Jan. 20, 1959 H. H. FORD 2,870,319

COMBINED HEATING AND VENTILATING UNIT

Filed Aug. 21, 1957 3 Sheets-Sheet 1

FIG. 1.

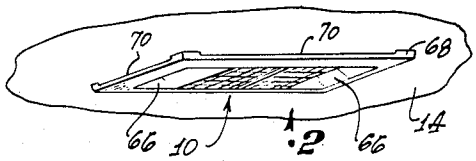


FIG. 2.

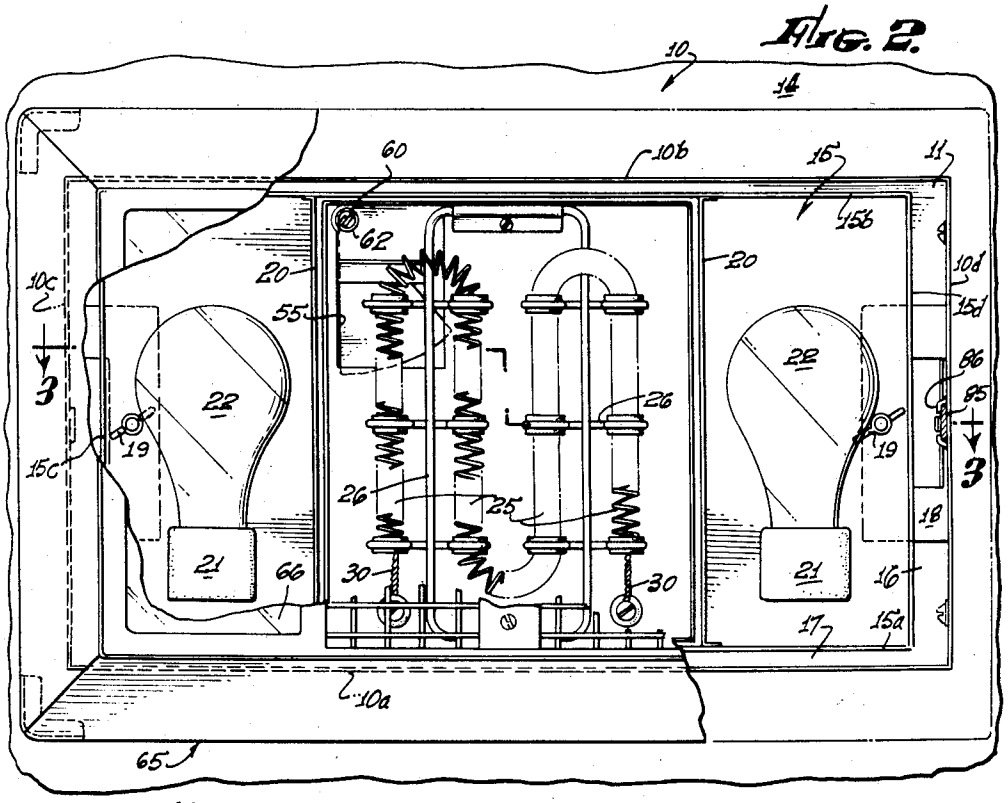


FIG. 6.

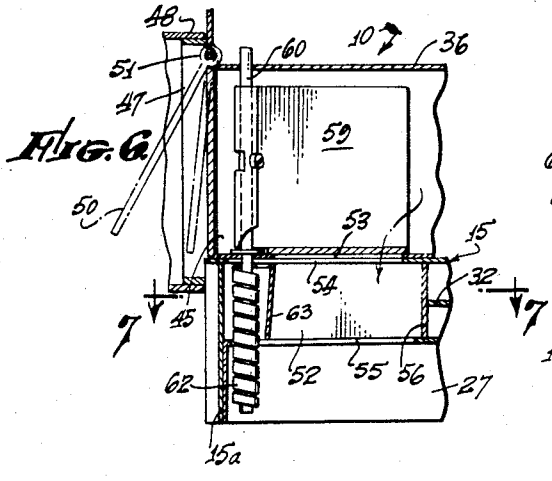
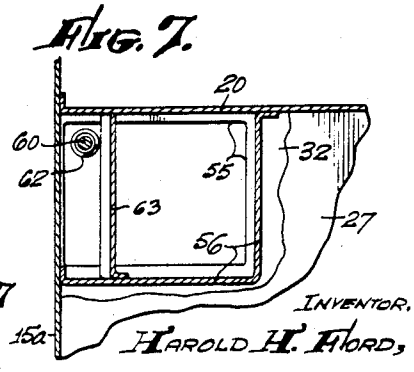


FIG. 7.



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FIG. 3.

