

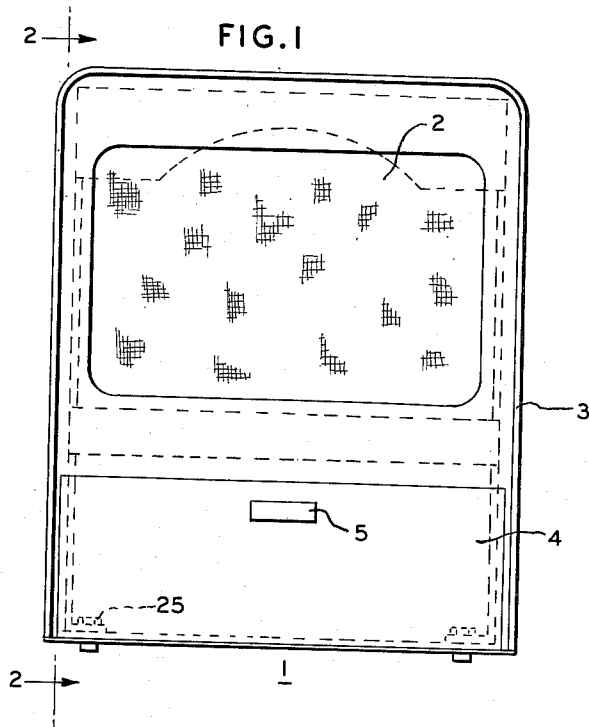
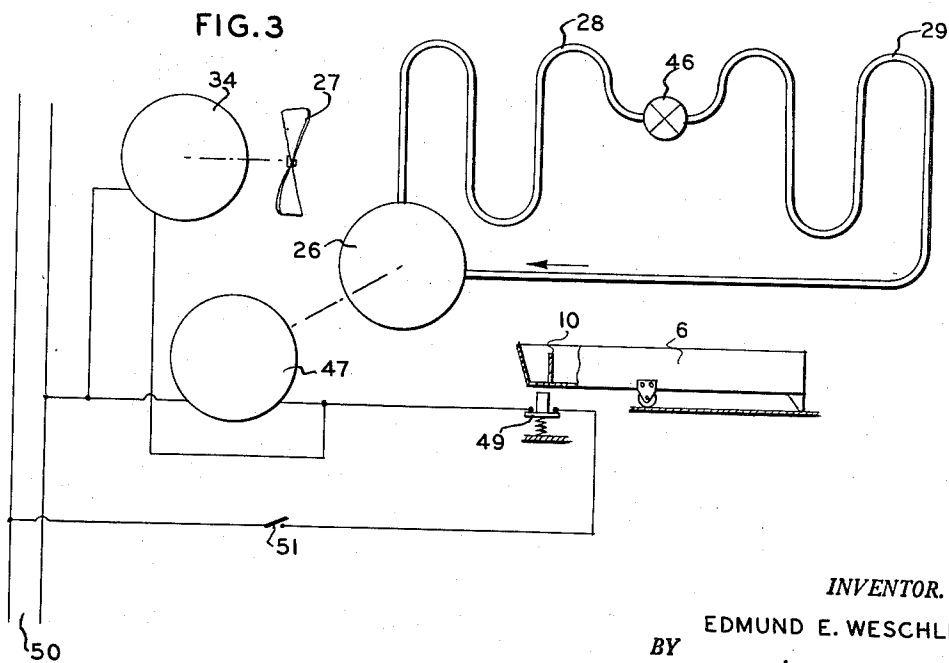
Aug. 21, 1956

