

Dec. 10, 1968

F. S. METCALFE

3,415,074

WINDOW MOUNT ROOM AIR CONDITIONER

Filed Feb. 27, 1967

3 Sheets-Sheet 1

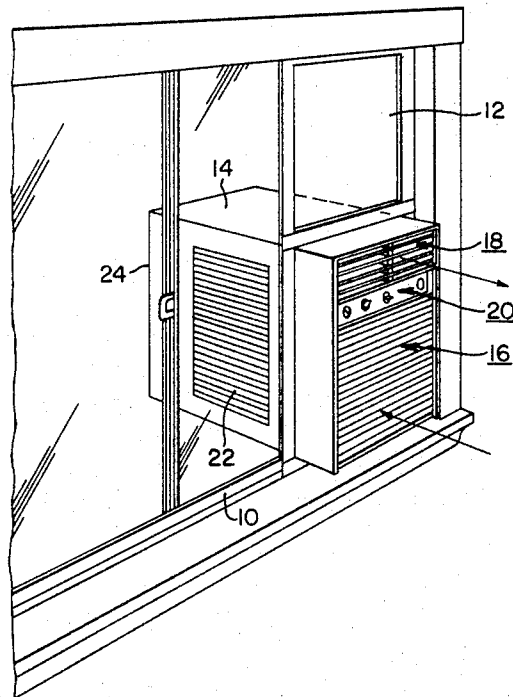


FIG. 1.

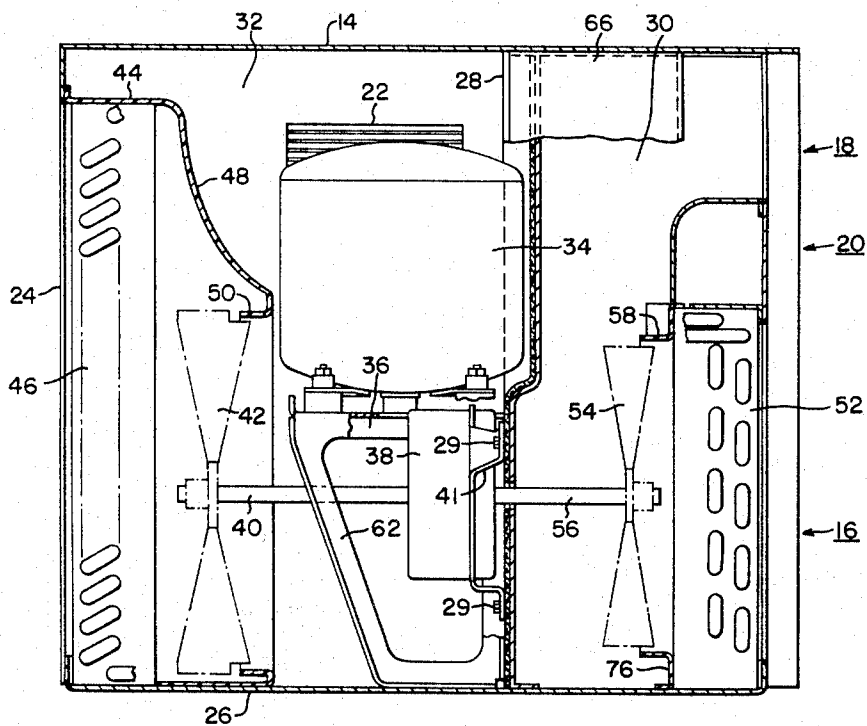


FIG. 2.

