

March 23, 1943.

R. K. SCHWEBS

2,314,463

REFRIGERATOR CAR

Filed March 24, 1941

4 Sheets-Sheet 1

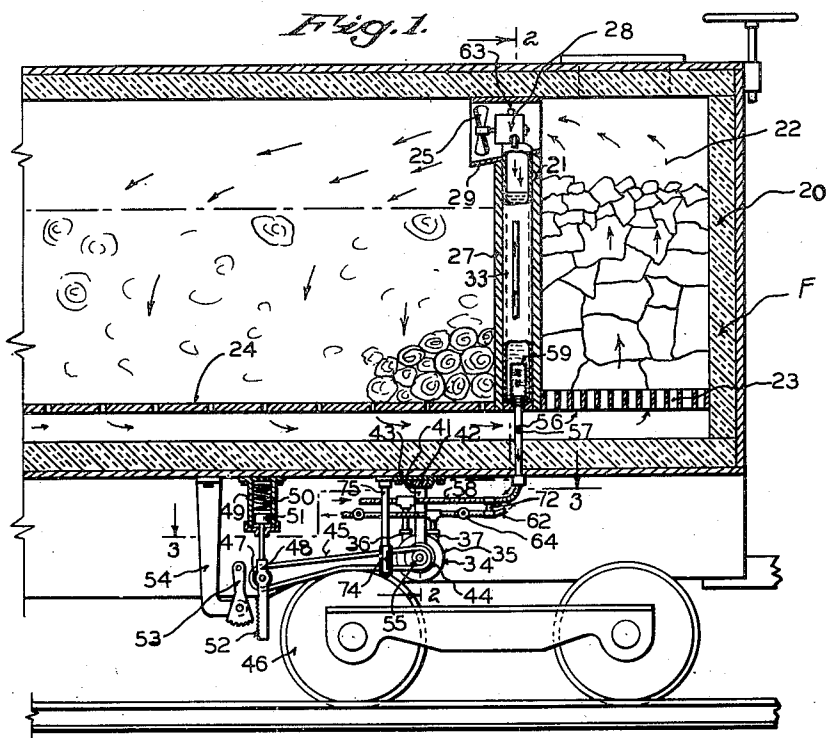


Fig. 2.

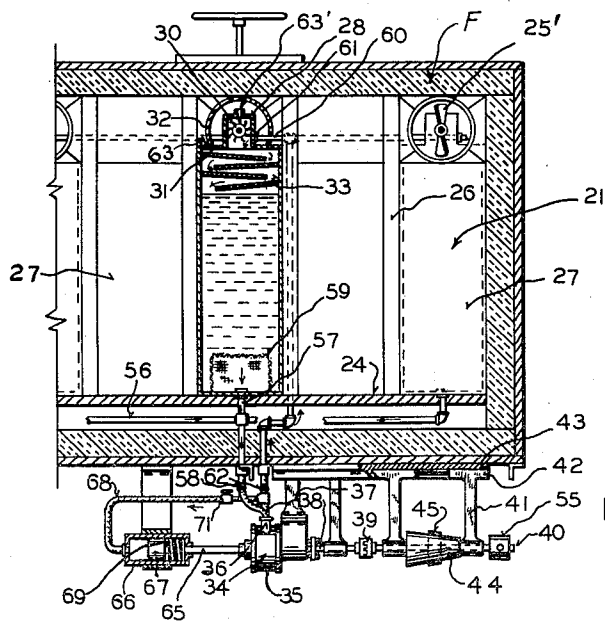
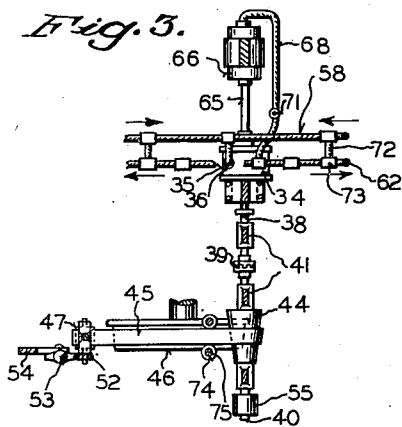


Fig. 3.



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Fig. 4.

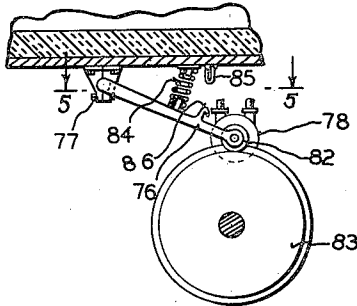


Fig. 5.

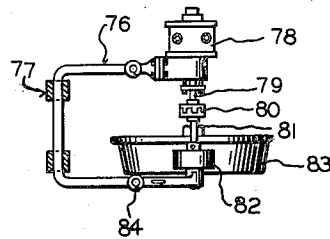


Fig. 6.

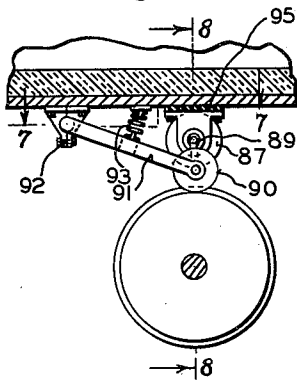


Fig. 7.