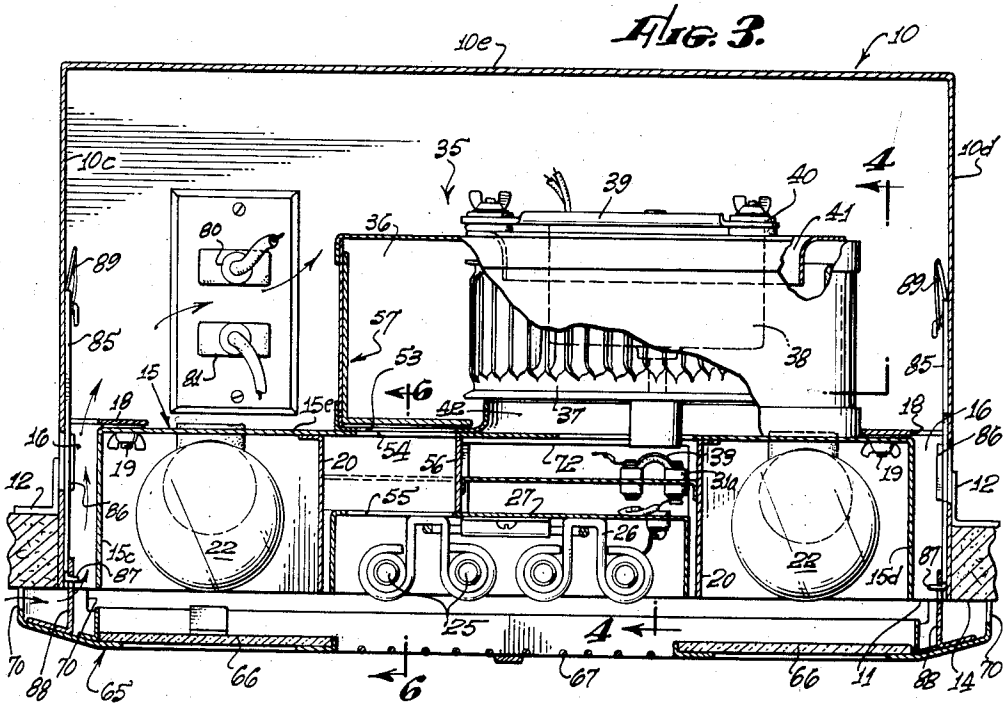


FIG. 4.

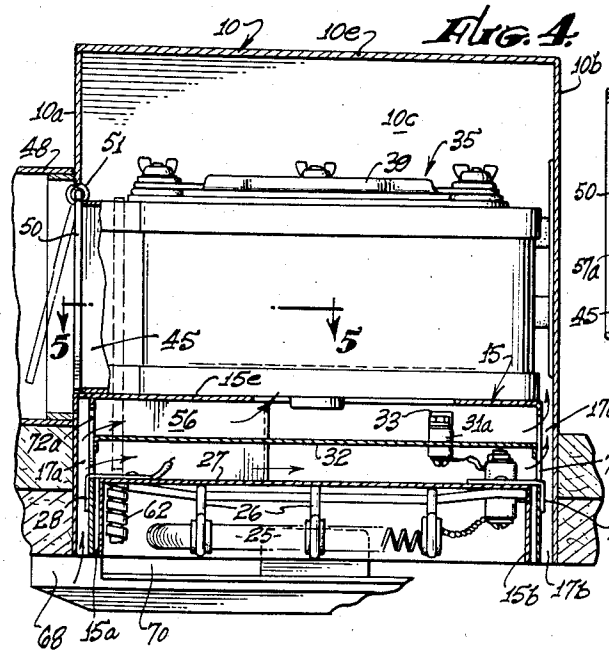
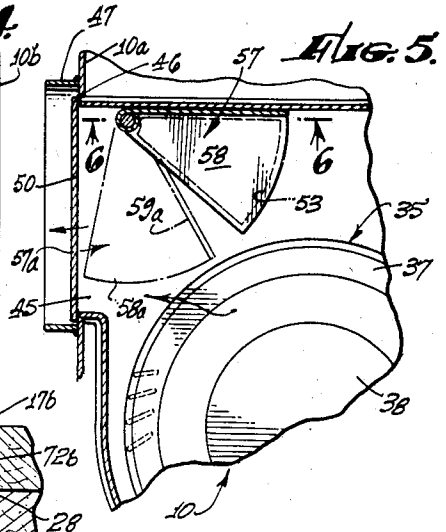


FIG. 5.



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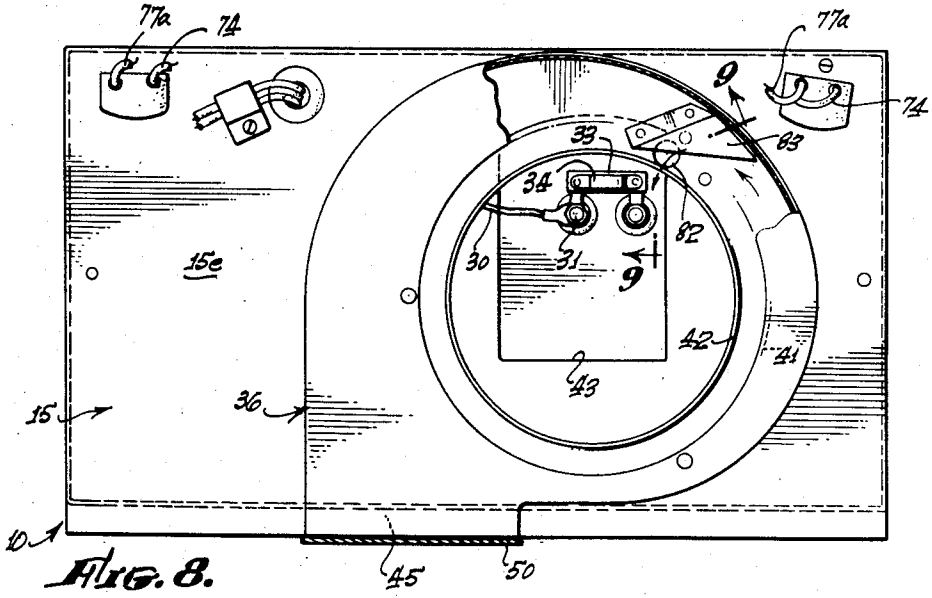


FIG. 8.