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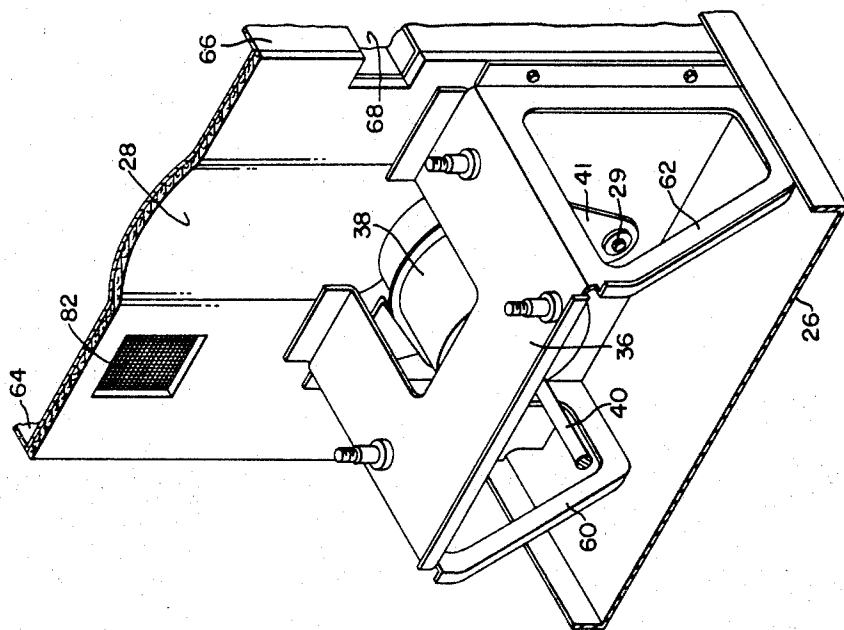


FIG. 3.

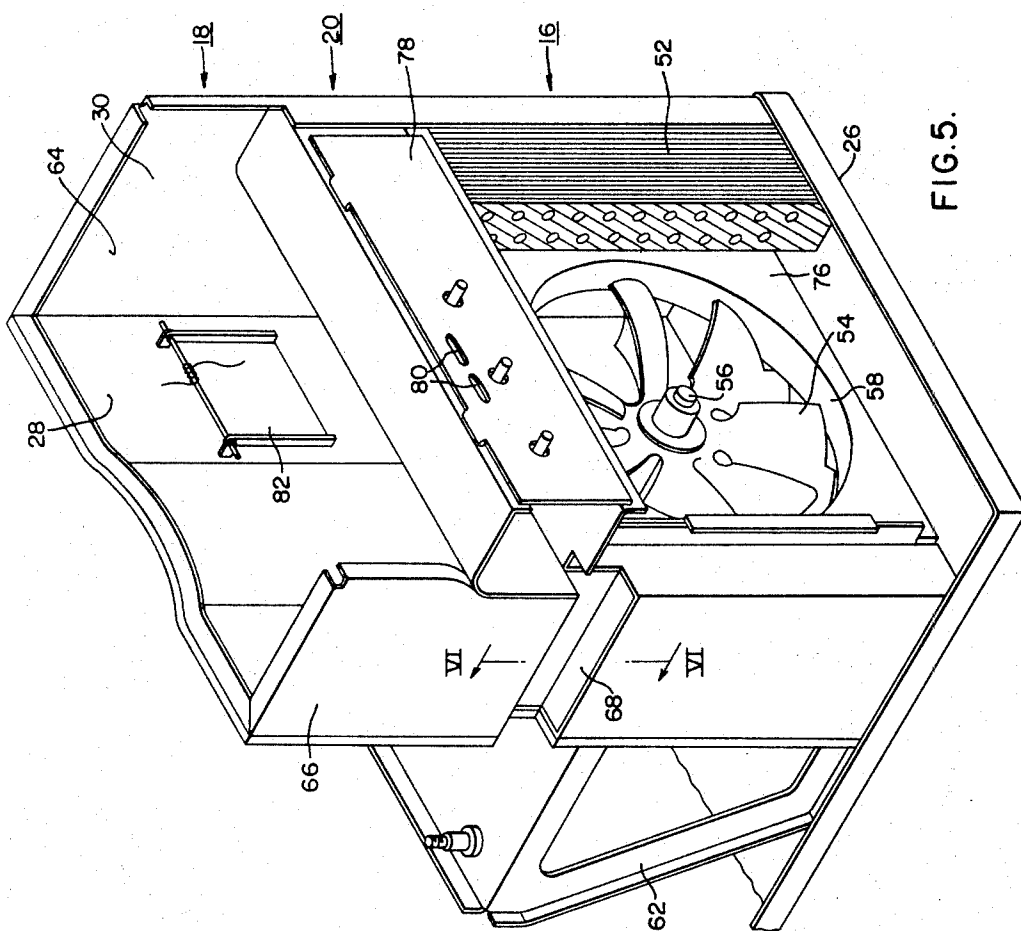


FIG. 5.

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FIG. 6.