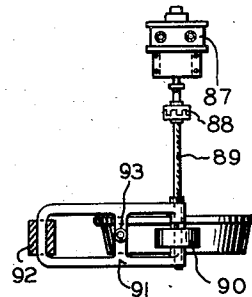


Fig. 9.

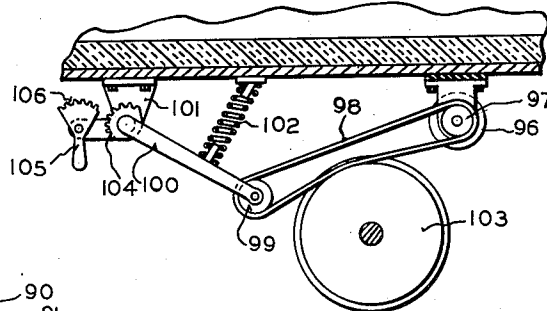
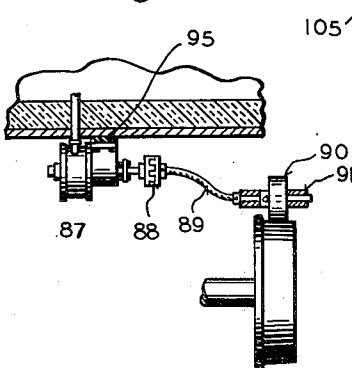


Fig. 8.



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Fig. 10.

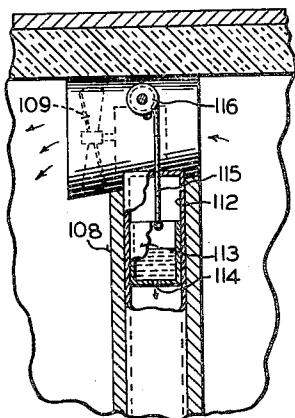


Fig. 11.

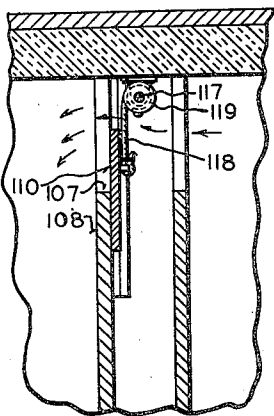


Fig. 12.

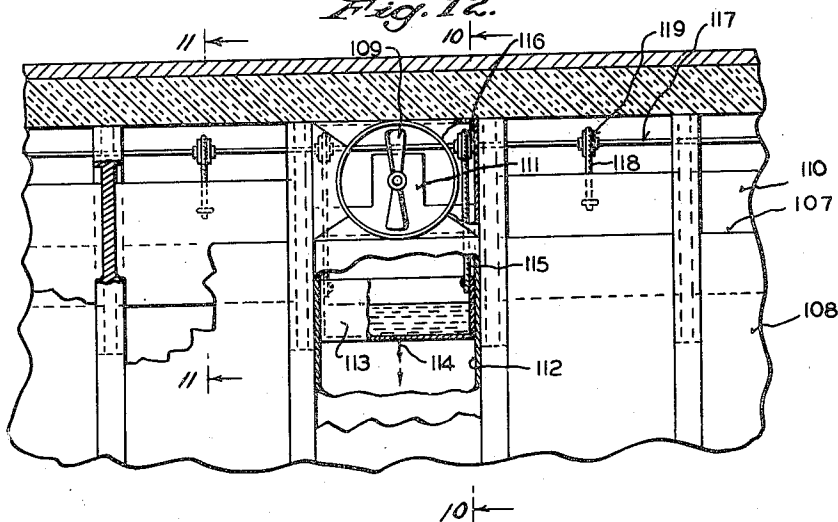
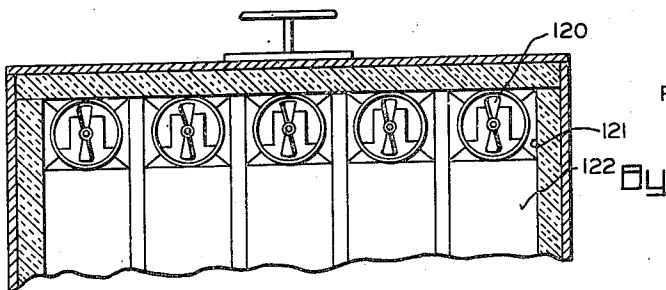


Fig. 13.



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Fig. 14.

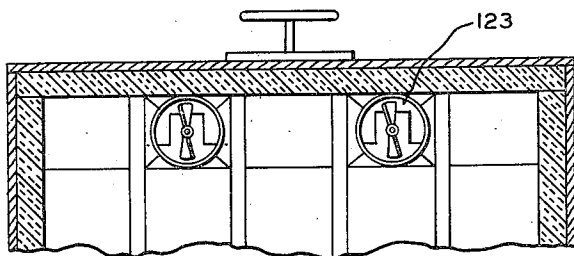


Fig. 15.

