May 19, 1953 R. W. DOEG 2,638,753

REFRIGERATING UNIT MOUNTING

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Fig. 1

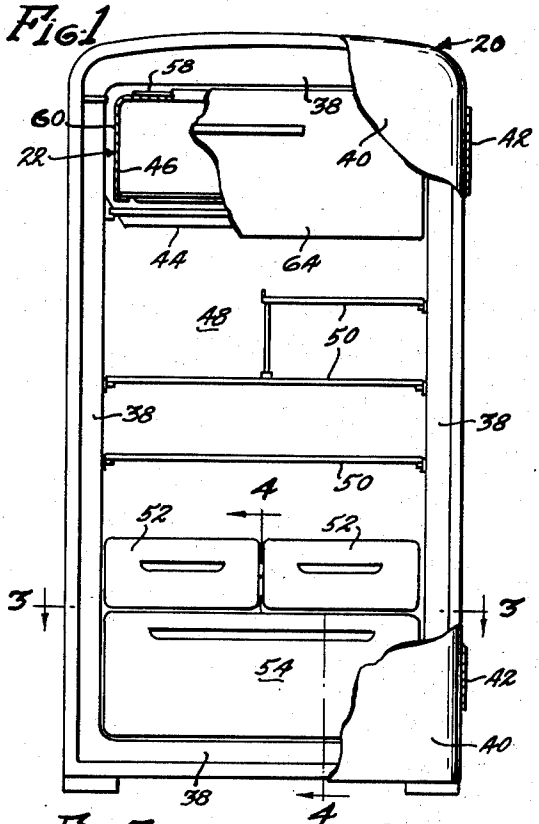


Fig. 2

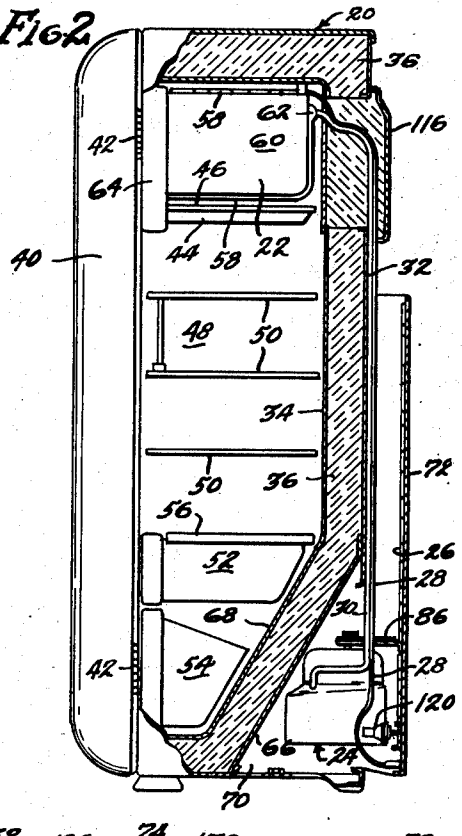
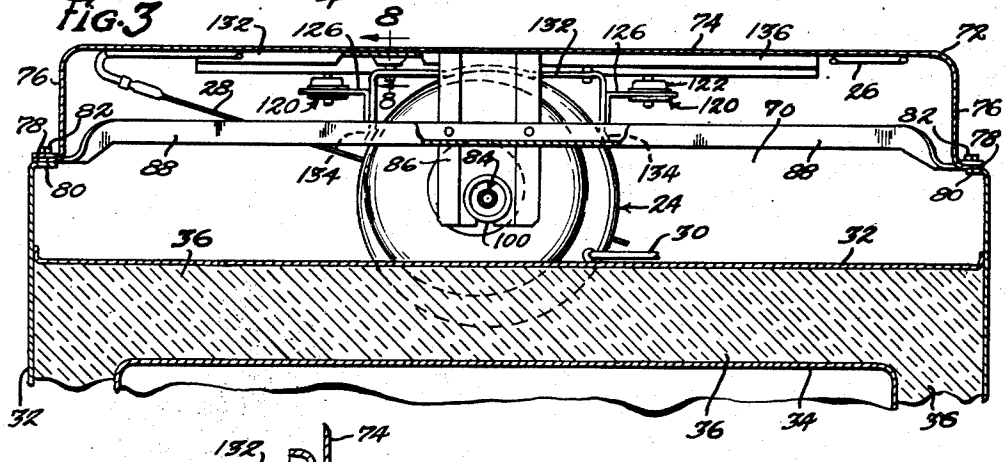


