Aug. 27, 1935. E. H. BATCHELDER, JR 2,012,527

REFRIGERATOR CAR

Filed March 16, 1931 2 Sheets-Sheet 1

Fig. 1

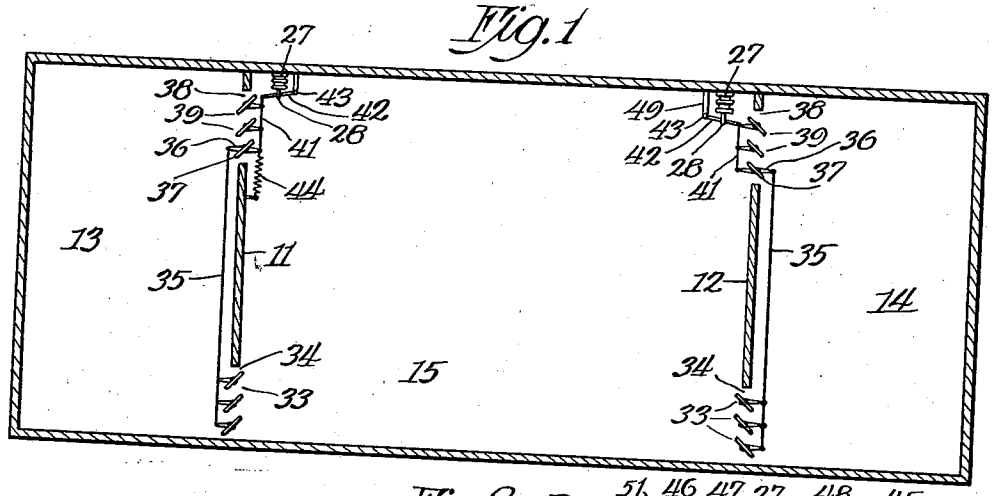

Fig. 2

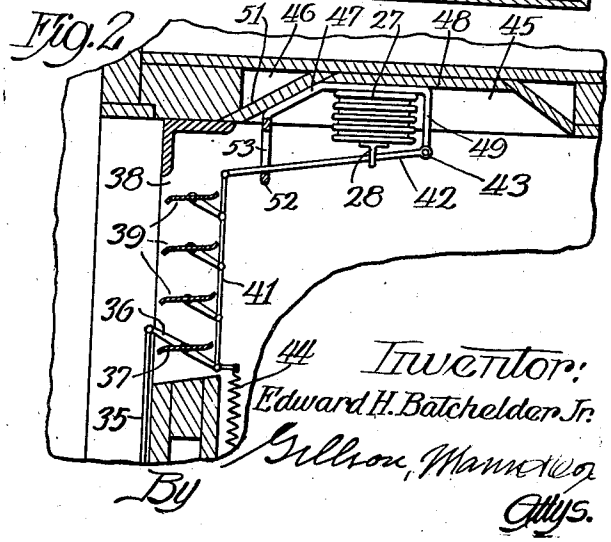

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Fig. 3.