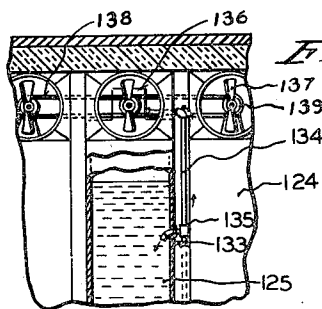
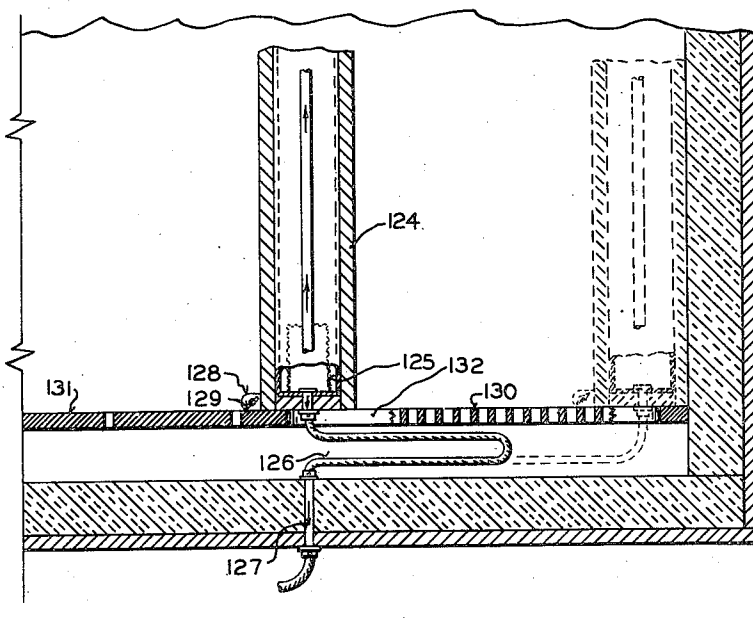


Fig. 16.

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UNITED STATES PATENT OFFICE

2,314,463

REFRIGERATOR CAR

Robert Kent Schwebs, Hortonville, Wis.

Application March 24, 1941, Serial No. 384,887

18 Claims. (Cl. 62—24)

This invention appertains to refrigerator freight cars and is an improvement over my prior Patents Nos. 2,136,894, 2,159,406, and 2,203,108, issued to me, respectively, on November 15, 1938, May 23, 1939, and June 4, 1940.

One of the primary objects of my present invention is the provision of a pump for delivering oil or like fluid under pressure to a turbine for operating air circulating fans disposed above the transverse partitions for the bunkers, with an oil tank or sump arranged below the turbine and above the pump for freely receiving the spent oil from the turbine and for maintaining a constant head of liquid on the pump.

Another salient object of my invention is to provide means for arranging the oil return tank or sump directly in the transverse partition for the bunkers, whereby the oil will be maintained substantially at a constant temperature and substantially unaffected by outside conditions, so that the viscosity thereof will not materially change under different climatic conditions, and thereby permit an even flow of oil through the system at all times.

Another important object of the invention is the use of an automatic reversing pump for the oil, whereby, irrespective of the direction of rotation of the pump from the car wheels, the oil will flow in one direction to the turbine without the use of a complicated valve system.

A further object of the invention is the provision of means for driving the pump in such a manner from the car wheels that such means can be lifted out of driving engagement with the car wheels to allow the convenient operation of the pump from an extraneous source of power when the car is standing still, so as to facilitate the pre-cooling of the car.

A further salient object of the invention is to provide means for operating a drive pulley belt for the pump directly from the periphery of one of the car wheels, with a cone pulley connected to the pump shaft over which the belt travels, means being provided for shifting the cone pulley in accordance with the speed of the freight car to bring about the delivery of a constant flow of oil from the pump to the turbine.

A further important object of my invention is to provide a flexible drive shaft connection between a wheel driven from the freight car and the pump, whereby to effectively reduce end thrust and the like on the pump shaft bearings.

A still further object of my invention is the provision of sliding gates for controlling the openings above the transverse partition of the bunkers on each side of the air circulating fans, with

means for automatically operating the gates in accordance with the rate of flow of the oil to the return tank or sump.

A still further object of my invention is to provide means for permitting the shifting of the transverse partitions from their normal positions to form the ice bunkers to a position against the end walls of the freight car when the bunkers are not needed and when it is desired to fill the entire car with freight.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a fragmentary, longitudinal, sectional view through a refrigerator freight car having my novel appliance incorporated therewith, and showing one form of drive between the reversible pump and one of the car wheels.

Figure 2 is a fragmentary, transverse, sectional view through the freight car, taken on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a horizontal, sectional view taken on the line 3—3 of Figure 1, looking in the direction of the arrows, illustrating the drive mechanism for the pump of the type shown in Figures 1 and 2.

Figure 4 is a fragmentary, detail, sectional view illustrating another form of operating the pump from one of the car wheels.

Figure 5 is a horizontal, sectional view taken on the line 5—5 of Figure 4, looking in the direction of the arrows.

Figure 6 is a fragmentary, detail, sectional view illustrating a still further form of operating the reversible pump from one of the car wheels.

Figure 7 is a fragmentary, detail, horizontal, sectional view taken on the line 7—7 of Figure 6, looking in the direction of the arrows.

Figure 8 is a detail, fragmentary, transverse, sectional view taken on the line 8—8 of Figure 6, looking in the direction of the arrows.

