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O. S. MCGUFFEY ET AL  
TRUCK REFRIGERATION SYSTEM

2,880,595

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4 Sheets-Sheet 1

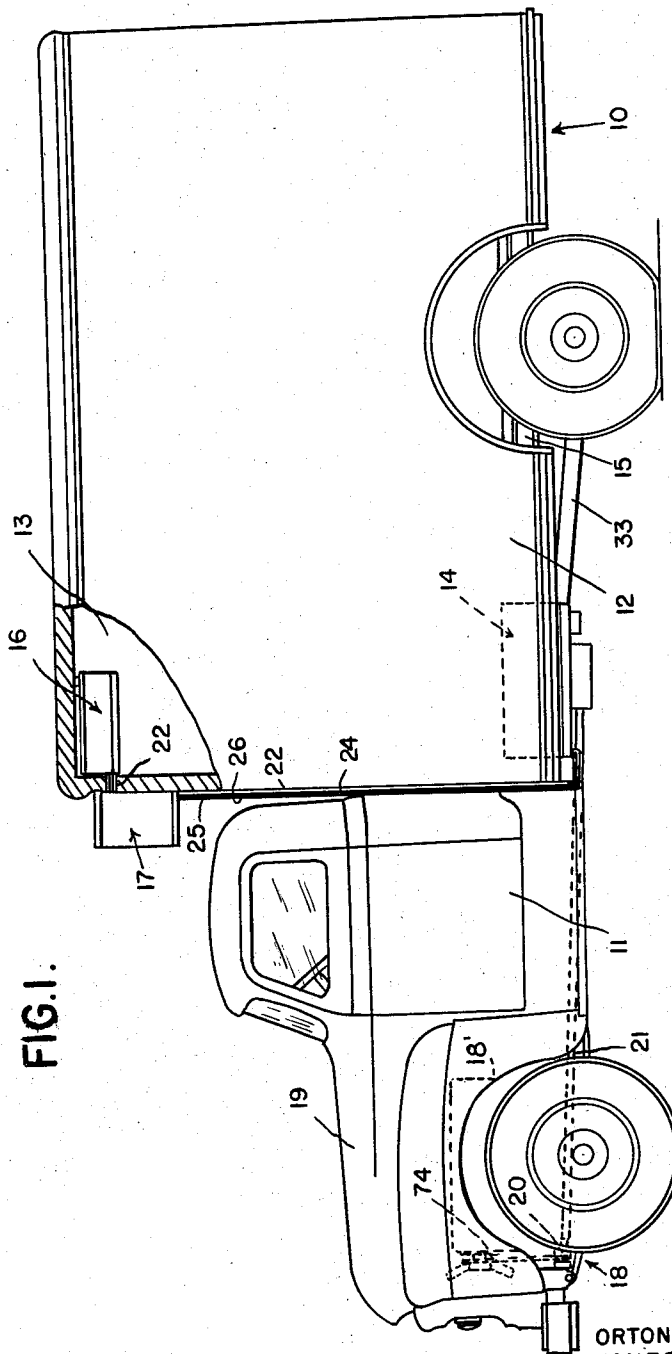


FIG. 1.

