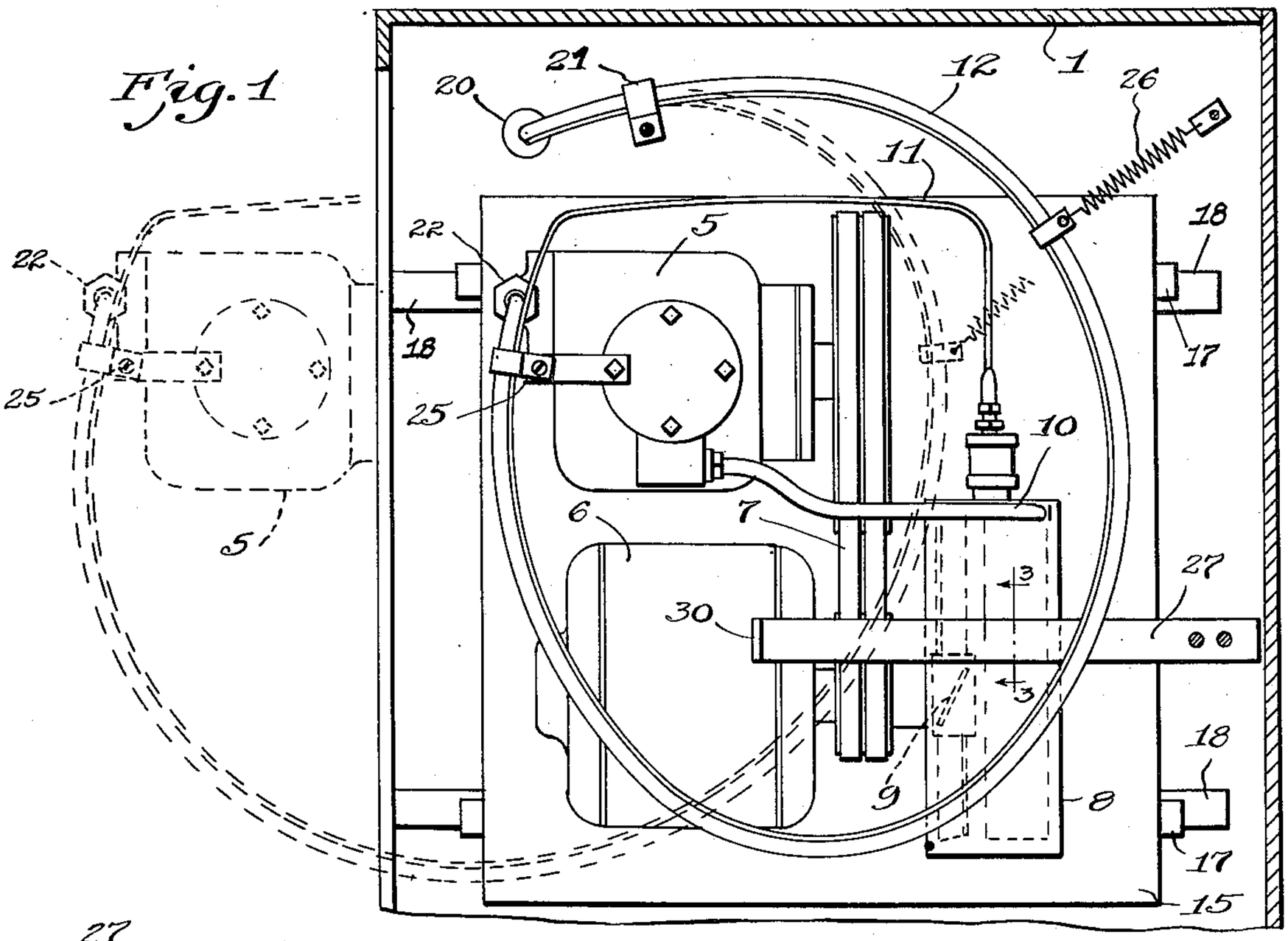
Dec. 23, 1941. W. W. HIGHAM 2,266,970

REFRIGERATING APPARATUS

Filed Aug. 18, 1939

Fig. 1



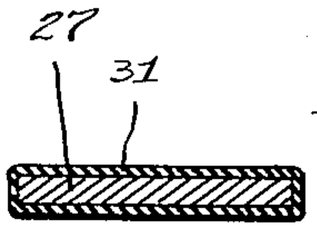




Fig. 3

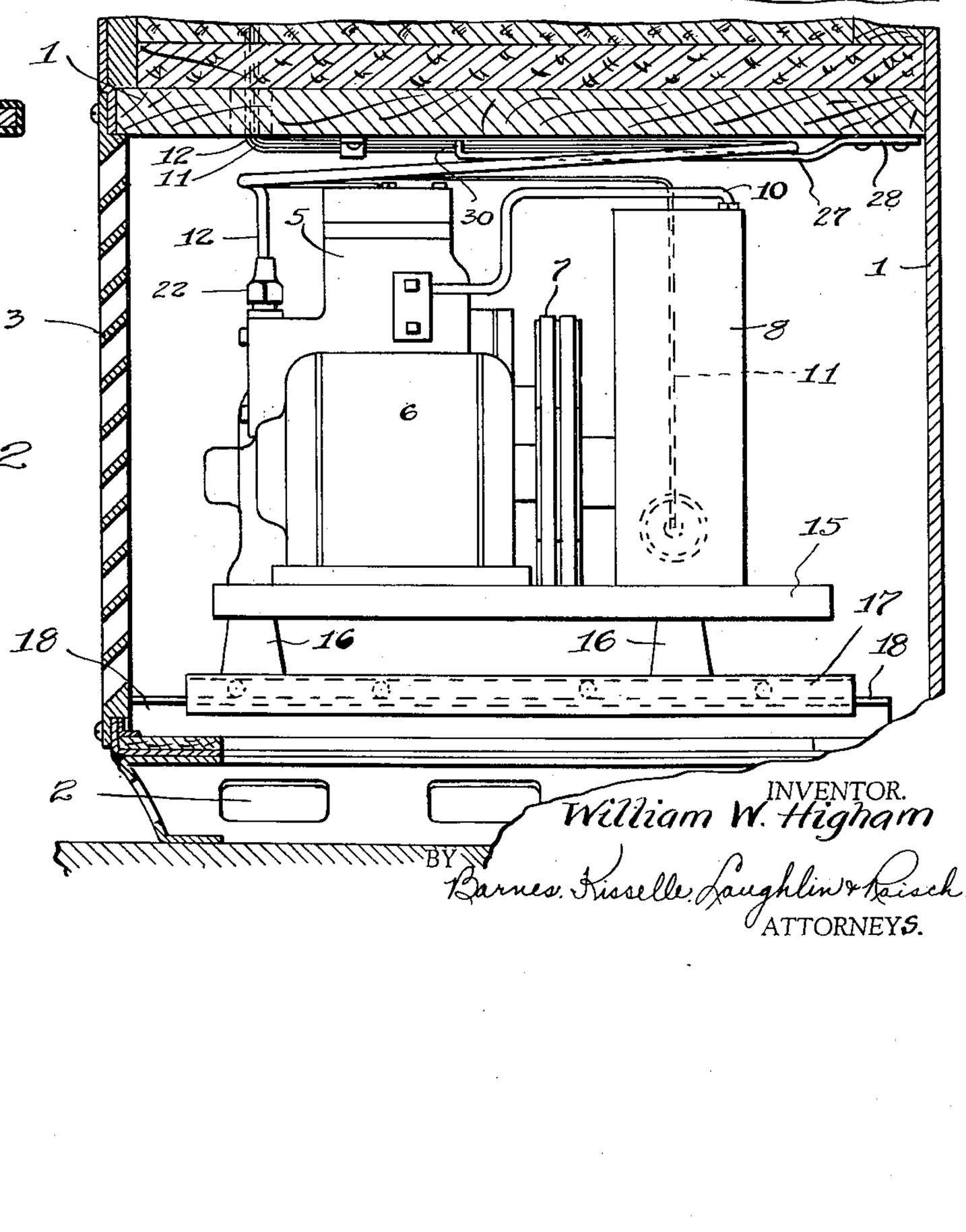



Fig. 2

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## REFRIGERATING APPARATUS

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8 Claims. (Cl. 62—116)

This invention relates to a refrigerating apparatus where the power unit or mechanism is movably mounted so that it may be shifted out of its normal operation position for service operations or the like.

The invention is applicable to an arrangement where the unit which may include a compressor, a driving motor, a condenser, and perhaps other elements, is slidably mounted in a compartment or cabinet so that it may be shifted outwardly of the cabinet on its mounting for easy access. Now it will be understood that this unit must be connected to the low side or evaporator by one or more tube lines or conduits and the evaporator or low side is usually positioned relatively remote from the said unit and in a stationary manner. Thus an arrangement of this kind requires some sort of a tube line connection which will permit movement of the unit without disrupting or disturbing or breaking the tube line connections.

