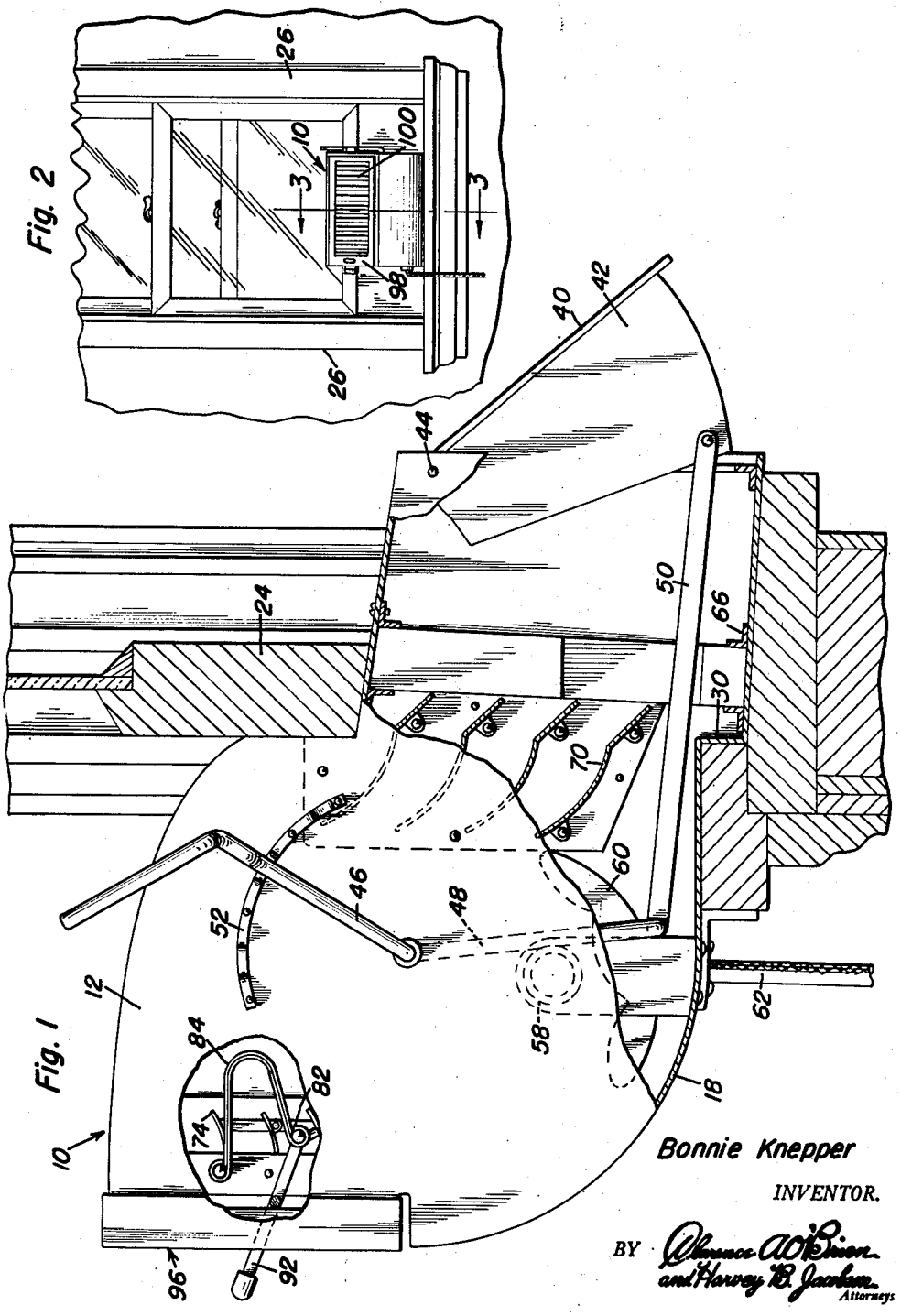
Feb. 23, 1954 B. KNEPPER 2,669,923

AIR CONDITIONING SYSTEM

