June 12, 1956 E. F. ESSMAN ET AL 2,749,725

PORTABLE AIR CONDITIONING APPARATUS

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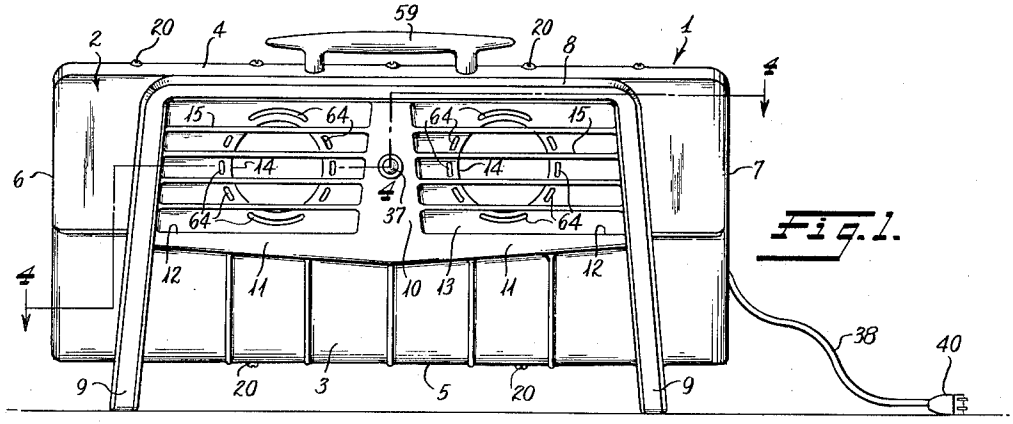

Fig. 1.

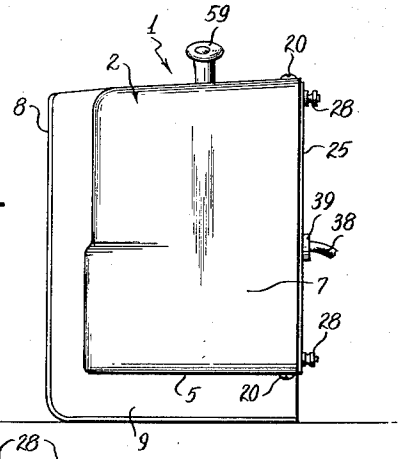

Fig. 2.

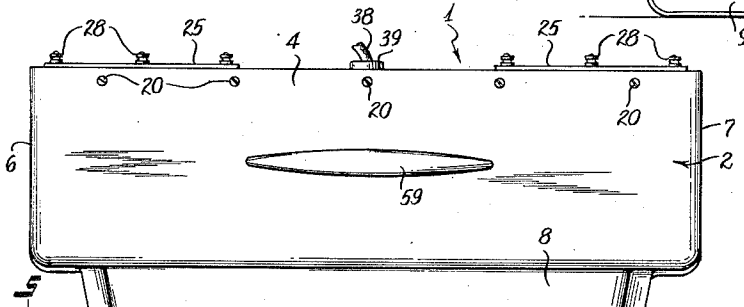

Fig. 3.

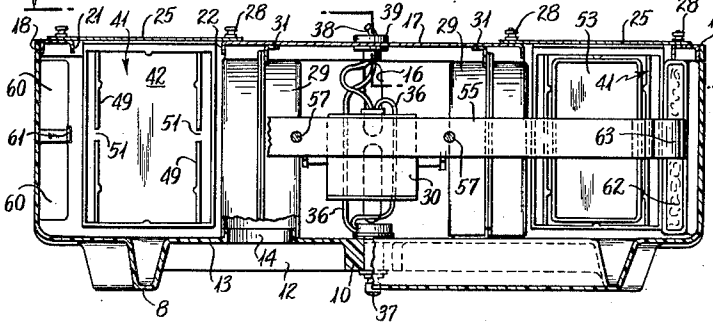

Fig. 4.

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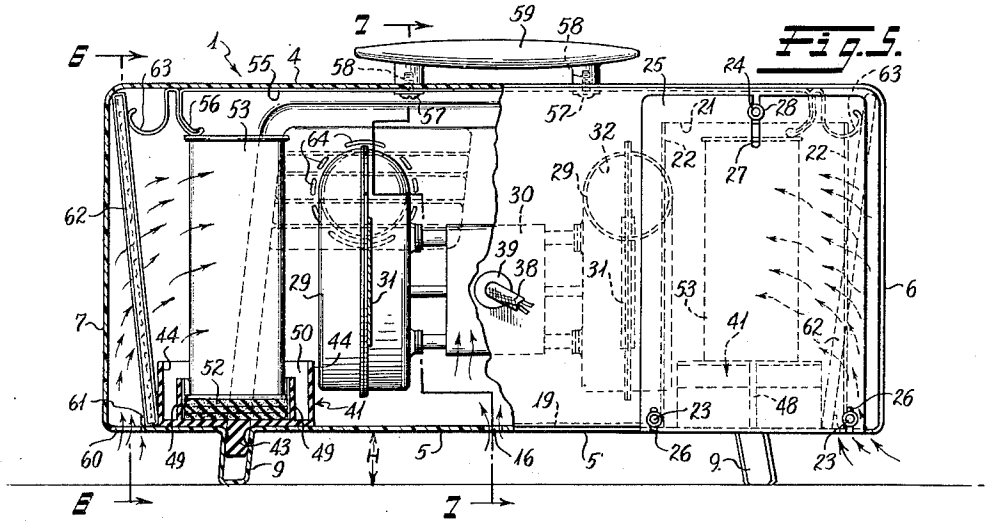
Fig. 5.