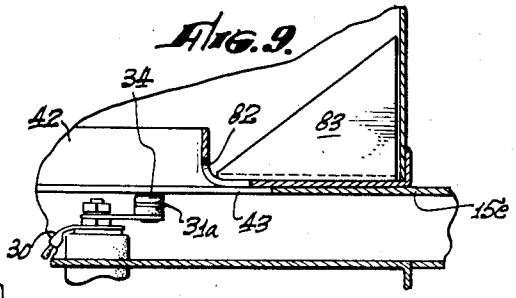


FIG. 9.

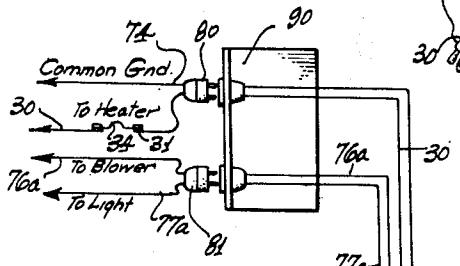
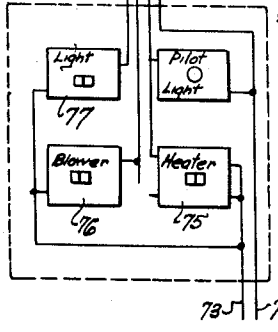


FIG. 10.



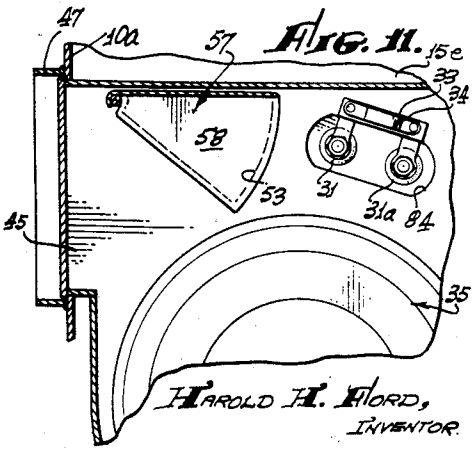


FIG. 11.

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2,870,319

COMBINED HEATING AND VENTILATING UNIT

Harold H. Ford, Claremont, Calif., assignor to Emerson-Pryne Company, a corporation of Delaware

Application August 21, 1957, Serial No. 679,410

10 Claims. (Cl. 219—39)

The present invention relates generally to combination heating and ventilating units which are adapted to be installed in the ceiling of a room in order to provide for either forced circulation of warm air into the room below the unit or ventilation by exhausting air from the room, or a combination of both. Units of this kind are frequently and preferably designed for installation in the ceiling. For this reason my invention is described in this connection; but it should be realized that in its broad aspects the invention may be embodied in units designed and adapted for installation in other walls of a room.

Heaters of this type are especially suited to bathrooms where a quick, safe heat is desired and the total volume of the space to be heated is relatively small. It has been common prior practice to use radiant heaters which are installed in the side walls of the bathroom. These are usually relatively low because most of their heat is delivered by direct radiation and they are located where a person can stand in front of them. However, this location has certain disadvantages, as for example the fact that they restrict other uses of that area of the wall and they must be kept clear of towels and the like. Since heaters of this type deliver their heat by direct radiation, they are slow to warm up the whole room; and even at best, there is a tendency for them to concentrate the major portion of their heat in a zone directly in front of the heater.

This characteristic of an electric heater can be overcome by adding a fan or blower which circulates air past a heating element and creates enough air movement within the room to bring about a high degree of equalization of temperature throughout the room space. A heater of this character employing forced circulation can be advantageously located in the ceiling of the room. When in the ceiling, the heater is free of any obstruction to radiant heat or to air movement around the heater and can thus be most effective in bringing warm air as well as radiant heat to all parts of the bathroom. When located in the ceiling the hot coils are removed from the possibility of contact with people or clothing, to obvious advantage in safety and comfort. A further, but less important advantage, is the fact that a ceiling heater does not require any space on the side walls which may be used for other purposes.

It has also been found advantageous to provide a ventilating unit in the bathroom in order to remove water vapor or odors. This is especially desired because bathrooms often are small and poorly located to have natural ventilation.

Thus it becomes a general object of my invention to provide in a single unit a forced air heater and a ventilating unit. This is practical and economical since both the heating and ventilating functions are often desired at the same time.

Another object of my invention is to provide a combined unit of the character described in which ventilation

of the room may be carried on without any heating, using the same blower for both the heating and ventilating functions.

A further object is to provide a combined heating and ventilating unit in which heating is carried out most effectively and efficiently, utilizing both radiant heat and the heated air obtained from air circulation past the heating elements to obtain the quickest and most comfortable heating of the room space.