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Fig. 3

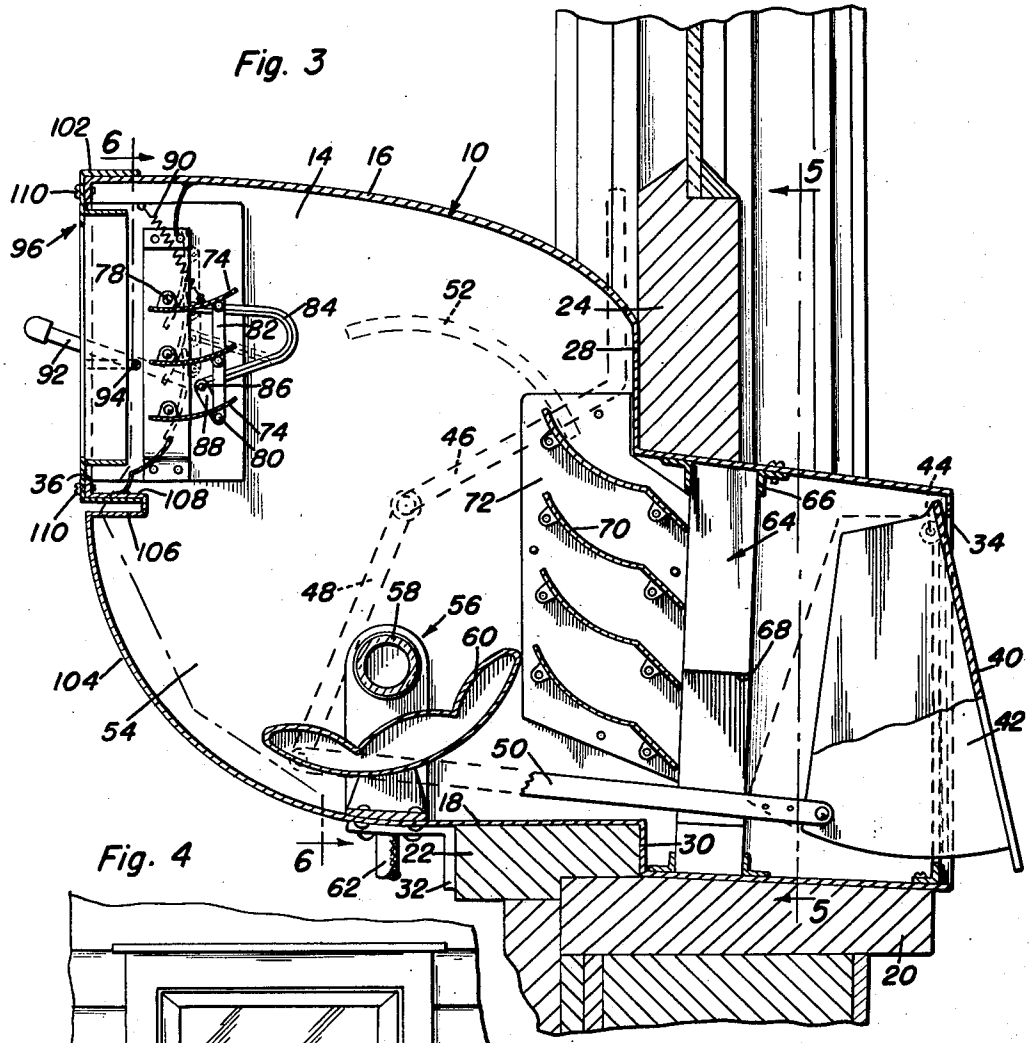
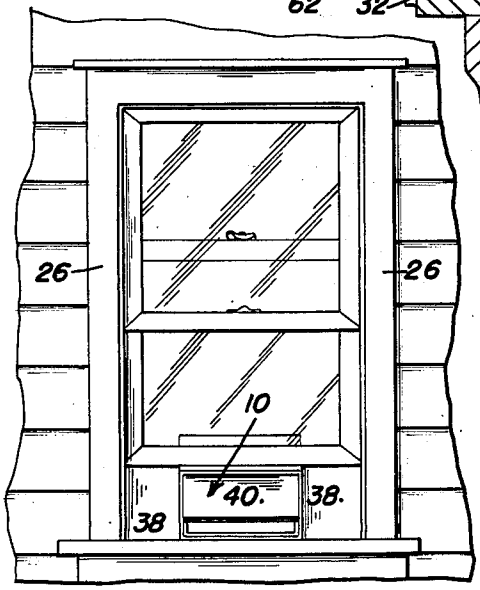