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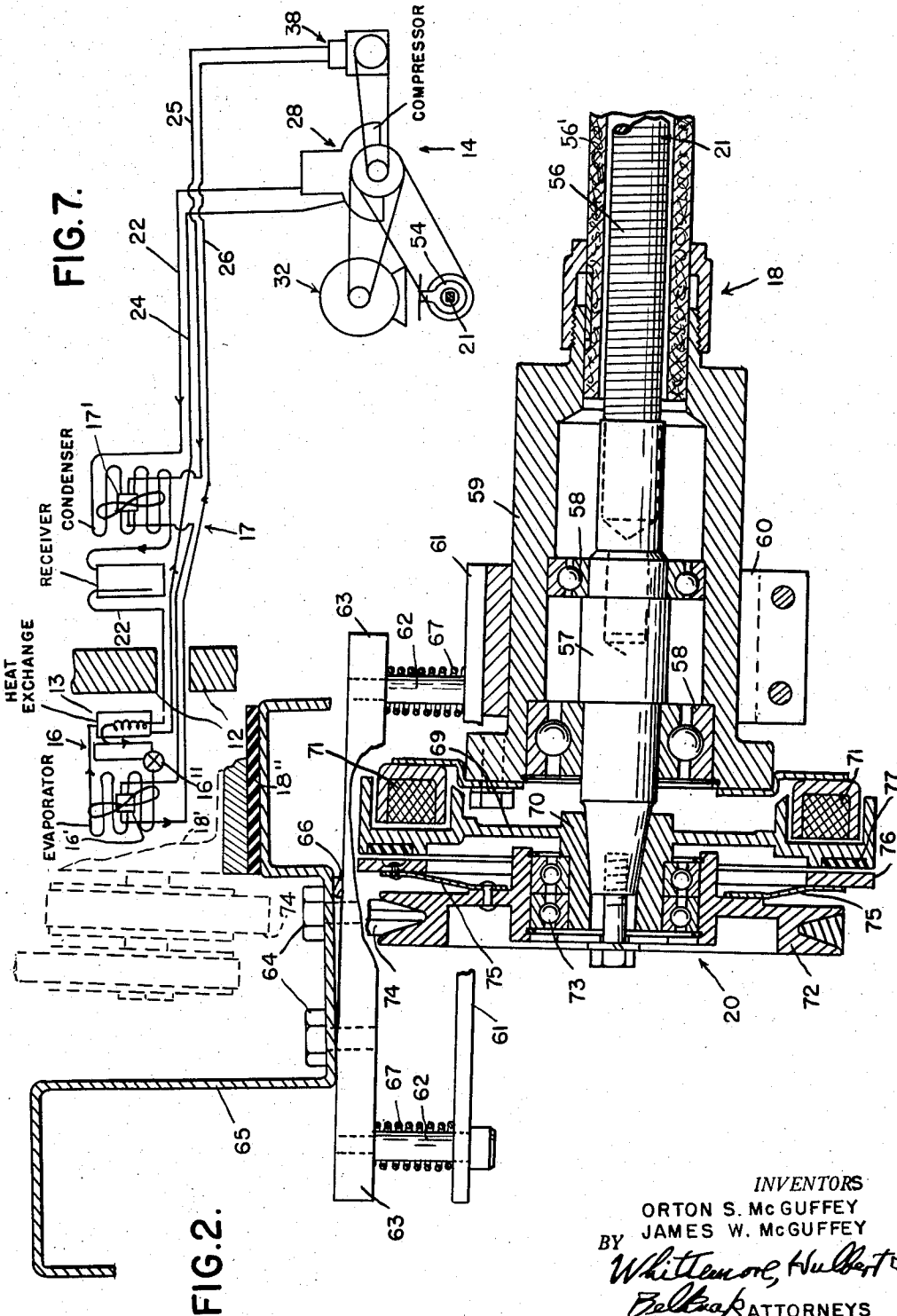
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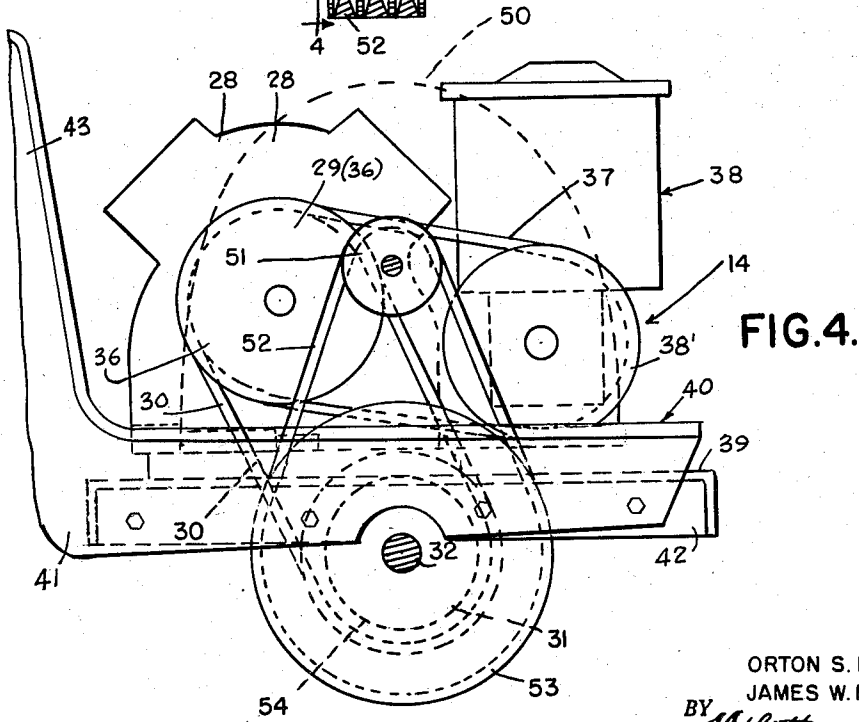
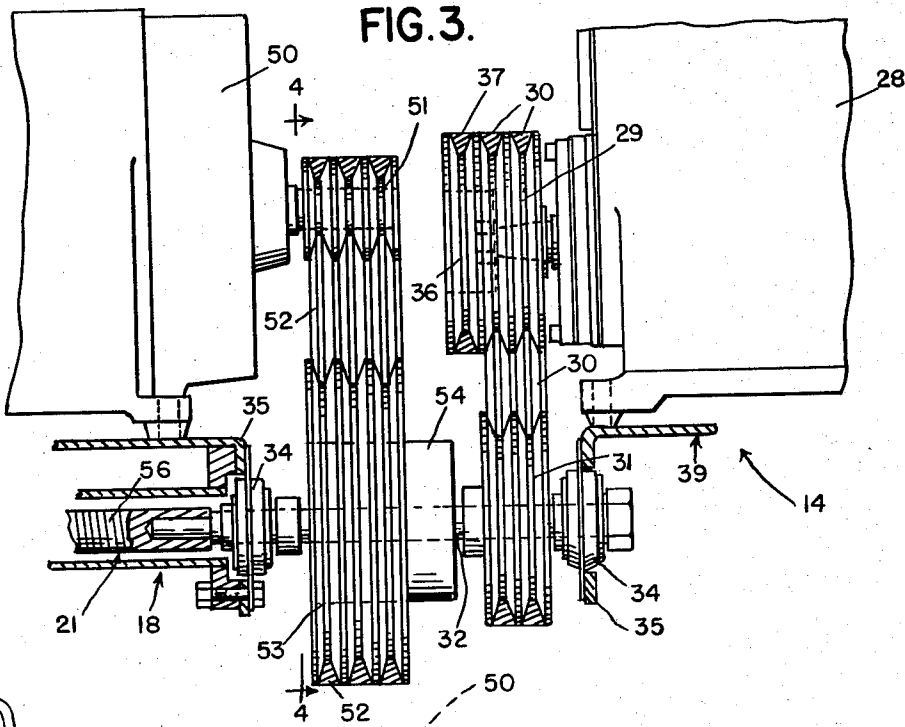
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4 Sheets-Sheet 3



