Aug. 9, 1932. E. J. LOCKWOOD 1,870,685

REFRIGERATOR TRUCK BODY

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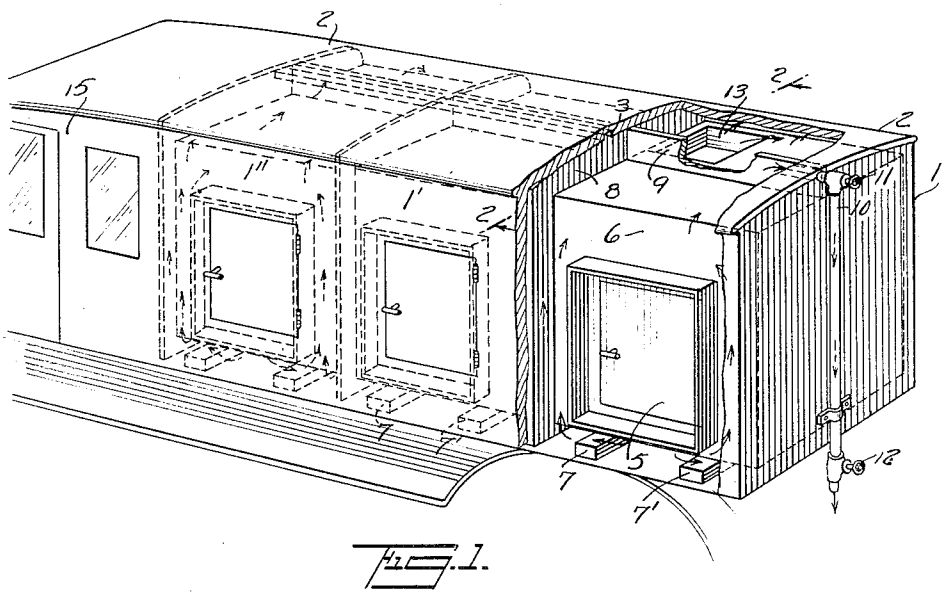

FIG. 1.

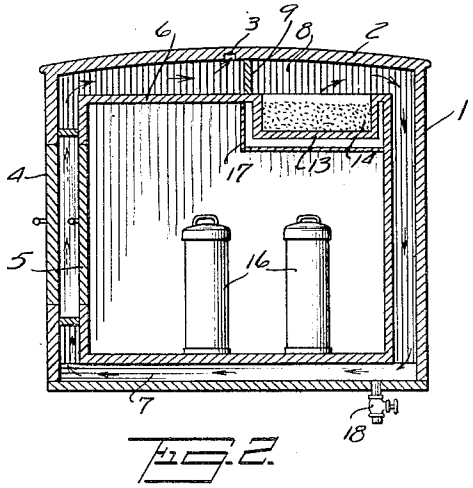

FIG. 2.

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REFRIGERATOR TRUCK BODY

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It is the object of my invention to design a truck body adapted for horse drawn and motor propelled vehicles, such as railroad cars, boats, aircraft and the like which will provide a maximum amount of refrigeration for the amount of refrigerant used. In my design and system I do not use any mechanical or electrical self-contained apparatus to create my refrigerant but I use material other than water ice, namely solidified gas such as carbon dioxide and the like. It is my object to design a body of this type suitable for the use of such solidified gas refrigerant in order to reduce the necessary body weights which are required for mechanical, electrical, water ice or can container refrigerant systems and in this way I reduce the working loads on my truck mechanism and chassis. It is my further object in my invention to obtain the maximum safety with the type of solidified gas refrigerant used so that none of this gas when vaporized can possibly be injurious to the drivers or operators. Also by the elimination of refrigerant which when heated turn into water or liquid such as water ice and the like I eliminate the wet conditions in and about the truck body which cause oxidation and deterioration of the parts. A further object of my invention is to design a structure which will lend itself to the control of the flow of the vaporizing gas under pressure while at the same time taking care that the pressure does not become sufficiently great to cause rupture of the parts. Moreover it is one of my chief objects to so construct my body that for a given amount of solidified gas refrigerant a maximum amount of refrigerated surface will be utilized for a minimum amount of refrigerant. It is my further object also to locate the mass of solidified gas refrigerant at a critical point in the body compartments so that upon the application of heat to it due to the opening of the doors, the leakage through the other openings in the outer body, and otherwise, a definite flow of vaporized gas refrigerant throughout and about the portion of the body desired to be refrigerated will take place. That is to say, I proportion the amount of my solidified gas refrigerant with the other proportions of the refrigerating container, the truck body, the door openings, the cubical body of space in the container itself and the other material factors in such fashion that for a given amount of refrigerant I obtain the maximum amount of refrigeration with the minimum amount of waste. In other words, it has been my purpose in my invention to obtain the maximum amount of commercial efficiency per pound of refrigerant used.

My invention will be more readily understood by reference to the accompanying drawing in which like numbers refer to like parts in the several views.