Fig. 4



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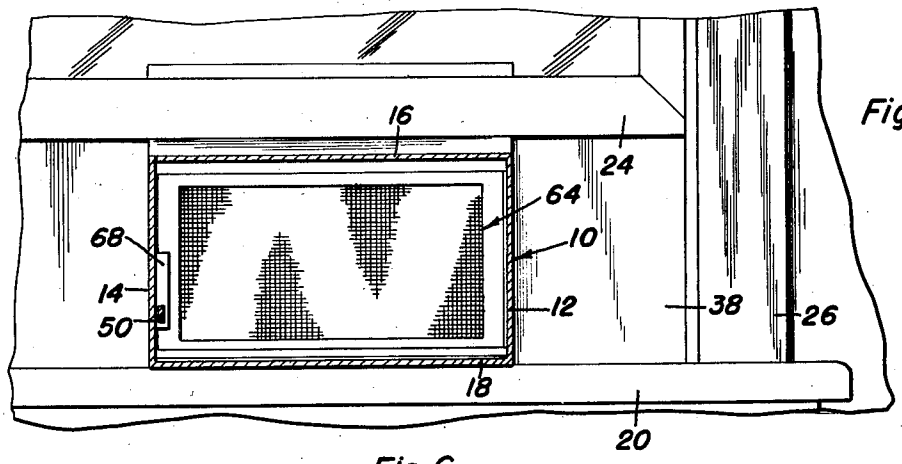
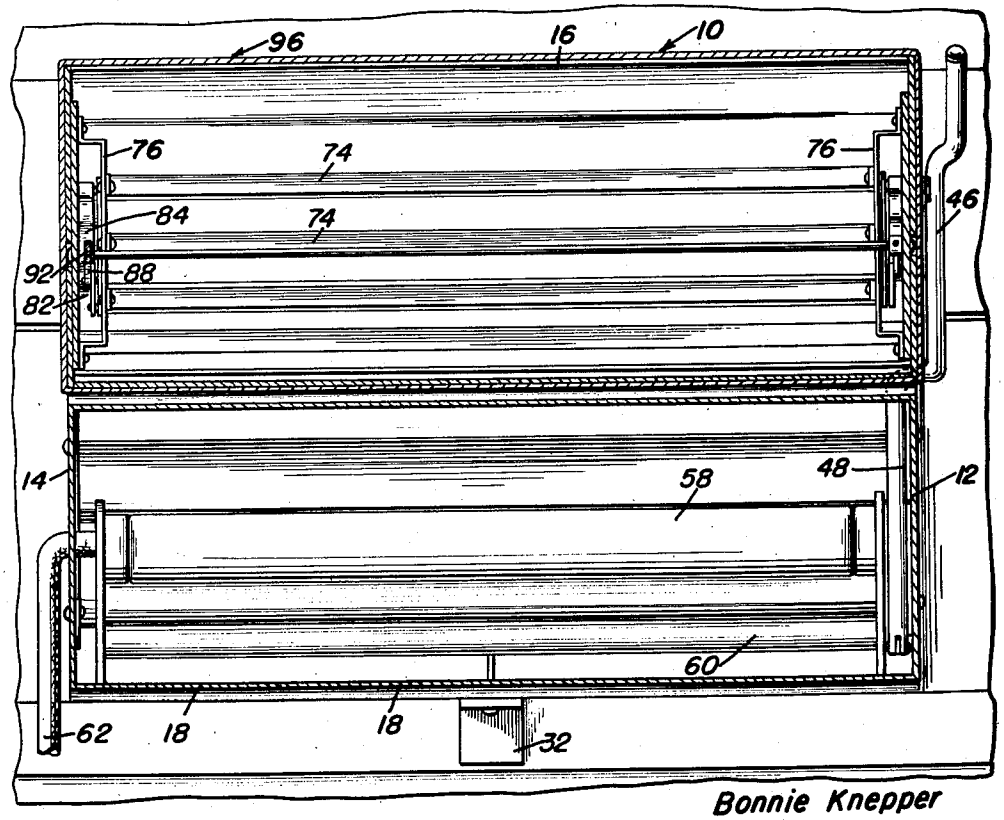


Fig. 5

Fig. 6



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AIR CONDITIONING SYSTEM

Bonnie Knepper, De Witt, Iowa

Application October 9, 1950, Serial No. 189,200

2 Claims. (Cl. 98—99.8)

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This invention relates to new and useful improvements in air conditioning systems, and more particularly pertains to air conditioning units of the portable type positionable in window openings, and is directed to subject matter similar to that disclosed in my co-pending application Serial No. 97,413, filed June 6, 1949, now Patent No. 2,619,894.