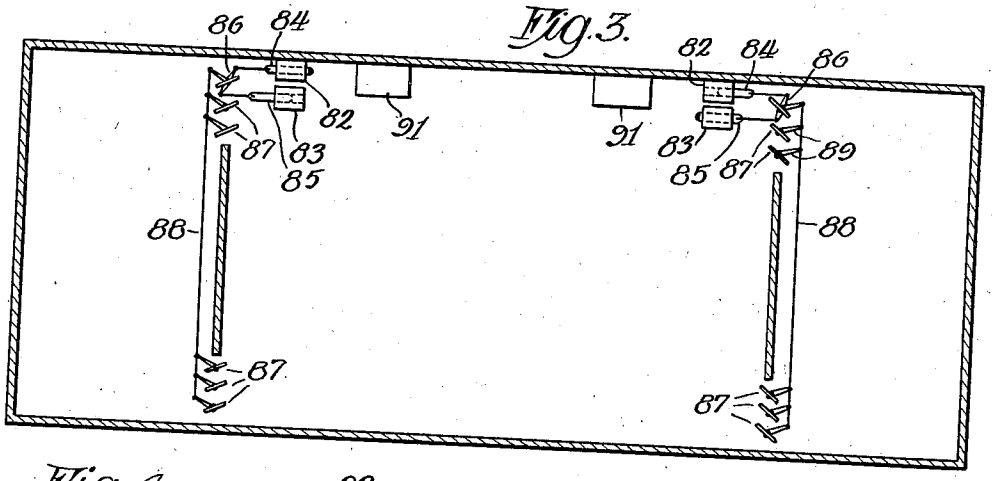
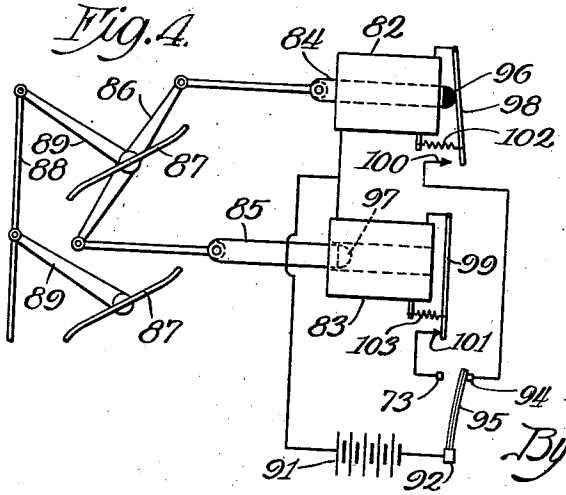


Fig. 4.



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UNITED STATES PATENT OFFICE

2,012,527

REFRIGERATOR CAR

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Application March 16, 1931, Serial No. 522,909

5 Claims. (Cl. 257—7)

This invention relates to mechanism for automatically controlling the flow of air to and from temperature changing means in freight cars and other vehicle bodies for maintaining the temperature in the freight compartments thereof within predetermined limits.

One of the objects of the invention is the provision of new and improved means for maintaining perishable products shipped in cars and other vehicle bodies at a substantially constant temperature during shipment.

Another object of the invention is the provision, in a freight car or other freight vehicle having a cooling or heating compartment and a freight compartment, of new and improved means mounted in the freight compartment for controlling the temperature of said compartment.

A further object of the invention is the provision of new and improved thermo-sensitive mechanism for controlling the temperature of the freight compartment of a refrigerator car, and so arranging the same that it will occupy a minimum amount of space in the freight compartment.

A still further object of the invention is the provision of new and improved mechanism for automatically controlling the temperature of the freight compartment of a refrigerator car, that is inexpensive to manufacture, easily assembled, efficient in operation, rugged in construction, that may be applied to the car with a minimum of time and expense, and that is not likely to become broken or get out of order.

Other and further objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a longitudinal vertical section of a railway car showing one form of the invention in position therein;

Fig. 2 is a vertical section of a portion of a refrigerator car, showing the invention in position thereon, with parts broken away;

Fig. 3 is a view similar to Fig. 1, showing a still further modified form of the invention in position in the car; and

Fig. 4 is a side elevation of the control mechanism, shown more or less diagrammatically.

It is common practice in refrigerator cars to employ bulkheads or partitions for dividing the car into bunkers or cooling or heating compartments, which, for convenience of description, will be termed temperature changing compartments, and freight compartments, with permanent openings in or above and below the bulkheads for the circulation of air through the temperature changing and freight compartments. Such a construction is objectionable because, no means being provided for controlling the flow of air through the openings, the temperature in the freight compartment may vary greatly from the requirements for transporting the contents of the car without damage and consequently excessive consumption of the temperature changing agent may result, and where a heating agent is employed the freight compartment may be maintained at such a temperature as to be deleterious to the freight, especially in case of perishable goods such as fruit and the like.

The herein described invention seeks to eliminate this difficulty by the provision of means for automatically controlling the circulation of air between the freight and temperature changing compartments, and thereby maintaining a predetermined temperature in the freight compartment.

Referring now to the drawings, in Fig. 1 is disclosed a railway refrigerator car, shown more or less diagrammatically. Extending transversely of the car, preferably at each end thereof, are the bulkheads or partitions 11 and 12 which form the temperature changing compartments 13 and 14 at each end of the car, and the freight compartment 15 in the central portion of the car. The compartments 13 and 14 are provided with a cooling or heating agent as occasion may require, depending on the season of the year.