Fig. 1 is a perspective view, partially in phantom. Fig. 2 is a sectional elevation on the line 2—2. By reference to Fig. 2 it will be seen that the principal feature of my device consists in circulating the vaporized gas arising from the solidified gas refrigerant 14, situated in the container 13, along the lines indicated by the arrows completely circulating and surrounding the inner refrigerated chamber 6 of the truck body. In utilizing solidified gas refrigerants in truck bodies and the like in the past the practice has been to simply place a container such as 13 at the top of the refrigerated chamber 6 and the container 13 was provided in such cases with holes or with pipes leading to various parts of the refrigerated space 6. This method was extremely wasteful in that as soon as the doors 4 and 5 were opened to remove the contents of the truck such as ice cream and the like the hot atmospheric air caused the solidified gas 14 to rapidly sublime and to allow the gas to flow into the refrigerated chamber, then to flow out through the doors on to the ground, also against the face and body

of the operator. It is, of course, apparent that in such a system enormous amounts of gas are wasted. In my system by preventing the introduction of the gas directly into the chamber 6 and by circulating it about and around said space, it is at once apparent that I am saving this gas which was heretofore wasted and at the same time obtaining the maximum amount of refrigeration, removing all the cold units available in the gas and subjecting it by circulation control means, hereafter explained, to a definite control for any given amount of refrigeration desired.

It will be seen that my truck body may consist of one or more separate sections, 1, 1′ and 1″, having roof portions 2, having a co-extensive channel section 3, connected at its rearward end to a pipe 10 through a valve 11, the bottom of pipe 10 being equipped with the valve 12. The outer portion of the body 1 is provided with an access door 4 giving access to the inner cell portion 6 which in turn is equipped with the door 5. Of course it is evident that the doors 4 and 5 may be, if desired, only one door. The inner chamber 6 is mounted on the stringers 7 and 7′ as shown. I also provide the valve 18 in the bottom of the outer section between the stringers 7 and 7′ for the purpose of draining any possible moisture which may develop between the outer and inner sections due to the condensation of the gas or any other moisture and to afford circulation of the gas under the bottom thereof. Also the upper portion of the chamber 6 is provided with a securely supported receptacle member 13 containing the solidified gas refrigerant 14. The material being shipped such as ice cream and the like may be in the containers 16, as shown. Each of the sections 1, 1′ and 1″ may be separated completely by the partitions 8 but preferably connected as stated by the common channel 3 for the escape of the waste gas after removal of all its cold units. The top sections of each compartment are completely separated by the laterally extending baffle board 9 as shown.

I have also indicated the cab portion of the truck body 15 in the drawing. Also I may use various designs of my receptacle 13 and it may also be insulated from the refrigerated space 6 by felt or by other non-conductor or there may be provided an air space between the receptacle proper and the inner chamber 6 and by providing manual or other means such as a shutter or the like indicated at 17 for regulating the amount of exposed surface between the refrigerated space and the bottom and sides of the receptacle 13. It must be understood that while the purpose of the shutter 17 is for controlling the volume of atmosphere in chamber 6 with regard to its contacting the surface of the receptacle 13, this shutter also may be used to control the rate of flow or permeation of the evaporated gas from the receptacle 13 which I may permit to flow directly into chamber 6 by simply perforating a portion of the sides or bottom of the receptacle 13 (said perforations not being shown on the drawing) or in any other suitable manner.

The operation is as follows: The products to be refrigerated having been placed in the chamber 6, a definite amount of solidified gas is placed in the receptacle 13 and so for each of the other sections of the truck body if such be the case. At the beginning the interior is, obviously at about atmospheric temperature, the doors 4 and 5 having been opened and are now closed. A certain amount of the refrigerant 14 vaporizes and circulates upward but cannot go out through the channel 3 by reason of the baffle board 9. It therefore proceeds in the other direction downward along the side of the body between the outer and inner walls along the bottom, up on the other side, between or about the doors and across the top to the baffle 9. This gas is facilitated in this circulation not only by reason of the pressure created by its expansion but also the weight of the gas itself tends in the first instance to cause it to drop down into the vertically disposed channel. Moreover, when it approaches channel 3 and tends to go out to the rear end of the truck, I have provided a downward disposed pipe section 10 with valve 12 which creates a definite siphon condition, if necessary, to expedite the flow in the initial period for quick cooling which flow can, of course, be regulated by the valves 11 and 12. I also provide an outlet at the top of the pipe 10 on the other side of the valve 11 (not shown in the drawing). Of course it must be understood that I can introduce outlets in the outer cell of the body or at any point in the sides, roof or bottom thereof which I may deem necessary for any given condition. It is apparent that the cold carrying gas has been introduced to all points in contact with the chamber 6, which I may desire to refrigerate and have simultaneously utilized the maximum amount of cold units for a given quantity of gas. Also it will appear that I have made available the control of the gas (1) by reason of the construction of the receptacle 13, (2) by reason of the gas being confined under pressure, (3) by reason of the natural gravity of the gas and (4) by reason of the siphon effect on the rear. All of these methods of control can and are utilized depending upon the various factors in the design of the body proper and the amount of refrigerant and the location of the receptacle and the nature of the commodity to be refrigerated. It is, of course, apparent that I may select a critical location either at the top, sides or bottom or the chamber 6 for the placing of the receptacle 13 by moving the baffle 9 and the channel 3 and by other changes, all of which

are within the scope and purport of my claims.