Figure 9 is a fragmentary, longitudinal, sectional view illustrating a still further modified form of drive for the pump.

Figure 10 is a fragmentary, longitudinal, sectional view taken through the body of the freight car on the line 10—10 of Figure 12, looking in the direction of the arrows, illustrating the means employed for controlling the sliding gates in accordance with the rate of flow of the oil to the return tank or sump.

Figure 11 is a view similar to Figure 10, the

view being taken on the line II—II of Figure 12, looking in the direction of the arrows.

Figure 12 is a fragmentary, transverse, sectional view through the body of a freight car, illustrating the means employed for automatically operating the gates.

Figure 13 is a fragmentary, transverse, sectional view through the body of a freight car, taken on a smaller scale than Figures 10 to 12, inclusive, and showing the use of a multiplicity of air circulating fans above the transverse partition.

Figure 14 is a view similar to Figure 13, but showing the use of an air circulating fan arranged on each side of the longitudinal center of the freight car.

Figure 15 is an enlarged, fragmentary, longitudinal, sectional view through the body of a freight car, illustrating one means for permitting the shifting of the transverse partition from its normal position to a position against one end wall of the car.

Figure 16 is a fragmentary, transverse, sectional view through the body of a freight car, taken on the same scale as Figures 13 and 14, and showing the use of several air circulating fans, with a bypass for the fluid leading to the return oil tank or sump.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter F generally indicates a refrigerator freight car, and the same embodies the customary insulated body having formed at each end thereof, by transverse partitions 21, bunkers 22 for the reception of ice in the summertime or a heater in the wintertime. The ice or the heater, as the case may be, rests on a grating 23 arranged above the level of the car floor. The body of the car is, likewise, provided with a suitable perforated false bottom 24 on which the foodstuffs to be shipped are placed.

In accordance with my invention, I arrange above the partition 21 one or more air circulating fans 25. The fans are adapted to draw air through the bunker and circulate the same over and down through the foodstuffs in the car. It is to be understood that one or more fans are provided at each end of the car, and the operation of the fans is such as to draw air from under the false bottom 24, through the bunker, and over the top of the foodstuffs. The air may be circulated in an opposite direction if so desired, that is, the air may be drawn from the top of the car and circulated down through the bunkers, and under the false bottom 24. In the Figures 1 and 2, I have shown three air circulating fans at each end of the car.

The transverse partitions 21 can be formed in any desired manner, but, as shown, the partitions include equidistantly spaced uprights 26 extending from the top to the bottom of the car, and the spaces between the uprights are closed by inner and outer panels 27. These panels terminate short of the top of the car to provide air circulating spaces, and the air circulating fans 25 are arranged within certain of these desired spaces above the panels. In Figures 1 and 2, a fan 25 is shown at the center of the car, and a fan 25' on each side of the car, and the spaces between the fans can be left open or closed, as may be preferred. Each fan 25 and 25' is adapted to be driven by a turbine 28. If preferred, means can be provided for adjusting the position of the fan and the turbine, and, if so desired,

the same can be mounted within a suitable hood 29.

Each turbine 28 can include a rotor 30 having blades or buckets 31, and this rotor can be mounted in a housing 32, which opens into the upper end of the liquid return tank or sump 33. There can be, if so desired, a return tank or sump for each turbine, and it is to be noted that these return tanks or sumps are arranged within the transverse partition 21. The tanks or sumps are hidden from view by the inner and outer panels 27 and the uprights 26. Hence, the tanks are also protected against blows. I lay particular stress upon the arrangement of the return tanks or sumps in the partitions, and the purpose of this arrangement will be more fully set forth.

Also, in accordance with my present invention, I provide novel means for supplying fluid under pressure to the turbines from an automatic reversible rotary pump 34. This automatic reversing pump is preferably of the type manufactured by the Tuthill Pump Company, of Chicago, Illinois, and this pump is of a well-known character and will not be described in detail, but it is to be noted that the same includes a stator casing 35 having an oil inlet 36 and an oil outlet 37. The pump shaft 38 extends outward from one end of the stator casing, and the pump shaft has connected directly therewith through the medium of a flexible coupling 39 (of the Lovejoy type) a drive shaft 40. The pump and the shafts are suspended by means of hangers 41 from a slide head 42, for a purpose which will be later set forth. At the present time, it is to be noted that the slide head 42 is mounted for free sliding movement in a guidetrack 43 rigidly secured to the lower surface of the body of the freight car.

The shaft 40 has keyed or otherwise secured thereto between certain of the hangers 41 a cone-shaped drive pulley 44. The cone pulley 44 is driven from a pulley belt 45, and this belt is, in turn, driven from one of the car wheels 46 of the freight car. The belt 45 is also trained over an idler pulley wheel 47 carried by a depending supporting bar 48. The pulley wheels 44 and 47 are arranged on opposite sides of the car wheel 46, and one run of the belt 45 engages the tread of the car wheel.

The belt is normally held down against the tread of the car wheel by a spring 49. This spring can be housed within a cylinder 50, and the supporting rod 48 can have secured thereto a piston 51 for movement in the cylinder. The spring 49 engages one end of the cylinder and pushes down against the piston. Means can be provided for raising the pulley belt above the car wheel 46 and out of driving contact therewith. This means can consist of a rack 52 formed on one edge of the bar 48, and a sector lever 53 can be employed for engaging the rack to raise the bar. The lever can be mounted in any preferred manner from the car, such as by a bracket 54.

