Aug. 18, 1959 S. L. McMILLAN 2,899,802

ROOM AIR CONDITIONING APPARATUS HAVING AUTOMATIC ODOR REMOVAL OPERATION

Filed Feb. 25, 1957 2 Sheets-Sheet 1

FIG. 1

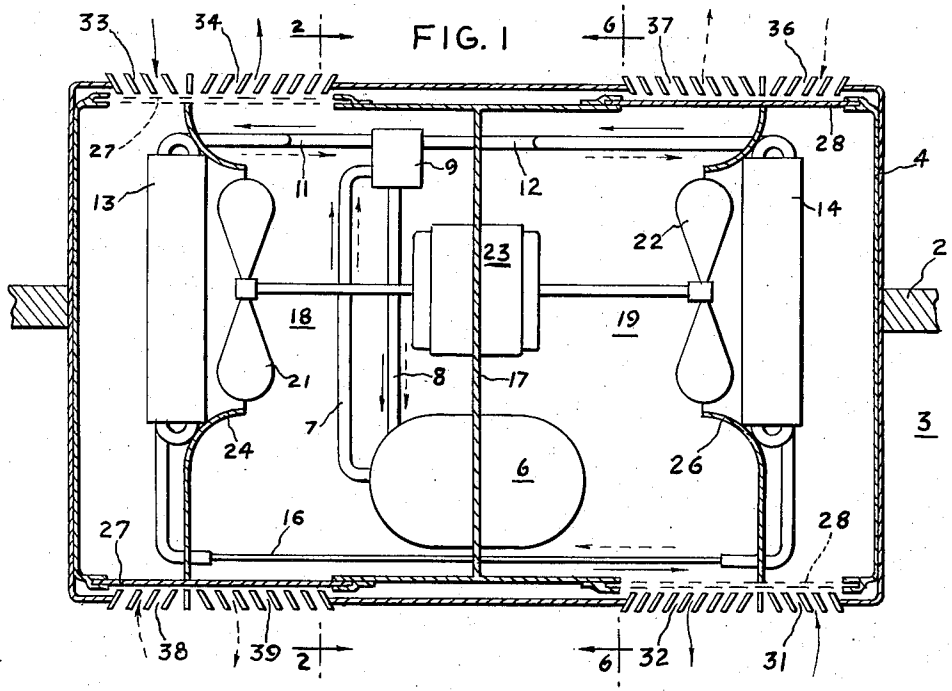


FIG. 2

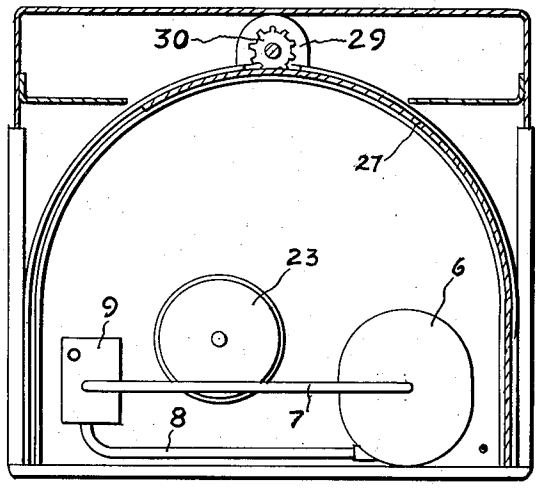
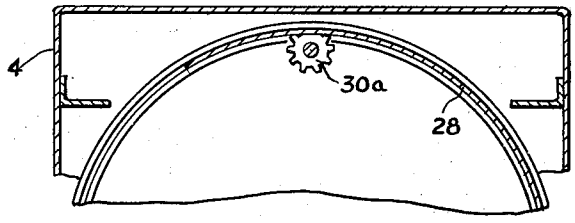