A further object of my invention is to provide a forced air heater of this character which avoids initial circulation of cold air, before the heating elements reach operating temperature thus eliminating the discomfort occasioned by the movement of cold air in the room before the heating element is functioning fully.

A still further object of my invention is to provide a combined heating and ventilating unit of this character which is capable of discharging air from the bathroom directly to the outside atmosphere but which prevents a reverse draft of cold air into the room.

Still another object of my invention is to provide a combined heating and ventilating unit in which the incoming cool air is directed around the heating element in a manner to keep internal temperatures within the unit below allowable safe values.

These objects of my invention have been accomplished by providing a housing that is adapted for installation in the ceiling and has an opening at its lower side. An inner shell is located within the housing and is inserted through this opening in the lower side. The inner shell carries an electric heating element located adjacent the opening in the lower side of the housing in order that heat may be radiated outwardly through the opening. A blower or a fan is mounted on the shell above the heating element and in position to discharge a stream of air to be heated over the heating element. Cool air enters the housing through air passages defined by spacing the shell from the housing to provide inlet passages admitting air from the room to the blower. Cool air preferably enters these passages around the entire periphery of the shell. This air cools both the shell and the housing before reaching the blower which then discharges the air past the heater where the air becomes heated. The heated air leaves the housing through a central portion of said opening at its lower side.

The air-circulating means is preferably a blower of the squirrel-cage type having an axial inlet at one end and a radial discharge, though my invention is not necessarily limited to any particular type of fan. This blower is mounted within a scroll having a first outlet in communication with an outlet in the outer housing through which air discharged by the blower can be vented to the atmosphere. A second outlet from the scroll communicates through suitable passage means with the heating element; and air movement through the two outlets is controlled by a movable air-directing shutter which in turn is controlled by a heat-responsive member. The shutter is normally in a position closing the second outlet so that all the air discharged by the blower passes through the first outlet to the atmosphere. However, as the heat responsive shutter operating means is warmed by heat received from the heating element, the shutter is moved to a position uncovering the second outlet and at least partially covering the first outlet so that a major portion of the air stream is directed past the heating element. The other portion of the stream may still be discharged through the first outlet if desired in order to exhaust continually a small portion of air from the room as well as recirculate the heated air.

How the above objects and advantages of my invention, as well as others not specifically referred to, are attained will be better understood by reference to the

following description and to the annexed drawing, in which:

Fig. 1 is a bottom perspective view of a completed installation in the ceiling, showing only the ornamental cover over the opening at the underside of the housing;

Fig. 2 is an enlarged bottom plan view of the combined ventilating and heating unit, looking upwardly, with a portion of the cover broken away;

Fig. 3 is a vertical longitudinal section on line 3—3 of Fig. 2;

Fig. 4 is a transverse vertical section on line 4—4 of Fig. 3;

Fig. 5 is a fragmentary horizontal section and plan on line 5—5 of Fig. 4 showing alternate positions of the shutter controlling the flow of air to the heater;

Fig. 6 is a fragmentary vertical section and elevation on line 6—6 of Fig. 5;

Fig. 7 is a fragmentary horizontal section on line 7—7 of Fig. 6;

Fig. 8 is a plan view of the inner shell alone removed from the housing and with the impeller removed from the scroll;

Fig. 9 is a fragmentary vertical section on line 9—9 of Fig. 8;

Fig. 10 is a schematic layout of the electrical wiring for the unit; and

Fig. 11 is a fragmentary section similar to Fig. 5 showing a modified construction.

Referring now to the drawing, and especially to Figs. 2 and 3, the outer housing enclosing the combined heater and ventilator unit is indicated generally at **10**. This housing **10** is preferably of rectangular outline when viewed in plan, although it will be appreciated that the invention is not necessarily so limited. The housing comprises parallel side walls **10***a* and **10***b*, parallel end walls **10***c* and **10***d*, and a top wall **10***e*. The housing is open at **11** at its lower side; and it is preferable that this opening be the full size of the lower side, as shown on the drawing. However, the dimensions of the opening in the lower side may be something less than the corresponding dimensions of the sides of the housing itself, if desired.

At each end of housing **10** is an external mounting bracket **12** by means of which the housing may be attached to the joists or other elements of the building structure. Brackets **12** locate the housing with respect to the ceiling so that the open lower side **11** of the housing is flush with the finished surface of the ceiling **14**, as shown particularly in Fig. 3.

Located within housing **10** is an inner shell generally designated at **15**. Viewed in plan, shell **15** is also rectangular in outline, since it preferably conforms in general shape to housing **10**, but is smaller. Thus end walls **15***c* and **15***d* of the shell are spaced from the respective end walls **10***c* and **10***d* of the housing as seen in Fig. 3 to define between adjacent pairs of end walls an air inlet passage **16** at each end of the housing between it and the shell. Each air passage **16** opens to a marginal portion of housing opening **11** at a shorter side of the housing. Side walls **15***a* and **15***b* of the shell are likewise spaced from walls **10***a* and **10***b* respectively of the housing to provide air inlet passages **17***a* and **17***b*, one at each side of the shell between it and the housing, as shown in Fig. 4. Passages **17***a* and **17***b* open to marginal portions of housing opening **11** along each of the longer sides of the housing. The top wall **15***e* of the shell is spaced below the top wall **10***e* of the housing; and the inlet passages **16** and **17***b* open at their upper ends to this interior space within the housing and above shell **15**. Passage **17***a* is blocked off at the top by a projecting lip on wall **15***e*, causing the air to pass through opening **72***a*. The air passes through spaces in the shell and out opening **72***b* on the opposite side into passage **17***b* and then into the space above shell **15**. This prevents heat from accumulating within the shell from heating element **25**.

