Nov. 15, 1955 J. H. HEIDORN ET AL 2,723,538

REFRIGERATING UNIT WITH RESILIENT SUPPORT

Filed April 1, 1954 2 Sheets-Sheet 1

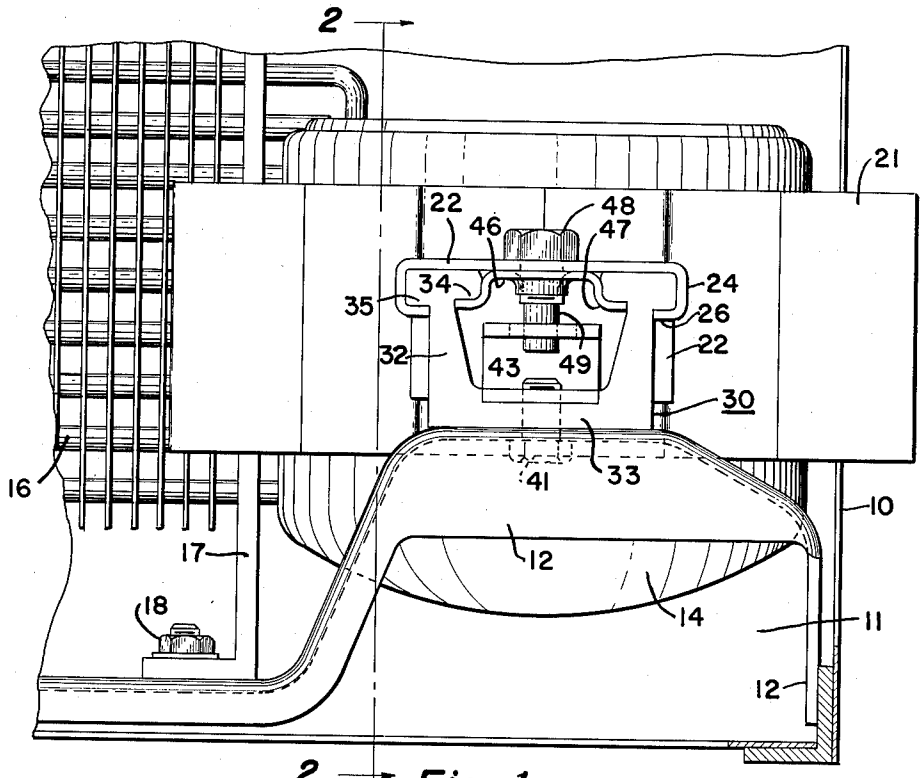


Fig. 1.