Fig. 3



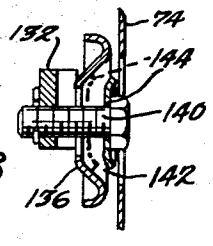


Fig. 8

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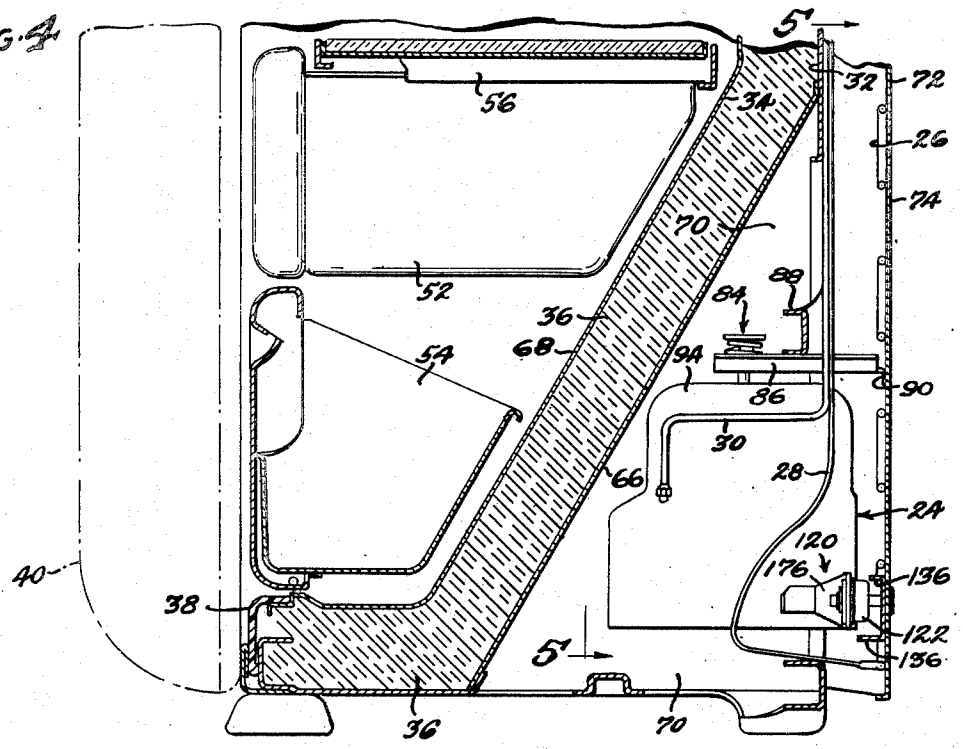
Fig. 4