While I have shown the belt operated from the tread of the car wheel, it is to be understood that the same can be operated from any other moving part of the car truck.

When a car is standing still, it is highly desirable in some instances to pre-cool the car or the load contained therein, and, hence, by raising the pulley belt above the car wheel, the drive shaft 40 can be conveniently operated from some external source of power, such as a small internal combustion engine. To permit the con-

nection of the shaft 40 with the power shaft of the engine, the shaft 40 can have keyed or otherwise secured thereto a drive pulley wheel 55.

Extending across the bottom of the freight car is a return oil header pipe 56, and this pipe has communicating therewith branch pipes 57, which lead to the bottoms of the oil return tanks or sumps 33. The return header pipe 56 is, in turn, connected with the inlet 36 of the pump through the use of a flexible hose 58. The bottoms of the oil return tanks 33 can have arranged therein relatively large screens 59 to filter the oil prior to the return thereof to the pump. A feed header pipe 60 is arranged adjacent the turbines 28, and this feed header pipe 60 has communicating therewith nozzles 61, which extend into the casings 31 of the turbines. The feed header pipe 60 can be connected with the oil outlet 37 of the pump 35 by a flexible hose 62.

Referring to Figure 2, it can be seen that the nozzles 61 are so arranged that the oil under pressure will impinge against the blades of the rotors, and the spent oil will enter directly into the return tanks or sumps 33 from the turbine casings. Hence, there is no back pressure on the feed oil line, and as the sumps are arranged below the turbines, the separation of air from the oil in the tanks is facilitated, and the tanks and the casings for the turbines can be provided with air escape and inlet openings 63 and 63'. By this arrangement, a full head of oil on the pump is insured at all times. In order to prevent foaming of the oil and to assure the escape of air therefrom, oppositely inclined baffle plates 33' can be arranged in top of the sumps 33 below the turbine outlets.

As heretofore stated, only one end of the freight car is shown, and the return hose 58 and the feed hose 62 extend to both ends of the car. The feed hose 62 on opposite sides of the pump can carry hand-operated control valves 64, so that the flow of oil to either or both ends of the car can be cut off.

I lay great stress on the arrangement of the oil return tanks or sumps 33 in the transverse partitions 27, as by this arrangement of parts, the oil is maintained substantially at an even temperature at all times, unaffected by outside climatic conditions. Thus, the consistency of the oil will remain substantially constant at all times.

From the description so far it can be seen that I have utilized an automatic reversible pump in my air circulating system, with novel means for operating the pump from a belt, which is maintained in driving contact with one of the car wheels.

As the pump is driven from a car wheel, it will be seen that the pump will be driven at different speeds according to the speed of travel of the freight car. Generally, it is advisable to drive the pump at a constant speed, irrespective of the speed of travel of the car, and I prefer to provide means for insuring the constant speed of rotation of the pump, irrespective of the speed of travel of the car. This can be accomplished by the use of a governor or some other suitable mechanism.

In Figures 1, 2, and 3, I have shown one form of means for accomplishing this purpose. The stator casing 35 of the pump 34 can have rigidly connected thereto a piston rod 65 leading into a cylinder 66. This rod 65 is connected to a piston 67 operating in the cylinder, and one end of the cylinder has communicating therewith a feed hose 68 leading from the main feed hose 62.

Hence, the piston is affected by the oil pressure in the feed oil line.

If the speed of operation of the pump increases, there will be a greater pressure in the line 62 and a greater oil pressure against the piston 67, and this oil pressure will tend to shift the pump, the shafts 38 and 40, and the cone pulley 44 to the right (see Figure 2). This is permitted in view of the fact that the slide bar 42 is mounted in the guideway 43 for movement. The shifting of the pump 35 and the cone pulley 44 will allow the pulley belt to ride up on the large side of the cone pulley 44, and this will decrease the speed of the pump. When the oil pressure decreases, the pulley and the pump will be shifted back by a spring 69. A hand valve 71 can be arranged in the hose 68 for the cylinder 66 to shut off the flow of oil to the cylinder, when such may be desired.

As is also shown in Figures 1 and 2, by-pass hoses 72 can connect the feed hose line 62 with the return hose line 58 on each side of the return pump inlet 36. Relief valves 73 are provided for controlling the flow of fluid through the by-pass hose 72, and, hence, when the pressure in the feed hose 62 exceeds a certain degree, the valve 73 will function to allow the liquid to by-pass from the feed hose 62 to the return hose 58.

In order to prevent the shifting of the pulley belt 45 during the movement of the cone pulley 44, guide rollers 74 are arranged on each side of the belt adjacent said cone pulley. These guide rollers can be carried by depending rods 75, and these rods are secured to the bottom of the car.

By using the reversible pump 34, I eliminate complicated check valves in the system and difficulties contingent with the use thereof, such as freezing, sticking, and the like.

