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V. P. WARREN

2,128,386

DEHYDRATING AND DEFROSTING SHOWCASE REFRIGERATOR

Filed Dec. 14, 1936

2 Sheets-Sheet 1

Fig. 1.

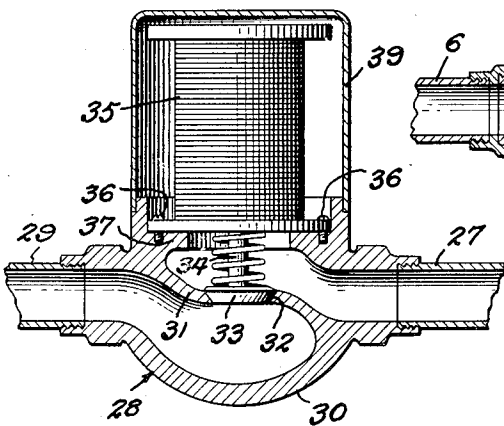
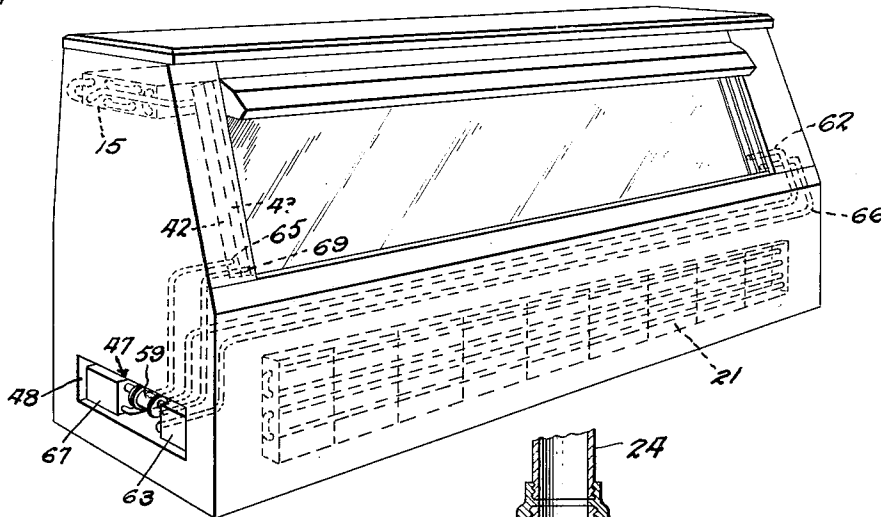


Fig. 4.

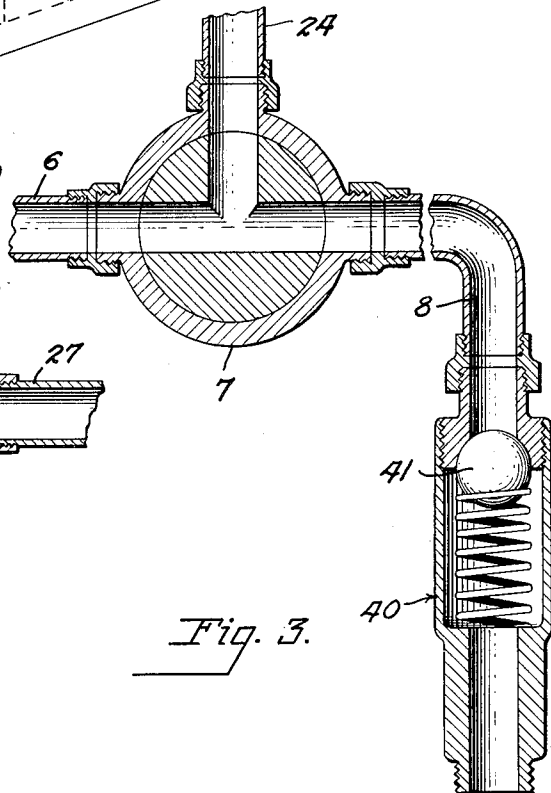


Fig. 3.