E. E. WESCHLER, JR
DEHUMIDIFYING APPARATUS

2,759,335

Filed Dec. 16, 1953

2 Sheets-Sheet 1



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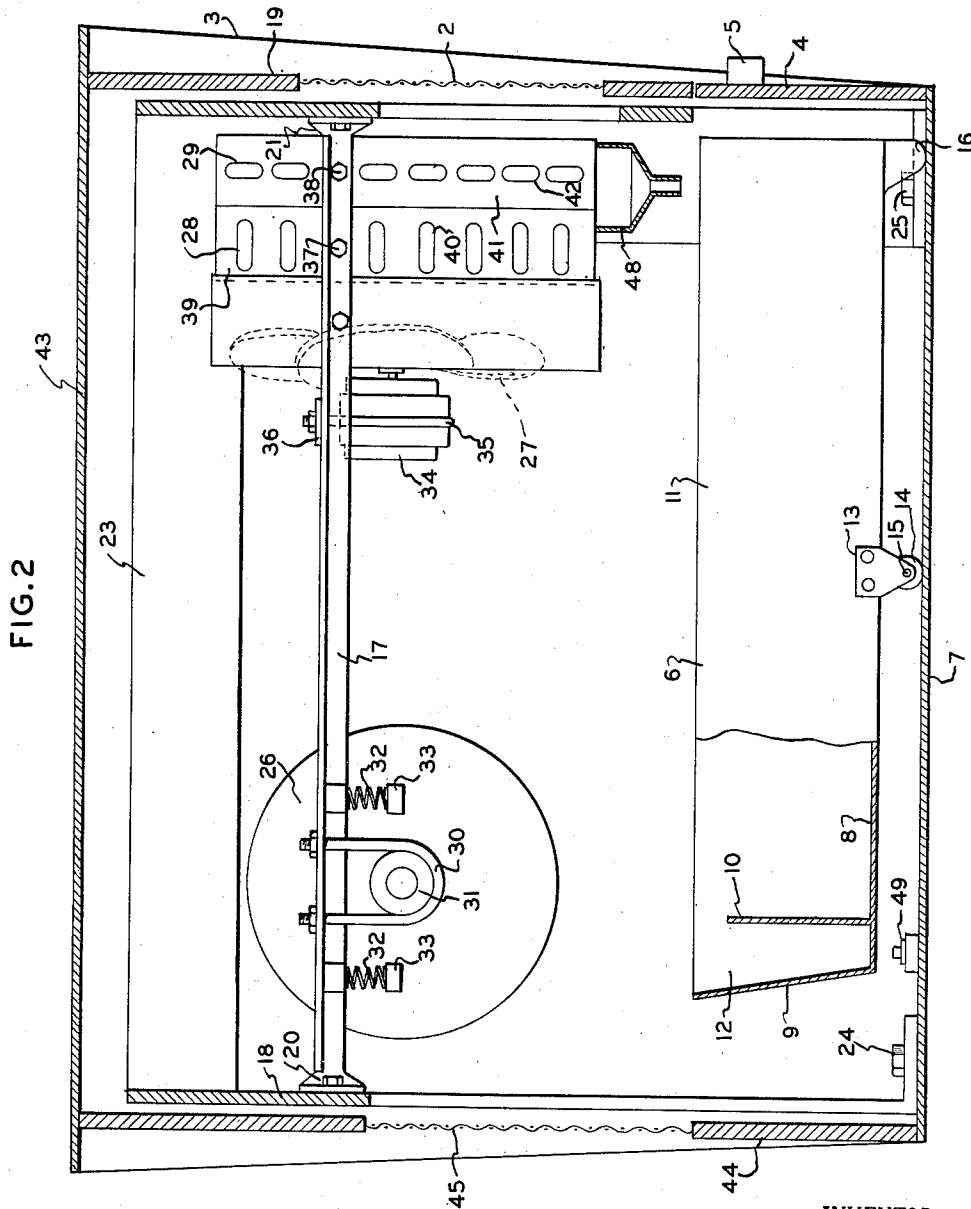
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DEHUMIDIFYING APPARATUS

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1 Claim. (Cl. 62-4)

My invention relates to electrical household appliances in which a waste liquid is formed, and more particularly to appliances, such as dehumidifiers, in which condensate is formed on one or more heat exchangers of a refrigeration system.

In certain types of household appliances waste liquids are formed which must be periodically disposed of or removed. For example, in most room air conditioners and dehumidifiers a considerable amount of moisture is condensed on the evaporators of the refrigeration or cooling systems contained therein. In these appliances it has been common practice to provide a catch pan or receptacle into which the condensate or other liquid drips. This catch pan must then be periodically emptied in order to prevent overflowing. Unfortunately, however, the average housewife is quite likely to forget about the pan and not empty it before overflowing actually occurs. This is obviously objectionable because the overflow, of course, creates a considerable mess which then must be cleaned up.