FIG. 6



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FIG. 4

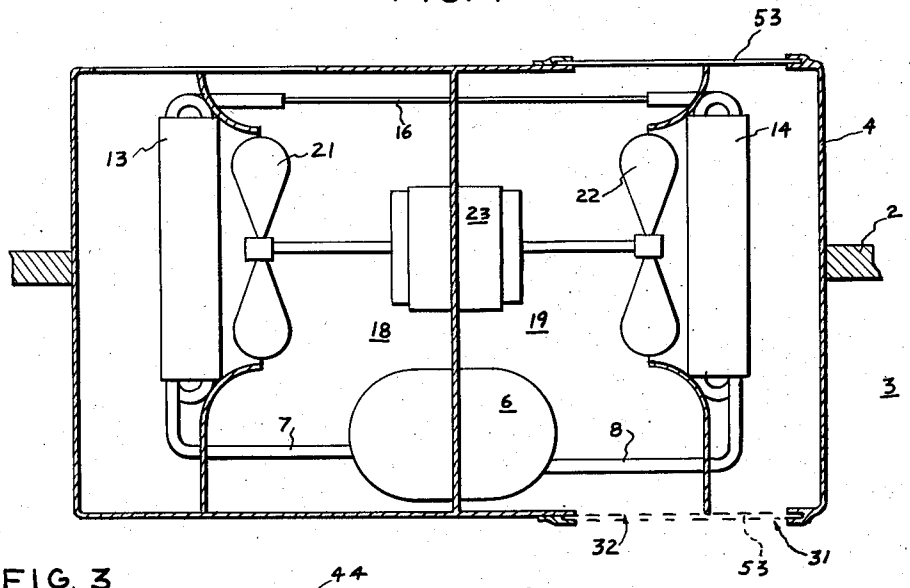


FIG. 3

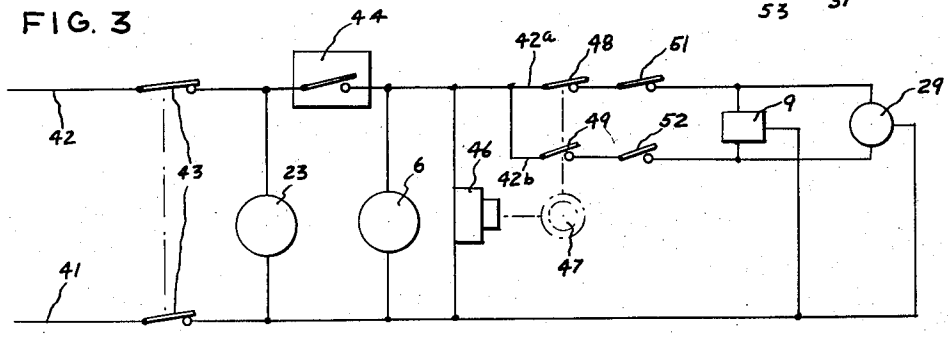
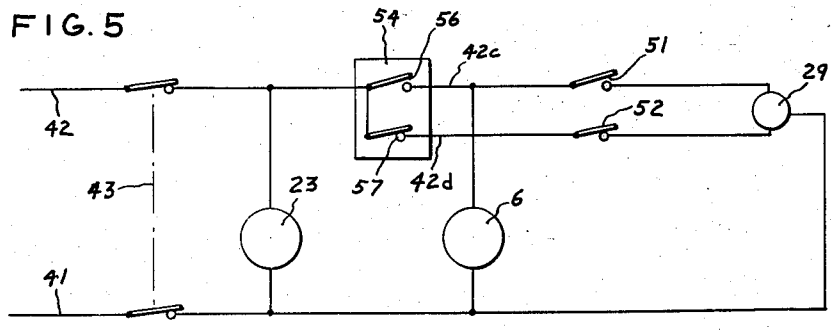


FIG. 5



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ROOM AIR CONDITIONING APPARATUS HAVING AUTOMATIC ODOR REMOVAL OPERATION

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Application February 25, 1957, Serial No. 642,241

7 Claims. (Cl. 62—157)

The present invention relates to a room air conditioning apparatus and more particularly to an arrangement for automatically removing the odors from the air within an enclosure during the operation of the apparatus.

To cool an enclosure with a room air conditioning apparatus it is necessary to seal off the air within the enclosure against contact with the outside air. The windows and doors leading to the enclosure are closed and circulation from the outside is reduced as much as possible. As a result of this, odors which have impregnated the air due to cooking or other activities within the enclosure, are prevented from escaping from the enclosure. In order to remove these odors, some air conditioning units provide means for exhausting the air from within the enclosure to the outside and for venting fresh air from the outside into the enclosure. This method of ridding the room of odors actually partially defeats the cooling purpose of the apparatus since the energy expended in cooling the air which is vented, along with the odors, to the outside is lost and the fresh air introduced into the enlosure must be cooled in order to maintain maximum comfort conditions within the enclosure.

