wall 44 by means of a stud 61. The centre of rotation of this plate coincides with the longitudinal axis of the fan 33. This plate has an outer opening 64 for each outlet 51 of the housing. Each outer opening is the same size and shape as its outlet opening, and when the control plate is rotated, the former is moved into and out of registry with the latter. The control plate is also formed with an inner opening 66 for each of the second inlets 54 of the housing. The inner openings are the same size and shape as these housing inlets, and when the control plate is rotated, the inner openings thereof are moved into and out of registry with the inlets. By referring to Figure 5,

it will be noted that the plate openings 64 are staggered in relation to the openings 66. With this arrangement, the outer openings move into registry with the housing outlets while the inner plate openings move out of registry with the housing second inlets, and vice versa.

The control plate 60 is rotated in any convenient manner. This may be done by means of a pin 70 which is connected to the plate adjacent its periphery and extends outwardly through an arcuate slot 71 formed in a part of the inner wall 44 which projects beyond the peripheral wall of the housing 32. A link 72 connects this pin to the upper end of the lever 73 which is pivotally mounted at its lower end at 74. This lever may be pivoted back and forth in any desired manner. For example, a link 76 may extend from the lever into a carburetor 77 for the pot burner 20. This carburetor has the usual oil control knob 78, and suitable means not shown, is provided within the carburetor for connecting the link 76 to this knob so that when the latter is turned to increase the flow of oil to the pot burner, lever 73 is moved in one direction, and when the knob is turned to reduce the flow of oil, the lever is moved in the opposite direction. This movement of the lever rotates the control plate.

Assuming that the burner unit is operating with a medium flame, the control plate 60 is set so that both the air outlets 51 and second air inlets 54 of the housing 32 are approximately half open. The fan 33 blows air through the openings 51 and 64 into the casing 15 of the oil burner unit. The fan always turns at the same speed. The amount of air blown into the burner unit casing is reduced owing to the fact that the outlets 51 are only half open. At the same time, the fan draws air through the main inlet 50 and through the second inlets 54. This keeps the pressure of the air in the casing 15 down so that the pot 20 receives only sufficient air for proper combustion. As the inlets 54 are only half open at this time, the fan will draw more air through the fully open main inlet so that there is no danger of combustion gases or oil fumes being discharged into the atmosphere outside the heating device through the blower unit.

When the control plate is moved fully to open the outlets 51, the inlets 54 are closed. This results in the full output of the fan being directed into the casing 15. This action takes place when the oil is fully turned on.

When the oil is turned almost to its lowest point, the control plate is rotated to close the outlets 51 and fully open the inlets 54. At this time, most of the draft for the pot is natural since the suction of the flue 12 creates an area of low pressure in the casing 13. However, the outer ends 55 of the inlets 54 are positioned farther from the axis of rotation of the fan than the outer edge 56 of the main inlet. As a result of this, the centrifugal action of the fan will direct a small amount of air into the casing through the second inlet openings.

When only sufficient oil is supplied to the burner to maintain a pilot light, the fan may be turned off, at which time air is free to move through the main inlet, the fan, and the second inlets into the casing. This takes place when the motor 37 or the electrical current fails. This latter feature is very important since the failure may take place when considerable oil is being directed to the pot. If no draft was available, the pot would soon carbon up, and the interior walls of the combustion chamber 11 of the heating device and of the flue 12 would soon be covered with soot.

Figures 8 to 10 illustrate an alternative form of the invention, in which the housing 32 is provided with an inner wall 84. This inner wall has spaced inner and outer annular flanges 85 and 86 projecting inwardly therefrom into the housing, the inner edges of said flanges being connected by a wall 87. Thus, wall 84, flanges 85 and 86, and wall 87 actually form the inner wall of the housing, flange 85 defining an opening in this wall communicating with the fan centre. A control plate 90 is rotatably supported by the inner wall of the housing, and has

spaced inner and outer annular sleeves 91 and 92 slidably fitting within the inner and outer flanges, respectively. A plurality of openings are formed in both flanges and both sleeves. The flanges 85 and 86 are formed with second inlet openings 94 and outlet openings 95, and the sleeves 91 and 92 are formed with second inlet openings 96 and outlet openings 97. These are arranged so that the sleeve openings 97 register with the flange openings 95 when the sleeve openings 96 are completely out of registry with the flange openings 94, and vice versa. The second inlet openings communicate with the centre of the fan through sleeve 91 fitting within flange 85. The control plate is formed with a plurality of holes 100 between the sleeves thereof.