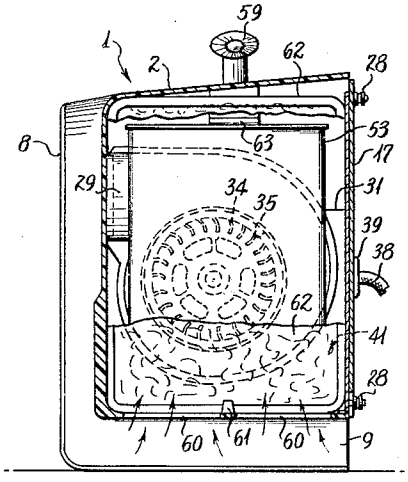


Fig. 6.

Fig. 7

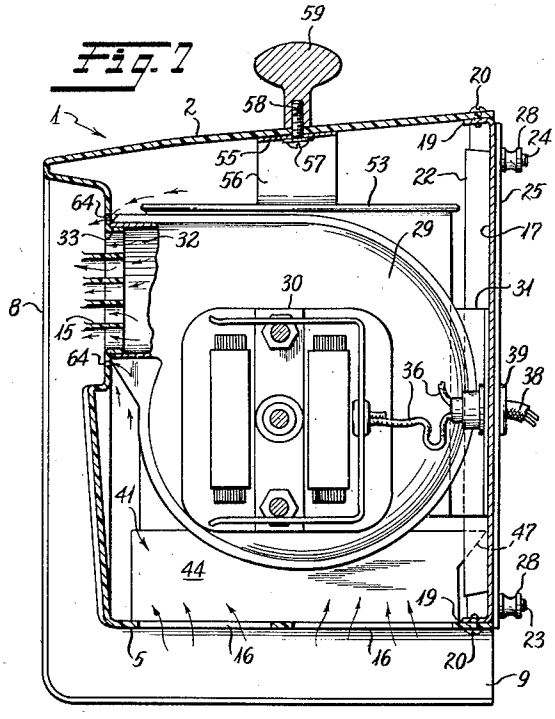


Fig. 8.

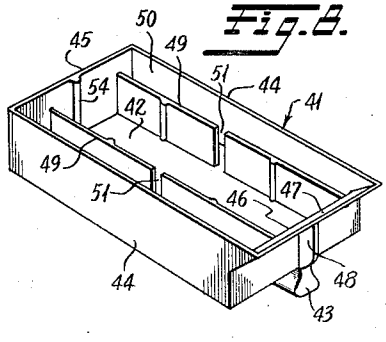


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Fig. 9.

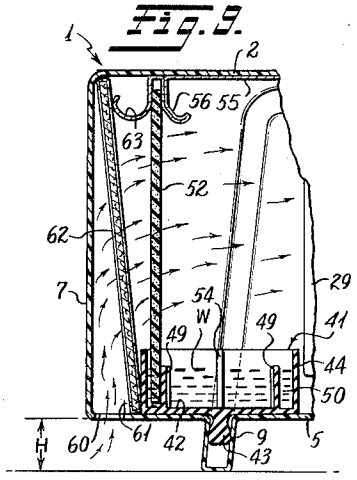


Fig. 10.

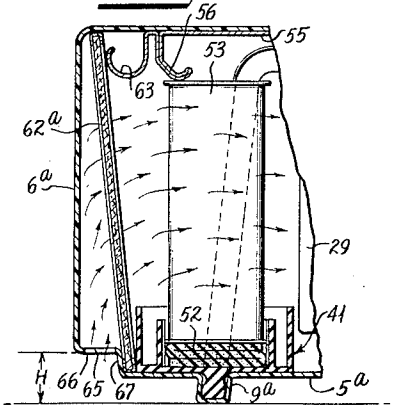


Fig. 11.

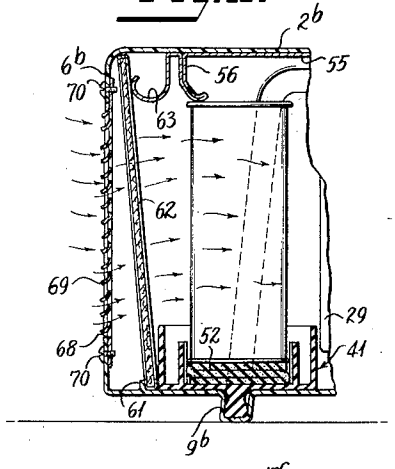
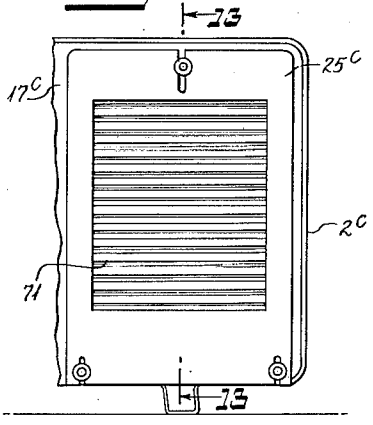


Fig. 12.



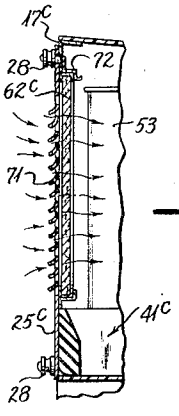


Fig. 13.