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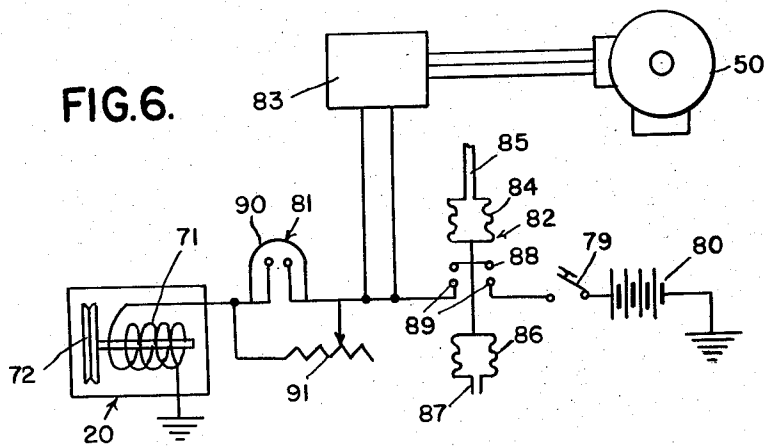
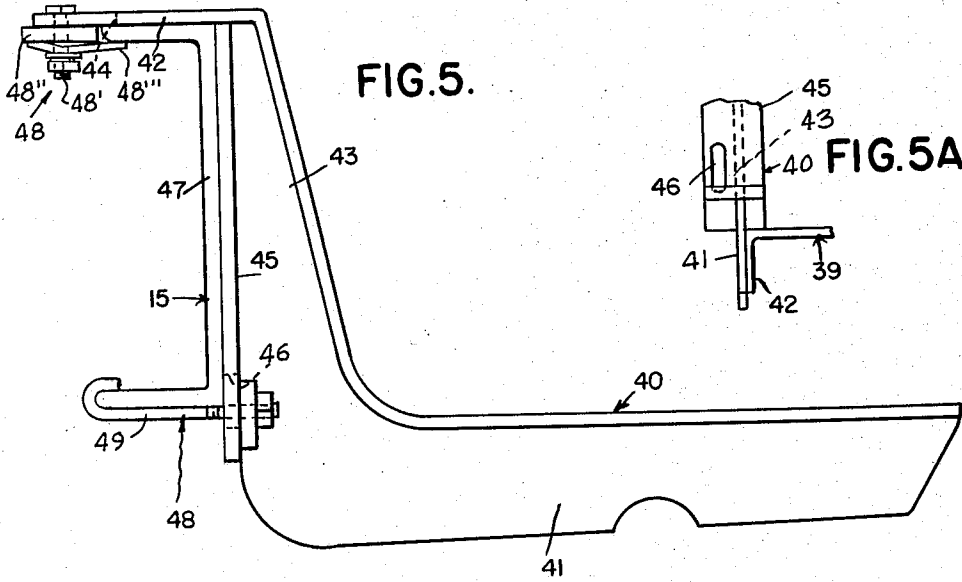
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## TRUCK REFRIGERATION SYSTEM

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7 Claims. (Cl. 62-242)

The present invention relates to improvements in a mobile refrigeration system such as is commonly built into refrigerated delivery trucks, cross-country refrigerated trucks and truck-trailer combinations, etc. It is a general object of the invention to provide a refrigerating system for installations of this character which is greatly improved in point of its relative simplicity and inexpensiveness, its lightness in weight and compactness, its entire reliability in operation, whether powered by a direct driving connection from the vehicle engine in transit or from a stand-by electrical motor, and by its inherent incapability of becoming damaged or imperfectly inoperative under conditions likely to be encountered in normal use.

More specifically, it is an object of the invention to provide a mobile refrigeration system of the foregoing character made up of an assemblage of more or less standard refrigerating system components, such as a compressor, condenser, heat exchange unit, etc., in which these components are arranged in an improved fashion in respect to the vehicle on which the installation is made. In accordance with the invention, as well as in conformity with customary practice, the heat exchange unit includes a coil, fan, and motor, as well as expansion and frost control valves which are mounted within the interior of a body compartment to the rear of the vehicle which is to be refrigerated. For the rest, the invention contemplates the mounting of a compressor unit which is mechanically actuated by the vehicle engine or a stand-by motor, along with the motor itself and an engine or motor driven pump or like power supply device or unit as a single combined sub-assembly or package on the chassis of the vehicle. This is accomplished by the use of a common compressor pump motor support beneath the vehicle chassis, whereas the condenser unit is mounted along with its associated fan and fan motor (either hydraulically or electrically driven in accordance with the character of the power supply device or unit) at an elevated point, preferably forwardly of and adjacent the top of the compartment to be refrigerated. A condenser unit so installed has the benefit of the cooling air stream set up in the movement of the vehicle, as well as being positioned to receive the least dirt and possibility of damage by impact.