Inner shell **15** is shaped like an inverted pan with its open side facing downwardly. The entire underside of the inner shell is also open and is preferably located near or substantially in the plane of opening **11** of the housing.

The shell, with blower **35**, which will be described later, is inserted into the housing through the open lower side thereof and moved upwardly into the housing until the top wall of the shell engages internal brackets **18** attached to the housing walls. The shell is detachably secured to these brackets by means of bolts and wing-nuts **19**, but spring clips, screws, or any other suitable type of fastening means may be used.

Shell **15** is divided into three compartments by means of two transverse vertical partitions **20**, as shown particularly in Fig. 2. In each of the two end compartments is a socket **21** adapted to hold a light bulb **22** while the center compartment contains the electric heating element **25**. The heater consists typically of a length of resistance wire mounted upon brackets **26**, though any other suitable heating element may be used. The brackets are just below and mounted on reflector **27** which also has the shape of an inverted pan and has its side walls slightly spaced from partitions **20** to reduce the amount of heat transmitted by conduction to the light compartments and other parts of the shell.

Reflector **27** is supported on and between side walls **15***a* and **15***b* of the shell by brackets **23** (Fig. 4), the upper or top wall of the reflector being spaced from shell wall **15***e*. About midway between wall **15***e* and the reflector is heat barrier wall **32** which preferably extends the full distance between shell walls **15***a* and **15***b* (Fig. 4) and between partitions **20** except for the air passage described below. This arrangement not only has the advantage of providing a barrier to the transmission of heat upwardly to the blower, but also provides a space for bringing in the conductor **30** from the power source to heating unit **25**. This conductor **30** is connected to binding post **31** which is mounted on heat shield **32**. Also mounted close by on the heat shield is a second post **31***a*. From the lower end of post **31***a*, conductor **30** goes to a third post **31***b* mounted on the reflector and to which one end of heating element **25** is connected.

Between the two binding posts **31** and **31***a* there is mounted a thermal protector **33** of the fusible link type. This protector is connected in series with conductor **30** in the power supply circuit to heater element **25** as a safety measure to open the circuit to the heater element in the event air circulation stops and internal air temperatures become too high. This condition could occur if blower **35** were to fail. Of course any suitable type of protector or thermal fuse can be employed and the protector **33** shown here is only typical. It consists of a ceramic arch with a conductive metal strip **34** bent over the convex face of the arch and anchored at each end by solder fusing at a known suitable temperature, for example 400° F. If overheated, the solder melts releasing one end of strip **34** which straightens and breaks the electric circuit. Thermostatic switches, as the bi-metal type, can also be substituted for the protector shown.

A blower indicated generally at **35** is mounted on the top wall of shell **15**. The blower consists of a scroll or volute housing **36** containing a cage-type impeller **37**. Motor **38** driving impeller **37** is suspended from a three-armed cross-bar **39** which is supported at its ends upon mounting members **40** attached to inlet collar **41** and resting upon scroll **36**. These mounts may include anti-vibration features, such as rubber washers. Impeller **37** is attached at its lower end to a disc that is fastened to the shaft of the motor. Thus the impeller surrounds the motor. Air enters the impeller from the upper end in an axial direction through collar **41** and is discharged in a radial direction from the periphery of the impeller. The whole blower is arranged and constructed in a manner well known in the art and needs no additional description here.

The bottom wall of scroll **36** has a central opening surrounded by collar **42** projecting inwardly toward the impeller from the bottom wall to a position closely spaced from impeller **37**. This central opening within collar **42** overlies an opening **43** in shell wall **15***e*; and these two openings provide access to the thermal protector for repair or replacement when the impeller and motor are removed, as in Fig. 8. The scroll is provided with two outlets through which air discharged from the impeller leaves the scroll.

Of the two air outlets from the scroll, the first outlet **45** is the usual outlet located in the side wall of the scroll in the path of air discharged radially from the impeller to exhaust air from the blower. As shown particularly in Figs. 5 and 6, outlet **45** of the scroll is placed in registration with an opening **46** in side wall **10***a* of the housing so that air discharged here from the scroll leaves the housing through the opening **46**. Housing outlet **46** may be surrounded by collar **47** in order that a duct **48** of any suitable type may be connected to the housing to receive the air discharged from the fan. A terminal portion of duct **48** may be seen in Fig. 4.

Outlet **45** is closed by shutter **50** when air is not being discharged from the blower. Shutter **50** is hinged at its upper end to housing wall **10***a*, as indicated at **51** in Fig. 4. Shutter **50** is a thin, light-weight member which is swung outwardly (see dotted line position in Fig. 6) by the force of air discharged from the blower so that air may pass from the blower into duct **48**. When the blower is turned off, the force of gravity biases the shutter to a closed position in which the shutter hangs vertically to close outlet **45**, as in Fig. 4. When closed, reverse flow of air from duct **48** into the blower and thence into the room is prevented; and any air movement in this direction only closes the shutter more tightly.