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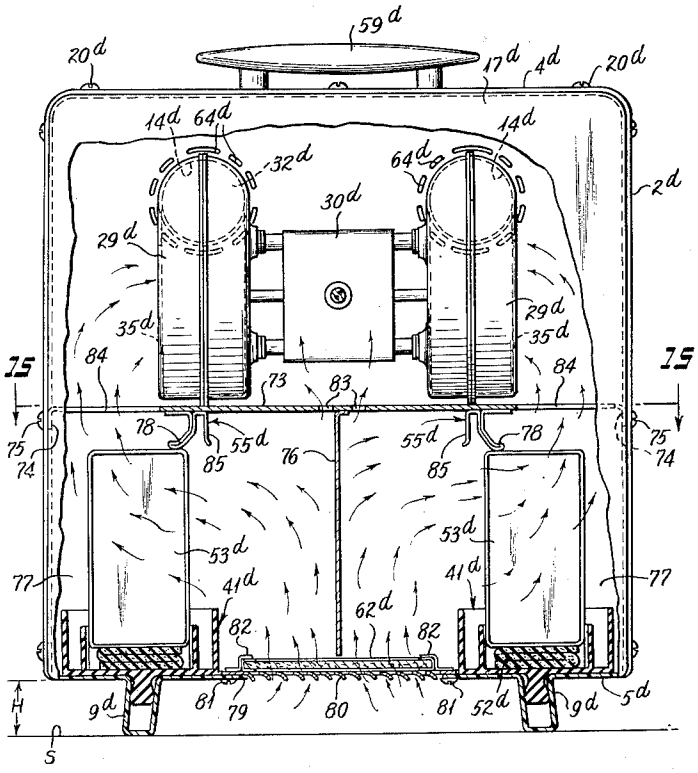

Fig. 14.

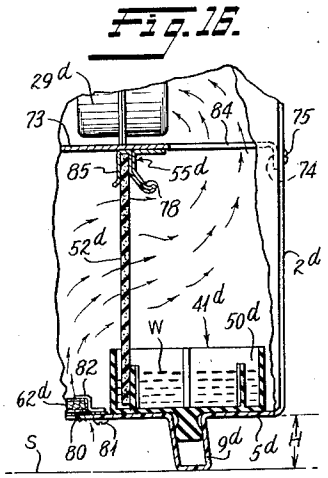

Fig. 16.

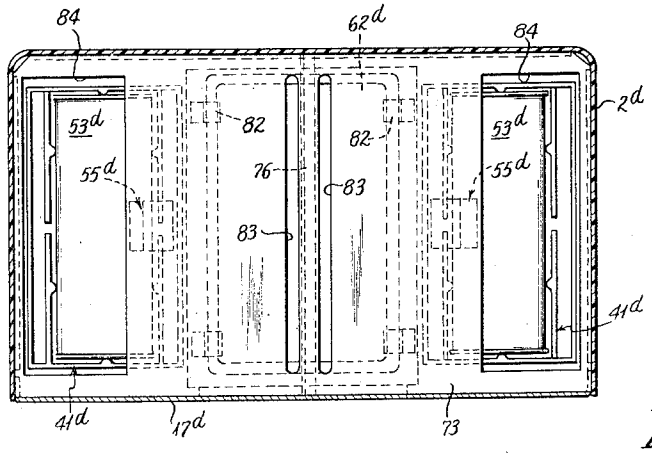

Fig. 15.

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PORTABLE AIR CONDITIONING APPARATUS

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Application December 6, 1955, Serial No. 551,439

16 Claims. (Cl. 62—131)

The present invention relates to air conditioning apparatus, and more particularly to a portable air conditioning unit adapted to be used in any environment requiring air cooling or air conditioning, such as a room, automobile, boat cabin, etc.

In general, the invention comprises an air conditioning unit which utilizes a frozen refrigerant in a sealed container as a cooling medium. Refrigerants of this character are per se conventional and are commonly used for cooling beverages and food products, but the present invention is believed to be the first to utilize the same in air conditioning apparatus. Normally, the refrigerant container is placed in a freezing compartment to freeze the contents thereof, and is then associated with the beverage or food to be cooled by placing the same in a small, closed refrigerator box or other insulated enclosure. The refrigerant gradually thaws as heat is absorbed and the cooling medium must then be refrozen to condition the same for reuse. One of the advantages of such refrigerant is that it can be reused indefinitely.

More specifically, the present air conditioning unit comprises a portable cabinet preferably containing at least two sealed refrigerant containers, and twin blowers driven by a single motor and arranged to draw air to be conditioned through suitable air inlet openings or louvers and across the refrigerant containers. The area of the intake louvers or openings is substantially greater than the area of the discharge outlet of the blowers, so that an excess of air beyond the capacity of the blowers is always available, thus preventing the blowers from being "starved" at any time and thereby contributing to the increased operating efficiency of the unit.

The present air conditioning apparatus also preferably includes trays or equivalent means for collecting moisture condensed from the air on the refrigerant containers. The trays may contain a moisture absorbent pad for absorbing such condensate. The apparatus also is designed to utilize the wet pads as an air dehumidifying means at times when air cooling is not desired. Air filter pads are also provided for filtering dust, etc. out of the air, preferably before the air contacts the refrigerant containers, whereby the containers and blowers are kept relatively dust and dirt-free.

One of the novel features of the invention is the provision of slots surrounding the air outlet openings through which additional cool air can be drawn from within the cabinet by the eductor action of the air discharged from the blowers. This function not only results in more efficient space cooling but also draws some air over the motor driving the blowers to maintain said motor cool.

Another feature resides in the design of the cabinet of the unit which is such that, even when the air inlet openings are formed in the bottom wall of the cabinet and the cabinet is placed upon a yieldable surface such as a seat cushion of an automobile, said air inlet openings will remain unobstructed.

The principal object of the invention is to provide an air conditioning unit of relatively simple construction

which is capable of cooling air, filtering the air, and dehumidifying the air, and which is also usable alternatively for dehumidifying the air.

Another object is to provide an air conditioning unit adapted to use a sealed container containing refrigerant that can be repeatedly refrozen and reused indefinitely.

Another object is to provide portable air conditioning apparatus which eliminates the usual "mess" incident to the use of water or ice as in certain prior, portable air conditioning devices.

A further object is to provide an air conditioning unit that can be readily and quickly converted from an air cooling and dehumidifying unit to an air humidifying unit.

A still further object is to provide air conditioning apparatus in which moisture condensed from the air is collected and can be used for air dehumidifying purposes, if desired.

Still another object is to provide an air conditioning unit in which provision is made for utilizing a portion of the incoming air to cool the motor driving the blowers.