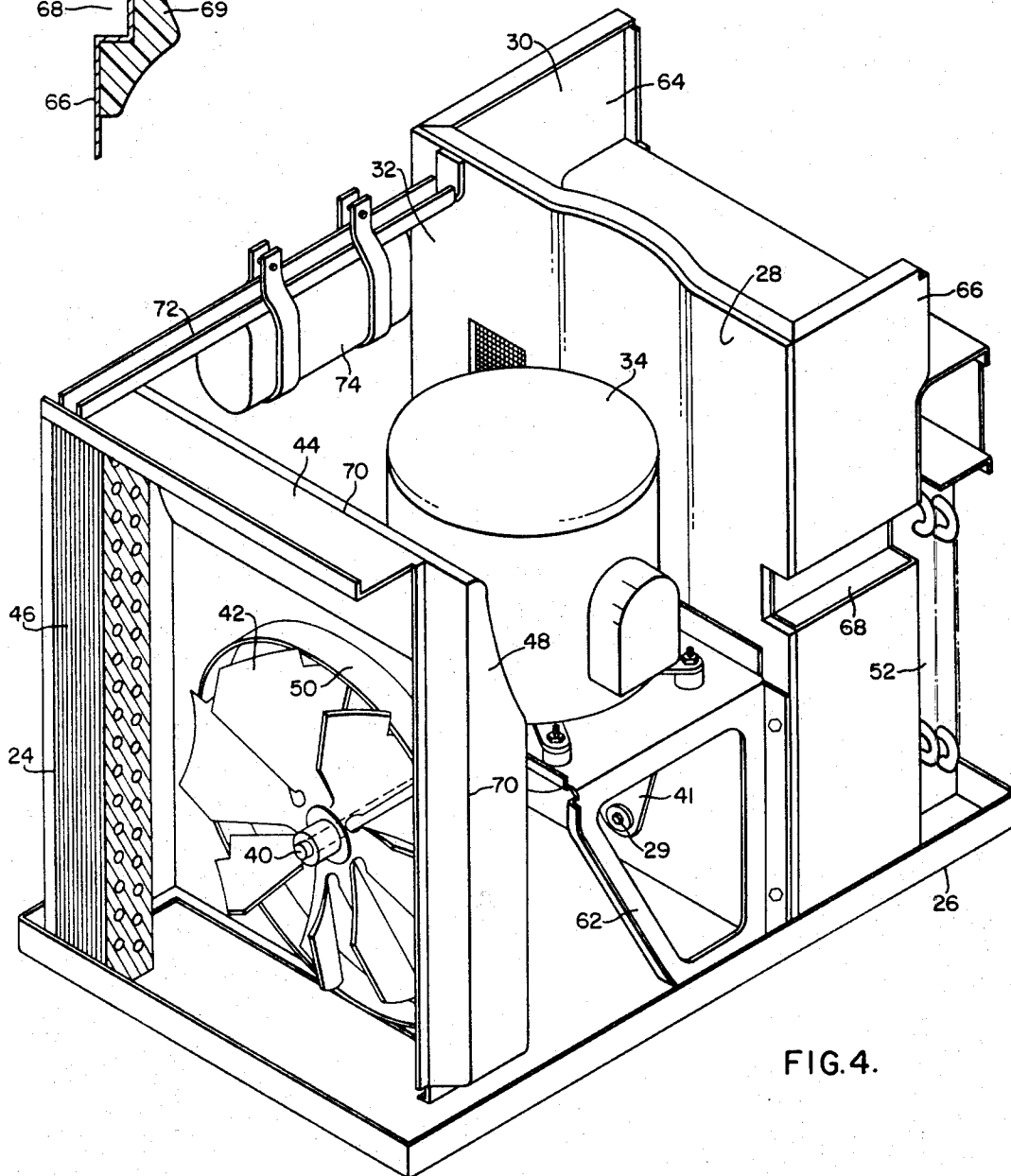
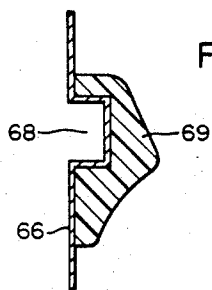


FIG. 4.

