Sept. 20, 1938.

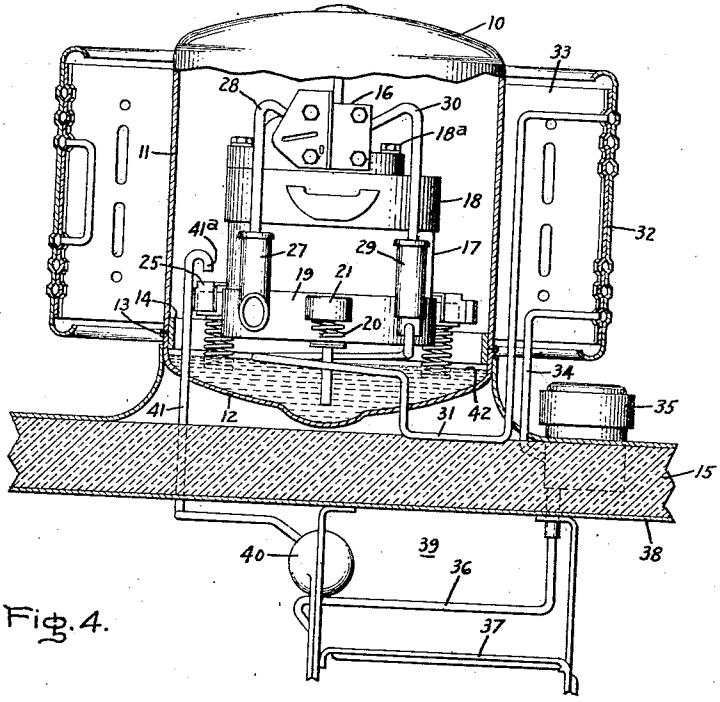
H. H. BIXLER

2,130,835

REFRIGERATING MACHINE

Filed Aug. 25, 1937

Fig. 1.



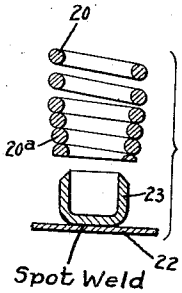


Fig. 4.

Fig. 2.

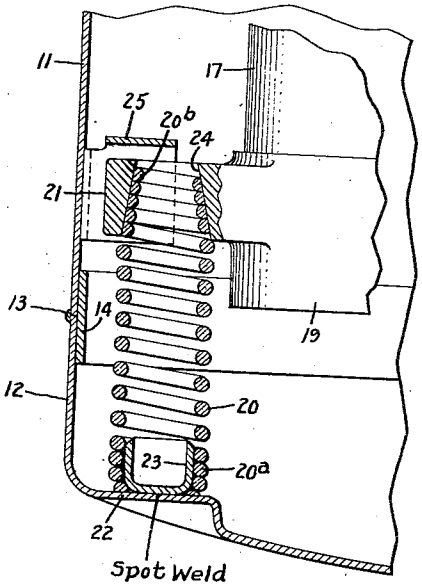
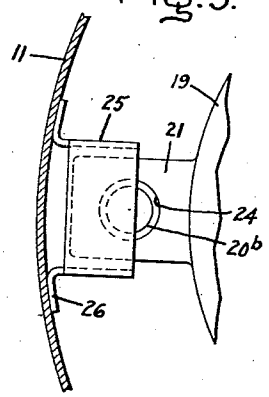


Fig. 3.



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His Attorney.

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REFRIGERATING MACHINE

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Application August 25, 1937, Serial No. 160,877

6 Claims. (Cl. 230—232)

My invention relates to refrigerating machines of the compression type, and more particularly to a resilient mounting arrangement for the motor and compressor units thereof.

In many refrigerating machines, and particularly in those designed for household use, a cabinet is provided having a food storage compartment therein. The machine also includes a motor and compressor unit for compressing gaseous refrigerant which is liquefied in a suitable condenser and supplied to an expansion type cooling unit located in the food storage compartment of the cabinet. In order to provide a self-contained refrigerating machine, it is desirable that the motor and compressor unit be enclosed in a sealed casing and that this casing together with the condenser be mounted on the cabinet. The motor and compressor unit is resiliently mounted on a series of helical compression springs carried by the bottom wall of the enclosing casing in order to minimize the transmission of vibration from the motor and compressor unit to the cabinet.