This invention aims to provide an arrangement of the tube connections and tube arrangement which will facilitate the sliding action of the unit without disturbing the connections or making the tubes defective. At the same time, the arrangement is of such a structure that there is substantially no looseness in the tube structure or the connections so that there will be no rattles even after a long period of use. The arrangement is essentially simple in structure, highly practical, readily manufactured, and employs a minimum length of connecting tubing for the proportional shift of the unit. To this end the connecting tubing is so arranged that it has a stationary end and an end connected to the unit, and the intermediate tube is so formed as to permit of the relative movements between the two ends. The intermediate portion of the tubing may, and preferably is, arranged to form a heat exchanger between the suction line and the condensed refrigerant line.

One arrangement for carrying out the invention is disclosed in the accompanying drawing wherein

Fig. 1 is a view showing the power unit and the tube arrangement in plan and disposed in a compartment or cabinet with the cabinet walls illustrated in section.

Fig. 2 is a view showing the unit in side elevation with some of the cabinet walls shown in section.

Fig. 3 is an enlarged cross sectional view taken substantially on line 3—3 of Fig. 1.

The unit may be mounted in a suitable housing or cabinet, the walls of which are illustrated at 1, and this may be a compartment in an ice cream cabinet, beverage cooler, water cooler, or any other sort of a cabinet, or for that matter a domestic refrigerator. The cabinet may be arranged with openings 2 and one side which may be either open or provided with an enclosing screen or louvered panel, as illustrated at 3, so that a circulation of air may be had through the compartment. Where a louvered panel or screen is provided, it, or any portion of the wall of the cabinet, may be removable so that the unit may be pulled out through the opening for inspection or service.

As illustrated herein, there is a compressor generally illustrated at 5 and an electric motor 6 for driving the same through the means of one or more belts 7 while a condenser is shown at 8. The details of these parts are not illustrated, as they may embody a number of variable structures. A fan 9 is illustrated to be driven by the motor and associated with the condenser.

Compressed refrigerant leaves the compressor through a tube line 10 and is discharged into the condenser 8, and the condensed refrigerant is conducted through a tube line 11 to the evaporator (not shown). The return line or suction line is illustrated at 12.

This unit is mounted upon a suitable support or platform 15 which may in turn be yieldably mounted through the means of rubber lugs 16 on rails 17 in turn slidable or shiftable upon fixed rails 18. As illustrated in Fig. 2 the unit is in normal operating position. However, the unit may be pulled to the left out through the opening at 3 to a position such as is indicated in dotted lines in Fig. 1. All of the parts of the unit move in this manner without changing their relation or position relative to each other, but it will be understood that flexing is required of the connecting tubes 11 and 12.

In the arrangement illustrated the tubes 11 and 12 are placed together so as to form a heat exchanger. The tube 11 may indeed be, but is not necessarily, a so-called capillary tube. That part of the tube line 11 which extends from the bracket 25 to a part of the unit may be relatively large or rigid tube as it is not required to flex. Also, this tube line may extend to any part of the unit whether such part be a condenser, receiver tank or other device. The suction line may extend through an aperture 20 in the cabinet, but it is clamped tightly to the cabinet wall by a clamp 21. The tube is fashioned so as to substantially take the form of a

Bourdon tube, or in other words, fashioned into a curve preferably of a rather sweeping character relative to the unit, and it is connected to the compressor as at 22. A bracket 25 grips and securely holds the tube adjacent the connection 22 with the result that the curved tube is held securely at 21 and 25 adjacent its ends. Grommets of rubber or the like may be used at the brackets to protect the tube. Now where the conduit for the condensed refrigerant is to be arranged in heat exchange relation with the suction line, it may extend, as illustrated in Fig. 1, from the condenser to the bracket 25, and then follow the formation and curvature of the suction line to the bracket 21, and then through the aperture 20. The two tubes may be secured together or united in any suitable fashion for heat exchange purposes.

A tension is preferably taken upon this curved tube formation to prevent looseness and rattling, and this may be accomplished by means of a tension spring 26. With the curved formation portion of the tubing arranged in or near a horizontal position, it is preferable to provide supporting means for the tube which will also permit the tube to shift. To this end, there is a bracket 27 secured to the wall of the cabinet as at 28 and having a rather elongated portion spaced from the wall and on which the tube is supported. The end of the bracket may be turned as at 30 to prevent the tube from slipping off the bracket. It is preferable to eliminate metal to metal contact between tubing and the bracket to prevent noise or rattle, and to this end a rubber or rubber-like substance may be employed as an intermediate medium. One way to accomplish this is to coat the bracket with the rubber or rubber-like material, as illustrated at 31 in Fig. 3. This may be done by dipping the bracket, or only a portion thereof, in a bath of the coating substance. The bracket may be used with a tube formation in other than in or near a horizontal position.