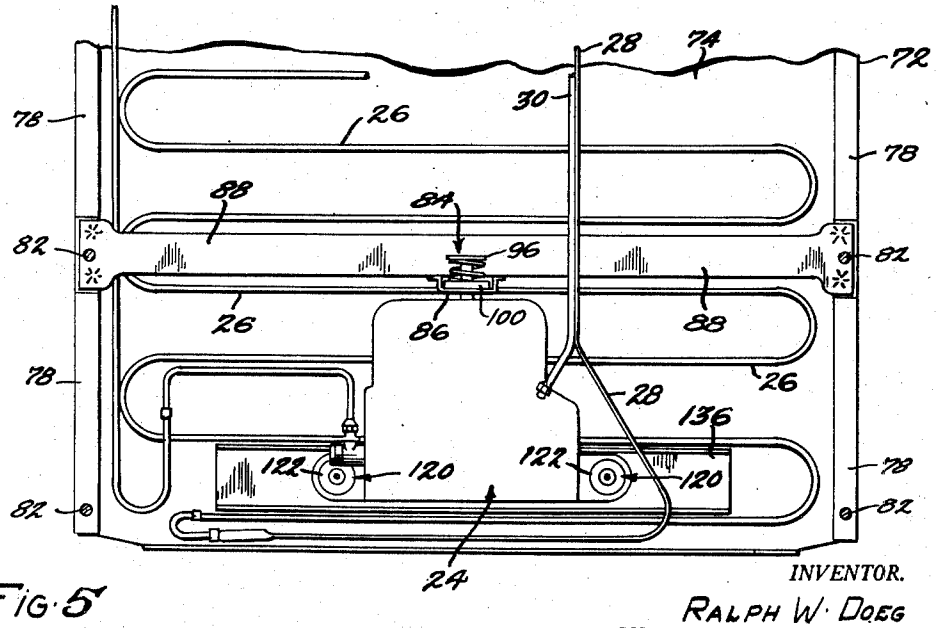


Fig. 5

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REFRIGERATING UNIT MOUNTING

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Fig. 6

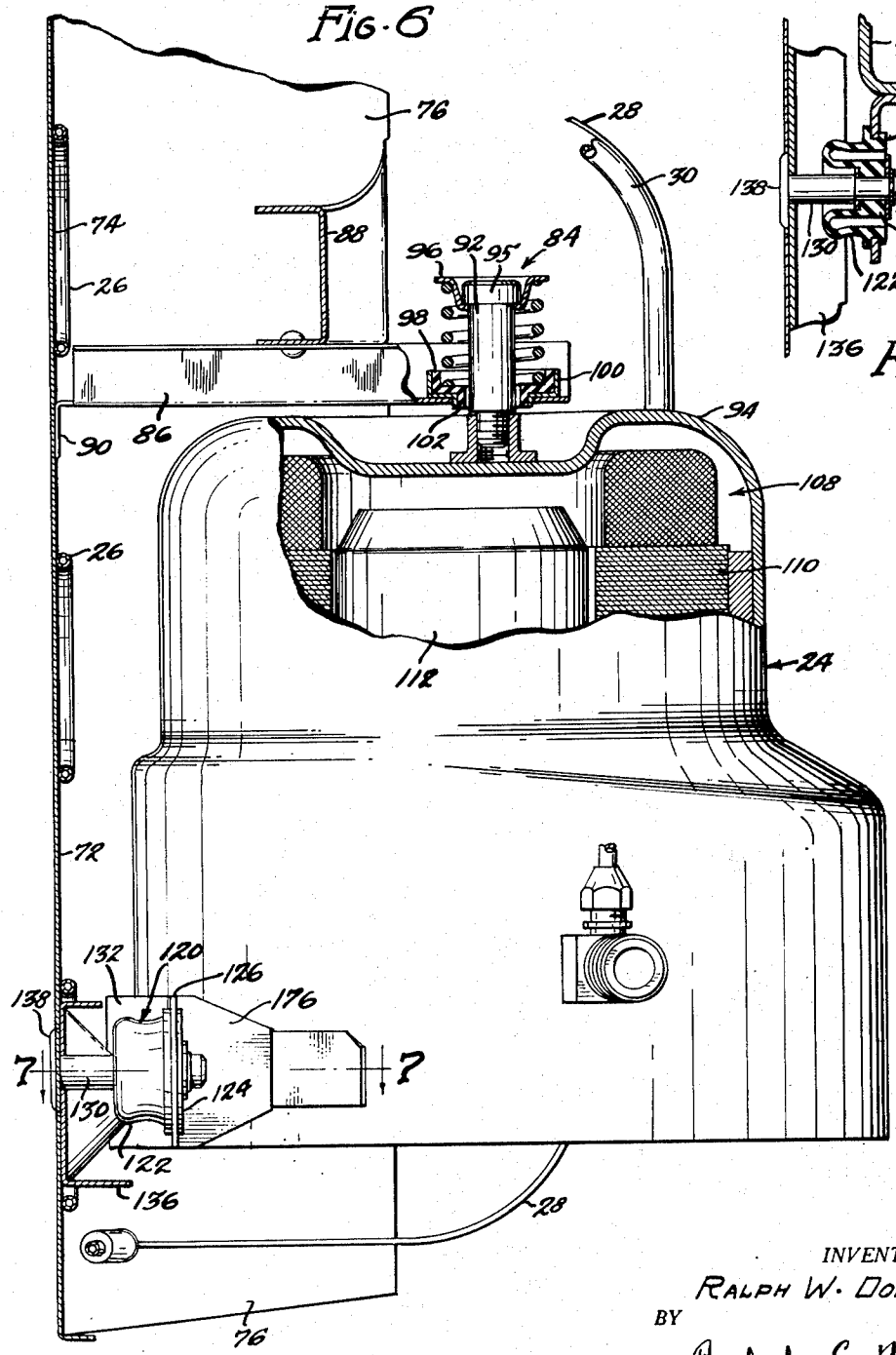

Fig. 7

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UNITED STATES PATENT OFFICE

2,638,753

REFRIGERATING UNIT MOUNTING

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Application July 19, 1950, Serial No. 174,643