Odors comprise a multitude of very small solid or liquid particles which are suspended in and circulate with the air streams within the enclosure. There is a tendency for these odor particles to collect or condense on cold, wet surfaces such as the surfaces of the evaporator of an air conditioning unit. In such a case, some of these odors are retained in the condensate water and some of them are also absorbed on the metal surfaces of the evaporator units. When the metal surfaces of the evaporator become warm these particles are discharged therefrom and enter the air stream circulating through the evaporator. Accordingly, it is an object of the present invention to take advantage of this tendency for odor particles to collect upon the evaporator metal surface to promote a steady pumping of odors from within the enclosure to the outdoors.

It is another object of the present invention to provide an improved air conditioning unit having an arrangement whereby odors may be removed from an enclosure without exhausting the air from within the enclosure to the outdoors.

It is a further object of the present invention to prevent condensate water which collects on the surfaces of the evaporator of an air conditioning unit from re-evaporating back into the enclosure while the refrigeration system is on the "off" cycle.

It is still another object of the present invention to provide an improved air conditioning unit having an arrangement for removing odors from within the enclosure to be cooled while maintaining the unit in operating condition to cool the enclosure.

Further objects and advantages of the invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In accordance with the invention there is provided an air conditioning apparatus having a refrigerating system including a compressor and having interconnected thereto a pair of heat exchangers. Means are provided within the air conditioner for circulating separate air streams over each of the heat exchangers. Means are also provided to condition the refrigeration system whereby one of the heat exchangers is cooled when the temperature within the enclosure rises above a predetermined temperature and whereby the heat exchanger is permitted to become warm when the temperature within the enclosure falls below the predetermined temperature. By a suitable air valve means, an air stream is directed from within the enclosure over this heat exchanger while it is cold and an air stream is directed from outside the enclosure over this heat exchanger when it becomes warm, whereby odors collecting on the heat exchanger are discharged to the outside as the heat exchanger becomes warm.

As a further aspect of the invention, in order to accelerate the removal of odors, means for periodically reversing the flow of refrigerant through the system is provided whereby each of the heat exchangers are interchangeably operated for a predetermined period as a condenser and then as an evaporator. Suitable air valves, their operation being coordinated with the reversing means, continually circulate air from within the enclosure over whichever heat exchanger is being operated as an evaporator and continually circulate air from outside the enclosure over the heat exchanger operating as a condenser, whereby odors collected upon heat exchanger while operating as an evaporator are discharged to the outside while the heat exchanger is operating as a condenser.

For a better understanding of the invention reference may be had to the accompanying drawings in which:

Fig. 1 is a plan view illustrating the air flow relationships in an air conditioner embodying the present invention;

Fig. 2 is an elevation view taken along line **2—2** of Fig. 1;

Fig. 3 is a schematic diagram illustrating the control system which may be used for automatically operating the air conditioner illustrated in Fig. 1;

Fig. 4 is a plan view showing a modification of the invention;

Fig. 5 is a schematic diagram illustrating the control circuit which may be used for automatically controlling the air conditioning unit of Fig. 4; and

Fig. 6 is a partial elevation view taken along line **6—6** of Fig. 1.

Referring now to Fig. 1, there is shown a room air conditioning unit inserted through the wall **2** for cooling an enclosure which is the general area indicated by the numeral **3** on one side of the wall. The air conditioning unit comprises a casing **4** suitably mounted within the wall **2** and housing a reversible cycle refrigeration system including a motor driven compressor **6** having a discharge line **7** and a suction line **8**. The discharge and suction lines are both connected to a reversing valve **9**. Also connected to the reversing valve **9** are a pair of conduits **11** and **12** which lead respectively to a pair of heat exchangers **13** and **14**. A suitable electrical means such as a solenoid (not shown) operates the reversing valve **9** between two positions for reversing the flow of refrigerant through the system. In the first position, the reversing valve connects the discharge line **7** and the suction line **8** to the conduits **11** and **12** respectively and thus conditions the system wherein the heat exchanger **13** operates as a condenser and the heat exchanger **14** operates as an evaporator. In its second position, the reversing valve **9** reverses the direction of

refrigerant flow and joins the discharge line 7 to the conduit 12, leading to the heat exchanger 14, and joins the suction line 8 to the conduit 11, leading to the heat exchanger 13, thereby operating the heat exchanger 14 as a condenser and the heat exchanger 13 as an evaporator. There has not been shown any particular reversing valve structure since it will be understood that any suitable reversing valve having the above characteristics may be used.