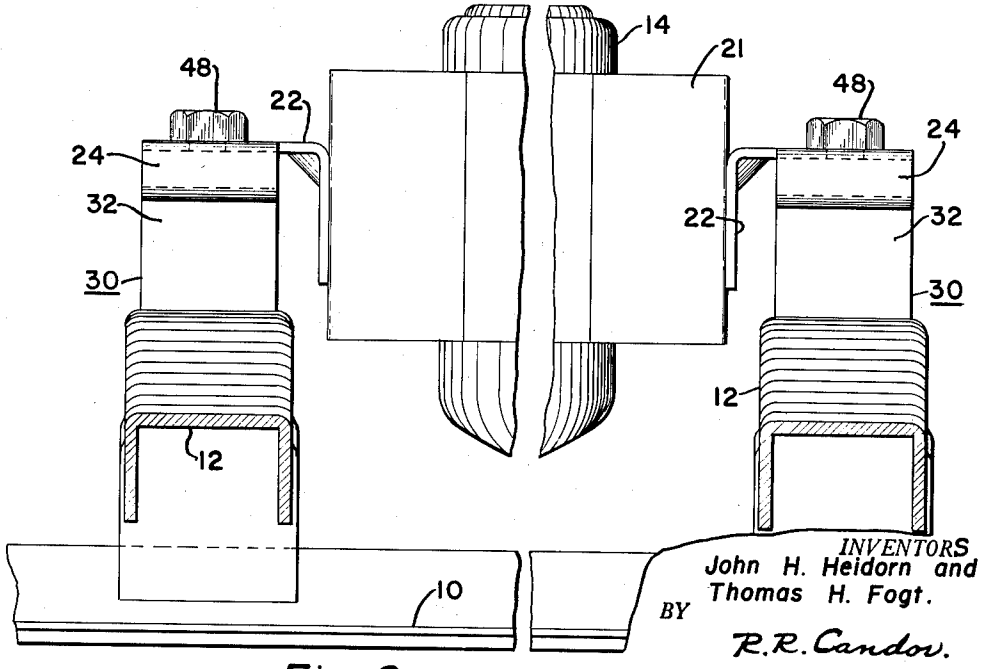


Fig. 2.

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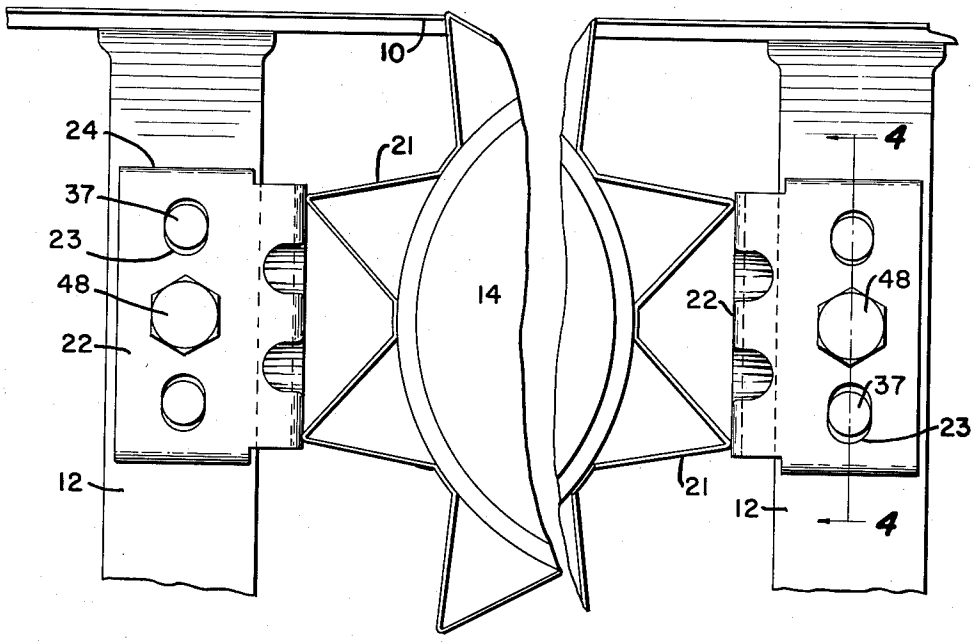


Fig. 3.

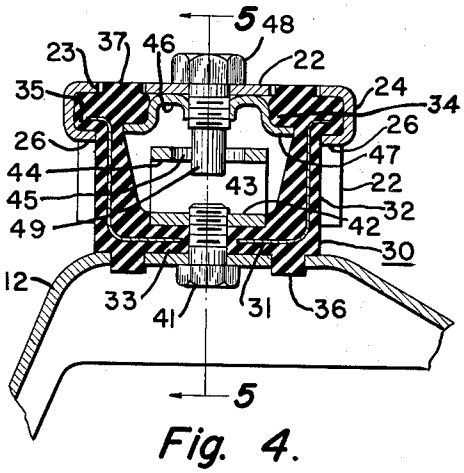


Fig. 4.

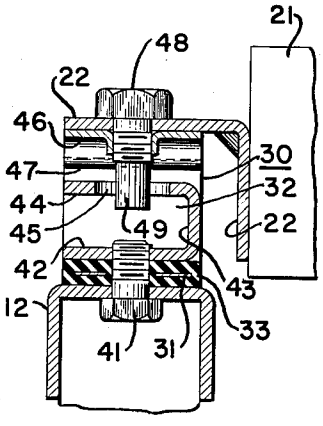


Fig. 5.

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REFRIGERATING UNIT WITH RESILIENT SUPPORT

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7 Claims. (Cl. 62—116)

This invention relates to refrigerating apparatus and particularly to an arrangement for carrying an operating unit of such apparatus upon a support mounted on a part of a refrigerator cabinet.