Suitable means are provided for permitting the circulation of the air through the different compartments and for preventing this circulation. As shown, ventilating openings are provided above and below or in the upper and lower portions of the bulkheads 11 and 12 through which openings the air in the freight compartment circulates to and from the compartments 13 and 14.

Suitable closures are provided for these openings. These closures may be of any convenient form, that shown being in the form of a plurality of louvers for closing the upper opening, and a similar plurality of louvers for closing the lower opening.

It is desirable that the freight compartment be maintained at uniform predetermined temperature. In the form of construction selected to illustrate one embodiment of the invention this is accomplished by the provision of thermo-sensitive means for controlling the operation of the louvers. Any suitable thermo-sensitive means

may be employed for this purpose. In the form of construction shown, which is by way of example only, a sylphon type of thermostat is employed.

In the form of construction shown in Figs. 1 and 3 all the louvers associated with one of the partitions or bulkheads are adapted to be operated simultaneously by a common operating rod.

In one operation of the device, cooling means is placed in the compartments 13, 14 as by filling or partly filling them with ice which is adapted to cool the air coming in contact therewith, thereby setting up circulation of the air from the freight compartment 15 through the upper opening into the cooling compartment and back through the lower opening in the partitions when the louvers are in open position. When, however, the temperature in the freight compartment 15 falls below a predetermined minimum the fluid in the bellows or sylphon 27 will contract and through the resiliency of the bellows and the air pressure on the same, the lever 42 will be operated to close the openings, which will prevent further circulation of the air through the cooling compartments until the temperature within the compartment 15 rises above a predetermined maximum.

When the temperature in the compartment 15 rises above a predetermined maximum the fluid in the sylphon will vaporize and expand the sylphon against its resiliency, and the air pressure on the same, thereby operating the levers 42 for opening the louvers.

In the form of construction shown in Fig. 1, a separate thermo-sensitive means is employed for operating the louvers associated with each one of the bulkheads or partitions. As shown, the louvers 33 for the lower opening 34 are connected together by the operating rod 35 which in turn is attached to an operating arm 36 of the lower louver 37 for the upper opening 38. The louvers 39 for the opening 38 are connected together by a common operating rod 41 which is attached at one end to the operating arm 36 and at its opposite end to a lever 42 pivoted as at 43, see Fig. 4. The bracket 28 pivotally engages the lever 42 for forcing the same downwardly for opening the louvers. A spring 44 will normally open the louvers in case of failure of the temperature regulation mechanism.

In order to locate the sylphon 27 where it will interfere to a minimum with the space in the freight compartment, a pocket 45 may be formed in the ceiling 46 for receiving the same. As shown in Fig. 2, the sylphon is provided with a base 47 which is adapted to be attached to the frame member 48 forming the pocket 45. The base 47 is bent downwardly as at 49 and has the lever 42 pivoted thereto as at 43. The outer end of the base 47 may, though not necessarily, be bent to conform to the inclined frame member 51 and may then be bent downwardly as at 52 and provided with an opening 53 which constitutes a guide for the lever 42 which extends through said opening.

In Figs. 3 and 4 is shown more or less diagrammatically a temperature controlled electrically operated means for controlling the operation of the louvers. In the form of construction shown, a pair of solenoids 82 and 83 having movable cores 84 and 85 are employed for this purpose. The movable cores 84 and 85 of these solenoids are connected to opposite ends of a lever 86 which is adapted to open and close the louvers 87 through a common operating rod 88 and arms 89. The parts are so constructed that when one of the solenoids is energized the lever 86 will be moved in one direction to open the louvers and when the other solenoid is energized the lever 86 will be moved in the opposite direction to close the louvers.

The solenoids are adapted to be energized by an electric current from any suitable source. For the purpose of illustration a storage battery 91 is employed. A suitable thermostat is employed for opening and closing the circuit. As shown, a bi-metal thermostat 92 is employed which is adapted to engage either the contact 93 or the contact 94. The parts are so arranged that when the temperature within the freight compartment rises above a predetermined maximum the thermostat blade 95 will move to the right in Fig. 4, into engagement with the contact 94, thereby closing the circuit through the solenoid 82.