A sealing ring 104 extends inwardly from the wall 87 to the blades of the fan 33 adjacent the outer end thereof to prevent air from moving from the pressure chamber 47 towards the inner sleeve 91. Suitable means is provided for rotating the control plate 90. This may be done by a rod 106 which is pivotally connected at one end to the plate and extends outwardly from the unit.

The blower unit of Figures 8 to 10 functions in the same manner as the one shown in Figures 1 to 7. The control plate 90 may be rotated to bring the openings 97 into complete registry with the openings 95, at which time the openings 94 are completely out of registry with openings 96. This setting is shown in Figures 8 and 10. The full force of air from the fan is directed through the outlet openings 95 and plate openings 100 into the burner unit casing 15. The control plate may be rotated gradually to close the outlet openings and to open the inlet openings. As the latter openings are uncovered, some of the air from the casing 15 is drawn into the housing 32 by the fan for recirculation. When the outlet openings are completely closed, the second inlet openings are full open, at which time air may be drawn into the casing 15 through said second inlets.

Figures 11 and 12 show another alternative form of the invention. The blower unit housing 32 is provided with an inner wall 110 having a plurality of outlet openings 111 spaced beyond the ends of the blades of the centrifugal fan 33 and in line with the pressure chamber 47, and a centrally located second inlet opening 112. A sleeve 115 surrounds the opening 112 and projects outwardly from the wall 110. A control plate 118 having a central hub 119 projecting outwardly therefrom is rotatably mounted on the sleeve. The control plate and its hub are movable back and forth on the sleeve, and this can be accomplished in any convenient manner. For example, a pin 122 may project inwardly from the hub through an angularly-arranged slot 123 in the sleeve 112. When the plate is rotated on the sleeve, the pin 122 forces it to move back and forth on said sleeve. A rod 125 may be connected to the plate adjacent the periphery thereof for rotating said plate.

A cover 127 is supported in line with the outer end of the hub 119. This cover may be supported by a plurality of arms 128 extending therefrom to the inner wall 110 beyond the periphery of the control plate. The control plate 118 overlaps and closes the outlets 111 when it bears against the inner wall 110. When the control plate is moved away from said wall by the rotation thereof, the hub 119 moves into engagement with the cover 127 so that air cannot enter the blower housing 32 through said hub. When the control plate is in the latter position, the outlets 111 are full open, and the inlet opening 112 is completely closed as the hub is in engagement with the cover. When the control plate is rotated in the opposite direction, the inlet opening is uncovered and the outlet openings are covered. A sealing ring 129 extends inwardly from the wall 110 to the fan blades adjacent the outer ends thereof.

What I claim as my invention is:

1. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing, a main air inlet in the housing for directing air

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to the centre of the fan, an air outlet from the housing adjacent the outer edge of the fan, a second air inlet in the housing on the side of the fan remote from the main inlet and communicating with the fan centre and through which air from the outlet may return to the housing, said fan being capable of drawing air through both inlets and discharging it near the outlet, and control means at the outlet and the second inlet for opening and closing same, said control means opening the outlet when closing the inlet and opening the latter when closing the former.

2. A blower unit as claimed in claim 1 in which the area of the second inlet when it is completely open is no greater than that of the main inlet.

3. A blower unit for oil burners and the like comprising a housing, a fan rotatably mounted in the housing and having an air inlet and outlet, a main air inlet in the housing, an air outlet from the housing communicating with the fan outlet, a second air inlet in the housing through which air from the outlet may return to the housing, said main and second air inlets communicating with the fan inlet, and a control plate at and for opening and closing the outlet and the second inlet, said plate being movable to one position opening the outlet and closing the inlet and to another position opening the latter and closing the former.

4. A blower unit for oil burners and the like comprising a housing, a fan having radiating blades rotatably mounted in the housing, a main inlet opening in a wall of the housing at the centre of rotation of the fan, a second inlet opening in a housing wall substantially in line with the main opening on the opposite side of the fan and communicating with the fan centre, an outlet opening in the same housing wall as the second inlet opening spaced outwardly from the latter in a radial direction, said fan being capable of drawing air through both inlet openings and directing it to the outlet opening, and control means for closing and opening the second inlet opening and respectively opening and closing the outlet opening at the same time.

5. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing centrally thereof, said housing having outer and inner walls on opposite sides of the fan, a main air inlet in the centre of the outer wall and communicating with the fan centre, an air outlet in the inner wall adjacent the outer edge of the fan, a second air inlet centrally of the inner wall communicating with the centre of the fan and through which air from the outlet may return to the housing, a control plate movably mounted on the inner wall, an outer opening in the plate adjacent the housing outlet, and an inner opening in the plate adjacent the second inlet, the outer plate opening being moved into registry with the outlet as the inner opening is moved out of registry with the second inlet and vice versa.

6. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing centrally thereof, said housing having outer and inner walls on opposite sides of the fan, a main air inlet in the centre of the outer wall and communicating with the fan centre, a plurality of spaced air outlets in the inner wall arranged around the outer edge of the fan, a plurality of spaced second air inlets arranged around the centre of the inner wall communicating with the centre of the fan and through which air from the outlet may return to the housing, a control plate movably mounted on the inner wall, an outer opening in the plate adjacent each housing outlet, and an inner opening in the plate adjacent each second inlet, the outer plate openings being so positioned relative to the inner plate openings that when the former are moved into registry with the outlets the inner openings are moved out of registry with the second inlets and vice versa.

7. A blower unit as claimed in claim 6 including means between the outer edge of the fan and the second inlets

for normally preventing air from the fan from passing out of the housing through the second inlets.

8. A blower unit as claimed in claim 6 in which the total area of the second inlets when uncovered is no greater than that of the main inlet.

9. A blower unit as claimed in claim 6 in which the second inlets are radially arranged with their outer ends positioned farther from the axis of rotation of the fan than the outer edge of the main inlet.

10. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing centrally thereof, said housing having outer and inner walls on opposite sides of the fan, a main air inlet in the centre of the outer wall and communicating with the fan centre, spaced inner and outer annular flanges projecting into the housing from the inner wall thereof, a control plate rotatably mounted on the inner wall centrally thereof, spaced inner and outer annular sleeves on the plate slidably fitting respectively within the inner and outer flanges, inlet and outlet openings in the inner and outer flanges, corresponding openings in both sleeves, the openings of the inner sleeve registering with the openings of the inner flange while the openings of the outer sleeve are completely out of registry with those of the outer flange and vice versa, the openings of the inner flange and sleeve communicating with the centre of the fan, a wall closing off the space between the flanges from the interior of the housing, and means for rotating the control plate to change the setting of the openings in the sleeves thereof relative to the openings of the flanges.

11. A blower unit as claimed in claim 10 in which the wall closing off the space between the flanges and the interior of the housing is connected to the inner edges of said flanges, and including a sealing ring extending inwardly from said wall to the fan adjacent the periphery thereof, and a plurality of holes in the control plate between the sleeves thereof.

12. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing centrally thereof, said housing having outer and inner walls on opposite sides of the fan, a main air inlet in the centre of the outer wall and communicating with the fan centre, an air outlet in the inner wall adjacent the outer edge of the fan, a second air inlet centrally of the inner wall communicating with the centre of the fan and through which air from the outlet may return to the housing, a sleeve around the second inlet projecting from the inner wall outwardly of the housing, a control plate having a central hub projecting outwardly therefrom rotatably mounted on the sleeve, a cover supported in line with the outer end of the hub spaced therefrom when the control plate bears against the adjacent housing wall, said plate overlapping the air outlet in the inner housing wall, and means for moving the control plate back and forth on the sleeve, the outer end of the hub being closed by the cover when the plate is moved outwardly and the air outlet being covered by the plate when the latter is moved inwardly.

13. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing centrally thereof, said housing having outer and inner walls on opposite sides of the fan, a main air inlet in the centre of the outer wall and communicating with the fan centre, a plurality of spaced air outlets in the inner wall arranged around the outer edge of the fan, a second air inlet centrally of the inner wall communicating with the centre of the fan and through which air from the outlet may return to the housing, a sleeve around the second inlet projecting from the inner wall outwardly of the housing, a control plate having a central hub projecting outwardly therefrom rotatably mounted on the sleeve, a cover supported in line with the outer end of the hub spaced therefrom when the control plate bears against the adjacent housing wall, said plate overlapping the outlets in the inner housing wall, means for rotating the con-

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trol plate on the sleeve, and means for moving the plate back and forth on the sleeve when it is rotated, the outer end of the hub being closed by the cover when the plate is moved outwardly and the air outlets being covered by the plate when the latter is moved inwardly.

14. A blower unit for oil burners and the like comprising a housing, a centrifugal fan rotatably mounted in the housing, a main air inlet in the housing for directing air to the centre of the fan, an air outlet from the housing adjacent the outer edge of the fan, a second air inlet in the housing on the side of the fan remote from the main inlet and communicating with the centre of the fan and through which air from the outlet may return to the housing, said fan being capable of drawing air through both inlets and discharging it near the outlet, control means at the outlet and the second inlet for opening and closing same, said control means opening the outlet when

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5 closing the inlet and opening the latter when closing the former, and means connected to the control means for operating the latter to set the degree of opening and closing of the outlet and second inlet relative to each other at any desired point.

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