It is an object of my invention to provide a refrigerating machine including a motor and compressor unit having an enclosing casing and a resilient mounting accommodating lateral and upward movements of the motor and compressor unit within the enclosing casing, and an improved stop arrangement for limiting the movements of the motor and compressor unit within the enclosing casing.

Another object of my invention is to provide a motor and compressor unit and an improved arrangement for resiliently mounting the motor and compressor unit in an enclosing casing which has a minimum number of parts and is readily assembled, and which is inexpensive to manufacture.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing in which Fig. 1 is a side elevational view, partly in section, of a refrigerating machine including a motor and compressor unit having a resilient mounting and stop arrangement embodying my invention; Fig. 2 is an enlarged fragmentary side elevational view, partly in section, of the resilient mounting and stop arrangement shown in Fig. 1; Fig. 3 is a plan view of the stop arrangement shown in Fig. 2; and Fig. 4 is an exploded view, partly in section, of the lower portion of the resilient mounting arrangement shown in Fig. 2.

Referring to the drawing, in Fig. 1 I have shown a refrigerating machine of the household type provided with an hermetically sealed enclosing casing 10 formed of an upper casing section 11 and a lower casing section 12, the adjacent edges of these casing sections being welded together at 13 over a reenforcing ring 14. The casing sections 11 and 12 are preferably made of steel and are mounted on a removable top wall 15 of a heat insulated refrigerated cabinet. A refrigerant compressor 16 and an electric driving motor 17 therefor are arranged within the enclosing casing 10. The motor 17 is provided with an upper end shield 18 and a lower end shield 19. The compressor 16 is secured to the upper end shield 18 of the motor 17 by a series of bolts 18a, thus forming a compact motor and compressor unit which is resiliently mounted in the enclosing casing 10 on three upwardly extending helical compression springs 20 carried by the lower casing section 12. The springs 20 are equally spaced apart and engage three similarly spaced apart supporting brackets 21 carried by the lower end shield 19 of the motor 17. Preferably, the supporting brackets 21 and the lower end shield 19 are formed integral and comprise a single metal casting.

As best shown in Fig. 2, the bottom wall of the lower casing section 12 is provided with three equally spaced apart and inwardly disposed portions 22 which provide substantially horizontal supporting surfaces for the springs 20. A cup-shaped stud 23 is spot welded or otherwise rigidly secured to each of these inwardly disposed portions 22 of the lower casing section 12. Each of the studs 23 is embraced by the lower portion 20a of one of the springs 20 to form a tight frictional connection therebetween. The upper portion 20b of each of the springs 20 is tapered, having substantially the form of a frustum of a cone, and is received in one of the downwardly opening and similarly tapered recesses 25 provided in each of the supporting brackets 21 carried by the lower end shield 19 of the motor 17. The coils adjacent the upper portion of the spring 20 are disposed in contacting relation to increase the rigidity of the upper portion of the spring. Also, the upper portion of the spring 20 is provided with a smooth outer surface in order to increase the area of contact between the upper portion of the spring and the inner surface of

the recess 24. Preferably, the conical outer surface of the upper portion of the spring 20 and the conical inner surface of the recess 24 are ground to provide a close machine fit therebetween, which prevents the upper portion of the spring 20 from moving and rattling within the recess 24 during normal operation of the machine.

The springs 20 accommodate lateral and upward vibratory movements of the motor and compressor unit within the enclosing casing 10 incident to normal operation thereof, and prevent the vibration of the motor and compressor unit from being transmitted therefrom to the removable top wall 15 of the heat insulated refrigerator cabinet upon which the motor and compressor unit is mounted. In order to limit lateral and upward movements of the motor and compressor unit within the enclosing casing 10, three equally spaced apart stops 25 are carried by the enclosing casing 10. Each of these stops 25 comprises an inverted U-shaped body portion arranged to straddle the outer end of one of the supporting brackets 21 and in spaced relation thereto. As best shown in Fig. 3, the stop 25 is also provided with outwardly disposed arms 26 which are spot welded or otherwise rigidly secured to the upwardly directed side wall of the upper casing section 11. During normal operation of the machine, the lateral and upward movements of the motor and compressor unit are not sufficiently great to cause the supporting brackets 21 to engage the stops 25 and the motor and compressor unit is retained on the springs 20 by its weight without requiring bolts or other securing devices. During shipment of the machine the same is frequently tilted from its normal upright position, which tends to displace the motor and compressor unit from the springs 20 due to the fact that the brackets 21 are not rigidly secured to the upper portions of the springs 20 and are free to move upwardly with respect thereto. However, displacement of the motor and compressor unit from the springs 20 is prevented by the stops 25. It will be observed that upward movement of the motor and compressor unit is limited by the engagements between the brackets 21 and the upper portions of the U-shaped stops 25, while lateral movements of the motor and compressor unit caused by rotation of the unit about a vertical axis or shifting of the unit sidewise within the enclosing casing is limited by the engagements between the brackets 21 and the downwardly extending sides of the U-shaped stops 25.