It is an object of our invention to provide a simplified, rugged and long-life resilient mounting for a motor-compressor unit of a refrigerating system in a refrigerator cabinet while at the same time permitting a limited rotary movement of the unit relative to its support.

Another object of our invention is to provide a mounting arrangement for a sealed casing containing a motor and compressor driven thereby which while cushioning vibrations of the casing normally permits a limited rotary movement thereof relative to its support and converts the force of any abnormal rotation thereof into a swinging movement of the casing in pendulum fashion and which also eliminates the necessity of providing special or additional hold-down bolts or clamps for the sealed casing.

A further object of our invention is to provide an improved sealed casing carrying means which limits movement thereof relative to its support in or on a refrigerator cabinet during shipment of the cabinet and which yieldingly affords a rotary movement of the casing particularly during the starting and/or stopping of a motor-compressor within the casing.

A still further object of our invention is to provide a carrying arrangement for mounting a casing containing a motor and a compressor upon a support in a refrigerator cabinet which is in the form of U-shaped resilient rubber-like members to cushion vibrations of the casing, to permit a limited rotary movement of the casing relative to its support and to isolate sounds generated by operating elements in the casing against transmission through the casing support to the refrigerator cabinet.

In carrying out the foregoing objects it is a more specific object of our invention to utilize the resiliency of reinforced leg portions of substantially U-shaped rubber-like mounting members of a sealed motor-compressor casing for absorbing vibrations of a casing supported thereon, to yieldingly check rotary movement of the casing relative to its support in a refrigerator cabinet and to associate means with the elements employed to clamp the mounting members in position for positively arresting any abnormal rotary motion of the casing.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a fragmentary side elevational view of a preferred embodiment of the invention showing a motor-compressor contained in a casing mounted in a machine compartment of a refrigerator cabinet;

Figure 2 is a broken side elevational view taken on the line 2—2 of Figure 1 showing opposed mounting members at two substantially equally spaced apart points around a sealed casing;

Figure 3 is a broken or fragmentary top view of the motor-compressor casing mounted on its support;

Figure 4 is a vertical sectional view of one of the casing carrying means and is taken on the line 4—4 of Figure 3; and

Figure 5 is another vertical sectional view through the one casing carrying means taken on the line 5—5 of Figure 4.

Referring now to the drawings, wherein a preferred embodiment of our invention is disclosed, reference numeral 10 in Figure 1 thereof indicates a wall or walls of a refrigerator cabinet having a machine compartment 11 provided in its lower portion. A rigid metal frame 12 within compartment 11 and stationarily bolted in any suitable manner to a part of cabinet 10 forms or provides a support for carrying a sealed metal casing 14 containing an electric motor and a compressor driven thereby of a portion of a refrigerant translating unit of a closed refrigerating system associated with the refrigerator 10. The refrigerant translating unit of the refrigerating system also includes a refrigerant condenser or condensing coil 16 carried by suitable brackets 17 and mounted on the frame-like support 12 by suitable bolts or the like 18. The closed refrigerating system also includes a refrigerant evaporator (not shown) utilized to cool the interior of a food storage chamber or compartment (not shown) provided or formed within the refrigerator cabinet 10 and which evaporator is connected with the refrigerant translating unit by suitable conduits. The construction and operation of a closed refrigerant system associated with a refrigerator cabinet is now well known to those skilled in the art and needs no further description herein.