Still another object is to provide an air conditioning unit in which the cooled air discharging from the blowers is utilized to withdraw additional cool air from the cabinet by eductor action and to thereby cause more effective cooling of the air in the space to be conditioned.

Other objects, features and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a front elevational view of an air conditioning unit embodying the principles of the present invention;

Fig. 2 is a right side elevational view of the air conditioning unit shown in Fig. 1;

Fig. 3 is a plan view of the air conditioning unit shown in Fig. 1;

Fig. 4 is a staggered horizontal sectional view through the air conditioning unit taken on the line 4—4 of Fig. 1;

Fig. 5 is a rear view of the air conditioning unit with portions thereof shown in elevation and other portions cross-hatched, as viewed on line 5—5 of Fig. 4;

Fig. 6 is a vertical sectional view taken on the line 6—6 of Fig. 5 and particularly illustrating the manner in which the air filter is retained in the unit;

Fig. 7 is an enlarged vertical sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a perspective view of one of the trays for the refrigerant container;

Fig. 9 is a fragmentary sectional view of one end of the cabinet illustrating the manner in which the pad, which is normally disposed below the container to collect condensate is adapted to be used to convert the apparatus to a humidifier;

Fig. 10 is a fragmentary sectional view illustrating a modified cabinet construction having short legs but wherein the air inlet openings are in a plane at a substantial height above the lowermost face of the legs;

Fig. 11 is a fragmentary sectional view illustrating a modified form of the invention in which louvers are provided in the sides of the cabinet;

Fig. 12 is a fragmentary rear elevational view of a cabinet in which air inlet louvers are associated with the rear panel of the cabinet;

Fig. 13 is a vertical sectional view taken on the line 13—13 of Fig. 12 illustrating the manner in which the air filter is mounted upon a louvered plate at the rear of the cabinet;

Fig. 14 illustrates a further modification of the invention in which the refrigerant containers are disposed below the blowers;

Fig. 15 is a horizontal sectional view taken on the line 15—15 of Fig. 14; and

Fig. 16 is a fragmentary sectional view illustrating the

manner in which the moisture absorbent pad of Fig. 14 is adapted to be utilized to serve as an air humidifying means.

Referring now in particular to Figs. 1 to 9 of the drawings, the air conditioning unit is generally identified by the numeral 1 and comprises a cabinet 2 having a front wall 3, a top wall 4, a bottom wall 5, a left end wall 6 and a right end wall 7. The front wall 3 comprises a protruding hollow riblike structure 8 having the general appearance of an inverted U, the lower ends of the legs of which respectively terminate in hollow feet 9 which extend inwardly from the front of the cabinet and project downwardly from the bottom wall 5.

A centrally raised portion 10 also projects outwardly from the front wall 2 of the cabinet, but to a lesser extent than the rib structure 8, and is connected with the legs of the U by laterally extending arms 11, thereby defining shallow symmetrical, generally rectangular recesses 12 on either side of the central portion 10. The recesses 12 each have a bottom wall 13 provided with a circular opening 14 of substantially less extent than the area of said bottom wall 13. Each recess 12 has a series of spaced, horizontal louvers 15 extending thereacross and intersecting the circular openings 14. These openings serve as outlet openings for conditioned air, as will be described in greater detail hereinafter. The bottom wall 5 has a pair of relatively small, centrally located air inlet openings 16 for admitting air to cool the blower motor 30, as will also be described more fully hereinafter.

From the standpoint of economy and production, the cabinet 2 is preferably formed of any conventional or suitable moldable plastic material, and is preferably made of a strong, tough composition, whereby the cabinet walls can be made relatively thin and still have the necessary strength for housing the essential components of the apparatus and at the same time withstanding abuse and rough handling.

The open back of the cabinet 2 is closed by a metal panel 17, which extends for the full height and width of the cabinet opening and is provided at its sides with inwardly turned flanges 18 and at its upper and lower ends with inwardly turned flanges 19. The panel 17 is retained in place by screws 20, Fig. 7 extending through the top wall 4 and the bottom wall 5 of the cabinet and into the flanges 19.

The panel 17 is provided adjacent its opposite ends with a rectangular access opening 21 defined in part by inwardly extending vertical stiffening flanges 22. Pairs of threaded studs 23 are mounted along the lower edge of the panel 17, with one stud of each pair disposed adjacent the upright edges of the opening 21. Another stud 24 is mounted on the panel 17 directly above the upper edge of each opening 21, as best shown in Fig. 5. A plate 25 closes each opening 21 and has vertical slots 26 in its lower edge to receive the studs 23 and a central vertical slot 27 in its upper edge to receive the stud 24. Knurled nuts 28 are threaded upon the studs 23 and 24 and removably retain the plates 25 in position closing the openings 21.

An assembly including two blowers 29 and an electric motor 30 for simultaneously driving said blowers is disposed centrally within the cabinet 2 and is suitably mounted upon angle irons 31 secured to the inner face of the rear panel 17. The blowers 29 have circular or tubular discharge openings 32 which telescope with an inwardly extending circular flange 33 formed at the circular discharge openings 14 of the cabinet 2. Each blower 29 contains a rotor 34 which lies adjacent the blower inlet 35, Fig. 6. The blower motor 30 is connected by electrical conductors 36 with a conventional high-low-off switch 37 mounted upon the central raised portion 10 of the cabinet. Electrical current for operating the motor 30 is supplied through a conventional 2-wire cord 38, which enters the cabinet 2 through an insulating sleeve 39 mounted upon the rear panel 17. A plug 40 is connected to the cord 38 and adapted to be received in any conventional electrical outlet of a dwelling, or to be received in a receptacle designed to fit a conventional cigarette lighting device, such as is commonly found on the dashboard of automobiles.