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3,415,074

WINDOW MOUNT ROOM AIR CONDITIONER
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4 Claims. (Cl. 62-262)

ABSTRACT OF THE DISCLOSURE

An air conditioner having interior parts organized for compactness in a shape lending itself to use in a relatively high, narrow, window space. The compressor is mounted on a shelf secured to the upright bulkhead separating the interior of the housing. A single motor below the shelf drives opposite end fans serving the condenser and the evaporator at opposite end faces of the housing.

Cross-reference to related application

Wegman U.S. patent application S.N. 618,639, entitled "Room Air Conditioner Control Arrangement," filed contemporaneously herewith on Feb. 27, 1967, relates to one type of control for an air conditioner of the character disclosed herein.

Background of the invention

Field of the invention.—This invention relates generally to the structural relationship of the parts of a window mount air conditioner to achieve compactness and is particularly directed to an air conditioner having an external configuration lending itself to installation in the now very common horizontal slider windows.

Description of the prior art known to applicant

Generally, window air conditioner design has trended toward compactness of the unit while maintaining or increasing the unit cooling capacity. Another influencing factor in the design has been the relative popularity of the various types of windows in which air conditioners are mounted. Recently, there has been a substantial increase in the relative use of horizontal slider windows. While the more conventionally shaped air conditioners, which are as wide or wider than they are high, may be installed in such windows, a substantial portion of the window is covered or blocked out above the conventionally shaped air conditioner. Accordingly, to reduce the obstruction afforded by the air conditioner and the space thereabove blocked out, and to accommodate the unit to slider windows of relatively narrow width, it is desirable to provide a shape which is of relatively narrow width, and which is relatively high with respect to its width. Such shapes are known, of course, by virtue of having been particularly designed for use in casement windows which also best accommodate high narrow units.

Now of course numerous factors other than the bare desire for a particular housing shape enters into the design of a room air conditioner. For example, the air conditioner must have adequate cooling capacity commensurate with its overall dimensions, and in large part the size of the interior components are directly related to the capacity. Additionally, the unit should have the normally expected features of modern units, such as provision for condensate disposal and its beneficial use to increase the cooling capacity of the unit, a location and arrangement of components to hold the noise to an acceptable level, and a structural configuration which permits the unit to be installed with its interior face flush with or only projecting slightly into the room, with a face return and discharge arrangement. Finally, to be commercially successful, the unit should utilize parts of reason-

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able cost, and permit assembly thereof without undue cost.

Summary of the invention

The apparatus according to the invention has a shape especially adapting it for use in horizontal slider windows by virtue of the housing being of greater height and depth than width. The structure generally includes a planar base extending for the width and depth of the unit with an upright bulkhead of substantially the width and height of the unit separating the interior of the housing into a room-side space and an outside-side space. A compressor mounting bracket positioned in the outside-side space is secured to the bulkhead and includes a horizontally-disposed shelf spaced sufficiently above the base to accommodate a fan motor between the shelf and the base. The shelf supports a compressor positioned closely adjacent to the bulkhead so that it occupies the upper and inner portion of the outside-side space. The condenser is sized to occupy substantially the entire area of the outer end face of the outside-side space while the evaporator is sized to occupy only the lower portion of the end face of the room-side space. The fan motor is mounted in the outside space below the shelf and is provided with opposite end drive shafts projecting into the opposite side spaces of the housing. One shaft carries a fan for creating the condenser air flow in through the sides of the housing and out through the end face condenser, and the other shaft carries a fan for drawing room air in through the evaporator and then forcing it up and out the upper part of the end face of the room-side space.

Drawing description

FIGURE 1 is an isometric view of the air conditioner according to the invention installed in a horizontal slider window;

FIG. 2 is a partly-broken side view, including selected parts in vertical section, showing the general locational relationship between the principal components of the air conditioner;

FIG. 3 is a fragmentary, isometric view illustrating the relationship of the compressor mounting bracket to the fan motor, base and upright bulkhead;

FIG. 4 is a fragmentary, partly-broken isometric view showing the relationship of the main parts located in the outside-side space;

FIG. 5 is a partly-broken isometric view illustrating the relationship of the main parts of the room-side space; and

FIG. 6 is a fragmentary vertical section corresponding to one taken along the line 6—6 of FIG. 5.