Another object of the invention is to provide a refrigeration installation of the sort described characterized by provisions to drive its compressor and power supply device either directly from the vehicle engine or by a stand-by motor mounted in common with the compressor and power device unit, in which there is an improved direct driving connection from the vehicle engine to an auxiliary drive shaft, mounted on the common support for those instrumentalities. Such direct drive avoids the need for a power take-off unit.

To this end, and in order to avoid cluttering the space beneath the engine hood or bonnet with refrigerator driving structure, making access difficult to the engine parts, an electrically controlled clutch is mounted on a cush-

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ioned support beneath the forward end of the engine crankshaft, the clutch being driven by a belt-pulley arrangement from the latter. The direct drive from the electric clutch rearwardly to the compressor unit referred to above is effected through the agency of a flexible shaft supported by the vehicle chassis and extending beneath the engine and operator's cab, which shaft is coupled directly to the auxiliary drive shaft of the compressor unit. An installation results which is extremely compact and conveniently located, yet which is relatively inexpensive and is reliable in operation.

It is a further object of the invention to provide an engine driven refrigeration system of the type described in which provisions are made to insure against undue shock to the transmission when the refrigeration system is cut into operation, as under control of a suitable automatic thermostatic control device, when the vehicle is engine driven in transit. It is evident that if this were accompanied by a positively engaging type of mechanical clutch, with the vehicle traveling at a considerable road speed, a destructive shock would be inevitable which, if applied to a flexible shaft type of drive connection as contemplated by the invention, would unduly strain the same. Accordingly, the application of the electric clutch energizing power is effected in a stepped or gradual manner, pursuant to the invention, in such manner that when the need for additional refrigeration is signaled by the automatic thermostatic control, the usual clutch magnet will be energized under partial current for a predetermined period, amounting to, say, three seconds to five seconds, after which full clutch applying voltage comes into play to lock the clutch and complete a direct, non-slip drive rearwardly to the auxiliary compressor drive shaft mounted by the chassis of the vehicle. With an arrangement of this sort, the transition into the engine-driven refrigerating phase is practically unnoticeable to an occupant of the truck vehicle cab when traveling at relatively high road speed.

As a further feature, it is an object of the invention to provide a system in which the electric stand-by motor, by which the compressor and hydraulic or electric generating unit of the system are actuated in a layover phase, is protected against damage during in-transit drive of the system from the vehicle engine. This takes the form of a connection of the motor to the auxiliary drive shaft of the compressor through an overrunning or one-way clutch; the result being that while the engine will drive the auxiliary shaft and compressor when running, assuming the electric clutch and flexible shaft drive for the auxiliary clutch is effective, and the motor will also drive the auxiliary shaft when energized, the driven auxiliary shaft can under no circumstances drive the motor.

The importance of such provision will be appreciated when it is understood that, whereas the compressor will be correctly driven at a speed of approximately 450 r.p.m. by a one horsepower electric motor operating at 1,750 r.p.m., in stand-by operation, the compressor can be operated at a speed of 2,500 r.p.m., approximately equivalent to a motor loading of four and one-half horsepower which would cause the motor to be driven at upwards of 9,000 r.p.m., lacking the overrunning drive coupling referred to above. A speed of this value would be destructive of the motor.

An important advantage of a system whose general character is understood from the preceding description, is all of its elements are, in effect, self-balancing. Thus, assuming that a condenser fan and a heat exchange blower fan are driven by a hydraulic or electric power generating unit, which in turn has a common drive from the vehicle engine or from a stand-by motor in the fashion described, it is seen that these fans will be driven at a speed exactly proportional to the compressor speed. If

the compressor runs at high speed and produces considerable refrigerating effect, the condenser and blower fans will also run at high speed enabling the former to handle the refrigeration effect produced by the compressor and the latter to dissipate the refrigeration effect in the compartment to be refrigerated.

Yet another object of the invention is to provide a mobile truck refrigeration system as outlined above, which may be installed on trucks of various types with little or no modification or alteration of the truck. Thus, the invention affords, in its preferred embodiment, a common mount for a compressor, a stand-by motor, a power supply device, which may be hydraulic or electric, and auxiliary shafting by which the compressor and power supply units are selectively engine or motor driven, under control of automatic instrumentalities which may also be mounted on this common support. Simple bracket means are associated with the support to rigidly but releasably clamp the sub-assembly just described to the vehicle chassis; and the whole operation of installation of the entire system is performed in a greatly reduced time and by fewer personnel than has been possible with comparable mobile refrigerating systems available to the trade.

Various ramifications in the positional arrangement of components contemplated by the invention are possible. An arrangement which has the condenser forwardly and upwardly of the refrigerated compartment, the compressor, stand-by motor, power supply sub-assembly positioned on a special common mount beneath and to one side of the chassis at the depending side skirt of the compartment (being with slight modification reversed to the opposite side of the chassis), the evaporator coil-heat exchange unit at an elevated location within the forward end of the refrigerated compartment, and an engine drive connection direct from the forward end of the vehicle and beneath the engine and chassis to the compressor-motor-power supply sub-assembly, involving a clutch mounted beneath the engine crankshaft and out of interference with engine parts. This is an arrangement which presents manifold advantages in regard to simplicity of construction, simplicity, ease and speed in installation, compactness and lightness in weight, and accessibility for inspection and servicing. Power is simply and directly derived in transit without the complication of a power take-off, which is objectionable from many standpoints and is useable with an automatic type transmission only at great expense. The electric stand-by motor is de-clutched during road operation, under which the only limiting consideration as to the maximum speed of operation of the compressor is the maximum speed at which it can receive its drive from the engine.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings wherein:

Fig. 1 is an elevational view, partially broken away, generally illustrating positional and operational relationships of various components of the improved refrigeration system to a conventional engine driven truck, in accordance with the invention;

Fig. 2 is a fragmentary view, partially in axial section, illustrating the forward end of an electric clutch-controlled, flexible shaft engine drive connection for the compressor of the system, as well as provision by which this forward end is connected beneath a cross frame of the vehicle to be driven by the engine crankshaft of the latter;

Fig. 3 is a fragmentary elevational view, partially in vertically longitudinal section, illustrating the rear extremity of the flexible shaft connection of Fig. 2 and the provisions for mounting the same and drivingly connecting it with an auxiliary drive shaft of the system, as well as showing belt-pulley provisions for connecting

this auxiliary shaft to the compressor and stand-by motor of the system.

Fig. 4 is a view in section along line 4-4 of Fig. 3 depicting the arrangement of compressor, motor, and power generating unit which are driven by the pulley provisions of Fig. 3, as well as a common support by means of which these units are carried by the chassis of a vehicle;

Fig. 5 is a view in side elevation of a bracket support by which the sub-assembly of Figs. 3 and 4 is conveniently and interchangeably mounted upon the vehicle chassis;

Fig. 5A is a fragmentary view in end elevation of the supporting bracket of Fig. 5, indicating the manner in which it sustains a supporting platform for the sub-assembly referred to;

Fig. 6 is a schematic diagram showing in a general way the wiring and automatic control provisions for the stand-by motor and electrically energizable clutch of the system; and

Fig. 7 is a schematic general layout of the system of the invention.

Referring first to Figs. 1 and 7 of the drawings, showing the overall arrangement and relationship of parts to a conventional commercial automotive truck 10, characterized by a cab 11 forwardly of a van-like body 12, the interior 13 of which is to be refrigerated, the reference numeral 14 generally designates a compressor, motor, and power supply unit of the improved system, which is mounted to one side of the chassis 15 of the vehicle; the reference numeral 16 generally designates the heat exchange, evaporator and blower unit of the system, which is mounted within the interior 13 adjacent the upper, forward end thereof, and is of conventional construction, including a hydraulically or electrically driven motor 16' of a blower associated with its distributor coils, as well as a thermostatically controlled expansion valve 16"; the reference numeral 17 generally designates a condenser unit, including a hydraulically or electrically driven blower motor 17', which is appropriately mounted fixedly to the forward end of the van body 12, at an elevated point above cab 11, so as to be exposed to the air current in transit and to be exposed to a minimum of dirt and dust; and the reference numeral 18 in general designates a direct mechanical power connection between the engine 18' of the vehicle (Figs. 1 and 2) beneath the forward bonnet or hood 19 of vehicle 10. The reference numeral 18' in Fig. 2 designates a conventionally shown resilient mount for the engine 18' on a part of the vehicle chassis 15, schematically indicated as its front framework. The power connection 18 includes a forward electric clutch 20 and a flexible shaft 21 direct driven from clutch 20 and rearwardly coupled rigidly to an auxiliary shaft of unit 14, to be described.

Circulatory lines connecting compressor-motor power generating unit 14 with condenser unit 17 and an evaporator and heat exchange unit 16 are also depicted in schematic fashion in Figs. 1 and 7. These include the usual refrigerant liquid discharge line 22 from the compressor of unit 14 to condenser unit 17 and evaporator heat exchange 16, a refrigerant return or suction line 24 connecting the compressor with heat exchange unit 16; and hydraulic feed and return lines 25, 26, respectively, by which hydraulic power liquid is circulated between a hydraulic pump of unit 14 and the units 16, 17, to drive the respective blowers or fans of those units. The blowers or fans will be, in accordance with the embodiment of the invention chosen for illustration, actuated by suitable hydraulic gear motor 16', 17' (Fig. 7). However, it is to be understood that in an alternative adaptation these units may be electrically energized, in which case the component of unit 14 which powers the motors will be a suitable electric generator, rather than a pump. An appropriate electric receiver (so captioned in

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Fig. 7) is provided in the refrigerant discharge line 22 behind condenser 17 and is actually a part of the condenser unit 17. The connections of the circulatory lines 22, 24, 25 and 26, are diagrammatically shown in Fig. 7.

As more or less schematically shown in Figs. 3 and 4 of the drawings, the combined compressor-stand by motor-pump unit 14 comprises a compressor 28 of conventional character having a multiple sheave drive pulley 29 fixed to its shaft, which pulley receives a V-belt or belts 30 by which it is driven from a further multiple sheave pulley 31 on an auxiliary stub shaft 32 of the unit 14. Shaft 32 parallels the main propeller shaft 33 of the vehicle (Fig. 1) and is journalled at its ends by bearings 34 supported by platform or framework 35 secured to the chassis 15 of the vehicle in an improved way, as will be described.

An additional sheave 36 on compressor shaft pulley 29 receives a further V-belt 37 by which a power generating device 38, such as a hydraulic pump is driven when compressor 28 is driven. Belt 37 is trained about a pulley 38' on the pump shaft.