2 Claims. (Cl. 62—117.4)

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This invention relates generally to refrigerating apparatus and more particularly to household type refrigerators.

It is an object of my invention to provide in a household refrigerator an improved construction and arrangement of cabinet, flue, supports, and mounting in the interests of improving the mounting of a refrigerant motor-compressor unit in a machinery compartment of the cabinet.

Another object of the invention is to support a refrigerant motor-compressor unit by means of a single point suspension mounting to the ends of facilitating assembly of the refrigerator and of decreasing motor-compressor operating noises.

Another object of the invention is to provide, in addition to the single point suspension, mounting members arranged to limit lateral yieldability of the suspension so as to decrease torque induced side-sway of the motor-compressor unit.

Another object of the invention resides in the provision of supplemental means co-operable with the single point suspension means to decrease further audible vibrations emanating from the motor-compressor unit.

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 present invention is clearly shown.

In the drawings:

Fig. 1 is a front view partly broken away and in section of a refrigerator embodying features of my invention.

Fig. 2 is a side view partly broken away and in section of the refrigerator;

Fig. 3 is an enlarged, fragmentary sectional view of the refrigerator, taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary vertical sectional view of the refrigerator, taken along the line 4—4 of Fig. 1;

Fig. 5 is a rear elevational view of a lower portion of the refrigerator;

Fig. 6 is an enlarged vertical sectional view of the refrigerator, taken along the line 5—5 of Fig. 4;

Fig. 7 is a detail view in horizontal section, taken along the line 7—7 of Fig. 6; and

Fig. 8 is another detail view in section, taken along the line 8—8 of Fig. 3.

Referring to the drawings by characters of reference, the refrigerator embodying my invention comprises, in general, a cabinet 20 and a refrigerating system including a refrigerant evaporator

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22, a refrigerant compressor 24, and a refrigerant condenser 26. The refrigerating system is associated with the cabinet 20 having the evaporator 22 located within the cabinet adjacent the top thereof; the compressor 24 located within the cabinet adjacent the bottom and rear thereof; and the condenser 26 located externally of the cabinet at the rear thereof. A refrigerant delivery conduit 28 and a refrigerant return conduit 30 operatively connect the evaporator and the condensing element. The refrigerant delivery conduit is preferably a small diameter or capillary tube adapted to meter liquid refrigerant to the evaporator in sufficient amounts to maintain the evaporator refrigerated.

The cabinet 20 may comprise, in general, a casing 32 and a liner 34. These may be box-shaped and suitably spaced apart to receive therebetween any of the well-known types of heat insulation 36 to decrease heat leakage into the cabinet. At the front of the cabinet, the edges of the casing 32 and of the liner 34 may be spanned by heat breaker strips 38 to close the opening between said edges and to give a finished appearance to the front of the cabinet. A door 40 is provided to close the front of the cabinet and may be hinged to one side of the cabinet proper by suitable hinges 42.

Immediately beneath the evaporator 22, a combination partition and drip pan 44 divides the interior of the cabinet into an upper freezing compartment 46 and a lower food storage compartment 48. Beneath the drip pan 44, a number of shelves 50 may be provided and below the lowermost of the shelves, the present cabinet has a pair of laterally positioned storage drawers 52 and below these a storage bin 54. The storage drawers 52 may be supported on slide-ways 56 which may be secured by any suitable means to the sides of the liner 34. The bin 54 may be a sliding bin mounted on slides or may be a tiltable bin, as may be desired.