Inasmuch as it is customary during cold weather to close buildings against the entry of outside cold air as well as practicable, and to warm the interior of the building by repeatedly heating and circulating the same air, and since this practice is manifestly unhealthful inasmuch as the air in the building will tend to be progressively depleted of its oxygen content by the occupants thereof and also progressively enriched in bacteria, particularly those bacteria of respiratory ailments so prevalent during cold weather; it is the primary object of this invention to introduce fresh outside air into the building and to heat the same during its passage thereinto to a predetermined temperature so that the entry thereof will not cause objectionable cold drafts.

Another important object of this invention, in conformity with the preceding object, is to subject the fresh air to germicidal treatment during its passage into the building, so that bacteria possibly contained in the outside air that is admitted to the building will be rendered harmless.

Another important object of this invention is to prevent rain or snow from entering the building along with the air admitted thereinto.

Yet another important object of this invention is to provide a unit capable of realizing the foregoing objects, which may be efficaciously mounted in a window opening, and which will be inexpensive in manufacture and yet durable and efficient for the purposes intended.

A meritorious feature of the present invention resides in the adjustable louvers positioned at the outlet opening of the unit which is automatically controlled by a thermally responsive device positioned in the unit upstream of the louvers to retard or prevent cold air from moving through the outlet opening of the unit.

Another important feature of the present invention resides in the combined hood and adjustable closure means for the inlet opening of the unit together with the manual means for adjusting the position of the inlet closure means.

A final important feature to be specifically enumerated herein resides in the shape of the top and bottom walls of the casing that cooperates with the window sill and the window sash to retain the unit in the window opening.

These, together with various ancillary objects and features of the invention which will become

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apparent as the following description proceeds, are attained by the present invention, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is a side elevational view of the unit positioned in a window construction, the latter being shown in vertical section, with portions of the unit being broken away and shown in section to illustrate the internal construction thereof;

Figure 2 is an end elevation of the unit on a reduced scale, showing the same positioned in a window opening as seen from the interior of a room;

Figure 3 is a vertical transverse sectional view of the invention, this view being taken upon the plane of the section line 3—3 of Figure 2 on an enlarged scale, with alternative positions of the combined hood and inlet closure member, and the bi-metallic thermal element being shown in dotted outline, and with the relative position of the hood adjusting handle also being shown in dotted outline;

Figure 4 is an end elevation of the unit similar to Figure 2, however, this view being taken from the exterior of the building;

Figure 5 is a vertical longitudinal sectional view taken upon the plane of the section line 5—5 of Figure 3; and

Figure 6 is a vertical longitudinal sectional view, this view being taken upon the plane of the broken section line 6—6 of Figure 3.

Reference is now made more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, and in which the reference numeral 10 designates the air conditioning unit generally.

The air conditioning unit 10 includes a casing formed of side walls 12 and 14 connected by top and bottom walls 16 and 18, respectively. The casing is uniquely adapted to be readily and securely positioned in a window opening defined by a sill 20, a raised inner sill 22, a window sash 24, and window side members 26. As clearly shown in Figure 3, the top wall 16 of the casing is bent to form an integral vertical shoulder 28 that faces toward the inlet end of the casing, the shoulder 28 being adapted to seat against the inner face of the window sash 24 to prevent movement of the casing outwardly through the window opening. In a similar manner, the bottom wall 18 of the casing is bent to form an integral vertical shoulder 30 that faces toward the outlet end of the casing, the shoulder 30 being adapted to seat against the outer edge of the raised inner sill 22 to prevent movement of the casing inwardly through the window opening. Thus it will be seen that the casing may be positioned in a window opening with the sash 24

raised, and that upon lowering the sash 24, the casing will be securely retained within the window opening. In addition, an angle 32 is suitably secured to the underside of the bottom wall 18 in spaced relation to and facing the shoulder 30 to receive the inner sill 22 therebetween to further insure the casing against dislodgement from its position within the window opening.

Of course, the interior of the casing is hollow, the same being provided with an inlet opening 34 at one end thereof and an outlet opening 36 at the other end thereof, it being noted that the outlet opening 36 is offset upwardly with respect to the inlet opening 34, it being pointed out at this time that the formation of the shoulders 28 and 30 in the top and bottom walls of the casing respectively contributes materially to the outlet opening being offset upwardly with respect to the inlet opening, such arrangement being desirable as will presently appear. With respect to the vertical dimensions of the casing, it will be apparent that the air conditioning unit is readily adaptable to any size of window opening by virtue of the manner by which the same is positioned and secured within the window opening; however, while it is desired that the air conditioning units have a width corresponding to the spacing of the side members 26 of the window frame construction, it is clear that in many instances the air conditioning unit will be smaller in width than the window opening, and since it is undesirable to have air pass through the window opening around the casing, the latter is provided with laterally projecting panels 38 that are suitably secured to the side walls 12 and 14 to engage the side members 26 and the window sash 24 to prevent the passage of air through the window opening around the casing as will be readily understood.