The preferred embodiment of my invention is shown in the drawing where the receptacle is located towards the rear, i. e. away from the door of the top of the refrigerated space 6, it is in this position that I can most readily secure the maximum amount of refrigeration for a given volume in the chamber 6 with the minimum amount of the solidified refrigerant. It must also be understood, of course, that where commodities such as meat, fruit and the like are being transported I may provide an access from the receptacle 13 and through the shutter control portion 17 so that the vaporized gas may flow directly into the chamber 6 and come into direct contact with such commodities in cases where solid carbon dioxide is used in the refrigerant, because the gas has a definite preserving effect on such commodities.

Having thus described my invention what I claim and desire to secure by United States Letters Patent is:—

1. In a refrigerator truck body, containing a plurality of sections, each section having commodity access means and each containing solidified gas refrigerant, the vaporization from which is free to circulate coextensive with the hollow shell structure of said body and of each of said sections.

2. In a refrigerator truck body having an outer air exposed portion, an inner unexposed portion, means of access to said inner portion, a receptacle for reception of a solidified gas refrigerant, the top of said receptacle allowing the vapor from said solidified gas refrigerant contained in said receptacle to pass to the channels formed by the space provided by said outer and inner portions to substantially surround said inner portion up to a point in the roof of said outer portion, and channel exhaust means extending rearwardly therefrom.

3. In a refrigerator truck body having an outer air exposed portion, an inner unexposed portion, means of access to said inner portion, a receptacle for reception of a solidified gas refrigerant, the top of said receptacle allowing the vapor from said solidified gas refrigerant contained in said receptacle to pass to the channels formed by the space provided by said outer and inner portions to substantially surround said inner portion, up to a point in the roof of said outer portion, and channel exhaust means extending rearwardly therefrom, a valve and pipe member connected to the end of said channel and extending downwardly therefrom.

4. In a refrigerator truck body having a plurality of sections, each section having an outer air exposed portion, an inner unexposed portion, means of access to said inner portion, a receptacle for reception of a solidified gas refrigerant, the top of said receptacle allowing the vapor from said solidified gas refrigerant contained in said receptacle to pass to the channels formed by the space provided by said outer and inner portions, to substantially surround said inner portion, up to a point in the roof of said outer portion, and channel exhaust means extending rearwardly therefrom, a valve and pipe member connected to the end of said channel and extending downwardly therefrom.

5. In a refrigerator truck body having an outer portion and an inner portion, the inner portion having near its top a receptacle, said receptacle containing solidified carbon dioxide gas, the top of said receptacle being connected to the channels created by said outer and inner portions, said channels being separated by a baffle plate to direct the flow of the vaporized gas of said refrigerant into a rearwardly extending exhaust channel, said rearwardly extending exhaust channel being equipped with siphon means at its outward end and also being connected with a plurality of sections of said truck body.

6. In a refrigerator truck body containing an outer portion, an inner carrier portion, said inner carrier portion having therein a receptacle containing a solidified gas refrigerant, the vapor from which is free to circulate in the channels between the outer and the inner portion of the body with means for controlling the rate and volume of said flow and with means for permitting a predetermined portion of said vapor to seep into the inner portion thereof.

7. In a refrigerator truck body having an outer air exposed portion, an inner unexposed portion, means permitting access to said inner portion, a receptacle for the reception of a solidified gas refrigerant, the top of said receptacle allowing the vapor from said solidified gas refrigerant to pass to the channels formed by the space provided by said outer and inner portions, to partially surround said inner portion, up to a point in the roof of said outer portion, and channel exhaust means extending therefrom.

8. In a refrigerator truck body having an outer air exposed portion, an inner unexposed portion, means of access to said inner portion, a receptacle for the reception of a solidified gas refrigerant, the said receptacle allowing the vapor from said solidified gas refrigerant contained in said receptacle to pass to the channels formed by the space provided by said outer and inner portions, to completely surround said inner portion, up to a point in the roof of said outer portion, and channel exhaust means extending rearwardly therefrom, a valve and pipe member connected to the end of said channel and extending downwardly therefrom.

9. In a refrigerator truck body having an outer portion and inner portion, a receptacle containing solidified carbon dioxide gas, said

receptacle connected to channels created by the outer and inner portions of said body, said channels being separated by baffle plates to direct the flow of the vaporized gas of said refrigerant into an exhaust channel, said channel being equipped with siphon means at its outward end and said exhaust channel being connected with a plurality of sections of said truck body.

In witness whereof, I have hereunto set my hand to these specifications this 29th day of March, 1928.

EDWIN J. LOCKWOOD.