The evaporator 22 may comprise a refrigerant conduit or coil 58 and an extended heat absorber in the form of a box-shaped, metal container 60. The conduit 58 may be wrapped in spiral fashion around the top and sides of the container 60, and may be secured in intimate contact therewith by cement or other suitable securing means so as to attain efficient heat transfer between the parts. The conduit has a discharge end connected to a refrigerant accumulator 62 which may be located on the rear wall of the container 60. In addition to functioning as a heat-absorbing surface, the con-

tainer 60 provides a large storage space for the reception of ice trays (not shown) and for foods and other items to be frozen. As shown, the evaporator 22 extends from front to rear of the cabinet and substantially across the width thereof to provide large heat absorbing and storage capacity. A door 64 is preferably provided to close the front of the container 60 to avoid loss of cold air therefrom when the outer or main door 40 is opened.

At the bottom of the cabinet, the rear walls of casing 32 and liner 34 have inclined portions 66 and 68, respectively, extending downwardly and forwardly to the cabinet bottom wall, to provide an external recess in the cabinet to serve as a machinery compartment 70 for the compressor 24. The machinery compartment 70 may extend substantially the full width of the cabinet and the casing sides may extend down to the bottom of the cabinet to form the sides of the machinery compartment.

Overlying the rear wall of the cabinet is a support and flue member 72 to induce upward flow of air over and cool the compressor 24 and also to support the compressor. The flue member 72 may be formed of sheet metal and may have a rear wall 74 and opposite side walls 76. At opposite sides of the cabinet 26, the flue member 72 is formed with outturned flanges 78 which may be secured, respectively, to similar inturned flanges 80 formed on the side edges of the casing 32. Screws 82, or other suitable securing means, may be used to secure the flue member flanges 78 to the casing flanges 80.

The condenser 26, in the form of a sinuous coil, is mounted on the inner surface of the flue member 72 to utilize the large surface of the flue to dissipate the heat of condensation to atmosphere. Bituminous cement, or other suitable securing means, may be provided to secure the condenser to the flue rear wall for efficient heat transfer therebetween.

In accordance with my invention, I provide a single point suspension or mounting member 84 for the compressor 24 and support the mounting member by a cantilever 86 which I, in turn, support on the flue member 72 and on a cross member or bar 88 carried by the cabinet. The cantilever 86 of the present construction is in the form of a horizontal plate member and is arranged to extend transversely to the cross member 88 and to the broad side or rear wall 74 of the flue member 72. The rear end of the cantilever 86 is secured to the support-flue member 72 in any suitable manner, such as by welding a downturned flange 90 of the cantilever 86 to and flat against the inner surface of the flue member 72. Intermediate its ends, the cantilever 86 is supported by the cross member 88 and may be secured thereto by rivets or by any other suitable means.

Mounted on and adjacent the free end of the cantilever 86 is the mounting member 84 which is a resilient mounting preferably in the form of a helical spring. The mounting or spring 84 surrounds a motor-compressor support or stud 92 which is secured at its lower end to the top or dome of a compressor casing 94 for the motor-compressor. The support or stud 92 functions also as a vibration transmitting member, transmitting vibrations emanating from the motor-compressor to the single mounting spring 84. The upper end of the stud 92 may be formed with a head 95 to seat in a spring retainer 96 which is engaged by the upper end of spring 84 and urged thereby against the head 95 as a stop. In order to decrease further audible vibrations emanating from the motor-compressor 24, I provide a vibration absorbing pad 98 between the lower end of the spring 84 and the cantilever 74. A lower spring retainer 100 receives the lower end of mounting spring 84 and seats on the upper surface of the cantilever 86. The supporting stud 92 extends through aligned clearance apertures in the cantilever 86, noise suppressing pad 98 and in the spring retainer 100, as shown in Fig. 6, and the pad 98 is preferably formed with a hollow boss 102 extending into the retainer aperture to prevent contact between the metal stud and retainer. Preferably, the pad 98 is made of rubber, or some suitable rubberized material, which will efficiently absorb and dampen audible vibrations.

The motor-compressor unit 24 may be a so-called sealed type of unit in which a suitable compressor (not shown) and a driving electric motor 108 are housed and sealed in a dome-like casing, such as casing 94. The motor 108 is located adjacent the top of the casing 94 and comprises the usual stator 110 and rotor 112. For further details of the compressor, reference may be had to my Patent No. 2,199,436 issued May 7, 1940.