Description of the preferred embodiment

The air conditioner is shown installed in FIG. 1 in a slider window environment with one slider sash 10 abutting the side of the air conditioner housing, and the space 12 above the unit blocked by a slide-up frame and curtain to close and seal the opening above the air conditioner. As shown, the major portion of the housing 14 projects outside of the window, while a minor portion projects into the room. The inside end face of the unit receives room air through the lower portion inlet 16 and conditioned air is discharged back into the room through the upper portion outlet 18. A temperature control chamber 20 is disposed between the inlet and outlet. Condenser air is drawn into the outside portion of the housing through louvers 22 provided on the opposite sides of the housing and is discharged back to the atmosphere after passing through the condenser at the outer end face 24.

The general locational relationship of the parts of the air conditioner is best shown in FIG. 2. The base pan 26

is coextensive with the width and depth of the air conditioner and has integral upright flanges at its periphery (FIGS. 3-5). An upright bulkhead 28 separates the interior of the unit into a room-side space 30 and an outside-side space 32.

In the outside-side space 32 a refrigerant compressor 34 is mounted upon a compressor bracket 36 secured against the outer face of the upright bulkhead 28. Thus the compressor may be said to occupy the upper, inner portion of the outside-side space. The spacing between the base pan 26 and the horizontal shelf portion of the compressor bracket is adequate to accommodate the fan motor 38 therebetween, which is attached directly to the upright bulkhead 28 by bolts 29 passing through the mounting bracket feet 41. The motor is located toward the top of the space under the bracket so that there is sufficient room between the base 26 and the shaft axis to accommodate the radius of the fans. The motor end shaft 40 projecting into the outside-side space carries the condenser fan 42.

The outer end portion of the outside-side space has a unitary polypropylene shroud structure, contributed by another, provided to form an outer rim and top portion 44 which is attached to the condenser 46, an intermediate transition portion 48, and an inner fan ring portion 50 in which the condenser fan 42 is located.

The room-side space 30 as shown in FIG. 2 contains an evaporator 52 coextensive with the room air inlet 16 of the inner end face of the unit. A room air fan 54 is mounted on the fan motor end shaft 56 projecting inwardly through the upright bulkhead 28 into the room-side space so that it is disposed in a fan ring 58. The temperature control chamber 20 is located closely above the upper edge of the evaporator with its top face defining the lower boundary of the conditioned air outlet 18.

Details of the structure of the compressor mounting bracket 36 and its manner of securement to the upright bulkhead 28 are best seen in FIG. 3. The bracket 36 includes the horizontal shelf portion and the opposite, openwork, depending legs 60 and 62. The openwork structure of the legs minimizes obstruction of condenser air flow entering through the side louvers of the housing wrapper 14 and passing to the condenser fan. The forward edges of both the shelf and legs have right angle flanges which receive fasteners for securing the bracket to the bulkhead. The central portion of the shelf portion or bracket is cut out to accommodate the top face of the motor 38.

The relationship of most of the outside-side space components as installed is seen in FIG. 4. This view also shows that the upright bulkhead 28 includes opposite, forwardly-directed side wings 64 and 66 which project forwardly along the sides of the unit to partially define the room-side space therebetween forward of the transverse portion of the bulkhead. The side wings help define the passage for room air leaving the room air fan, stiffen the transverse part of the bulkhead required to support the compressor and fan motor and also provides mounting means for evaporator 52. It may also be seen that a channel 68 is provided in the forwardly-extending wing 66 at an intermediate height to serve as a raceway for refrigerant lines and electrical lines (not shown) connecting parts in the outside-side space and room-side space.

The molded polypropylene shroud structure is attached only to the condenser 46. Both the side edges and the top face 44 of the shroud are hingedly connected to the remainder of the shroud structure by hinge lines 70 of web thickness. The fan ring also has a condensate pick-up portion (not shown) molded in its lower portion. The hinged parts facilitate assembly and the use of a molded structure lowers overall cost. One upper corner of the shroud structure is secured by brace 72 to the upper part of the vertical bulkhead 28. This brace also carries the start capacitor 74 for the motors.

Details of the relationship of most of the major parts located in the room-side space 30 are shown in FIG. 5.

An upright, formed plastic wall section 76 spaced behind the evaporator 52 extends across the width of the unit and for the height of the evaporator 52 and generally forms a plenum which directs room air pulled through the evaporator to the fan ring 58 defined in the rear face of the partition. The fan forces this air up behind and over the top of the temperature control chamber 20 to the outlet 18 through the passage defined on the opposite sides by the wings 64 and 66. To smooth the air flow about the inwardly-projecting raceway 68, and to serve somewhat as a cut-off for the mixed flow room air fan, a formed plastic block 69 (FIG. 6) having a curved exposed face is secured over the raceway.