With the use of my enlarged oil sumps or tanks above the pumps, the complete separation of air from the oil is assured, and, thus, a steady stream of fluid will be delivered to the pump. Where air is mixed with the oil, there is danger of ice forming around the orifices in the nozzles 61 for the turbines, which, in time, would affect the working of the entire system.

When heating devices are used in the bunkers, the oil from the pump can be shut off from one end of the car, and the turbines with the fans will give the necessary circulation for heating.

If preferred, a pump can be provided for each end of the car, and where this arrangement is used, the drive for a pump at one end of the car can be lifted out of driving engagement with the car wheel when it is desired to circulate air from one end only.

Various arrangements other than that shown in Figures 1, 2, and 3 for operating the pump can be employed, and in Figures 4 and 5, I have shown a swinging U-shaped hanger 76 rockably mounted in bearings 77 suspended from the car. The swinging bracket can have directly connected thereto the pump 78, and the pump shaft 79 is connected through a flexible coupling 80 with the drive shaft 81. This drive shaft 81 has keyed or otherwise secured thereto a drive wheel 82, which normally engages the periphery of a car wheel 83. The bracket 76 is normally urged down toward the car wheel by springs 84, so as to insure the proper driving contact of the drive wheel 82 with the car wheel 83.

By lifting the swinging bracket 76 against the tension of its springs 84, the wheel 82 can be

held above the car wheel, and, thus, the wheel 82 can be driven from some suitable external source of power. The bracket can be held in a raised position by moving a link 84 suspended from the bottom of the car over the bill of a hook 86 formed on the bracket.

In Figures 6, 7, and 8, I have shown another form of means for driving a pump. In this form, a pump 87 is rigidly secured to the bottom of the freight car, and its shaft is connected through the medium of a flexible coupling 88 with a flexible drive shaft 89. This drive shaft 89 is operatively connected to a friction wheel 90, which is adapted to be normally held in contact with a car wheel. The friction wheel 90 is carried by one end of a swinging bracket or platform 91, and this bracket or platform is rockably carried by a bearing 92 suspended from the bottom of the car. Spring means 93 is utilized for engaging the bracket or platform to hold the friction wheel 90 in contact with the periphery of the car wheel. This platform can also be held in a raised position by some suitable means, such as the means shown in Figures 4 and 5, when it is desired to drive the pump from an external source of power.

I lay great stress on the use of the flexible drive shaft 89, as by utilizing a flexible shaft, the pump can be readily suspended from the bottom of the freight car, and all shocks thereto will be eliminated. The coupling 88 eliminates all end thrust on the pump shaft bearings. Where necessary or desirable, cushion means 95 can be interposed between the pump and the freight car.

In Figure 9, I have shown a form of drive for the pump similar to that shown in Figures 1, 2, and 3, but in the form shown in Figure 9, no means is provided for changing the speed of the drive from the car wheel to the pump. In this figure, a pump 96 is suspended directly from the bottom of the car, and a driven pulley 97 is operatively connected to the pump shaft. This pulley wheel 97 has trained thereabout a drive belt 98, and this belt is also trained over an idle pulley wheel 99 carried by a swinging bracket 100. The bracket 100 is rockably mounted in bearings 101 carried by the bottom of the car, and the bracket is normally urged downward by coil springs 102. Hence, the pulley belt is normally held in driving contact with the periphery of a car wheel 103.

The bracket 100 can be raised against the tension of the spring 102 when it is desired to lift the pulley belt off the car wheel, so that the pump can be driven by a small internal combustion engine or an electric motor or the like. To permit the lifting of the bracket 100, the bracket can be provided with a sector gear wheel 104, and this gear wheel can be actuated through the use of a swinging lever 105 having formed thereon a sector gear 106 for meshing with the sector gear 104.

Where the pump is driven at different speeds, due to the change of speed of travel of the freight car, I can provide means for controlling the flow of the air circulating through the car. As illustrated in Figures 10, 11, and 12, the spaces 107 above the partition 108 on each side of the air circulating fan 109 can be opened or closed by sliding gates 110. The gates 110 can be automatically actuated according to the rate of flow of the oil from the turbine 111 to the return tank or sump 112.

To bring this about, I slidably mount in the sump a bucket 113 for initially receiving the oil

from the turbine. This bucket has formed therein a relatively small oil escape opening 114. The bucket is suspended in the tank by means of flexible ropes 115, which are trained about guide wheels 116 secured to a shaft 117. This shaft 117 extends transversely across the car above the partition 108 and the sliding gates 110. Each sliding gate has connected therewith a flexible rope 118, which is trained over and secured to a guide pulley 119 secured to the shaft 117.

In operation of this form of my invention, should the speed of the pump increase, a greater quantity of oil will be forced to the turbine, and this oil will be delivered in relatively large quantities to the bucket 113. If the oil cannot escape fast enough through the opening 114, the oil will collect in the bucket, and the weight thereof will carry the bucket down and turn the shaft 117. As the flexible ropes 118 for the gates are wound in a reverse direction over the pulleys 119 from the ropes 115 over the pulleys 116, the ropes 118 will be wound up on the pulleys of the guide wheels 119, and the gates will be raised. This will decrease the circulation of air through the car. The bucket 113 also acts as a baffle and facilitates the separation of air from the oil.