An adjustable combined sheltering hood and closure member is provided for the inlet opening 34 of the casing. As clearly shown in Figures 1 and 3, such member is U-shaped in horizontal section and consists of a closure plate 40 carrying wings or flanges 42 at its opposite side edges. The member is positioned at the inlet opening 34 and the flanges 42 thereof are pivoted, as at 44 to the side walls 12 and 14 adjacent the top of the closure plate 40. It will be noted that the flanges 42 are received between the side walls of the casing so that irrespective of the angular position of the closure plate 40 and the flanges 42 rain or snow cannot enter the inlet opening 34, and that the closure plate 40 may be swung to adjustably control the size of the inlet opening 34. Means is provided for adjusting the position of the closure plate 40 from the interior of the room. Such means include a handle having upper and lower offset portions 46 and 48, respectively, the upper portion 46 being disposed on the outside of the wall 12 with the lower portion 48 being disposed on the inside of the side wall 12, the handle extending through the side wall 12 at the juncture of the portions 46 and 48 and journaled therein for oscillation about a horizontal axis. A link 50 is disposed within the casing and has its opposite ends respectively coupled to the lower end of the handle portion 48 and the lower end of one of the flanges 42, the arrangement being such that an angular adjustment of the handle is accompanied by an angular adjustment of the closure plate 40 as will be understood. The handle is frictionally retained in adjusted position by the provision of an arcuate strip 52 having a crenulated surface secured to the outer side of the side wall 12, the arrangement being such that the handle portion 46 is in frictional engagement with the crenulated surface of the strip 52 to frictionally retain the handle portion 46 in adjusted angular position.

As best shown in Figure 3, the air passage through the casing connecting the inlet opening 34 and the outlet opening 36 is enlarged adjacent the outlet opening 36 by virtue of the shoulder 28 being of greater vertical height than the shoulder 30, and for convenience such enlargement in the passage may be termed the air heating and sterilization chamber 54. Mounted in the bottom of the chamber 54 in any suitable manner is a combined air heating and sterilization means 56, such means 56 consisting of a heating element 58, preferably of the type that radiates ultra-violet energy in addition to becoming simply heated to heat air by the emission of infra-red energy and by simple convection, and a reflector assembly 60 for reflecting the ultra-violet energy as well as the infra-red energy upwardly through the chamber 54, the reflector 60 preferably having an aluminum surface for high reflectivity in the ultra-violet range and a surface highly resistant to corrosion and burning to preserve its reflective properties. Of course, the heating and sterilization element 58 will preferably be of an electrical type, and an electrical conduit 62 extends into the casing and is connected to the element 58 for energizing the latter.

It will be appreciated that heating of the air within the casing will expand the same, thereby reducing its density to induce a draft of air through the casing into the inlet opening 34 and out the outlet opening 36 by virtue of the latter opening being disposed upwardly with respect to the inlet opening 34. Accordingly, while a fan could be provided to force air through the casing, such a provision is unnecessary in view of the draft induced through the casing.

Means is provided to filter air passing through the casing, such means consisting of a filter construction 64 mounted in the passage adjacent the inlet opening 34 in the casing. As best shown in Figures 3 and 5, the filter construction 64 is retained within the casing by angle brackets 66, while the filter construction 64 is provided with a slot 68 through which the link 50 slidably extends. To further facilitate the passage of air through the casing, a plurality of vertically spaced vertically inclined baffles 70 are positioned in the casing adjacent the downstream side of the filter construction 64, such baffles 70 having their opposite ends secured to plates 72 that are, in turn, suitably secured to the side walls 12 and 14.