Included in the refrigeration system for the purpose of expanding the refrigerant from the condensing pressure to the evaporating pressure is a capillary tube 16. This tube operates as an expansion means regardless of the direction of flow of the refrigerant, and it is so constructed and arranged that an efficient flow rate is obtained in both directions.

The casing 4 is divided by a barrier 17 into two separate compartments 18 and 19 in which the heat exchangers 13 and 14 are arranged. In order to circulate separate air streams through the heat exchangers 13 and 14 there is provided an air moving means in the form of a pair of fans 21 and 22 driven by a suitable fan motor 23 which is mounted in the barrier 17. The fans 21 and 22 are designed to pull a stream of air through each of the heat exchangers 13 and 14, blowing the air stream toward the center portion of the unit or toward the barrier 17. Suitable scrolls 24 and 26 are provided within each compartment 18 and 19 to promote the most efficient circulation of air through the heat exchangers 13 and 14. Thus, when the fan motor 23 is energized separate air streams are circulated through each of the heat exchangers from the portion of the casing 4 adjacent the wall 2, as seen in Fig. 1, towards the interior portion of the unit or the barrier 17. The air streams flowing through the heat exchangers are admitted into the compartments 18 and 19 either from within the enclosure or from the outdoors in a manner to be later described.

The flow of refrigerant through the system is illustrated by the solid and broken arrows in Fig. 1, the solid arrows representing the refrigerant flow when the reversing valve 9 is in its first position and the broken arrows representing the flow when the valve 9 is in its second position. When the reversing valve 9 is in its first position, the hot, gaseous refrigerant from the compressor 6 first passes through the heat exchanger 13 wherein heat is rejected to the air stream passing therethrough. The condensed refrigerant then passes through the capillary tube 16 being expanded thereby. The cool, expanded refrigerant next absorbs heat from the air stream circulating through the heat exchanger 14 and finally returns to the compressor 6 through the conduit 12 and the compressor suction line 8. Thus, when the reversing valve is in its first position the heat exchanger 13 acts as a condenser and rejects heat and the heat exchanger 14 acts as an evaporator to absorb heat from the air stream passing therethrough. However, if the reversing valve 9 is operated in second or other position the compressor discharge is fed directly to the heat exchanger 14 which then operates as a condenser and rejects heat from refrigerant into the air stream circulating thereover. The refrigerant condenses in the heat exchanger 14 and then passes through the capillary tube 16 wherein it is expanded and enters the heat exchanger 13 which then operates as an evaporator to cool the air stream circulating thereover.

Within the enclosure, odors, which arise due to cooking, smoking and other activities take the form of small solid or vapor particles which become suspended in the air and circulate with the air streams therein. These particles are continually deposited upon the cold, wet evaporator surfaces of the air conditioner by the air stream circulating therethrough and are again discharged into the air stream when the refrigeration system is deenergized and the evaporator becomes warm. By the present invention these odors which collect upon the cold evaporator and are absorbed by its metallic surface, are periodically removed and discharged into the outside air and are thereby prevented from being recirculated within the enclosure when the evaporator becomes warm. In order to accomplish this, the present invention illustrated in Figs. 1, 2 and 3 provides a means for periodically reversing the operation of the refrigeration system while, at the same time changing the air streams circulating through the heat exchangers such that an air stream from within the enclosure is at all times directed over the heat exchanger operating as an evaporator and an air stream from the outside is at all times directed over the heat exchanger operating as a condenser.