In some instances, it may be advisable to utilize a plurality of air circulating fans, and in Figure 13, I have shown an air circulating fan 120 for each space 121 above the partition 122. In all events, the number of air circulating fans 120 can be increased or decreased without departing from the spirit or the scope of the invention. Thus, in the form of my invention shown in Figure 2, I have illustrated three fans, and in Figure 13, I have shown five fans. As illustrated in Figure 14, two fans 123 can be utilized, and, if desired, these fans can be arranged on opposite sides of the longitudinal center of the car. In all instances, the fans are shrouded or mounted in a suitable hood.

In certain instances, it may be desirable to eliminate the bunkers and to utilize the entire length of the cars for receiving the goods being shipped, and in Figures 15 and 16, I have illustrated shiftable partitions 124. Where shiftable partitions are utilized, the lower ends of the oil return tanks or sumps 125 are connected by flexible hoses 126 with the return oil pipe 127 for the oil pump, and it is also to be understood that a flexible hose is utilized from the oil feed pipe to the turbines.

The partitions are held securely in place in an adjusted position through the use of brackets 128 and screws 129. Obviously, by releasing the screws, the partitions can be shifted back against the end walls of the freight car, as shown in dotted lines in Figure 15. The gratings 130 for the ice can be arranged in the same plane as the false flooring 131 for the freight car, so as to facilitate the easy shifting of the partition. The gratings 130 can be longitudinally slotted, as at 132, to form guideways for the flexible hoses 126 during the shifting of the partition. The shifting of the partition will not affect the working parts of my system in view of the fact that the turbines, fans, and oil sumps are all carried by the partitions. Where stationary partitions are utilized, I prefer to employ rigid pipes in the car, as shown in Figures 1 and 2.

In lieu of utilizing the bypass hoses 62, shown in Figure 1 and 3, I can utilize a bypass pipe 133. This pipe 133 is connected with the feed oil pipe 134 extending to a turbine, and the by-

pass pipe can be extended directly into the oil sump 125. A bypass valve 135 is employed for the bypass pipe 133, and when the pressure of the oil reaches a certain degree, the valve will allow the escape of oil from the pipe line 135 into the sump 125.

In lieu of providing a turbine for each air circulating fan, I can utilize one turbine 136 only (see Figure 16) and drive the other fans 137 from this turbine through any suitable mechanical power transmission, such as belts 138 and pulleys 139, or shafts and gearing.

From the foregoing description it can be seen that I have provided novel means for supporting the oil sumps in the partitions and novel means for operating the oil pumps from a moving part of the freight car.

Various changes in details may be made, providing the same do not depart from the spirit or the scope of the claims. What I claim as new is:

1. In a refrigerator car of the type having a storage compartment and a bunker compartment separate from the storage compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; means for driving the pump from a wheel of the truck of the car, including a pulley belt normally held in engagement with the periphery of said wheel.

2. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment therein, car trucks for the body including car wheels, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; a drive shaft for the pump, a pulley wheel on the drive shaft arranged on one side of the car wheel, an idle pulley wheel arranged on the other side of the car wheel, a pulley belt trained about said pulley wheels for engaging the periphery of the car wheel, and means normally urging the belt into driving contact with said car wheel.

3. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment therein, car trucks for the body including car wheels, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; a drive shaft for the pump, a pulley wheel on the drive shaft arranged on one side of the car wheel, an idle pulley wheel arranged on the other side of the car wheel, a pulley belt trained about said pulley wheels for engaging the periphery of the car wheel, means normally urging the belt into driving contact with said car wheel, and means for lifting the belt out of driving contact with the car wheel, whereby to permit the operation of the pump from an external source of power.

4. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment therein, a car truck for the body having wheels, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, and means for operating said fan, including a turbine, a pump delivering liquid under pres-

sure to the turbine, a drive shaft for the pump, means slidably mounting the pump and drive shaft on the body on one side of a car wheel, a cone pulley secured to the drive shaft, an idle pulley disposed on the other side of the car wheel from the pump, a pulley belt trained about the idle pulley wheel and the cone pulley wheel, spring means normally holding the pulley belt in driving contact with the last-mentioned car wheel, and means for shifting the pump and cone pulley wheel relative to the belt in accordance with the pressure of the liquid delivered from the pump to the turbine.

5. In a refrigerator car of the type having a storage compartment and a bunker compartment separate from the storage compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; a drive shaft for the pump, a drive cone pulley for the shaft, a pulley belt trained over the cone pulley, means for operating the belt from a wheel of the truck of the car, and means for shifting the cone pulley relative to the belt according to the pressure of the liquid delivered from the pump to the turbine.

6. In a refrigerator car of the type having a storage compartment and a bunker therein, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, and means for operating said fan, including a turbine; a rotary pump delivering liquid under pressure to said turbine, a return sump for the liquid arranged in the car for receiving the liquid directly from the turbine, a return pipe for conducting spent liquid from the sump to the inlet of the pump, and means for driving the pump from a wheel of the truck of the car.

7. In a refrigerator car of the type having a transverse partition to divide the car into a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, and means for operating said fan, including a turbine; a pump delivering liquid under pressure to said turbine, means for driving the pump from a moving part of the car, a sump for the liquid arranged within said partition between the turbine and the pump, and a return pipe for conducting spent liquid from the bottom of the sump to the inlet of the pump.