Therefore, it is a primary object of my invention to provide a new and improved means for preventing overflow of catch pans or the like used with such appliances.

It is another object of my invention to provide a new and improved means for deactivating the appliance upon the collection of a predetermined amount of waste liquid in the catch pan.

It is a further object of my invention to provide a new and improved dehumidifier in which the refrigerating system is automatically deactivated upon the collection of a predetermined amount of condensate in the catch pan.

It is still a further object of my invention to provide a new and improved movable catch pan, switch arrangement which automatically opens the energizing circuit of a dehumidifier or other appliance upon a predetermined amount of condensate collecting in the catch pan.

My invention also has as its object the provision of a new and improved catch pan, switch combination in which a quick positive switch opening is automatically accomplished upon the collection of a predetermined amount of liquid in the catch pan.

In carrying my invention into effect in one preferred form thereof, I provide air conditioning apparatus which includes in a closed refrigerating system a compressor, a condenser, and an evaporator. The compressor is driven, and thus the whole system activated, by an electric motor, the motor being energized through a suitable circuit. Beneath the evaporator is positioned a pivotally mounted receptacle which is tiltable between normal and second positions. The receptacle remains in the normal position until a predetermined amount of condensate from the evaporator has collected therein and at that point it moves with a quick positive action to the second position. In so moving it actuates means which open the motor circuit and thereby deactivate the entire refrigerating system. Preferably the receptacle is divided into first and second compartments with means allowing overflow therebetween, and is so positioned that the condensate is collected in the first compartment only. Then upon the collection of a

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predetermined amount in the first compartment the condensate overflows into the second compartment and by its weight causes the receptacle to tilt quickly and positively to the second position and thereby deactivate the refrigerating system.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and mode of operation may be best understood by reference to the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a front view of a household dehumidifier embodying my invention in one preferred form thereof;

Fig. 2 is a view in partial section taken along the line 2-2 of Fig. 1; and

Fig. 3 is a schematic showing of the refrigeration system and electrical circuits included in the dehumidifier.

Referring now to Fig. 1 I have shown therein, as illustrative of the type of apparatus to which my invention may be adapted, a dehumidifier 1 in which the air to be conditioned is drawn through a screen 2. The screen is mounted in a fixed upper panel 3 and as will hereinafter be explained serves to hide the heat exchangers of the dehumidifier from view. Positioned below the fixed panel 3 is a removable panel 4 which may be detachably secured to the dehumidifier frame by any suitable means, as for example by spring clips. A handle 5 is provided to facilitate removal of the panel.

As may be best seen in Fig. 2 the panel 4 serves to hide a removable catch pan 6 which is supported by the bottom or floor plate 7 of the dehumidifier. The catch pan includes a bottom 8 and upstanding sides 9 and has secured to its bottom an upstanding barrier 10. In accordance with my invention the barrier 10 extends the width of the receptacle or pan so that the pan is divided into two separate compartments 11 and 12. The compartment 12 is the smaller of the two and is located immediately adjacent one end of the pan, specifically the left-hand end as viewed in Fig. 2. The top of the barrier 10, however, is somewhat lower than the top edges of the sides 9 so that it is possible for liquid to overflow from compartment 11 to compartment 12 whenever the liquid level in compartment 11 rises higher than the top of the barrier 10.

In the illustrated embodiment, the receptacle is supported by means of brackets 13 which are attached to a roller 14 by pivot pins 15 in such a manner that these brackets may pivot relative to the roller. In other words, the receptacle is pivotally supported on the bottom plate 7 by means of the pin and roller arrangement, although it should be understood that other pivoting arrangements may be used. Also providing support for the receptacle is a generally U-shaped foot 16 attached to its extreme right-hand end (as viewed in Fig. 2). The brackets 13 are slightly offset from the center of the pan so that when the pan is empty it will assume the normal position shown in Fig. 2, wherein it rests both on the roller 14 and on the foot 16. Moreover so long as only compartment 11 contains liquid, it will remain in that normal position. However, as will be explained hereinafter, if the liquid within compartment 11 should rise so high as to overflow the barrier 10, the weight of the liquid then flowing into compartment 12 will shift the balance around the fulcrum bracket 13 and cause the receptacle to tilt to an opposite or second position wherein the compartment 12 end is lower than the foot 16 end.