In order to promote the proper air flow over the heat exchangers during operation of the refrigeration system in either direction and thereby to provide cooling of the enclosure at all times regardless of the direction of refrigerant flow, there is provided an air directing means in the form of air valves 27 and 28. Each of the air valves is movable between two positions as indicated by the positions shown in both solid and broken lines in Fig. 1. In the arrangement of the invention illustrated in Figs. 1, 2 and 3, movement of the air valves 27 and 28 between the two positions is accomplished by means of a two direction motor 29 and a pair of drive sprockets 30 and 30*a* which engage with racks (not shown) or other means on the air valves and move the air valves in one direction or the other depending upon energization of the motor by a control means to be later described. As illustrated in Figs. 2 and 6, drive sprockets 30 engages air valve 27 from the top and drive sprocket 30*a* engages air valve 28 from the bottom. Thus, rotation of the drive sprockets 30 and 30*a* in one direction by the motor causes movement of air valves 27 and 28 in opposite directions to close openings on opposite sides of the casing. In the arrangement shown in Fig. 1, the air valves are driven around the periphery of the semicylindrical casing 4. Suitable means are provided to guide the air valves around the casing. Thus, when the air valve 28 is in the position shown by the solid lines, air may flow from within the enclosure through the inlet opening 31 leading into the compartment 19 whereupon it flows over the heat exchanger 14 and is finally discharged through the opening 32 leading from the compartment 19. Whenever the air valve 28 is in the position indicated by the solid lines in Fig. 1, the air valve 27 is in the position also indicated by the solid lines in Fig. 1. Thus, outside air may enter the compartment 18 through the inlet opening 33 thereupon circulating through the heat exchanger 13 and is then discharged to the outside through the outlet opening 34. The second position for the air valves 28 and 29 is shown in dotted lines in Fig. 1. Whenever the air valves are in this position the air flow over heat exchanger 14 is from outside the enclosure with the air entering the compartment 19 through the inlet 36 and being discharged through the outlet 37. Air flow over the heat exchanger 13, when the air valves are in their second position, is directed from within the enclosure 3 through the opening 38 and discharged back into the enclosure through the outlet 39. By properly coordinating the position of the air valves 27 and 28 with the position of the refrigerant reversing valve 9 it is possible to maintain air flow from within the enclosure at all times over the heat exchanger being operated as an evaporator and to obtain air flow from the outside over the heat exchanger being operated as a condenser. Thus, referring to Fig. 1, by proper controlling means, when the refrigerant flow is in the direction indicated by the solid arrows, then the air flow is directed into the compartments as shown by the solid arrows extending through the inlet and outlet openings in each compartment. Similarly when the refrigerant flow is in the direction indicated by the broken arrows in Fig. 1, then the air flow is directed into the compart-

ments as indicated by the broken arrows extending through the inlet and outlet openings of the compartments.

By coordinating the direction of air flow either from inside the enclosure or from outside the enclosure over the respective heat exchangers according to the direction of refrigerant flow through the system, it is possible to periodically discharge the odors, which collect on the heat exchangers when they operate as evaporators, to the outside when the heat exchangers are operating as condensers. This permits continual cooling of the enclosure by one heat exchanger operating as an evaporator while the other heat exchanger is discharging the collected odors to the outside during its operation as a condenser. It also permits the evaporation of condensate water, which collects upon each heat exchanger surface during its operation as an evaporator, to the outside while the heat exchanger is operating as a condenser.

Referring now to Fig. 3, there is shown a control scheme whereby the components of the air conditioning unit illustrated in Fig. 1 may be controlled to operate as a moisture and odor removal pump. A source of electrical voltage is supplied to the unit through the conducting lines **41** and **42** and this is controlled by the on-off switch **43**. As soon as the contacts of the on-off switch **43** are closed the fan motor **23**, which is connected directly across the lines **41** and **42**, is energized, and air streams are immediately circulated through the heat exchangers **13** and **14**. In order to control the temperature within the enclosure, a suitable thermostat **44** is provided which energizes or de-energizes the compressor according to temperature conditions within the enclosure. The thermostat may be any of the well-known thermostats which are operative in response to room temperature conditions to produce this desired control. Thus, as may be seen in Fig. 3, if the temperature within the enclosure gets above a certain predetermined temperature the thermostat will close its contacts and energize the compressor **6**. The closing of the thermostat contacts also completes the circuit to the remaining components of the control system which operate in a manner to be hereinafter described.

In order to provide periodical reversing of the refrigerant flow through the system and to coordinate the changing of the position of the air valves to promote flow of air over the requisite heat exchanger from the inside or the outside, an electrically operated timer **46** is provided which drives a cam **47** that, in turn, operates switches to energize and de-energize the two direction air valve motor **29** and the refrigerant reversing valve **9**. The timer **46** may be of any of the well-known types now on the market and may be adjustable to switch the operation of the air conditioner components every 15 minutes, or at the end of any predetermined period desired.