The second outlet from the blower scroll is the opening **53** in the lower end wall of the scroll located adjacent the first outlet **45**. As may be seen in Fig. 3, outlet **53** is placed in registration with an opening **54** in top wall **15***e* of the inner shell in order that air discharged from the blower can enter the central heater compartment. Normally the adjoining walls of the scroll and the shell are in contact around openings **53** and **54** to prevent the escape of air at this point. To complete the passage means directing air to the heating element, opening **55** is located in the upper wall of reflector **27** directly below openings **53** and **54**; and the L-shaped vertically extending wall **56** (Fig. 7) that extends between reflector **27** and shell wall **15***e* defines two sides of a generally rectangular passage **52** that conducts air from opening **54** to opening **55**. The other two sides of the air passage are formed by a partition **20** and shell wall **15***a* as may be seen in Fig. 7. This arrangement provides air passage means **52** in the shell to direct air from impeller **37** to and past heating element **25**, the air being thereby heated after which the air is discharged from the housing through the open lower side **11**.

The flow of air out of the blower is controlled by a movable air directing member **57** pivotally mounted on the scroll in a position to control air flow through outlets **45** and **53**. Air directing member **57** consists of shutter **58** and deflector **59** which are respectively horizontally and vertically disposed, as may be seen in Figs. 5 and 6. Under normal or non-operating conditions shutter **58** covers discharge opening **53** and deflector **59** offers substantially no obstruction to the passage of air through outlet **45**. This is the position of the parts shown in Figs. 5 and 6 in full lines. The air deflecting member is pivotally mounted on vertical shaft **60** and is movable from the full line position to the position **57***a* shown in Fig. 5 in broken lines in which position shutter **58** substantially uncovers outlet **53**, while the air deflecting member at **59***a* is now in the path of air moving toward outlet **45** to direct that air into and through outlet **53**. It is not necessary that baffle **59** direct all of the air from the impeller into opening **53**, and for this reason it is not necessary that opening **45** be entirely closed by baffle **59**. In practice, it is preferred that some air be discharged through outlet **45** whenever the blower is operating.

The movement of shaft **60** and air directing member **57** is controlled by heat-responsive operating means which typically takes the form of spiral bi-metallic member **62** which surrounds the lower end of shaft **60**. The bi-metallic strip is anchored at its upper end to any suitable stationary member, as for example, the wall of shell **15**. The lower end of the bi-metallic member is fastened to shaft **60**. When cold, the bi-metallic strip turns the shaft and the air directing member **57** to the non-operating position shown in full lines in Figs. 5 and 6 in which outlet **53** is closed and outlet **45** is open. By extending the heat-responsive means **62** through passage **52** the lower end of the bi-metallic strip is exposed to receive heat by direct radiation from heating element **25**. As a result, when the heating element is in operation, the operating means **62** becomes heated sufficiently to rotate shaft **60** and move the air directing member **57** to the broken line position **57***a* of Fig. 5. In this latter position, the air circulated by impeller **37** is directed into outlet **53** and through passage **52**, then past heating element **25** in order to warm the air discharged into the room below.

Air in passage **52** cools the bi-metal strip and it may be advantageous to shield more or less of its length from contact with this air stream. This may be accomplished by shield **63** (Figs. 6 and 7) extending parallel to wall **15***a*. A shield of the shape shown reduces the net cross-sectional area of passage so that the shield may be considered to be one wall defining the passage.

Since it is desired to have the blower operating at all times when the heating unit is operating, motor **38** and heating element **25** are wired in parallel as shown in Fig. 10 so that they are both energized simultaneously when one switch is closed or the blower alone may be in operation. A preferred wiring diagram is shown in Fig. 10 which will accomplish this result. Power is derived from a pair of conductors **73** and **74** connected to any suitable source of electric power. The "hot" conductor **73** is connected in parallel to switches **75**, **76** and **77**. Switch **77** is connected through conductor **77***a* to both of the lamps **22**. Switch **76** is connected through conductor **76***a* to the blower motor **38**. Both of these switches are single pole switches. Switch **75** is a double pole switch having one side of both sets of contacts connected to conductor **73**. The other side of one pair of contacts is connected to conductor **76***a* while the other side of the second pair of contacts is connected by conductor **30** to heating element **25**. The lights, the blower and the heater are all connected to a common ground return line **74**. In order to permit the electrical conductors to be disconnected easily when the shell is removed from the housing, some suitable means such as plugs **80** and **81** are provided. Of course, all four conductors can be brought to a single four-prong plug, but it is easier to use two-prong plugs, two such plugs being required. These plugs are preferably polarized in any suitable way so that electrical connections can only be effected in the proper manner.

As a result of this circuit, impeller **37** starts to circulate air before the heating element is warmed. However, it will be appreciated that with the air directing member **57** in the initial or non-operating position, air is discharged through the first opening **45** from the scroll to the atmosphere through duct **48**. As the heating element reaches a normal operating temperature, it heats up the bi-metallic element **62** and this in turn causes the air directing member to move to the second position **57***a* in which air from the impeller is directed past the heating element. By this time the heating element is warm and the air discharged into the room below the unit has been warmed by the heating element. As a result, no air is

circulated through the room by the blower before the heating element has reached a normal operating temperature and the circulation of cold air from the room is avoided.