As shown more clearly in Fig. 5, the cantilever 86 crosses the member 88 substantially midway of the ends thereof and the free end of the cantilever projects beyond the cross member into the machinery compartment where the compressor is hung on the free end of the cantilever by the single mounting spring. Opposite ends of the cross member 88 are secured to the flue flanges, such as by welding, and these flanges may be provided with aligning apertures to receive screws for securing the cabinet casing and flue member together. Thus, it will be seen that the flue member 72, the refrigerant condensing element, and the motor-compressor supporting structure, including the cross member 88 and the cantilever 86, can be assembled separately from the cabinet and then, as a unitary structure, be mounted on the back of the cabinet. In the cabinet rear wall, an opening closed by a plate 116 and a section of insulation allows removal of the evaporator from the rear of the cabinet, which is advantageous when it is desired to remove the entire system and the above-mentioned unitary structure from the cabinet for repair or replacement.

Also forming a part of the above-mentioned unitary structure is a pair of spaced mounting members 120 which are adapted to limit sideway of the motor-compressor unit induced by the torsional force of operation of the compressor. The mounting members 120 each comprise, in general, a cushioning member or rubber diaphragm 122 of tubular form having an outer, movable end 124 attached by a bracket 126 to the motor-compressor casing 94 and having an inner, fixed end 128 attached to the flue rear wall by a pin 130. In the present construction, the brackets 126 are secured respectively to the sides of a larger, U-shaped bracket 132 which may have end portions 134 secured, such as by welding, to the side of the motor-compressor casing 94, adjacent the bottom thereof. A reinforcing plate 136 may be welded or be otherwise secured to the rear wall of the flue member, and the pins 130 may have enlarged heads 138 welded to the reinforcing plate to secure the parts together. It will be understood that in operation, the motor-compressor unit 24 will have an oscillatory

motion about its single point suspension, limited by the pair of resilient, side mountings **122** to the end of absorbing and dampening vibrations generated by operation of the unit.

Preferably, the motor-compressor unit **24** is secured against movement for shipping purposes and to this end, a screw **140** may be provided (Fig. 8) to secure the bracket **132** to the flue. At the location of the screw **140**, the reinforcing plate **136** is offset from the flue member wall and is formed with a conical recess **142** through which the screw extends to engage the bracket **132**. A clamping washer **144** under the head of the screw is clamped in the recess **136**, as shown in dot and dash lines, to hold the unit against movement when in shipment.

From the foregoing description, it will be undesrtood that I have provided an improved support and arrangement of a single suspension mounting for a refrigerant motor-compressor unit at the back of a refrigerator cabinet for general improvement of refrigerators, including facilitating their manufacture and assembly. It will further be understood that I have reduced audible vibrations of the motor-compressor unit by mounting it on a single suspension mounting member supplemented by a noise suppressor. In addition, I have provided for supporting the motor-compressor mounting on the end of a cantilever reinforced by a cross member so as to obtain single point suspension of the unit, while at the same time having the unit and associated parts, such as supports, mounting condenser, etc., all carried by the removable flue member.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. In refrigerating apparatus, a cabinet having a rear wall recess, a refrigerant motor-compressor unit received within said recess, said unit tending to oscillate about a vertical axis, a flue member overlying said recess at the back of the cabinet to induce air flow upwardly over said motor-compressor unit, means attaching said flue member to said cabinet, a cross member inwardly of said flue member and secured at opposite ends to said cabinet, an extension member extending transversely of said cross member, said extension member being attached at one end thereof to said flue member and further being attached intermediate its ends to said cross member having a cantilever arm overlying said motor-compressor unit, a resilient mounting member carried by said arm and supporting said motor-compressor unit, a noise suppressor interposed between said resilient mounting member and said arm, a pair of spaced diaphragm members carried by said flue member below said mounting member and arranged to move transversely to said axis, and means attaching said pair of diaphragm members to said motor-compressor unit and to said flue member to limit oscillatory movement of the former.

2. In refrigerating apparatus, an upright support having a laterally extending arm, a motor-compressor unit below said arm, a single point spring mounting suspending said unit from said arm, said unit having oscillatory movement about a vertical axis induced by operating torque of the unit, and a pair of spaced rubber diaphragms attaching said unit below said single point mounting to said upright support between said support and said spring and arranged laterally of the unit for yieldingly opposing oscillatory movement thereof.

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