Inventor

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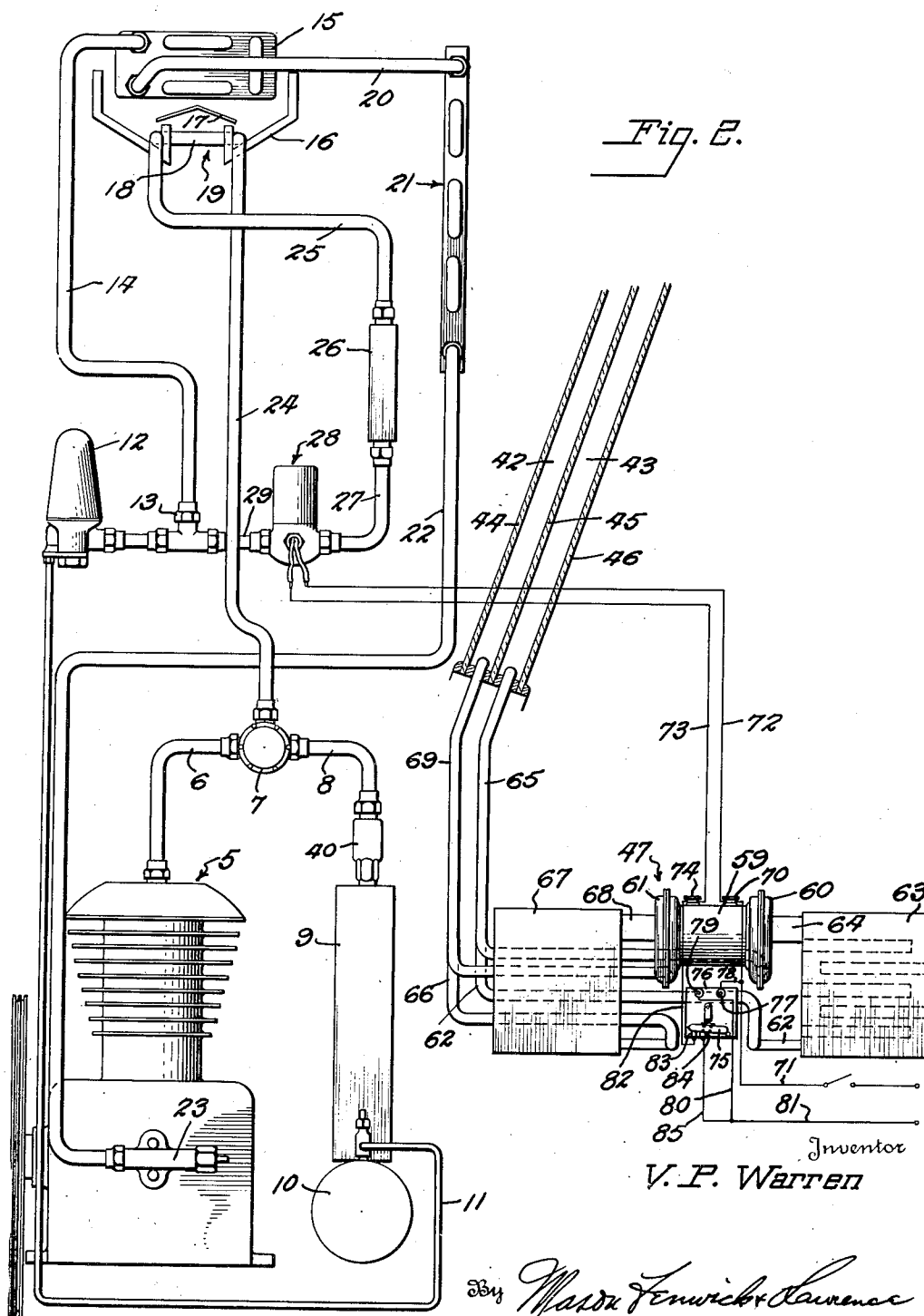
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,128,386

DEHYDRATING AND DEFROSTING SHOW-CASE REFRIGERATOR

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1 Claim. (Cl. 62—89.5)

This invention relates generally to show-case refrigerators and more particularly to systems for simultaneously dehydrating the air cells formed by the spaced apart glasses in the display windows of such refrigerators and defrosting the refrigerating coils mounted in the interiors thereof.