In normal use the parts are in the position shown in the full lines of Fig. 1 and as shown in Fig. 2. The spring 26 places a restraining tension upon the loop of the tube and it is supported by the bracket 27 so that it is not subject to objectionable vibration. To inspect or service the unit, it may be drawn to the left on the slidable mounting. In this action the tube loop flexes as illustrated by the dotted lines in Fig. 1. The fixed end of the loop, however, is securely held by the bracket 21 so that there are no strains or movements imparted to the tube beyond this bracket. Also, the movable end of the loop is securely held by the bracket 25 so that no movement or strains are placed upon the extreme end of the tube which connects to the compressor as at 22. Thus the only portion of the loop which is flexed lies between the two brackets so that there is no disturbance of any couplings or mountings beyond the brackets. In this action the spring 26 is tensioned as illustrated, and a portion of the tubing slides on the bracket 27. When the unit is returned to its normal position, the spring 26 assures proper returning movement of the loop. Thus the tube is not required to return to its normal position by its own elasticity. Accordingly, tubing may be made of any desired material without regard to whether or not the tube has sufficient elasticity to return itself to normal position. The spring, of course, also aids in maintaining a tension to eliminate rattle.

I claim:

1. In a refrigerating mechanism, a unit including a compressor, means mounting the unit so that it is shiftable from an operating position to a position for servicing or the like, one or more refrigerant tubes having a single loop-like form connected substantially at the ends of the form to the unit and to a fixed support, spring means for maintaining a tension on the loop, and a bracket for supporting and having a slidable relation with the loop.

2. In refrigerating mechanism, a unit including a compressor and a condenser, means mounting the unit so that it is shiftable from operating position to a position for servicing or the like, a refrigerant return tube connected to the compressor, a tube for outgoing condensed refrigerant connected to the unit, said tubes being disposed in heat exchange relation and formed substantially into a loop substantially parallel with the said means mounting the unit, means for holding the tubes adjacent one end of the loop to a fixed support, and means for holding the tubes adjacent the other end of the loop to the unit.

3. In refrigerating mechanism, a compartment, a unit including a compressor, means mounting the unit in the compartment so that it may be shifted for service or the like, a refrigerant tube line, means fixedly securing the tube line to a fixed part of the compartment, means fixedly securing the tube line to a part of the unit, one end of the tube line extending to the compressor, said tube line between the said securing means having the formation of a single coplanar loop of such proportions as to facilitate the shift of the unit by the flexing of the loop formation, said loop being substantially parallel to the base of the said unit.

4. In refrigerating mechanism, means forming a compartment, a unit in the compartment including a compressor and a condenser, means mounting the unit in the compartment so that it may be shifted, a refrigerant return tube connected to the compressor, a condensed refrigerant tube connected to the unit, said tubes being directed to come into proximity with each other, means for holding the two tubes securely on the unit, means for holding the two tubes securely mounted to a fixed part of the compartment, said two tubes between the holding means being fashioned into substantially a single curved loop of such proportions as to provide sufficient flexing for the shift of the unit, said loop having its axis disposed substantially at right angles to the direction of shift of the unit so that the loop is flexed in its plane upon shift of the unit.

5. In refrigerating mechanism, a unit including a compressor, means mounting the unit so that it may be shifted, a refrigerant tube connected to the compressor and fashioned into a substantially single coplanar loop formation parallel to the base of the unit, means fixedly securing one end of the formation to the unit, means fixing the other end of the formation to a fixed support, and means for placing a tension load upon the loop.

6. In refrigerating mechanism, a unit including a compressor, means mounting the unit so that it may be shifted, a refrigerant tube connected to the compressor and fashioned into a substantially single loop formation, said loop formation being disposed in a plane substantially parallel to the means mounting the unit, means fixedly securing one end of the formation to the unit, means fixing the other end of the for-

mation to a fixed support, and a bracket for slidably supporting a portion of the loop.

7. In refrigerating mechanism, a unit including a compressor, means mounting the unit so that it may be shifted, a refrigerant tube connected to the compressor and fashioned into a substantially single loop formation, said loop formation being disposed in a plane substantially parallel to the means mounting the unit, means fixedly securing one end of the formation to the unit, means fixing the other end of the formation to a fixed support, a bracket for slidably supporting a portion of the loop, and means establishing a non-metallic slidable contact between the bracket and loop.

8. In a refrigerating mechanism, walls defining a compartment, a refrigerating unit including refrigerant liquefying means, means mounting the unit so that it may be shifted relative to the compartment to and from an operating position and a position for service or repair or the like, a refrigerant tube line, means fixedly securing the tube line adjacent one of the walls, means fixedly securing the tube line to a part of the unit, one end of the tube line connecting to the unit, said tube line between the said securing means having the formation of a single loop, said loop being disposed so that its axis is substantially at right angles to the direction of the shift of the unit and being of such proportions as to facilitate the shift of the unit by the flexing of the loop in its plane.

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