The electrical supply line **42** supplies energy to a pair of parallel conductors **42***a* and **42***b* which are alternately energized by switches **48** and **49**, respectively. Conductors **42***a* and **42***b* are each connected to separate windings within the two direction valve motor **29** and the refrigerant reversing valve **9** and provide a means for reversing the direction of operation of each of these two components. Energization of the conductor **42***a* causes the operation of these components in one direction while energization through conductor **42***b* causes them to operate in the opposite direction. Operation of the switches **48** and **49** occurs at the end of each predetermined period, during which one of the switches remains closed while the other is open. Operation of one of the switches to the closed position automatically opens the other switch and vice versa. The cam **47** operates the switches at the end of each predetermined period and thereby energizes one or the other of the conductors **42***a* or **42***b*. Conductors **42***a* and **42***b* are further controlled by a pair of limit switches **51** and **52**, respectively. The limit switches **51** and **52** are operated by the air valves **27** and **28** which open one or the other of the switches when the air valves are at their extreme valve positions. For example, when the air valves are in the position shown by the solid lines in Fig. 1, then the limit switch **51** is closed and the limit switch **52** is open. This is the condition illustrated in Fig. 3. Thereupon when the cam **47** actuates the switch **48** to the closed position, as is the case illustrated in Fig. 3, the circuits leading to both the two direction valve motor **29** and the reversing valve **9** are completed. The reversing valve **9** then reverses the flow of refrigerant through the system and the two direction valve motor moves the air valves **27** and **28** to their second position, as is indicated by the dotted lines in Fig. 1. Upon reaching this position, the air valves operate the limit switches **51** and **52** to open the switch **51** and to close the switch **52**. Upon the opening of the contacts of switch **51**, the power through conductor **42***a* is interrupted to both the refrigerant reversing valve **9** and to the two direction valve motor **29**. The contacts of switch **52** are then in the closed position thereby partially conditioning the conductor **42***b* for energization. Energization of conductor **42***b* will be completed at the end of the predetermined period when the cam closes the switch **49**. Upon the closing of the switch **49**, the two direction valve motor **29** and the refrigerant reversing valve **9** are again energized, but in the reverse direction, and move the valves **27** and **28** back to their original or first position (shown in solid lines in Fig. 1) and the reversing valve **9** moves to its first position. As the valves **27** and **28** are moved back to their first position they operate the limit switches **51** and **52** thereby closing the limit switch **51** and opening the limit switch **52** placing the line **42***a* in condition for energization as soon as the cam **47** again operates the switch **48** to the closed position. Operation of the limit switches **51** and **52** by the air valves **27** and **28** at their extreme positions is accomplished through a direct mechanical contact between the respective air valve and a switch operating arm (not shown) or by any of the other means, well known in the art, for actuating limit switches.

The above arrangement provides a simple means for "pumping" the odors from inside the enclosure to the outdoors by using a reversible cycle refrigerating system which periodically discharges the odors to the outside during the warm, or condenser, operation of each heat exchanger. It is possible to obtain this odor removal operation from the evaporator surfaces in the more economical and more conventional type of air conditioners in which the refrigeration system is not reversible, through the use of an air valve having its operation coordinated with the "on-off" cycles of the compressor or refrigeration system. This arrangement of the invention is illustrated by the embodiment of Fig. 4 in which the same numerals have been used to denote similar components of the air conditioner described in Fig. 1. The system shown in Fig. 4 is similar to that of Fig. 1 except the reversing valve **9** and one of the air valves is eliminated. Discharge refrigerant gas leaving the compressor **6** is discharged directly through the discharge tube **7** into the heat exchanger **13** which always operates as a condenser in this arrangement. The refrigerant liquid leaves the condenser **13** through the capillary tube **16** whereupon it is expanded from the condensing pressure to the evaporating pressure and enters the heat exchanger **14** which, in this embodiment of the invention, always operates as an evaporator. Also, in this embodiment of the invention, air is always drawn from the outside into the compartment **18** whereupon it is circulated over the heat exchanger **13** and discharged again back into the outdoors. An air valve **53** is pro-

vided which is driven between first and second positions by a two direction valve motor (not shown in Fig. 4). In its first position, the air valve 53 permits air from within the enclosure to flow into the compartment 19 whereupon it is circulated over the evaporator 14 and is discharged back into the enclosure. When in its second position, or in the position shown in dotted lines in Fig. 4, air valve 53 permits air to flow from the outdoors into the compartment 19 whereupon it is circulated over the heat exchanger 14 and discharged back into the outdoors. By properly coordinating the operation of the air valve 53 with the refrigerating system on and off cycles it is possible to obtain a removal of the odors collected upon the evaporator 14 during the off cycle of the refrigeration system. That is, by actuating the air valve 53 into its second position whenever the compressor 6 is de-energized, it is possible to obtain a flow of air from the outdoors over the evaporator 14 when the evaporator warms up, thus venting the odors and condensate collected upon the evaporator 14 into the outdoors during the off cycle.