Under some circumstances, it may be desirable to take additional measures to prevent thermal protector 33 from interrupting the circuit to the heating element unnecessarily. With a high wattage heating element, sufficient heat may accumulate above reflector 27 after a long period of operation to cause the solder holding metal strip 34 at one end to melt even when the blower is operating normally. To prevent this, it may be desirable to direct a stream of cooling air over protector 33 to prevent the fusible link from opening. This may be done by providing an opening 82 in flange 42 near its base, as shown particularly in Figs. 8 and 9. A portion of the air discharged from impeller 37 can be deflected through openings 82 and 43 and over thermal protector 33 by means of deflector 83. This deflector is mounted on the inner face of the scroll and is suitably located to provide clearance at the base of impeller 37. The air thus entering above shield 32 adds to the cooling effect of the other circulation around the thermal protector and leaves the shell through a side opening 72*b*.

Fig. 11 shows a variational construction involving relocation of the thermal protector. Here the binding posts 31 and 31*a* are mounted on top wall 15*e* of the shell and project through an opening 84 in the scroll wall into the scroll. The protector is mounted on the two binding posts as before. It is located near outlets 45 and 53 where clearance between the impeller and the involute side wall of the scroll approaches the maximum and is adequate. By this construction the protector is located inside the blower scroll in the main stream of air moving to the scroll outlets from the impeller and maximum cooling of the protector is attained. Since the thermal protector is accessible from inside the scroll, opening 43 and that within collar 42 may be omitted.

For reasons of safety and appearance, it is desirable to cover the open underside of housing 10; and for this purpose there is provided a removable cover 65. Cover 65 comprises a rectangular frame of the same general configuration but slightly larger than the open side of housing 10 in order that the frame may extend beyond the housing at all sides, as may be seen from Figs. 3 and 4. The frame has at each end an opening which is filled by a pane of glass 66 while the central open portion has a grille 67 which is typically formed by a series of louvers or an open mesh wire screen. The central opening containing grille 67 is directly beneath and substantially coextensive with the central compartment of the shell occupied by heating element 25 in order that the circulated air after passing over the heating element and leaving the housing through the lower open side may be discharged through grille 67 into the room space below. A pane of glass 66 is disposed immediately below each of the lights 22 to transmit light from them to the room beneath.

As shown particularly well in Figs. 3 and 4, cover 65 has an upturned marginal flange 68 which at the four corners of the cover rests against the surface 14 of the ceiling. Edges of this upstanding flange are recessed at all four sides to provide a plurality of air inlet openings 70 that allow air to enter housing 10 around the margins of cover 65. The corner portions of the flange also space the cover from the lower edges of the housing walls. Thus air from the room can enter the two end openings 70 and pass upwardly through end passages 16 between the housing and shell into the interior of the housing above the shell. Axial inlet 41 of the blower communicates with this interior space of the housing, and air inside the housing can be drawn into the blower through opening 41.

Air entering through the openings 70 at the longer sides of the grille can flow upwardly through the air inlet passages 17*a* and 17*b* between the side walls of the shell and housing, as shown in Fig. 4. Since passage 17*a* is blocked off at the top of the shell, all air rising through this space must flow through openings 72*a* in the side of the shell into the space between heater reflector 27 and shell top wall 15*e*. This air then passes out through openings 72*b* at the opposite side into space 17*b* and then into the space above shell 15 from which it enters the blower.

Air following this latter path removes heat transmitted through reflector 27 into the space immediately above it and keeps cool the portions of the shell immediately above the heating element as well as the thermal protector. Shield 32 acts to reduce the heat transmitted to the blower, and cooling air flows across it both above and below. Air flowing downwardly through blower inlet 41 removes heat developed within motor 38 and acts as a cooling medium for the blower motor. This air flows over and around shell 15 as well as through it to remove heat from element 25 and lamps 22 and prevent any undesired accumulation of heat.

Cover 65 may be held in place by any suitable means for mounting it upon the walls of housing 10. Such means include screws, spring clips, or other elements that are well known in the art. However I prefer to use as mounting means the arrangement disclosed in my co-pending application Serial Number 606,363, filed on August 27, 1956, entitled "Cover Attaching Assembly" since this attaching means allows cover 65 to be easily removed for access to the housing for replacement of lights 22 or other service needs. Reference may be had to said co-pending application for other details of the structure of the attaching means, which includes briefly a slide 85 at each end of the housing which is free to move longitudinally along a vertical path to which the slide is confined by a guide 86. The lower end of each slide 85 is provided with a hook 87 which is engaged in a hole in bracket 88 attached to the inner face of frame 65. To the upper end of slide 85 is attached spring 89 which is also anchored to an end wall of housing 10, the spring being so arranged as to hold the slide in the raised position shown in Fig. 3 in which cover 65 is in engagement with the surface 14 of the ceiling. The spring permits the cover and the two attaching slides to be lowered to a position in which the cover may be disengaged from the slides by springing the slides sufficiently to disengage hooks 87 from brackets 88.