A rectangular tray 41, Fig. 8, which may be made of rubber or other suitable material, is removably mounted in the cabinet 2 adjacent the housing of each of the blowers 29, as best shown in Fig. 5. The tray 41 comprises a bottom wall 42, provided with a longitudinally depending rib 43 received in the hollow portion of the cabinet feet 9. The tray 41 further comprises side walls 44, a front wall 45 and a rear wall 46, including a rearwardly sloping portion 47 having a tab 48 projecting therefrom for facilitating insertion and removal of the trays 41 from the cabinet 2. While the side walls of the cabinet feet 9 slope slightly, as viewed in Fig. 5, the ribs 43 is flexible enough to accommodate itself to such slope and to fit snugly within said feet. Each of the trays 41 contains longitudinal partitions 49 spaced inwardly from the side walls 44 and of less height than the side walls 44. The partitions 49 provide narrow troughs 50 adjacent each side of the tray 41 and each partition 49 is provided with a vertical slot 51 to establish communication between the troughs 50 and the main compartment of the tray disposed between the partitions 49. A reversely folded pad 52 of felt or other liquid absorbent material is disposed on the bottom 42 of the tray between the partitions 49. The central compartment of the trays 41 is of a size slightly larger than the dimensions of the ends of sealed, metallic refrigerant containers 53. The containers 53 are maintained out of contact with the front wall 45, rear wall 46 and partitions 49 of the trays 41 by inwardly projecting ribs 54. These ribs permit moisture condensed on the outer surfaces of the container 53 to run down the sides of the container and to collect in the trays and/or be absorbed without hindrance by the pads 52. Should an excess of moisture run down into the central compartments of the trays 41, such moisture can flow into the troughs 50 through the slots 51.

The containers 53 are maintained in an upright position by a strap 55 extending longitudinally of the cabinet and provided with depending resilient fingers 56 which yieldably engage the upper ends of the containers. The strip 55 is secured to the upper wall 4 of the cabinet 2 by screws 57 received in threaded openings 58 in a handle 59 adapted to be gripped to carry the unit 1 from one place to another. The strip 55 also serves as a reinforcing means for preventing the heads of the screws 57 from being pulled through the relatively thin top wall 4 of the cabinet 2.

The bottom wall 5 of the cabinet 2 is provided adjacent the cabinet side walls 6 and 7 with air inlet openings 60, best shown in Figs. 4 and 5. The combined area of the inlet openings 60 at each end of the cabinet is greater than the area of the outlet 32 of the blowers 29, so that a greater volume of air can be drawn into the cabinet 2, then can be discharged by the blowers. This assures an ample supply of air for flow across the containers 53. A tab 61 extends upwardly from the bottom wall 5 in spaced relation to the trays 41 and serves to retain the lower end of an air filter pad 62 in place in a position to filter the air drawn into the cabinet 2 by each blower 29, before the air is drawn across the containers 53. The upper end of the air filter pad 62 is conveniently disposed in an upper corner of the cambinet and is resilient retained in place by a yieldable finger 63 at each extremity of the strips 55.

It will be apparent from the foregoing that when the plates 25 are removed from the back panel 17, the containers 53 can readily be inserted or removed from the trays 41, the rearwardly inclined wall portion 47 of the trays facilitating such insertion and removal. Likewise, the trays 41 can be removed, if desired. It will also be apparent that upon removal of the trays 41, the air filter

pads 62 can also be readily removed and cleaned or replaced as conditions require.

Referring to Figs. 1 and 7, the bottom wall 13 of the recesses 12 is provided with arcuate slots 64 arranged in concentric relation around the circular openings 14, the slots being disposed outwardly of the tubular outlet 32 of the blowers 29, for a purpose which will be explained later.

In the normal operation of the air conditioning unit 1, the containers 53 with a frozen refrigerant therein are placed in the trays 41 above the pads 52, the fingers 56 serving to retain the containers 53 upright within the cabinet 2. As the switch 37 is turned on, the rotors 34 of the blowers 29 are rotated and draw air into the blower housing through the inlet openings 35. This produces a suction condition within the cabinet 2 and air to be conditioned is drawn into the cabinet through the air inlet openings 60. The air thus drawn into the cabinet 2 passes through the air filter pads 62 and is drawn across the outer surfaces of the containers 53 to be cooled thereby. The air thus cooled is drawn into the blowers 29 and then discharged through the blower outlets 32 and the circular openings 14 in the cabinet 2, to cool the space in which the unit 1 is operating the air discharges through the openings 14 at fairly high velocity and produces an eductor action which pulls additional air out of the cabinet through the slots 64. This induces a circulation of air within the cabinet 2 for effecting cooling of the blower motor 30. Cooling of the motor 30 is further facilitated by air drawn into the cabinet through the central air inlet openings 16.

Any moisture from the air which condenses on the containers 53 will flow down the side walls of the containers to be absorbed by the pad 52 or collect in the trays if excessive, as previously mentioned. The trays 41 are of generous capacity so that they will accommodate more moisture than can be condensed during the period that any given container 53 is in use, so that there is no danger of condensate overflowing from the trays 41.

It will be noted that the cntainers 53 are spaced a substantial distance from the sides of the blowers containing the inlet openings 35. This is important for the reason that if the container is too close to the blower, it will retard the flow of air into the blower inlet 35 and thus decrease the operating efficiency of the unit. Containers of one quart capacity have served to satisfactorily cool air over the a period of several hours with the blower operating at moderate speed. It will be understood that for heavy duty cooling the cabinet 2 will be made larger to accommodate a plurality of containers at each end thereof.

Should it be desired to humidify the air, instead of cooling the air, then the plates 25 can be removed from the rear of the cabinet and the containers 53 removed. One end of the pad 52 is then inserted into the space between the resilient fingers 56 and 63, as illustrated in Fig. 9, and the other end is inserted into the trough 50 adjacent the air filter pad 62. Water W is then added to the tray 41 so that it can replace the water in the pad 52 evaporated by the passage of air therethrough. The plates 25 are replaced before starting the motor 30. Thus, the unit 1 can be readily converted from an air cooler to an air humidifier.