In assembling the refrigerating machine the lower portions 20*a* of the springs 20 are forced over the studs 23 to form frictional connections therebetween. In order to insure tight frictional connections between the springs 20 and the studs 23, the lower portion of each of the springs is tapered, having substantially the form of a frustum of a cone, as best shown in Fig. 4. The lowermost coil of the spring 20 slightly underhooks the base of the stud 23 to positively lock the connection therebetween. The assembled motor and compressor unit is then brought into superimposed relationship with respect to the lower casing section 12 and placed upon the springs 20, the conical upper portions 20*b* of the springs 20 being received in the conical recesses 24 provided in the brackets 21 carried by the lower end shield 19 of the motor 17. The upper casing section 11 is then brought into superimposed relationship with respect to the lower casing section 12, the U-shaped stops 25 carried by the upper casing section 11 being alined with respect to the brackets 21. The upper casing section 11 is then lowered into place upon the lower casing section 12 to bring the U-shaped stops 25 into position straddling the outer ends of the brackets 21 and in spaced relation with respect thereto.

During normal operation of the refrigerating machine illustrated, gaseous refrigerant in the enclosing casing 10 is drawn into the compressor 16 through an intake muffler 27 and a conduit 28 and compressed and discharged into an exhaust muffler 29 through a conduit 30. The compressed refrigerant is conducted from the exhaust muffler 29 through a conduit 31 into an air cooled condenser 32 of the natural draft type supported about the enclosing casing 10 upon an annulus of fins 33. The compressed refrigerant in passing through the condenser 32 is cooled and condensed into a liquid and then flows through a conduit 34 into a suitable float-operated flow-controlling device 35. The liquid refrigerant is supplied from the float-operated flow-controlling device 35 through a liquid supply conduit 36 to a cooling unit 37. The cooling unit 37 comprises a sheet metal evaporator of the flooded type which is supported from an inner liner 38 of the removable top wall 15 in a food storage compartment 39 formed in the refrigerator cabinet cooled by the refrigerating machine. The liquid refrigerant contained in the evaporator 37 is vaporized by the absorption of heat from the food storage compartment 39 and the vaporized refrigerant is collected in a cylindrical header 40 formed in the evaporator 37, which is normally maintained about one-half full of liquid refrigerant. The vaporized refrigerant which accumulates above the level of the liquid refrigerant in the header 40 is returned to the interior of the enclosing casing 10 through a suction conduit 41 which communicates with the header 40 above the normal liquid level therein. It will be noted that the discharge end 41*a* of the suction conduit 41 is located above the normal level of a body of lubricant contained in a lubricant reservoir 42 formed in the lower casing section 12. This body of lubricant is recirculated to the moving parts of the motor and compressor unit during operation of the machine. The vaporized refrigerant returned to the enclosing casing 10 is again drawn into the compressor 16 through the intake muffler 27 and the conduit 28, and the cycle above described is continuously repeated until the food storage compartment 39 in which the evaporator 37 is located is cooled to the desired temperature.

While I have shown a particular embodiment of my invention in connection with a refrigerating machine of the household type, I do not desire my invention to be limited to the particular construction shown and described and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. A motor and compressor unit, a casing having upper and lower sections enclosing said unit, a supporting bracket carried by said unit, an upwardly extending helical compression spring carried by said lower casing section, a connection between said supporting bracket and the upper portion of said spring, said connection allowing free upward movement of said supporting bracket with respect to said spring, the weight of said unit being utilized to retain said supporting

bracket on said spring, said spring accommodating lateral and upward movements of said unit within said casing, and means including a stop carried by said upper casing section and cooperating with said supporting bracket for limiting lateral and upward movements of said unit within said casing.