Alternatively, as indicated above, the power generating device 38 may be a suitable electric generator connected by appropriate wiring to the blower of heat transfer unit 16 and the fan of condenser unit 17. In an installation such as is shown herein, the hydraulic lines 25, 26 (Fig. 1) will be appropriately connected to the hydraulic power generator 38 of Fig. 4 in an obvious manner. The term "power device" is therefore employed to designate either the electrical or hydraulic type of power supply.

The compressor 28 and pump 38 are mounted on a common supporting platform 39 of rigid, well-braced construction, of which the shaft journalling frame work 35 of Fig. 3 may also be a part. The general nature of the platform, minus bracket mounting means therefor, is somewhat schematically shown in Figs. 3 and 4. This supporting platform is sustained by a pair of brackets on the chassis 15 of the vehicle, which brackets may be of the general character shown in Figs. 5 and 5A of the drawings. The bracket, generally designated 40, is constructed of T-shaped, horizontally and vertically flanged cross section and in an L-shaped outline, and affords a laterally extending central web 41 against which a depending marginal flange 42 of the platform 39 may be rigidly secured (in one way depicted in Fig. 5A) as by bolting or welding. Bolting is preferred, due to the ease and flexibility of location and assembly which it permits. Other ways of fastening the platform and bracket may of course be resorted to; and Fig. 5A is to be considered simply a suggestion. A similar connection of the platform is similarly made to a bracket at the opposite end of the support. Attaching arms 42 extend laterally inwardly from each of the upright legs 43 of the brackets 40, which arms are provided with elongated apertures 44. Upright leg 43 has a stabilizing and reinforcing flange 45 welded along the innermost edge of its laterally extending web 41, and the flange 45 is also provided with a hole 46.

As illustrated in Fig. 5, the brackets 40 are placed in side by side abutment of their flanges 45 with channel 47, the channel constituting a length of vehicle chassis 15, and appropriate fastening studs, bolts, or the like, generally designated 48, are applied through the apertures 44, 46 to lock the brackets 40 and supported platform 39 in place along the side of the chassis 15. The fastening device 48 applied to the upper flange of channel 47 may comprise a bolt 48' applied to the aperture 44, with a nut on the bolt and a spacer 48'' and spring clip 48''' coacting in clamping the upper arm 42 over the upper channel flange.

The fastener 48 applied to the lower channel flange is shown as a stud 49 hooked at its inner end around the lower flange and drawn up by a nut to thrust the

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bracket flange 45 against the outer surface of the channel. The width of the unit 14 is such that it is received well within the side limits of the vehicle, being shielded in a readily accessible location by a depending side portion or skirt of the vehicle body 12, as shown in Fig. 1.

As appears in Fig. 5, the brackets 40 may be expeditiously applied to the chassis channel member 47 without the need for drilling and thus weakening the latter. The arms 42 are locked on the top of the channel, with the upright flange in stable side engagement therewith; and studs 49 hook around the bottom channel flange to lock the platform and bracket assembly securely in place.

Referring again to Fig. 3 of the drawings, an electric stand-by motor is designated generally therein by the reference numeral 50. It is supported, along with compressor 28 and pump 38, on the platform 39, which is intended to afford a common mount for all of the instrumentalities having a common drive, along with compressor 28, from the front to rear, clutch controlled drive connection 18 (Fig. 1). Indeed, it is contemplated by the invention that the framework 35 (Fig. 3) by which the auxiliary drive shaft 32 is sustained shall also be appropriately supported by platform 39, so as to enable the entire sub-assembly 14 and the mechanical driving provisions therefor to be sustained rigidly but removably on the vehicle chassis 15.

A multiple sheave pulley 51 is mounted on the shaft of motor 50, for the purpose of stand-by operation of auxiliary shaft 32. V-belts 52 drivingly connect the pulley 51 with a larger diameter pulley 53 on auxiliary shaft 32, and the driving connection of pulley 53 is effective through the agency of an overrun or one-way clutch 54, which will enable the motor drive of shaft 32 in one direction to operate the compressor 28 and power pump 38 of unit 14, but will not permit the shaft 32 to rotate motor 50. The importance of this protective feature in preventing damage to or destruction of motor 50 at the relatively high speeds at which the compressor 28 and generator 38 are driven through the flexible shaft connection 18 has been referred to in the preceding description. Motor 50 is de-clutched from the system during road operation.

The improved and simplified, direct engine drive connection 18 is illustrated adequately, as to its structural details and as to its front end mounting in Fig. 2 of the drawings. The flexible shaft component 21 thereof is conventional in character and requires no further illustration. It extends beneath the vehicle engine and chassis 16, and beneath the operator's cab 11, to the forward bearing 34 of auxiliary shaft 32 (Fig. 3) at which point the flexible shaft 21 is drivingly secured to shaft 32.

As illustrated in Fig. 2, the driving cable 56 of flexible shaft 21 is surrounded by a flexible, non-metallic sheath 56' and is fixedly connected to the output shaft 57 of electrically controlled clutch 20, which shaft is mounted by ball bearings 58 in a rearwardly extending clutch housing 59 which is in fixed association with the housing of flexible shaft 21.

This rear housing 59 of the clutch 20 is clamped in an appropriate collar 60 which is bolted in depending relation to a rigid mounting plate 61 having a central aperture to accommodate the further coil and armature components of clutch 20, to be described.