Positioned above the catch pan 6 are the operating elements of the dehumidifier. Specifically these operating elements are supported between a pair of longitudinally extending bar members 17, only one of which is shown. These bar members 17 are themselves affixed to the front and back risers 18 and 19 of the dehumidifier frame by any suitable means as by bolts 20 and 21. The risers 18

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and 19 are in turn held in position by means of the side frame members 23 and are attached to the base plate 7 by any suitable means such as the bolts 24 and 25. In the illustrated embodiment these bottom attaching bolts 24 and 25 also serve as a means for mounting feet below the base plate 7 whereby the plate is held spaced somewhat from the floor or other supporting means of the dehumidifier.

The operating elements of the dehumidifier supported from cross bars 17 comprise a compressor 26, a fan 27, a condenser 28, and an evaporator 29. Specifically, the compressor 26 is supported from bars 17 by means of U-shaped brackets 30 which fit around trunnions 31 provided on opposite ends of the compressor casing. Further, to damp any motion that might otherwise tend to occur between the case and the mounting brackets, a plurality of springs 32 are secured between the bars 17 and outstanding flanges 33 provided on the compressor casing. The fan 27 is supported by means of its driving motor 34. The motor 34 is itself supported by a clamp 35 which is affixed to a cross piece 36 running between the bars 17 and firmly secured thereto. The condenser 28 and the evaporator 29 may be secured between the bar members in any suitable means and are here shown as secured by cross bolt members 37 and 38. Specifically the bolt member 37 is attached to the condenser fins 39 surrounding the condenser tubing passes 40 whereas the bolt 38 is secured to the evaporator fins 41 surrounding the evaporator tubing passes 42.

The frame on which all the dehumidifier elements are supported is itself surrounded by a decorative housing in which the panels 3 and 4 form the front side. The housing further includes a top piece 43 and a back piece 44, the back piece 44 being provided with a large aperture in which is positioned a screen 45. The housing also has side walls which, however, are not shown in the drawings.

In operation the action of fan 27 is such that air is drawn in through the screen 2, passed over the evaporator 29 and the condenser 28 and then exhausted through the rear screen 45. However, it should be understood that any suitable air passageways may be provided within the dehumidifier to accomplish this result, my invention not being limited to the specific screen positionings shown. As may be seen by reference to Fig. 3 the evaporator 29 and the condenser 28 are connected in a closed refrigerant circuit with the compressor 26 and an expansion valve 46. The expansion valve 46 may be of any of the various well-known types and is adjusted so as to maintain the evaporator at a temperature well below the dew point temperature of the surrounding or room air. Thus during operation of the compressor 26 which is driven by an electric motor 47 sealed within the compressor casing, the air drawn through the evaporator is cooled to a point at which most of moisture contained within the air condenses on the evaporator. The dried air is then pulled through the condenser 28 so as to warm it again to room temperature and then exhausted through the screen 45 as above mentioned.

The condensate forming on evaporator 29 is passed through a collecting trough 48 to my new and improved catch pan structure. Specifically the moisture collecting on evaporator 29 will drip into the trough 48 and from there will flow or drop directly into the catch pan. So long as the catch pan is only partially filled, the system will continue to operate to remove moisture from the room air. However, according to my invention, upon the filling of the catch pan to a dangerously full level, the catch pan itself deactivates the entire system so as to prevent further condensation of moisture on the evaporator.

Thus as shown in Fig. 2 a normally closed, spring biased switch 49 is positioned below the left hand or compartment 12 end of the catch pan. This switch as shown in Fig. 3 is connected in series circuit relation with the compressor motor 47 across the power supply 50 so that if

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the switch is open it will de-energize motor 47. The de-energizing of motor 47, of course, deactivates the entire refrigeration system. Preferably, and as shown, the fan motor 34 is connected in parallel with the compressor motor 47 so as to be also controlled by the switch 49. A manually actuated switch 51 is also included in the circuit to allow manual starting and stopping of the unit.