The defrosting part of this invention forms an improvement on the defrosting systems disclosed in my U. S. Patents No. 1,827,410, October 13, 1931 and No. 1,863,427, June 14, 1932. The dehydrating part constitutes an improvement on the dehydrating systems disclosed in my U. S. Patent No. 1,856,008, April 26, 1932 and in the patent to Coughlin, No. 1,647,785, November 21, 1927. The said defrosting and dehydrating parts are combined for simultaneous automatic operation at predetermined intervals.

In refrigerators of the showcase type provided with the dehydrating and defrosting system disclosed in the aforesaid patents the defrosting mechanism and the dehydrating mechanism have been operated independently of each other and by manually controlled valves. The operation of these defrosting and dehydrating systems is therefore dependent upon the will of the person controlling the operation of the refrigerator. It is obvious that the dehydration and defrosting operation should be carried out periodically, and preferably during such time as the refrigerator will not be repeatedly opened for the purpose of obtaining access to the contents. It has been found frequently, however, that the operator either forgets to manipulate the valves necessary to effect this dehydration and defrosting functions, or is too careless to take the trouble to operate them when necessary.

It is, therefore, the main object of the present invention to provide apparatus in which the defrosting and dehydrating functions are performed automatically and at intervals during which the refrigerator proper would not be subject to changes in temperatures resulting from the repeated opening and closing of the refrigerator. In other words, the defrosting and dehydrating operations are performed preferably during the times when the stores using the refrigerators are closed. For this purpose, the combined system in the present case is provided with a time control switch which is operated to set in operation the defrosting and dehydrating mechanisms at pre-determined intervals.

Other objects of the invention will become apparent as the detailed description thereof proceeds.

In the drawings:

Figure 1 is a perspective view of a showcase refrigerator provided with defrosting and dehydrating mechanism forming the subject matter of this invention.

Figure 2 is a diagrammatic layout of the combined dehydrating and defrosting system.

Figure 3 is a vertical section to an enlarged scale of a check valve control forming part of the defrosting system and

Figure 4 is a vertical section to an enlarged scale, through a solenoid valve forming part of the defrosting system.

Referring now in detail to the several figures of the drawings, and particularly to Figure 2 thereof, there is shown a Carnot cycle refrigerating system in which the compressor 5 delivers hot gaseous refrigerant through a conduit 6, three way valve 7, and conduit 8 to a condenser 9 in which the gaseous refrigerant is liquefied and stored in a reservoir 10. The cold liquid refrigerant is conducted from the condenser through a conduit 11 to an expansion valve 12 connected to a distributor head 13. A pipe 14 connects the head 13 to the refrigerating coil system 15, arranged directly below the top of the show case refrigerator substantially as shown in my Patent No. 1,827,410. A pan 16 and a baffle plate 17 are supported below the coil system 15 in the manner shown in my aforesaid patent; with the bypass loop 18 arranged in the gutters of the pan on opposite sides of the slot 19. There is nothing novel in this particular bypass construction which is shown fully in my Patent No. 1,827,410.

The coil 15 is connected in series with the conduit 20 to the vertical refrigerating coil designated generally by the reference numeral 21 and preferably supported within the refrigerating casing directly below the transparent window thereof. The outlet end of the coil 21 is connected by conduit 22 to the suction inlet fitting 23 of the compressor 5.

The three way valve 7 is connected by a conduit 24 to one end of the bypass coil 18, the other end of which is connected by a conduit 25, a strainer 26, and elbow 27 to one end of a solenoid valve designated generally by reference numeral 28. The other end of the solenoid valve is connected by a conduit 29 to the distributor head 13.

The solenoid valve (see Fig. 4) comprises a casting 30, having a diaphragm 31, separating the conduits 27 and 29. The diaphragm 31 is provided with an aperture 32, beveled to form a seat

for the valve 33 carried by a valve stem 34 which extends as a core through the solenoid 35. The solenoid 35 is secured at its lower end by means of the screws 36 to a flange 37 forming part of the casting 38. A casing 39 detachably mounted on the casting 38 serves as a protecting cover for the electromagnet formed by the solenoid and its core. A check valve 40 of common construction is interposed in the connection between the conduit 8 and the condenser 9, to inhibit suction of the contents of the condenser through the conduit 8.