As illustrated in Fig. 2, the mounting plate is sustained by a plurality of studs 62 loosely received in apertures of plate 61, which studs are threaded into a further rigid base plate 63; and the plate 63 is rigidly clamped by bolts 64 to the front cross framework 65 of the vehicle chassis 15. A spacing shim 66 is preferably interposed between frame 65 and base plate 63 in order to impart a necessary slight downward tilt to the clamped clutch housing 59, so as to align the same with the housing of flexible shaft 21.

Coil springs 67 encircle the plate supporting studs 62 and are placed under compression in the assembly, thus

providing a cushioned, vibration-absorbing mount for the electrically energized clutch 20 and assuring a long, trouble-free life of the latter under very severe operating conditions. In accordance with the universal practice, the vehicle engine has a floating mount on the chassis. Hence the cushioning of the clutch mounting enables the clutch to follow and accommodate movements of the engine, thus maintaining constant tension of the belt driving the same (to be described).

As in the case of the mounting provisions for compressor-motor-generator unit 14, the clutch mount just described is an exceedingly simple and inexpensive one, easily and inexpensively assembled to the vehicle chassis. The clutch 20 is in a conveniently accessible position, and does not occupy space within the engine hood 19 to obstruct access to engine parts. In short, the clutch mount carries out the underlying objective of the invention to permit assembly of the system to the vehicle with an absolute minimum of modification of the vehicle itself. Thus, the improved system is in a maximum degree standardized and adaptable for installation in truck designs of various types and sizes.

As indicated above, the electrically controlled clutch 20 as specifically illustrated in Fig. 2 is of a conventional type, hence, the description of its details will be brief. It includes a rotatable driven plate or disc 69 which is fixed to the forward pilot end of the clutch output shaft 57 by means of an integral hub 70. Disc 69 has annular outer recess which accommodates annular electrical coil 71 of the clutch.

A driving pulley 72 of clutch 20 is journaled for free rotation on driven disc hub 69 by ball bearings 73, and the pulley 72 is continually driven by a V-belt 74 from the crankshaft of the engine 18' of the vehicle when the engine is operating. In accordance with the conventional design of the clutch 20, the pulley 72 is connected by means of a plurality of flexible drive arms 75 with the disc armature 76 of the clutch, which armature is attracted against the friction disc 77 on clutch driven plate 69 when the coil 71 of the clutch is electrically energized.

In accordance with one of the essential objects of the invention, provisions are made to protect the clutch 20 and its connected flexible drive shaft 21 against damage in operation. The nature of the flexible shaft 21 and its cable 56 necessitates such protection against abrupt shocks of connection, particularly at a high road speed. Provisions for this purpose are schematically illustrated in Fig. 6 of the drawings.

Referring to Fig. 6, it is seen that the clutch 20 is appropriately grounded to the vehicle chassis and its coil 71 is connected in a circuit through the ignition switch 79 of the vehicle (which may also be considered for simplicity to represent a manually operable control switch for the circuit independent of the ignition) and the vehicle battery 80, by means of an electrical time delay unit 81 and an automatic control unit 82. A conventional starter 83 for the stand-by motor 50 is connected in parallel with this time delay circuit.

The unit 82 may be of an appropriate bellows type, including a corrugated flexible bellows 84 pressure connected by a line 85 with a high pressure line of the refrigerating system, and a further flexible corrugated bellows 86 connected by a line 87 with the low pressure line of the system, or alternately with a temperature sensing bulb as customarily used in a thermostatically controlled system. The bellows 84, 86 control the opposite movements of a contactor 88 which is adapted to make and break a circuit through the fixed contacts 89. Thus excessively high pressure on the high side of the system or low pressure on the low side will cause the circuit to be broken and operation stopped until the condition changes. With a thermostatic control the attainment of desired low temperature in the refrigerated interior, for an excessively high pressure, will stop the apparatus.

The delay unit 81 simply comprises a parallel hookup of a suitable switch device 90 and an adjustable potentiometer 91. The device 90 is a bimetallic type, and an electrical circuit is completed therethrough after a predetermined interval amounting to, say, three seconds to five seconds after closure of switch unit 82. During this interval, the reduced current flowing through potentiometer 91 through coil 71 causes the armature disc 76 of clutch 20 to be engaged with driven disc 69 under partial force, resulting in a somewhat impositive clutch connection. The clutch locks positively when the circuit is completed through bimetallic switch device 90. Thus a stepped engagement of the clutch results which frees flexible shaft 21 of the abrupt shock of initial connection. Full driving torque is transmitted after the delay interval described.

Various modifications of the system described above are contemplated. For example, in some installations it may be desirable to arrange the mechanically driven components in their entirety in a position corresponding to that occupied by the condenser unit 17 in Fig. 1; this would be made possible by transmitting engine power through a suitable flexible shaft and gear box to such a top mounted unit. Another modification contemplates the mounting of the condenser unit 17 and the blower and coil unit 16 on a substantially common base enabling this combination to be arranged as a single unit at the front of the body 12 and over the cab, the heat transfer coil and blower extending through an appropriate opening cut in the forward end of the body. Other alternative adaptations will suggest themselves to those skilled in the art.

It is seen that the invention affords a mobile truck refrigeration system of great compactness, simplicity, versatility and ease of installation and servicing. Parts thereof normally subject to damage in operation are fully protected, as by the overrunning clutch connection of motor 50 to auxiliary drive shaft 32 and the protective, stepped electrical engagement of engine driven clutch 20 by the circuit shown in Fig. 6.