In accordance with my invention the condensate dripping from coils 29 falls into the compartment 11 side of the catch pan 6. The barrier 10, of course, so isolates compartment 12 from compartment 11 that the condensate remains in compartment 11 only until the level thereof reaches the top of barrier 10. Moreover the catch pan is so balanced around its fulcrum brackets 13 that as long as the liquid remains in compartment 11 only, the pan is balanced in its normal position. Specifically, foot 16 remains on the base plate 7 and the compartment 12 end of the pan remains spaced above switch 49. However, after the system has run for a period of time depending upon the humidity of the surrounding air, the condensate level in compartment 11 will rise to a point where it spills over the top of barrier 10. As soon as any appreciable amount of liquid overflows barrier 10 the catch pan is then weighted in the reverse direction around its fulcrum bracket. This causes the pan to begin to pivot around the brackets so that its compartment 12 end moves toward switch 49. As the pan begins to move, i. e. tilt, more liquid, of course, spills across the barrier and increases the overbalancing weight in compartment 12, and thereby increases the speed of the pivotal movement. In other words, the amount of liquid spilling over the barrier begins to snowball so that the weight of liquid in compartment 12 rises very quickly and a sharp downward movement of the left-hand end of the pan is obtained toward the switch 49. This rapid movement of the catch pan results in a quick breaking of the contacts of switch 49 so that the motor circuit is opened even though the motor may be operating under heavy load.

The shutting off of the motor and thus of the entire dehumidifying unit, of course, notifies the housewife that the catch pan is full. To empty the catch pan, she then merely removes the front panel 4 by means of the handle 5 and pulls out the catch pan and dumps it in any suitable drain. The catch pan is then replaced in its position and will itself assume the normal position in which foot 16 rests on the floor. Since switch 49 is biased to the closed position, the motor circuit will then again energize the motor. And hence the dehumidifier will once again start in operation resulting in the eventual filling of the catch pan. Then upon the overflowing of barrier 10, the same reverse tilting action will occur turning off the system.

Thus, through my invention I have provided a novel means whereby the overflowing of a dehumidifier catch pan or the like is effectively prevented. Moreover through my novel structure a quick circuit-breaking action is obtained whereby the dehumidifier motor circuit may be opened even under the severest load conditions. Further due to its extreme simplicity this catch pan and switch arrangement is very inexpensive to manufacture and incorporate in dehumidifiers or other air conditioning apparatus. Moreover it should be obvious that my invention is not limited alone to such apparatus for it can obviously be used in any electrically actuated apparatus in which a waste liquid is formed so as to prevent a periodic disposal problem.

Thus, while in accordance with the patent statutes I have described what at present is considered to be the preferred embodiment of my invention, it should be obvious to those skilled in the art that various changes and modifications may be made therein without departing from my invention, and I, therefore, aim in the appended claim to cover all such changes and modifications as fall within the true spirit and scope of my invention.

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

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In refrigerating apparatus, a refrigerating system including a compressor, a condenser, and an evaporator, a motor for driving said compressor, a circuit for energizing said motor, a receptacle having a bottom and upstanding sides, means pivotally supporting said receptacle to allow tilting of said receptacle between first and second positions, a barrier mounted in said receptacle and extending upwardly from the bottom thereof to divide said receptacle into first and second compartments, with the top of said barrier being lower than the edges of said sides, said barrier being positioned relative to said pivot means to cause said receptacle to be normally weighted to said first position when liquid is contained in said first compartment only and to be tilted to said second position upon the overflow of liquid from said first compartment to said second compartment across said barrier, said receptacle being positioned to collect the condensate dripping from said evaporator in said first compartment, and normally closed switch

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means positioned below the barrier end of said receptacle and actuated by the movement of said receptacle to said second position for opening said motor circuit, whereby said refrigerating system is inactivated upon a sufficient amount of condensate filling said first compartment that said condensate overflows said barrier into said second compartment.

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