The bottom wall 5 of the cabinet 2 is spaced a distance H, Figs. 5 and 9, above the lower surface of the feet 9, sufficient to maintain the air inlet openings 60 unobstructed even when the unit 1 rests upon a yieldable support, such as an auto seat cushion, and the weight of the unit causes said feet to sink slightly into the cushion.

Fig. 10 illustrates a modified form of cabinet construction in which a side wall 6*a* is provided with an inwardly offset or horizontal portion 65 disposed above the plane of the bottom wall 5*a* of the cabinet. Feet 9*a* (only one of which is shown) are relatively shallow compared with the height of the feet 9 of the cabinet shown in Fig. 9. However, the height H of the offset portion 65 above the plane of the lower surface of the foot 9*a* is approximately equal to the height H of the bottom wall 5 above the plane of the lower surface of the feet 9, so that air inlet openings 66 formed in the side wall portion 65 will remain unobstructed, should the unit be placed upon a yieldable support such as the soft cushioned seat of an automobile. The side wall 6*a* also includes a portion 67, which serves as a means to retain the lower end of an air filter pad 62*a* from obstructing the air inlet openings 66. Otherwise, the structure shown in Fig. 10 is the same as that described in connection with the form of the invention shown in Figs. 1 to 9 and in the interest of brevity, the corresponding parts have been identified in the drawings by the same reference numerals.

Fig. 11 illustrates a further modification of the invention in which a cabinet 2*b* generally similar to the cabinet 2 has its side walls 6*b* (only one of which is shown) provided with a rectangular opening 68 which is covered by a louvered plate 69 serving as an air inlet. The louvered plate 69 is secured to the side wall 6*b* by screws 70. In this form of the invention, the legs 9*b* of the cabinet 2*b* may be made relatively short since there is no possibility of the openings in the louvered plate 69 being blocked by supporting the cabinet 2*b* on a soft, yieldable surface.

Figs. 12 and 13 illustrate a further modification of the invention in which closure plates 25*c* are associated with the rear panel 17*c* of a cabinet 2*c*. The plates 25*c* have louvers 71 which serve as an air inlet for the cabinet 2*c*, thus placing the air inlets at the rear of the cabinet. An air filter pad 62*c* is detachably secured to the inner side of plate 25*c* by suitable clips 72. It will be noted from Fig. 13 that the lower end of the air filter pad 62*c* is located above the upper edge of a tray 41*c* so that the tray does not in any way interfere with the mounting of the air filter pad 62*c*.

Figs. 14, 15 and 16 illustrate a further embodiment of the invention in which refrigerant containers 53*d*, similar to the containers 53, are mounted in a cabinet 2*d* below a twin blower unit identical to that shown in Fig. 5 and comprising a motor 30*d* and two blowers 29*d*. The cabinet 2*d* is higher and shorter than the cabinet 2, but otherwise embodies the same general principles of design, including circular air outlet openings 14*d* in the front thereof through which conditioned air discharges. The cabinet 2*d* further differs from the cabinet 2*a* in that it contains a horizontal partition 73 disposed below the blowers 29*d* and provided with flanges 74 at the ends thereof which receive screws 75 for securing the partition in place in the cabinet 2*d*. A vertical dividing wall 76 depends from the partition 73 and divides the lower portion of the cabinet 2*d* into chambers generally identified by 77. Each chamber 77 contains a tray 41*d* which is longer than the trays 41 so that a refrigerant container 53*d* may be disposed lengthwise in the tray in order to shorten the overall height of the unit. A moisture absorbent pad 52*d* is received in the tray 41 in folded condition for absorbing moisture which condenses and flows down the sides of the containers 53*d*. Clip members 55*d* having spring fingers 78 engaging the containers 53*d* are suitably secured to the partition 73 and serve to hold the containers 53*d* in place.

The cabinet 2*d* has a botton wall 5*d* and hollow legs 9*d* which depend from said bottom wall for maintaining the same spaced a substantial height H above a supporting surface S. An opening 79 is provided centrally of the bottom wall 5*d* and is closed by a louvered plate 80 secured to the bottom wall 5*d* by screws 81. The louvered plate 80 serves as an air inlet, and an air filter pad 62*d* overlies the louvers and is detachably secured to the plate 80 by clips 82.

The horizontal partition 73 is provided with openings 83, one disposed on each side of the dividing wall 76. The horizontal partition 73 is further provided with rela-

tively large openings **84** which establish communication between the chambers **77** and the space in the cabinet **2***d* above the partition **73**. Each of the blowers **29***d* has an air intake opening **35***d* and an air discharge opening **32***d*, the latter registering with the air outlet openings **14***d* of the cabinet **2***d* in the same manner illustrated in Fig. 7. The cabinet **2***d* is also provided with slots **64***d*, so that an eductor action is produced by the air discharged from the blower outlets **32***d*. A handle **59***d* is secured to the top wall **4***d* of the cabinet **2***d* to enable the same to be readily carried from place to place.

In the normal operation of the device disclosed in Fig. 14, the flow of air follows the pattern indicated by the arrows. That is to say, air to be conditioned enters the cabinet through the louvered plate **80** and passes through the air filter pad **62***d*, a portion of the air entering the respective chamber **77** and passing over the exterior surfaces of the containers **53***d*. The air is then drawn through the openings **84** in the partition **73** and then into the inlet **35***d* of the blowers and finally discharged through the blower outlets **32***d* and openings **14***d* in the front of the cabinet **2***d*. The slots **64***d* permit air to be withdrawn by eductor action produced by the velocity of the air discharging through the openings **14***d*. Cooling of the motor **30***d* is facilitated by air drawn by the blowers from the chambers **77** and air passages **83** into the space above the partition **73**. The vertical dividing wall **76** serves to divide the incoming air so that substantially equal amounts are drawn over the respective refrigerant containers **53***d* to be cooled thereby before being discharged from the cabinet **2***d*.