The hermetically sealed casing 14, containing the motor and compressor, has metal heat radiating fins 21 welded or otherwise rigidly secured in intimate thermal contact therewith. These fins 21, in addition to aiding in dissipating heat from casing 14, serve as means for securing wings or L-shaped wing brackets 22 to casing 14 for supporting the same upon the frame support 12. As best indicated in Figures 3 and 5 of the drawings, one of a pair of substantially L-shaped metal wing brackets 22 are spot welded to the metallic heat radiating fins 21 on opposite sides of the sealed casing 14 so as to be spaced apart an equal distance around the casing. The horizontal portion of each of these wings or wing brackets 22 is provided with a central round hole and a pair of slightly elongated holes 23 on either side of the central hole (see Figures 3 and 4). This horizontal portion of brackets 22 also has its side edges bent down, as at 24, and thence inwardly as at 26, to form a portion of a tying and clamping means for a purpose to be hereinafter described. Vibration absorbing and sound insulating or deadening means are associated with the wing or wing brackets 22 for carrying or supporting the sealed casing 14 upon its support or frame 12. Each of the pair of mounting or casing carrying means, disposed at substantially equally spaced apart points around casing 14, comprises or includes a resilient substantially U-shaped rubber-like member generally represented by the reference numeral 30 and having a U-shaped strap-like spring metal insert 31 embedded therein. Each of the U-shaped members 30 includes upright substantially parallel leg portions 32 and an integral bight portion 33. The end of each leg or leg portions of U-shaped members 30 is enlarged to provide inner and outer horizontal shoulders 34 and 35 respectively thereon for a purpose to be presently described. Each member 30 is provided with two small round bosses 36 depending from the lower surface of its bight portion 33 and round bosses 37 extending upwardly from the end surface of each leg portion 32 thereof. The bosses 36 normally project into suitable holes provided in the frame or support 12 and the bosses 37 normally project into the elongated holes 23

provided in the L-shaped wing brackets 22 (see Figure 4). Means is provided for tightly clamping the bight portion 33 of each resilient U-shaped rubber-like member 30 to support 12. This means is in the form of a screw or bolt 41 which passes through a suitable hole provided in support 12 and is threaded into a tapped hole provided in the lower portion 42 of a substantially C-shaped metal element 43, located on top of the bight portion 33 of member 30 and disposed between the legs 32 thereof (see Figures 4 and 5). The upper portion 44 of C-shaped element 43 is provided with a round opening 45 for a purpose to be presently described. Means is provided for tying the ends of both legs or leg portions 32 of the U-shaped members 30 to one another and for clamping the ends of legs 32 to casing 14 by way of the wing brackets 22. This latter clamping means comprises or includes a plate 46 having its sides bent downwardly and thence inwardly as at 47. Plate 46 is provided with a central extruded and tapped hole and a screw or bolt 48, having an integral stud 49 depending from the threaded shank portion thereof, is threaded into the tapped hole in plate 46 to clamp this plate tightly against the enlarged ends of the legs of U-shaped member 30 and to also clamp this member tightly to the wing brackets 22 secured to casing 14. The stud 49, formed integrally with screw or bolt 48, normally projects through the opening 45 in C-shaped element 43 and is positioned centrally within this opening 45. It will be noted that the tying and clamping means for the leg portions 33 of U-shaped resilient rubber-like members 30 causes the inwardly bent edge portions 26 on brackets 22 to abut against the outer shoulders 35 and the bent-down edges 47 of plate 46 abut against the inner shoulders 34. It should also be noted that while metallic clamping means are employed to secure the casing mounting means upon its support 12 there is no direct metal-to-metal contact between the casing 14 or its brackets 22 and support 12 and that the sound deadening U-shaped members 30 thus prevent transmission of noise created in casing 14, by operation of the motor and compressor therein, to the support 12 and to cabinet 10.