A control scheme for obtaining this type of operation is shown in Fig. 5. By this control scheme, the operation of a two direction valve motor 29 is coordinated with the operation of the compressor. In this control system the timer, cam, and cam operated switches are eliminated and a thermostat 54 is provided which includes a pair of switches 56 and 57 which in turn energize lines 42*c* and 42*d* according to temperature conditions within the enclosure to control the operation of the compressor 6 and the two direction valve motor 29. The thermostat 54 is shown, in Fig. 4, in the refrigerant cycle off position in which the switch 56 has de-energized connector 42*c* to the compressor 6 and switch 57 has energized the connector 42*d* to the two direction valve motor 29, As in the previous embodiment, a pair of limit switches 51 and 52 are provided which are actuated by the air valve 53 in its extreme valve positions. When the air valve 53 is in its solid line position shown in Fig. 3 it has actuated the limit switches 51 and 52 such that the switch 51 is in the open position and the switch 52 is in the closed position. Therefore whenever the thermostat conditions the system for the "off" cycle and closes switch 57, then the circuit is completed to one side of the two direction valve motor 29 and the air valve 53 is then moved by the valve motor 27 into its dotted line position indicated in Fig. 4. This condition, with both switches 52 and 57 closed, is indicated in Fig. 5. As the air valve reaches the position shown in dotted lines in Fig. 4, it operates the limit switches 51 and 52 thereupon opening the switch 52 to break the circuit to the two direction valve motor 29 thereby shutting off the motor. In this position the air valve 53 has operated the switch 51 into the closed position and when the thermostat 54 again calls for cooling within the enclosure, or for the "on" cycle of the refrigeration system, and the contact 56 closes thereby completing the circuit to energize the compressor, it will also complete the circuit to the other side of the air valve motor 29. The air valve motor 29 will then move the air valve 53 into its first position or the position shown in solid lines in Fig. 4. As the air valve 53 moves into the solid line position shown in Fig. 4 it opens the switch 51 and closes the switch 52, thereby partially energizing the conductor 42*d*, and interrupts the current to the air valve motor 29. In this manner it is possible to direct a flow of air from the outside over the evaporator during the "off" cycle of the refrigeration system while the evaporator 14 warms up, and by closing off the enclosure inlet and outlets 31 and 32, respectively, this outdoor air is effectively prevented from entering the enclosure. Odors and condensate water collecting upon the evaporator 14 during the cooling cycle are evaporated and carried off in the air stream flowing over the evaporator when the refrigeration system has been de-energized or has been placed in the off condition.

By the present invention there has been provided a simple arrangement whereby odors which arise within an enclosure may be removed from the enclosure by the air conditioning apparatus while operating according to its normal cooling cycle.

While in accordance with the patent statutes there has been described what at present is considered to be the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, the aim of the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a refrigeration system including a compressor and a pair of heat exchangers interconnected in refrigerant flow relationship, at least one of said heat exchangers capable of being refrigerated by the flow of refrigerant therethrough, air moving means in said apparatus for circulating separate streams of air over each of said heat exchangers, air valve means in said apparatus movable between first and second positions, said air valve means directing air from within said room over said one heat exchanger when said air valve means is in said first position and said air valve means directing air from outside said enclosure over said one heat exchanger when said air valve means is in said second position, control means for discontinuing the refrigeration of said one heat exchanger, said control means also actuating said air valve means to said second position when said refrigeration of said one heat exchanger is discontinued so that condensate water and odors collected from said indoor air stream passing over said one heat exchanger while refrigerated are discharged into said outdoor air stream when said refrigeration of said one heat exchanger is discontinued.

2. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a refrigeration system including a compressor and having an evaporator and a condenser interconnected thereto in the refrigerant flow relationship, means for circulating separate air streams over said evaporator and said condenser respectively, thermostat means for conditioning said refrigeration system to cool said evaporator when said temperature within said enclosure rises above a predetermined temperature and for conditioning said refrigeration system to permit said evaporator to become warm when said temperature within said enclosure falls below said predetermined temperature, air valve means in said apparatus movable between first and second positions, said air valve means directing air from said enclosure over said evaporator when said air valve means is in said first position and said air valve means directing air from outside said enclosure over said evaporator when said air valve means is in said second position, and control means for actuating said air valve means to said first position when said evaporator is cooling said enclosure, said control means actuating said air valve means to said second position when said evaporator becomes warm.

3. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a refrigeration system including a compressor and having an evaporator and a condenser interconnected thereto in a refrigerant flow relationship, means for circulating separate air streams over said evaporator and condenser respectively, thermostat means for energizing said refrigeration system when said temperature within said enclosure rises above a predetermined temperature and

for de-energizing said refrigeration system when said temperature within said enclosure falls below said predetermined temperature, air valve means in said apparatus movable between first and second positions, said air valve means directing air from said enclosure over said evaporator when said air valve means is in said first position and said air valve means directing air from outside said enclosure over said evaporator when said air valve means is in said second position, and control means for actuating said air valve means to said first position when said refrigeration system is energized to cool said enclosure, said control means actuating said air valve means to said second position when said refrigeration system is de-energized.

4. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a reversible cycle refrigeration system having first and second interconnected heat exchangers, said heat exchangers each being operable interchangeably as a condenser or as an evaporator, means in said system for periodically reversing the operation of said heat exchangers thereby to operate one of said heat exchangers as an evaporator for a predetermined period while operating the other heat exchanger as a condenser and then to reverse the operation of such heat exchangers, air moving means in said apparatus for circulating separate streams of air over each of said heat exchangers, air valve means in said apparatus for directing separate air streams from inside and outside said enclosure over each of said heat exchangers respectively, and control means for coordinating the operation of said air valve means with the operation of said reversing means to promote flow of air from within said enclosure over said heat exchanger operating as an evaporator and flow of air from outside the enclosure over said heat exchanger operating as a condenser.

5. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a reversible cycle refrigeration system having first and second interconnected heat exchangers, said heat exchangers each being operable interchangeably as a condenser or as an evaporator, reversing means in said system for reversing the flow of refrigerant through said heat exchangers, said reversing means operating at predetermined intervals thereby to operate said first heat exchanger for a predetermined period as an evaporator while operating said second heat exchanger as a condenser and then to reverse the operation of said heat exchangers for a predetermined period, air moving means in said apparatus for circulating separate streams of air over each of said heat exchangers, air valve means in said apparatus associated with each of said heat exchangers and coordinated with said reversing means to direct air within said enclosure over said heat exchanger employed as an evaporator and to direct air from the outside over said heat exchanger employed as a condenser whereby odors and condensate water collecting on said heat exchangers while operating as evaporators are vaporized by said air stream passing thereover from the outside when said heat exchangers are operating as condensers.

6. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a reversible cycle refrigeration system having first and second interconnected heat exchangers, said heat exchangers each being operable interchangeably as a condenser or as an evaporator, a reversing valve in said system for reversing the flow of refrigerant through said heat exchangers, timer operated means for actuating said reversing valve to thereby operate said first heat exchanger for a predetermined period as an evaporator while operating said second heat exchanger as a condenser and then to reverse said operation of said heat exchangers, air moving means in said apparatus for circulating separate streams of air over each of said heat exchangers, first and second air valve means in said apparatus, said first and second air valve means being movable from a first position wherein air is directed from within said enclosure over said first heat exchanger and air is directed from outside said enclosure over said second heat exchanger to a second position wherein air is directed from outside said enclosure over said first heat exchanger and air is directed from within said enclosure over said second heat exchanger, said movement of said first and second air valve means between said first and second positions being actuated by said timer operated means simultaneously with said actuation of said reversing valve whereby condensate water and odors collected from said air stream passing over each of said heat exchangers while employed as an evaporator are discharged into said air stream circulating over each of said heat exchangers while employed as a condenser.

7. In an air conditioning apparatus for conditioning the air within an enclosure, the combination comprising a reversible cycle refrigeration system having a pair of interconnected heat exchangers, each of said heat exchangers being operable interchangeably as a condenser or as an evaporator, timer operated means in said system for periodically reversing the operation of said heat exchangers thereby to operate one of said heat exchangers as an evaporator for a predetermined period while operating the other heat exchanger as a condenser and then to operate said one heat exchanger as a condenser for a predetermined period while operating said other heat exchanger as an evaporator, air moving means in said apparatus for circulating separate streams of air over each of said heat exchangers, air valve means in said system also actuated by said timer operated means, said air valve means coordinated by said timer operated means to direct air from within said enclosure over said heat exchanger employed as an evaporator and to direct air from the outside over said heat exchanger employed as a condenser whereby odors and condensate water collecting on said heat exchanger operating as an evaporator are vaporized by said air stream passing thereover when said heat exchanger is operating as a condenser.

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