The trays **41***d* are identical in construction to the trays **41** except that they are longer. Hence, the moisture absorbent pads **52***d* can be used for humidifying air in the same manner as the pad **52** described in connection with Fig. 9. When it is desired to dehumidify, instead of cooling the air, the containers **53***d* are removed from the cabinet **2***d* and the lower end of the moisture absorbent pad **52***d* is inserted into one of the troughs **50***d* of the tray **41***d*. The other end of the paid **52***d* is forced into the space between the spring finger **78** and another spring finger **85** on the clip **55***d* so that the pad **52***d* is supported vertically and will serve to humidify the air drawn therethrough by the blowers **29***d*. The moisture collected in the pad **52***d* may be used for this purpose and supplemented by additional water W added to the tray **41***d*.

The back of the cabinet **2***d* is closed by a panel **17***d* held in place by screws **20***d*, it being understood that the panel **17***d* is provided with access openings and closure plates (not shown) similar to the openings **21** and plates **25** described in connection with Fig. 5.

The moisture absorbent pads **52**, etc., may be omitted if desired, but their use in the trays **41**, etc., is preferred. Further, the containers **53**, etc., can be painted with lacquer and metallic or other heat conducting particles embedded in the lacquer to roughen the surface of the containers and increase the heat transfer area thereof to cause more effective cooling.

It will be understood that various changes may be made in the details of construction and in the arrangement of the various components comprising the air conditioning units disclosed herein without departing from the principles of the invention or the scope of the annexed claims.

We claim:

1. Air conditioning apparatus, comprising: a cabinet having a bottom wall and a side wall provided with an offset portion disposed generally parallel with but above the plane of said bottom wall, said offset portion having an inlet opening for air to be conditioned, and said cabinet having an outlet opening for air which has been conditioned spaced laterally inwardly from said side wall of said cabinet and arranged to discharge air in a direction generally parallel with said cabinet side wall; a sealed refrigerant container in said cabinet between said inlet and outlet openings disposed at least in part in a vertical plane passing through the intervening space between said cabinet end and said outlet opening; and means in said cabinet for creating a flow of air across said refrigerant container from said inlet opening to said outlet opening.

2. Air conditioning apparatus, comprising: a cabinet having spaced-apart air inlet openings for air to be conditioned, and having spaced-apart outlet openings for air that has been conditioned; a plurality of sealed refrigerant containers in said cabinet, each disposed in said cabinet between an inlet and an outlet opening; and a pair of blowers in said cabinet disposed between said refrigerant containers, each of said blowers having an inlet adjacent to but spaced from its associated refrigerant container and having an outlet in registration with an outlet opening of said cabinet.

3. Air conditioning apparatus as defined in claim 2 in which the back of the cabinet is closed by a removable panel; and wherein means is provided which mounts said blowers upon said panel so that they can be inserted within the cabinet as a unit.

4. Air conditioning apparatus, comprising: a cabinet having an inlet opening for air to be conditioned, and having an outlet opening for air which has been conditioned; a blower disposed in said cabinet; a horizontal wall in said cabinet beneath said blower and in a plane above said air inlet opening; and a sealed refrigerant container in said cabinet below said wall, said air inlet opening being so arranged in said cabinet that said refrigerant container is disposed in the path of flow of air from said air inlet opening toward the inlet of said blower.

5. Air conditioning apparatus, comprising: a cabinet having a first wall and means providing an air inlet opening in said first wall for air to be conditioned, said cabinet having a front wall and an air outlet opening in said front wall for air which has been conditioned; a blower in said cabinet having an inlet for receiving air from said air inlet opening and having an outlet arranged to discharge air through the air outlet opening of said cabinet; a sealed refrigerant container in said cabinet between said first wall and the inlet of asid blower; means in said cabinet for holding said refrigerant container against tipping; and an air filter pad in said cabinet between said air inlet means in said first wall and said refrigerant container, said means which retains the refrigerant containers against tipping having a portion engaging the air filter pad to retain it in position.

6. Air conditioning apparatus as defined in claim 2, including a panel closing the back of said cabinet, said panel having access openings for inserting and removing the refrigerant containers; and closure plates carried by said panel and overlying said access openings.

7. Air conditioning apparatus, comprising: a hollow cabinet including a front, side, top and bottom walls; a panel forming a closure for the back of said cabinet, said cabinet having spaced-apart air outlet openings for conditioned air in the front wall thereof, said outlet openings being spaced a substantial distance inwardly from said side walls; a pair of motor-driven blowers in said cabinet, each blower having an inlet, and having an outlet communicating with one of the outlet openings in said front wall; a tray in said cabinet disposed between each blower and one side wall of said cabinet; a sealed refrigerant container mounted in each of said trays, said cabinet having air inlet openings for air to be conditioned, arranged so that air is drawn through said inlet openings and across said refrigerant containers before being drawn into the inlet of said blowers.

8. Air conditioning apparatus comprising: a cabinet having a front wall provided with spaced-apart air outlet openings arranged medially of the ends thereof; a pair of blowers disposed centrally within said cabinet, each of said blowers having an inlet at one side thereof, and having an outlet communicating with one of said

air outlet openings; a sealed refrigerant container disposed in said cabinet on the inlet side of each of said blowers, said cabinet having a top wall; and a strip disposed in said cabinet adjacent the inner surface of said top wall and including means engaging each of said containers for retaining the same in an upright condition within the cabinet.

9. Air conditioning apparatus comprising: a cabinet having a front wall provided with spaced apart air outlet openings arranged medially of the ends thereof; a pair of blowers disposed centrally within said cabinet, each of said blowers having an inlet at one side thereof, and having an outlet communicating with one of said air outlet openings; a sealed refrigerant container disposed in said cabinet on the inlet side of each of said blowers, said cabinet having a top wall; a strip disposed in said cabinet adjacent the inner surface of said top wall and including means engaging each of said containers for retaining the same in an upright condition within the cabinet; a handle; and means extending through said strip, top wall and into said handle for securing said strip and handle to the top wall of said cabinet.