We have discovered that the presently disclosed arrangement serves several purposes in the mounting of a sealed casing, having a motor and a compressor disposed one above the other therein, upon a support. The leg portions 32 of U-shaped rubber-like members 30 cushions up and down movement of sealed casing 14. Due to the leg portions 32 of members 30 being disposed substantially at right angles to a portion of an arc about the circumference of cylindrical casing 14 the resiliency of these leg portions is sufficient to yieldingly snub any normal rotary movement of the casing relative to support 12. The arrangement is such that the mounting or carrying means withstands jars and jolts of the casing 14 relative to its support 12 during shipment of a refrigerator cabinet and that any abnormal rotary force imparted to casing 14, during shifting of the refrigerator cabinet upon a floor and/or during shipment thereof, is arrested by the studs 49 engaging the wall of openings 45 in the C-shaped element 43. After a refrigerator cabinet having a motor-compressor sealed within a casing located therein has been installed in a home the most objectionable movement of the casing relative to its support has been found to be due to starting and/or stopping of the motor and compressor. That is at the moment that the motor and compressor starts operating or their operation is stopped the motor rotor, motor shaft and compressor eccentric causes an unbalanced condition within the sealed casing 14 and this tends to rotate the casing. This rotation of casing 14 causes the leg portions 32 of members 30 to tilt, in parallelism, at an angle relative to the vertical and thus the leg portions 32 absorb and snub rotary movement of the casing relative to its support and yieldingly limits this rotation to a normally predetermined distance. When the rotary force of casing 14 diminishes or terminates the resilient leg portions 32 of members 30 tend to resume their normal vertical position and thus return casing 14 to its normal location. The U-shaped spring metal strap-like insert 31, embedded in the U-shaped rubber-like members 30, in addition to increasing the supporting strength of leg portions 32 also increase the resiliency thereof and aid in pulling the leg portions 32 back into a normal vertical position after being tilted by the rotary movement of casing 14. If, during shipment of casing 14 in a refrigerator cabinet or during shifting of the refrigerator cabinet on a floor, an abnormal rotary movement of casing 14 tends to take place the stud 49, on screw or bolt 48, will engage the wall of opening 45 in C-shaped elements 43 to positively stop or arrest any such abnormal movement. Obviously too much rotary movement of casing 14 relative to its support 12 might fracture a refrigerant conduit or its connection to the sealed casing. The resiliency of leg portions 32 of members 30 is further utilized for another purpose. When such an abnormal force or rotary movement of casing 14 occurs, to cause stud 49 to engage the C-shaped elements 43, this rotary force is converted into a force which, by virtue of the resiliency of leg portions 32 of members 30, tends to create a pendulum-like movement of casing 14 upon its carrying members 30. Thus by dividing any abnormal force imparted to the sealed motor-compressor containing casing into both a rotary and a pendulum swinging movement thereof the danger of fracturing conduits and/or their connection to the casing is eliminated.

From the foregoing it should be apparent that we have provided a simplified and improved resilient carrying arrangement having a two-point mounting of a motor-compressor casing upon a support in a refrigerator cabinet wherein the casing is at all times free to move in several directions and its movement is cushioned or normally snubbed. Our improved arrangement in addition to absorbing high frequency vibrations also deadens or prevents any noise created thereby from being amplified and transmitted to the cabinet or to the room in which the cabinet is located. By converting abnormal rotary movement imparted to the sealed casing into a pendulum swinging movement thereof jars or shocks applied thereto are readily absorbed by the carrying means herein disclosed. Also by reinforcing the rubber-like members of our present casing carrying arrangement with a spring metal insert the resiliency and life of these members are prolonged.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In combination, a refrigerator cabinet, a refrigerating system associated with said cabinet and having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped, means for carrying said casing at two substantially equally spaced apart points thereabout upon a support mounted on a part of said cabinet, each of said carrying means comprising a resilient substantially U-shaped rubber-like member having its legs disposed in upright side by side relationship, means clamping the bight portion of said U-shaped member to said support, means tying the ends of both upright leg portions of said U-shaped member to one another and securing the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, that part of said leg portions of each of said U-shaped members intermediate said clamping means and said tying and securing means yieldingly snubbing the rotary movement of said casing and limiting the same to a normal predetermined distance, and means associated with said clamping means and with said tying and securing means for arresting rotation of said casing beyond said normal predetermined distance upon abnormal

rotation of the casing with respect to said support said part of said leg portions of said members converting the abnormal rotary force of the casing into a swinging movement thereof in pendulum fashion.

2. In combination, a refrigerator cabinet, a refrigerating system associated with said cabinet and having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped, means for carrying said casing at two substantially equally spaced apart points therearound upon a support mounted on a part of said cabinet, each of said carrying means comprising a resilient substantially U-shaped rubber-like member having its legs disposed in upright side by side relationship, means clamping the bight portion of said U-shaped member to said support, means tying the ends of both upright leg portions of said U-shaped member to one another and securing the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, that part of said leg portions of each of said U-shaped members intermediate said clamping means and said tying and securing means yieldingly snubbing the rotary movement of said casing and limiting the same to a normal predetermined distance, and said U-shaped rubber-like members having a metal strap-like spring insert embedded therein for increasing their supporting strength and the snubbing action thereof.