It is believed that the operation of the system will be clear from the foregoing description. When the engine is in operation, a closure of the electrical circuit, automatically through the thermostatic unit 82 and manually through switch 79, occasions a progressive engagement of clutch 20 to transmit power through the same and the flexible shaft connection to the auxiliary shaft 32. Compressor 28 and hydraulic pump 38 of the combined, chassis mounted unit 14 are driven, and the shaft 32 overruns the pulley 53 connecting the same with stand-by motor 50. When adequate refrigeration is had, the thermostatic unit 82 breaks this driving connection. During a layover interval, the same closure of the electrical circuit will cause motor starter 83 to energize stand-by motor 80, which then drives auxiliary shaft 32 through the motor pulley 51, belts 52, pulleys 53 and overrunning clutch 54. The pulley 31 is thus motor driven to actuate compressor 28 and pump 38 through the belts 30 and pulley 29, in case of the compressor, and the belt 37 and pulley 36 and in the case of the pump 38. The blower and fan of the units 16, 17 are driven at speeds in proportion to the speed of operation of the compressor 28, whether in the engine driven or the stand-by motor driven phase of operation of the system, resulting in a perfect balancing proportionate to the amount of refrigeration which is being generated and must be distributed and dissipated.

What we claim as our invention is:

1. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion, a refrigerating unit including a compressor mounted by said chassis adjacent and within said skirt portion, a readily applicable bracket-like support mounting said unit on said chassis, compris-

ing a bracket on which said unit is fixedly secured, said bracket having an upright member firmly engageable with an upright surface of a member of said chassis, and means in nonpenetrative engagement with said chassis member to clamp said bracket member to said chassis surface.

2. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion, a refrigerating unit including a compressor mounted by said chassis adjacent and within said skirt portion, a readily applicable bracket-like support mounting said unit on said chassis, comprising a bracket on which said unit is fixedly secured, said bracket being of L-shaped outline and horizontally and vertically flanged cross section, having an upright member firmly engageable with an upright surface of a member of said chassis, and a horizontal portion supporting said unit, and means in nonpenetrative engagement with said chassis member to clamp said bracket member to said chassis surface.

3. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion, a refrigerating unit mounted by said chassis adjacent and within said skirt portion, and a readily applicable bracket-like support mounting said unit on said chassis, comprising a generally L-shaped bracket, on a laterally projecting leg of which said unit is fixedly secured, the other leg of said bracket being firmly engageable with an upright surface of a member of said chassis, and means in non-penetrative engagement with said chassis member to clamp said upright bracket leg to said chassis surface.

4. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion along a longitudinal side thereof, a refrigerating unit mounted by said chassis adjacent and within said skirt portion, and a readily applicable bracket-like support mounting said unit on said chassis, comprising a generally L-shaped bracket, on a laterally projecting leg of which said unit is fixedly secured, the other leg of said bracket being firmly engageable with an upright surface of a member of said chassis, said other leg having a projecting arm engaging a top surface of said chassis member, and means in non-penetrative engagement with said chassis member to clamp said upright bracket leg and arm to said chassis surfaces.

5. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion along a longitudinal side thereof, a refrigerating unit including a compressor mounted by said chassis adjacent and within said skirt portion, a readily applicable bracket-like support mounting said unit on said chassis, comprising a generally L-

shaped bracket, on a laterally projecting leg of which said unit is fixedly secured, the other leg of said bracket being firmly engageable with an upright surface of a member of said chassis, and means in non-penetrative engagement with said chassis member to clamp said upright bracket leg to said chassis surface.

6. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body having a vertical outer skirt portion, a refrigerating unit including a compressor and a motor mounted by said chassis adjacent and within said skirt portion, said motor being disposed in compact adjacent relation to said compressor and having means to drive the latter in that relation, a readily applicable bracket-like support mounting said unit on said chassis comprising a bracket on which said unit is fixedly secured, said bracket having an upright member firmly engageable with an upright surface of a member of said chassis, and means in non-penetrative engagement with said chassis member to clamp said bracket member to said chassis surface.

7. In a refrigerating system for a truck or like vehicle characterized by a chassis and a van-like body, a refrigerating unit including a compressor and a motor mounted by said chassis, said motor being disposed in compact adjacent relation to said compressor and having means to drive the latter in that relation, a readily applicable bracket-like support mounting said unit on said chassis, comprising a bracket on which said unit is fixedly secured, said bracket having an upright member firmly engageable with an upright surface of a member of said chassis, and means in non-penetrative engagement with said chassis member to clamp said bracket member to said chassis surface.

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2,281,244	Milar -----	Apr. 28, 1942
2,320,432	Henny -----	June 1, 1943
2,357,148	Turner -----	Aug. 29, 1944
2,449,888	Edwards -----	Sept. 21, 1948
2,494,175	Hoder -----	Jan. 10, 1950
2,605,074	Bucsko -----	July 29, 1952
2,636,356	Rejan et al. -----	Apr. 28, 1953
2,660,865	Durant -----	Dec. 1, 1953
2,696,084	Kirkpatrick -----	Dec. 7, 1954
2,758,662	Peras -----	Aug. 14, 1956
2,784,562	Gamundi -----	Mar. 12, 1957