2. A motor and compressor unit, a casing enclosing said unit, a supporting bracket carried by said unit and provided with a downwardly opening tapered recess therein, an upwardly extending helical compression spring carried by said casing and provided with a tapered upper portion, the tapered recess in said supporting bracket receiving and closely fitting the tapered upper portion of said spring to form a connection therebetween, said connection allowing free upward movement of said supporting bracket with respect to said spring, the weight of said unit being utilized to retain said supporting bracket on said spring, said spring accommodating lateral and upward movements of said unit within said casing, and means including a stop carried by said casing and cooperating with said supporting bracket for limiting lateral and upward movements of said unit within said casing.

3. A motor and compressor unit, a casing having upper and lower sections enclosing said unit, a supporting bracket carried by said unit and provided with a downwardly opening tapered recess therein, an upwardly extending helical compression spring carried by said lower casing section and provided with a tapered upper portion, the tapered recess in said supporting bracket receiving and closely fitting the tapered upper portion of said spring to form a connection therebetween, said connection allowing free upward movement of said supporting bracket with respect to said spring, the weight of said unit being utilized to retain said supporting bracket on said spring, said spring accommodating lateral and upward movements of said unit within said casing, and means including an inverted U-shaped stop carried by said upper casing section and cooperating with said supporting bracket for limiting lateral and upward movements of said unit within said casing.

4. A motor and compressor unit, a casing having a bottom wall and an upwardly directed side wall enclosing said unit, a supporting bracket carried by said unit, an upwardly extending helical compression spring arranged in said casing, a stud carried by the bottom wall of said casing, the lower end of said spring embracing and tightly fitting said stud to form a frictional connection therebetween, a connection between said supporting bracket and the upper portion of said spring, said connection allowing free upward movement of said supporting bracket with respect to said spring, the weight of said unit being utilized to retain said supporting bracket on said spring, said spring accommodating lateral and upward movements of said unit within said casing, and means including a stop carried by the side wall of said casing and cooperating with said supporting bracket for limiting lateral and upward movements of said unit within said casing.

5. A refrigerating machine, or the like, including a motor provided with upper and lower end shields, a compressor carried by said upper end shield and operated by said motor, a casing enclosing said motor and said compressor, a plurality of spaced apart supporting brackets carried by said lower end shield, each of said supporting brackets being provided with a downwardly opening tapered recess therein, a plurality of spaced apart and upwardly extending helical compression springs carried by said casing, each of said springs being provided with a tapered upper portion, the tapered recesses in said supporting brackets receiving and closely fitting the tapered upper portions of said springs to form connections therebetween, said connections allowing free upward movement of said supporting brackets with respect to said springs, the weight of said motor and said compressor being utilized to retain said supporting brackets on said springs, said springs accommodating lateral and upward movements of said motor and said compressor within said casing, means including a plurality of spaced apart stops carried by said casing and cooperating with said supporting brackets for limiting lateral and upward movements of said motor and said compressor within said casing.

6. A refrigerating machine, or the like, including a motor provided with upper and lower end shields, a compressor carried by said upper end shield and operated by said motor, a casing having upper and lower sections enclosing said unit, a plurality of spaced apart supporting brackets carried by said lower end shield, each of said supporting brackets being provided with a downwardly opening tapered recess therein, a plurality of spaced apart and upwardly extending helical compression springs carried by said lower casing section, each of said springs being provided with a tapered upper portion, the tapered recesses in said supporting brackets receiving and closely fitting the tapered upper portions of said springs to form connections therebetween, said connections allowing free upward movement of said supporting brackets with respect to said springs, the weight of said motor and said compressor being utilized to retain said supporting brackets on said springs, said springs accommodating lateral and upward movements of said motor and said compressor within said casing, and means including a plurality of spaced apart inverted U-shaped stops carried by said upper casing section and cooperating with said supporting brackets for limiting lateral and upward movements of said motor and said compressor within said casing.

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