When the solenoid becomes energized the core 84 will be drawn inwardly for operating the arm 86 for opening the louvers.

Preferably, though not necessarily, the louvers are so pivoted that when in open position those for the upper opening will direct the air downward in the cooling chamber and those for the lower opening will be turned to direct the cool air upward in the freight compartment.

It is often desirable to maintain the ends of the car at different temperatures as where the car is loaded with freight that requires different temperatures for the purpose of preserving the goods. In order to accomplish this function, the louvers at the ends of the car are independently operated.

In order to prevent unnecessary discharge of the battery, suitable means are provided for opening the circuit after the louvers have been operated. As shown, the cores 84 and 85 are extended and may be provided at their inner ends with brass or rubber caps 96 and 97 whereby they will engage contact members 98 and 99 for opening the circuit. The contact members 98 and 99 are normally held in engagement with the contact members 100 and 101 by light springs 102 and 103.

The thermostat is located in the freight compartment, and in the operation of the device, assuming the parts to be in the position shown in Fig. 4, the thermostat will move to the left and engage the contact 93 to close the circuit through the solenoid 83 when the temperature in said compartment falls below a predetermined minimum. The current through the solenoid 83 will energize the same and cause the movable core 85 to move toward the right, thereby operating the arm 86 for closing the louvers. This movement will withdraw the core 84 from the solenoid 82 which in turn will permit the contact member 98 to engage the contact member 100 thus closing the circuit at this point so that the solenoid 82 will be energized when the thermostat blade 95 engages the contact 94. The final movement of the core 85 to the right will cause the same to engage the member 99, thus opening the circuit through the solenoid 83. When the temperature in the freight compartment rises above a predetermined maximum the thermostat will move to the right and engage the contact 94 to close the circuit through the solenoid 82, thereby energizing the same for opening the louvers.

I claim as my invention:

1. In a railway car having a compartment for containing a temperature changing agent and a freight compartment, a partition between said compartments, said partition having an opening therethrough, a closure for said opening, electrically operated mechanism comprising a pair of solenoids having movable cores, and means for connecting said cores to said closure for positively operating the same in both directions, switches operated directly by said cores for controlling the energizing of said solenoids, and thermo-sensitive means for controlling the operation of said mechanism.

2. In a railway car having top, bottom side and end walls and a partition adjacent to each end wall and spaced therefrom to form a cooling compartment, said partitions having openings at their upper and lower portions, the combination of closures for said openings, means connecting all of the closures at one end of said car for operating same independently of those at the other end of the car, the closure for the lower opening when in operative position directing the air upwardly into the freight compartment and the closure for the upper opening when in operative position directing the air downwardly into the cooling chamber, and means adjacent the top wall at each end of the car operable independently of each other for controlling the opening and closing of said closures in response to thermal changes at each end of said car.

3. In a railway car having top, bottom and side walls and a partition at each end of said car provided with openings at their upper and lower portions and closures for said openings, the combination of means for operating said closures and thermo-sensitive means for controlling the operation of said first named means, said first named means comprising a pair of solenoids at each end of the car, levers secured to each of said closures and links connecting the cores of said solenoids with said levers whereby when one solenoid of each closure is energized said closures will be opened and when the other solenoid is energized, said closures will be closed, switches operated directly by said solenoids for controlling the energizing of said cores, and thermo-sensitive means for controlling the energizing of said solenoids.

4. In a railway car having a temperature conditioning compartment and a freight compartment, a partition between said compartments, said partition having an opening through its upper portion and an opening through its lower portion, a closure for each opening, means for pivoting said closures so that when in open position, the closure for the upper opening will direct air downwardly in the temperature conditioning compartment and the closure for the lower opening will direct air upward in the freight compartment and electrically operated mechanism for positively operating said closures in both directions.

5. In a railway car having a cooling and a freight compartment, a partition between said compartments, said partition having an upper and a lower opening therethrough, a closure or closures for each of said openings, each closure comprising louvers that when in open position will direct the warm air from the freight compartment downward in the cooling chamber and will direct the air from the cooling chamber upward in the freight compartment, electrically operated mechanism for operating each of said closures in both directions and thermo-sensitive means for controlling the operation of said mechanism.

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