8. In a refrigerator car of the type having a body and a transverse partition therein for dividing the body into a storage compartment and a bunker compartment, an air circulating fan arranged above the partition for drawing air from one of said compartments and delivering it to the other of said compartments, and means for operating said fan, including a turbine arranged above the partition; a pump for delivering liquid under pressure to said turbine, a return sump for the liquid arranged in said partition above the pump and directly below the turbine for receiving spent liquid from said turbine, and a return pipe for conducting liquid from the bottom of said sump to the inlet of the pump.

9. In a refrigerator car of the type having a body and a transverse partition therein for dividing the body into a storage compartment and a bunker compartment, an air circulating fan

arranged above the partition for drawing air from one of said compartments and delivering it to the other of said compartments, and means for operating said fan, including a turbine arranged above the partition; a pump for delivering liquid under pressure to said turbine, a return sump for the liquid arranged in said partition above the pump and directly below the turbine for receiving spent liquid from said turbine, and a return pipe for conducting liquid from the bottom of said sump to the inlet of the pump, said partition being shiftable in said body to one position for forming the compartments and to another position against an end wall of the body.

10. In a refrigerator car of the type having a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; means for driving the pump from a wheel of the truck of the car, including a swinging platform rockably mounted on the car, said pump being mounted directly on the platform, a friction pulley for engaging the wheel rotatably carried by the platform, means operatively connecting the pulley to the pump, spring means normally urging the platform and the friction pulley toward the wheel, and means for holding the platform in a raised position with the friction pulley out of engagement with the car wheel.

11. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; means for driving the pump from a wheel of the truck of the car, including a swinging platform rockably carried by the car, means securing the pump to the body of the car above the platform, a friction pulley carried by the platform, means normally urging the platform and friction pulley toward the wheel with the pulley in driving contact with the wheel, and a flexible shaft operatively connecting the friction pulley with the pump.

12. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to said turbine; means for driving the pump from a wheel of the truck of the car, including a swinging platform rockably carried by the car, means securing the pump to the body of the car above the platform, a friction pulley carried by the platform, means normally urging the platform and friction pulley toward the wheel with the pulley in driving contact with the wheel, a flexible shaft operatively connecting the friction pulley with the pump, and a flexible coupling interposed between the flexible shaft and the pump.

13. In a refrigerator car of the type having a body and a transverse partition arranged in said body terminating short of the top of the body forming a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and deliver-

ing it to the other of said compartments, means for operating said fan, including a turbine, a pump delivering liquid under pressure to said turbine, means for driving the pump from a moving part of the car, and gates for controlling the space between the partition and the top of the car; means for automatically operating said gates according to the rate of flow of spent liquid from said turbine.

14. In a refrigerator car of the type having a body and a transverse partition arranged in said body terminating short of the top of the body forming a storage compartment and a bunker compartment, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, a pump delivering liquid under pressure to said turbine, means for driving the pump from a moving part of the car, and gates for controlling the space between the partition and the top of the car; means for automatically operating said gates according to the rate of flow of liquid delivered to said turbine, said means including a movable bucket for receiving liquid from the turbine, a shaft for moving the gates, and an operative connection between the movable bucket and the shaft.

15. In a refrigerator car of the type having a body including a transverse partition therein terminating short of the upper end of the body forming a storage compartment and a bunker compartment in said body, an air circulating fan for drawing air from one compartment and delivering it to the other compartment, a turbine for operating said fan, a pump for delivering liquid under pressure to said turbine, a return sump for the liquid arranged below the fan and turbine, a return pipe for conducting spent liquid from the bottom of the sump to the inlet of the pump, and movable gates for controlling the active size of the space between the partition and the top of the body; a rotatable shaft disposed above the gates, means operatively connecting the shaft to the gates, a sliding bucket arranged in the sump for initially receiving the liquid from the turbine, said bucket having a small drain opening therein, and means operatively connecting the sliding bucket to the shaft for operating said shaft upon downward movement of the bucket.

16. In a refrigerator car having a body provided with a transverse partition dividing the body into a storage compartment and a bunker compartment, said partition including equidistantly spaced uprights and panels between said uprights terminating short of the top of the car defining a plurality of openings between the panels and the top of the car, and air circulating fans arranged in certain of said openings on opposite sides of the central opening.

17. In a refrigerator car of the type having a body including a storage compartment and a bunker compartment therein, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump delivering liquid under pressure to the turbine; means for driving the pump from a wheel of the truck of the car, and means forming a part of said drive for maintaining the speed of the pump substantially uniform, irrespective of the speed of rotation of the car wheel.

18. In a refrigerator car of the type having a

storage compartment and a bunker therein, an air circulating fan for drawing air from one of said compartments and delivering it to the other of said compartments, means for operating said fan, including a turbine, and a pump for delivering liquid under pressure to said turbine; a return sump for the liquid arranged in the car for receiving the liquid directly from the turbine, a

return pipe for conducting spent liquid from adjacent the bottom of the sump to the inlet of the pump, means for driving the pump from a wheel of the truck of the car, and baffles for the liquid arranged in the top of the sump for initially receiving liquid from the turbine.

ROBERT KENT SCHWEBS.