3. The combination of a refrigerator cabinet and a refrigerating system associated therewith having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped comprising, means for carrying said casing upon a support mounted on a part of said cabinet, said carrying means including resilient substantially U-shaped rubber-like members spaced apart around said sealed casing, said U-shaped rubber-like members each having its legs disposed in upright side by side relationship, means clamping the bight portion of said U-shaped members to said support, means tying the ends of both upright leg portions of said U-shaped members to one another and securing the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, and said tying and securing means serving to cause each leg portion of said resilient U-shaped rubber-like members to yieldingly snub the rotary movement of said casing.

4. The combination of a refrigerator cabinet and a refrigerating system associated therewith having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped comprising, means for carrying said casing upon a support mounted on a part of said cabinet, said carrying means including resilient substantially U-shaped rubber-like members spaced apart around said sealed casing, means clamping the bight portion of said U-shaped members to said support, means tying the ends of both leg portions of said U-shaped members to one another and clamping the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, said leg portions of said resilient U-shaped rubber-like members yieldingly snubbing the rotary movement of said casing and limiting the same to a predetermined distance, and said U-shaped members having a U-shaped spring metal strap-like insert embedded therein for increasing their supporting strength and the snubbing action thereof.

5. In combination, a refrigerator cabinet, a refrigerating system associated with said cabinet and having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped, means for carrying said casing from a support mounted on a part of said cabinet, said

carrying means comprising resilient substantially U-shaped rubber-like members spaced apart around said casing, means clamping the bight portions of said U-shaped members to said support, means tying the ends of both leg portions of said U-shaped members to one another and clamping the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, said leg portions of said resilient U-shaped rubber-like members yieldingly snubbing the rotary movement of said casing and limiting the same to a normal predetermined distance, means arresting rotation of said casing beyond said normal predetermined distance, and said last named means including a part of one of said clamping means projecting through an opening in a part of the other of said clamping means.

6. In combination, a refrigerator cabinet, a refrigerating system associated with said cabinet and having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped, means for carrying said casing from a support mounted on a part of said cabinet, said carrying means comprising resilient substantially U-shaped rubber-like members spaced apart around said casing, means clamping the bight portion of said U-shaped members to said support, means tying the ends of both leg portions of said U-shaped members to one another and clamping the same to said sealed casing, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, said leg portions of said resilient U-shaped rubber-like members yieldingly snubbing the rotary movement of said casing and limiting the same to a normal predetermined distance, means for arresting rotation of said casing beyond said normal predetermined distance, said last named means including a part of one of said clamping means projecting through an opening provided in a part of the other of said clamping means, and said U-shaped rubber-like members having a U-shaped spring metal insert embedded therein for increasing their supporting strength and the snubbing action thereof.

7. In combination, a refrigerator cabinet, a refrigerating system associated with said cabinet and having a refrigerant translating unit including a motor and a compressor driven thereby sealed within a casing and adapted to be started and stopped, said casing having mounting wings thereon disposed at two substantially equally spaced apart points therearound, means connected to said wings for carrying said sealed casing from a support mounted on a part of said cabinet, said carrying means comprising a resilient substantially U-shaped rubber-like member having a U-shaped spring metal strap-like insert embedded therein, clamping means for securing the bight portion of said U-shaped member to said support and including a bracket intermediate the leg portions of said member having an opening therein, means tying the ends of both leg portions of said U-shaped member to one another and clamping the same to a wing on said sealed casing, said last named tying and clamping means including a stud projecting through the opening in said bracket, the starting and/or stopping of said motor and said compressor imparting a rotary movement to said casing relative to said support, said leg portions of said resilient U-shaped rubber-like members yieldingly snubbing the rotary movement of said casing and limiting the same to a normal predetermined distance, and said stud engaging the wall of the opening in such bracket for arresting rotation of said casing beyond said normal predetermined distance and converting the rotary force into a force tending to swing said casing in pendulum fashion.

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