The temperature control chamber 20 comprises top, bottom and rear walls forming a forwardly-open U in cross-section, and the forward open face is in turn covered by the control panel 78. The panel has a number of openings to accommodate the forwardly-projecting shafts of the control elements and also has a pair of air inlet openings 80 located to admit a bypass stream of room air into the chamber. This bypass air influences a bimetal temperature responsive element therein and exits from the chamber through outlet openings (not shown) into the main air stream downstream of the evaporator. Thus, the control of temperature is exercised to a degree in accordance with the concept described in Kelly U.S. Patent 3,293,875.

An opening may be provided in the upright bulkhead 28 with a damper 82 serving to control the degree of interchange of air between the room-side space and the outside-side space for ventilation.

From the foregoing description it will be appreciated that the relationship of the various components as described yields an air conditioning apparatus having a form adapted to especially fit horizontal slider windows and casement windows, as well as having other desirable characteristics. With the arrangement of the room air inlet and conditioned air outlet in the plane of the end face of the room-side space of the unit, the unit may be mounted nearly flush with the windows. The design is also such that although only a single fan motor drives both the condenser and evaporator fans, satisfactory air flow patterns are obtained over the different size coils. Further, by providing a condenser fan which sweeps close to the base 26, the condensate disposal arrangement of the general character disclosed in Eberhart et al., U.S. Patent 3,159,984, may be used, it being understood that the condensate from the evaporator is conveyed from a pan underlying the evaporator through a pipe extending to the outside-side space.

The arrangement also permits the location of the compressor and fan motor in the outside-side space so that the vertical partition 28 serves to block passage of noise into the room therefrom.

The mounting of the compressor is an elevated position upon the shelf 36 with the fan motor below achieves a compactness in height particularly, and relative compactness overall, for a given cooling capacity, which quite satisfactorily meets the commercial marketing requirements.

The connected parts of the refrigerating assembly including compressor, condenser, evaporator and connecting lines may be installed as a sub-assembly in connected form after the upright partition 28, the compressor bracket 36, fan motor 38 and shroud structure have been located, with reasonable assembly procedures. The provision of the single piece, detachable housing shell 14 covering the top and opposite sides gives ready access to the interior for servicing.

I claim as my invention:

1. In a room air conditioner unit including:

- a one-piece housing of greater height and depth than width to cover the top and sides of said unit;
- a generally planar base extending for the width and depth of said unit;
- an upright bulkhead of substantially the width and

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height of said unit separating the interior of said housing into a room-side space and an outside-side space;

- a compressor mounting bracket in the outside side space secured to said bulkhead only and including a horizontally disposed partly-open, shelf portion spaced above said base a sufficient distance to accommodate a fan motor between said shelf and base; 5
- a compressor mounted on said shelf closely adjacent said bulkhead to occupy the generally upper, inner portion of said outside-side space; 10
- a condenser mounted in said outside-side space to occupy substantially the entire area of the outer end face thereof; 15
- an evaporator mounted in said room-side space to occupy substantially the width, but only the lower portion, of the end face thereof;
- a fan motor mounted in said outside-side space between said shelf and base and having opposite end drive shafts in said room-side space and said outside-side space; 20
- a condenser fan mounted on the one of said shafts in said outside-side space for creating a flow of air into said outside-side space from other than said outer end face and through said condenser; and 25
- a room air fan mounted on the other of said shafts in said room-side space for creating a flow in through said evaporator and out of said room-side space through the end face portion above said evaporator. 30

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- 2. In a unit according to claim 1: said compressor mounting bracket includes opposite, openwork, depending leg means secured to said upright bulkhead, and having their bottom ends upon said base.
- 3. In a unit according to claim 1: said upright partition includes integral, forwardly projecting, side wings on opposite sides for generally defining a flow passage for room air passing from said room air fan to the conditioned air outlet.
- 4. In a unit according to claim 1 including: means for attaching said fan motor to said upright bulkhead closely below said compressor mounting bracket.

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U.S. Cl. X.R.

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