10. Air conditioning apparatus, comprising: a cabinet having top and bottom walls and having a horizontal partition disposed between said top and bottom walls, forming upper and lower compartments in said cabinet, said cabinet having air inlet means below said horizontal wall, for air to be conditioned, providing for flow of air into said lower compartment; a pair of blowers in said upper compartment, each blower having an inlet and an outlet, said cabinet having a pair of spaced air outlet openings for air which has been conditioned aligned with the outlets of said blowers; sealed refrigerant container means in said lower compartment disposed in the path of flow of air from said air inlet means toward the inlet of the respective blowers; and imperforate tray means in said lower compartment beneath said sealed refrigerant container means for receiving any condensate which runs off said refrigerant container means.

11. Air conditioning apparatus, comprising: a cabinet having an air inlet opening in a first wall thereof for air to be conditioned, and an air outlet opening in a second wall thereof for air which has been conditioned; a flange surrounding said outlet opening and extending inwardly from said second wall; a blower in said cabinet having an inlet, and having an outlet structure in telescoping relation with said flange, said second wall having relatively small openings surrounding said air outlet opening through which air is drawn from within the cabinet by eductor action produced by the air discharging from the blower through said air outlet opening; and a sealed refrigerant container in said cabinet in the path of flow of air from said air inlet opening to said blower inlet.

12. Air conditioning apparatus, comprising: a cabinet having an inlet opening for air to be conditioned, and an outlet opening for air which has been conditioned spaced laterally inwardly from one end of said cabinet and arranged to discharge air in a direction generally parallel with said cabinet end; a sealed refrigerant container in said cabinet between said inlet and outlet openings disposed at least in part in a vertical plane passing through the intervening space between said cabinet end and said outlet opening; an imperforate tray in said cabinet arranged to receive moisture condensed from the air on the exterior of said refrigerant container; a pad in said tray beneath said refrigerant container for receiving condensed moisture; means in said cabinet for creating a flow of air across said refrigerant container from said inlet opening to said outlet opening, said refrigerant container being removable from the cabinet and the moisture containing pad being removable from the tray and positionable in the cabinet in the path of air flow to humidify the air; and means in said cabinet for so positioning said moisture containing pad.

13. Air conditioning apparatus, comprising: a cabinet having an outlet opening for air which has been conditioned spaced laterally inwardly from one end of said cabinet and arranged to discharge air in a direction generally parallel with said cabinet end; a sealed refrigerant container in said cabinet between said inlet and outlet openings disposed at least in part in a vertical plane passing through the intervening space between said cabinet end and said outlet opening, said cabinet having a bottom wall provided with downwardly extending wall portions defining grooves opening inwardly of the cabinet and also forming depending legs to space the bottom wall from a support, said bottom wall having an air inlet opening for air to be conditioned; and means in said cabinet for creating a flow of air across said refrigerant container from said inlet opening to said outlet opening.

14. Air conditioning apparatus, comprising a cabinet having an inlet opening for air to be conditioned, and an outlet opening for air which has been conditioned spaced laterally inwardly from one end of said cabinet and arranged to discharge air in a direction generally parallel with said cabinet end; a sealed refrigerant container in said cabinet between said inlet and outlet openings disposed at least in part in a vertical plane passing through the intervening space between said cabinet end and said outlet opening; an imperforate tray in said cabinet arranged to receive moisture condensed from the air on the exterior of said refrigerant container, said cabinet having a bottom wall provided with a groove extending from the rear of said cabinet toward the front of said cabinet and said tray having a depending rib which is received in said groove; and means in said cabinet for creating a flow of air across said refrigerant container from said inlet opening to said outlet opening.

15. Air conditioning apparatus, comprising: a cabinet having an inlet opening for air to be conditioned, and an outlet opening for air which has been conditioned spaced laterally inwardly from one end of said cabinet and arranged to discharge air in a direction generally parallel with said cabinet end; a sealed refrigerant container in said cabinet between said inlet and outlet openings disposed at least in part in a vertical plane passing through the intervening space between said cabinet end and said outlet opening; an imperforate tray in said cabinet arranged to receive moisture condensed from the air on the exterior of said refrigerant container, said refrigerant container being disposed upright and said tray containing vertical walls that engage the refrigerant container adjacent the bottom thereof to maintain said refrigerant container in an upright position in the cabinet; and means in said cabinet for creating a flow of air across said refrigerant container from said inlet opening to said outlet opening.

16. Air conditioning apparatus as defined in claim 2, in which the air inlet openings are at the end portions of the cabinet and an air filter pad is disposed in the path of air flow between each air inlet opening and a refrigerant container.

References Cited in the file of this patent

UNITED STATES PATENTS

246,781	Jennings	Sept. 6, 1881
662,541	Moskolczy	Nov. 27, 1900
847,840	Smith	Mar. 19, 1907
925,887	Farrar	June 22, 1909

(Other references on following page)

11

UNITED STATES PATENTS

1,391,592	Stone	Sept. 20, 1921
1,394,924	Macffaden	Oct. 25, 1921
2,031,055	McKinney	Feb. 18, 1936
2,083,607	Joseph	June 15, 1937
2,090,875	O'Brien	Aug. 24, 1937
2,187,387	Trigg	Jan. 16, 1940
2,196,310	Kalin	Apr. 9, 1940
2,258,961	Saathoff	Oct. 14, 1941

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2,242,594	Petersen	May 20, 1941
2,417,010	Mobley	Mar. 4, 1947
2,496,296	Lobl	Feb. 7, 1950
2,654,232	Galazzi	Oct. 6, 1953

FOREIGN PATENTS

362,647	France	July 2, 1906