Housing 10 may be provided with an externally mounted splice box, indicated diagrammatically at 90, of any suitable design into which the electrical conductors 30, 74, 76*a* and 77*a* pass and which may be provided with one or more electrical outlets opening into the upper portion of housing 10. Into these outlets, there may be connected the electrical plugs 80 and 81. The unit is so wired that the following combinations of operating conditions may be achieved: (1) light only; (2) blower only; (3) light and blower; (4) blower and heater; or (5) blower, light and heater. Of course, other wiring arrangements than shown in Fig. 10 may be used. It is so wired that the blower will always turn on when the heater is turned on. All other functions may be performed separately.

From the above, it will be realized that various changes may be made in the relative shape and arrangement of the parts comprising my invention; and accordingly it is to be understood that the foregoing description is considered to be illustrative of rather than limitative upon the appended claims.

I claim:

1. A ceiling heater unit comprising: a housing of rectangular outline having side and end walls, a top wall, and an opening in its lower side; an inner shell of rectangular outline insertable through said opening and located inside the housing, said shell having top, side and end walls spaced respectively from the top, side and end walls of the housing; an electrical heating element mounted within the inner shell adjacent said opening in the housing; and a cover over the opening in the housing having a centrally located grille under the heating element to permit air to

pass through the cover at said central portion of the opening, said cover being spaced from the housing walls to admit air into the housing around the edges of the cover; and a blower mounted on the top wall of the shell above the heating element with its intake in communication with the interior space between top walls of the housing and the shell; said shell defining passage means wholly within the shell for receiving air from said blower and directing said air downwardly over the heating element and out of the central portion of said opening in the housing; and end walls of the shell and housing defining between them air inlet passages receiving air from end marginal portions of said opening in the housing and directing the air into said interior space.

2. A ceiling heater unit comprising; a housing having a first opening in its lower side and a second opening in another side; a unitary blower and heater assembly disposed inside the housing, said assembly including a blower inside a scroll having an air inlet communicating with the space inside the housing and a first and second air outlet, and a heating unit located adjacent the first opening in the housing; said first air outlet being in communication with the second opening in the housing, and said second air outlet being located to direct air from the blower past the heating unit; a shutter member normally closing said second air outlet; and heat-responsive shutter operating means connected to the shutter to open the second air outlet in response to heat generated by said heating unit.

3. A ceiling heater unit as in claim 2 in which the shutter carries a baffle member movable to a position at least partly closing the first air outlet when the second outlet is open.

4. A ceiling heater unit comprising: a housing of rectangular outline having side and end walls, a top wall, and air opening in its lower side; an inner shell of rectangular outline insertable through said opening and located inside the housing, said shell having top and end walls spaced respectively from the top and end walls of the housing; an electrical heating element mounted within the inner shell adjacent said opening in the housing; wall means including an end wall of the shell defining a light compartment in the inner shell that is separated by a wall from the heating element and is open to the opening in the housing; and a blower mounted on the top wall of the shell above the heating element with its intake in communication with the top space between the shell and the top wall of the housing; said shell defining passage means wholly within the shell for receiving air from said blower and directing said air downwardly past the heating element and out of a central portion of said opening in the housing; and the end walls of the shell and housing providing between them air inlet passages receiving air from end marginal portions of said opening in the housing, and directing the air into said top space.

5. A blower and heater assembly for use in a ceiling heating and ventilating unit, comprising: a blower comprising an impeller, motor means driving the impeller, and a scroll surrounding the impeller and having an inlet, a first outlet, and a second outlet; an electrical heating unit adjacent the blower in position to heat air discharged from the second outlet; a shutter movably mounted to close normally the second outlet; and heat responsive shutter operating means moving the shutter to a position opening the second outlet in response to heat generated by the heating means.

6. A heater and blower assembly as in claim 5 in which a baffle is carried by the shutter and movable therewith to divert air discharged from the blower through the second outlet when the second outlet is opened.

7. A blower and heater assembly for use in a ceiling heating and ventilating unit, comprising a rotary impeller; motor means driving the impeller; a scroll surrounding the impeller and having a first air outlet in a side wall and a second air outlet and an air inlet in opposite end walls; a heating unit disposed in the path of air discharged through the second outlet; an angular air directing member mounted to move between a first position closing the second outlet and a second position directing air discharged by the impeller through the second outlet; and heat responsive operating means operable in response to heat received from the heating unit to move the air directing member from the first to the second position.

8. A blower and heater assembly for use in a ceiling heating and ventilating unit, comprising: a blower comprising an impeller, motor means driving the impeller, and a scroll surrounding the impeller and having an inlet, a first outlet, and a second outlet; an electrical heating unit adjacent the blower in position to heat air discharged from the second outlet; a thermal protector of the fusible link type in series with the electrical heating element; and means directing a stream of air from the blower over the thermal protector to cool the thermal protector while the blower is in operation.

9. A blower and heater assembly as in claim 8 in which the thermal protector is mounted above the electrical heating element and outside the scroll, and the means directing air over the thermal protector includes an opening in a wall of the scroll.

10. A blower and heater assembly for use in a ceiling heating and ventilating unit, comprising: a blower comprising an impeller, motor means driving the impeller, and a scroll surrounding the impeller and having an inlet, a first outlet, and a second outlet; an electrical heating unit adjacent the blower in position to heat air discharged from the second outlet; and a thermal protector of the fusible link type in series with the electrical heating element; said protector being located inside the scroll in the path of air being discharged through the outlet in the scroll.

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