Means is provided to prevent the discharge of air from the casing until the same has been heated to a predetermined minimum temperature, whereby cold drafts cannot enter a room through the casing, and which will tend to control the draft through the casing so that the air emitted therefrom will be heated to a substantially constant or uniform temperature. Such means consists of a plurality of vertically spaced louvers 74 arranged in parallel that have their opposite ends pivotally secured to the web portions of U-shaped brackets 76 that are, in turn, suitably secured to the side walls 12 and 14. The louvers 74 are pivoted to the brackets 76 at 78, and are also each pivotally connected at opposite ends at 80 to a pair of links 82 so that the louvers 74 are maintained in parallel relation to each other and move in unison about the pivots 78 to adjustably control the size of the outlet opening 36. Thermally responsive means is provided

to automatically adjust the angular positions of the louvers 74. Such means comprise a pair of U-shaped bi-metallic strips 84 positioned between the web portions of the brackets 76 and the side walls 12 and 14, respectively. One end of the strips 84 is secured to the side walls of the casing, while the other end of the strips is pivotally connected at 86 to one end of a link 88, which, in turn, has its other end pivotally connected at 90 to the lower end of the links 82, the arrangement being such that upon cooling the strip 84, the latter moves from its full line position shown in Figure 3 to its dotted line position shown in the same figure, whereby through the link 88, the link 82 is elevated to cause closing movement of the louvers 74, as will be readily apparent. In order to lessen the load on the strips 84 in closing the louvers 74, a tension spring 90 is provided connecting the uppermost louver 74 to the side wall 14 to counterbalance the gravitational force on the louvers 74.

In addition, means is provided whereby the position of the louvers 74 may be manually controlled if for any reason it is deemed desirable. Such means simply includes the provision of a handle 92 pivoted to the casing at 94 intermediate its ends and having one end pivotally connected to the link 88 at the pivot 86. It will be understood that the handle 92 projects outwardly from the casing at its end remote from the pivot 86.

In order to conceal the louvers 74 and to prevent any possible damage thereto, and yet to afford means for having access thereto for adjustment, repair or replacement thereof, a removable cover construction 96 is provided for the outlet opening 36. Such cover construction 96 includes a front plate 98 having a plurality of vertical ventilating slots 100 therein, the plate 98 also being provided with a peripheral securing flange 102. As best shown in Figure 3, the bottom wall 18 of the casing is curved upwardly at 104 toward the outlet opening 36 to terminate at the lower edge of the opening 36 in an inturned flange 106 folded back upon itself at 108 to receive the bottom portion of the peripheral flange 102 on the cover plate 98, with the top portion of the peripheral flange on the plate 98 being engaged over the top wall 16. The cover construction 96 is detachably secured to the flange 106 and the top wall 16 by suitable fasteners 110 whereby the cover construction 96 may be efficaciously installed or removed.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary.

However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. An air conditioning unit comprising a casing adapted to be mounted in a window opening, said casing having an inlet opening at one end thereof and an outlet opening at the other end thereof with a passage therein communicating between said inlet and outlet openings, a combined ultra-violet and infra-red radiator in said passage, louver means in the outlet opening of the casing adjustable for limiting the size of the outlet opening, and thermal responsive means operatively connected to the louver means and disposed in the passage to vary the size of the outlet opening according to the air temperature in the passage adjacent the outlet opening, whereby the temperature of air discharged from the casing into the interior of a room may be automatically maintained substantially constant irrespective of the temperature of outside air entering the casing, said louver means comprising a plurality of pivotally mounted louvers in spaced parallel arrangement, a link pivotally connected to each of the louvers remote from the pivots thereof, whereby the louvers move in unison, said thermal responsive means comprising a bimetallic strip having one end secured to the casing and its other end operatively connected to the link to actuate the link and thereby the louvers, including a second link pivotally connected at one end to the first mentioned link, said other end of the bi-metallic strip being pivotally connected to the other end of the second link, and manual control handle for the louvers pivoted intermediate its ends to the casing and having one of its ends pivotally connected to the second link.

2. An air conditioning unit comprising a casing adapted to be mounted in a window opening, said casing having an inlet opening at one end thereof and an outlet opening at the other end thereof with a passage therein communicating between said inlet and outlet openings, said passage being enlarged adjacent the outlet opening to constitute an air heating and purifying chamber, a radiator emitting ultra-violet and infra-red rays, said radiator being disposed adjacent the bottom of said chamber, louver means in the outlet opening of the casing adjustable for limiting the size of the outlet opening, and thermal responsive means operatively connected to the louver means and disposed in the passage to vary the size of the outlet opening according to the air temperature in the passage adjacent the outlet opening, whereby the temperature of air discharged from the casing into the interior of a room may be automatically maintained substantially constant irrespective of the temperature of outside air entering the casing, wherein the upper wall of the casing is formed with an integral shoulder therein facing the inlet end of the casing for seating against a window sash to prevent the casing from falling outward through a window opening, the casing having a bottom wall having an integral shoulder formed therein facing the outlet end of the casing for seating against the outer side of a raised inner sill to prevent the casing from falling inwardly through a window opening.

BONNIE KNEPPER.

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