In the operation of the mechanism so far described, and assuming the solenoid valve in closed position as shown in Figure 4, the hot gaseous refrigerant passes through the conduit 6, the three way valve 7, upwardly through the conduit 24, defrosting coil 18, conduit 25, strainer 26 and elbow 27 to the solenoid valve. Since this valve is closed, a pressure is built up in the conduit system just described, so that the hot gaseous refrigerant passes through the conduit 8 and forces the ball valve 41 from its seat to permit the gaseous refrigerant to flow into the condenser 9 and receiver 10. From the condenser 9, the cold liquid refrigerant flows through the conduit 11 to the expansion valve 12, distributor head 13, conduit 14, coil 15, conduit 20, coil 21 and the suction line 22 back to the inlet fitting of the compressor 5.

When the valve 33 of the solenoid is raised from its seat, the pressure on the ball valve 41 is released and the valve moves to closed position. The hot gaseous refrigerant then passes from the three way valve 7 through the conduit 24, bypass loop 18, conduit 25, strainer 26 and elbow 27, through the open valve seat in the diaphragm 31 to the distributor head 13, and from the distributor head through the conduit 14, coil 15, conduit 20, coil 21, suction line 22 and fitting 23 to the compressor. During the latter operation, of course, the condenser is cut out and nothing but the hot gaseous refrigerant passes through the refrigerating coils and bypass loop to defrost the entire system. Immediately upon the closing of the valve 33, the bypass loop is cut out of operation and the condenser is again set in operation to cool the system once more.

The defrosting of the refrigerating system is carried out simultaneously with the dehydration of the air cells 42 and 43 formed by the spaced apart sheets of glass 44, 45 and 46, constituting the display window of the showcase refrigerator. The dehydrating mechanism 47, mounted in a recess 48 formed in one end of the refrigerator, comprises a motor 59 having the suction fans or blowers 60 and 61 connected for operation to opposite ends of its rotor shaft. The blower 60 controls the dehydration of the cell 43, and blower

61 controls the dehydration of cell 42. The dehydrating operation is substantially the same as that illustrated in the U. S. Patent No. 1,647,785; that is, the air to be dehydrated is drawn through a pipe connected to one end of a cell, and, after dehydration is forced in the cell through the pipe connected to the other end thereof.

The air is exhausted from one end of the cell 43 by the pipe 62 connected to the intake end of a chemical dehydrator 63. The outlet end of the dehydrator is connected by a conduit 64 to the inlet of blower 60, the outlet end of which is connected by a pipe 65 to the other end of cell 43. The circulation in the cell 42 is effected through the pipe 66, connected at one end to one end of the cell 42 and at its other end to the inlet end of the dehydrator 67, the outlet end of which is connected by conduit 68 to the intake of blower 61. The outlet of blower 61 is connected by pipe 69 to the other end of cell 42.

The motor 59 has a terminal 70 connected to the main 71; and this terminal is also connected by wire 72 to one end of the solenoid 35, the other end of which is connected by wire 73 to the other terminal 74 of the said motor.

The motor and solenoid are controlled for simultaneous operation by means of a mercury switch 75 pivoted on the case 76 of a suitable timing device. One terminal 77 of the timer is connected by a tap 78 to the main 71. The other terminal 79 is connected by wire 80 to the other main 81. The return from wire 73 and motor terminal 74 is effected by wire 82 connected to a contact 83 on the mercury switch 75, the other contact 84 thereof being connected by wire 85 to the main 81. The operation of this mercury switch and the circuits controlled thereby will be obvious from inspection of the drawings.

While I have in the above description disclosed what I believe to be a preferred and practical form of my invention, it is to be understood that changes in the detailed construction or arrangement of the several parts can be contemplated without transcending the scope of the invention as claimed.

What I claim is:

In a showcase refrigerator of the type having a window formed by panes of glass spaced apart to form intervening air cells, separate means for dehydrating the air in each of said cells and comprising a closed circulation system for each one of said cells forming a part, a drier in each of said circulation systems, a motor having blowers connected to opposite ends of its rotor shaft, each blower being connected to one of said air circulation systems and time controlled means for operating said motor.

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