Jan. 19, 1954 R. W. DOEG 2,666,301

MOUNTING REFRIGERATING APPARATUS

Filed Feb. 11, 1949 4 Sheets-Sheet 1

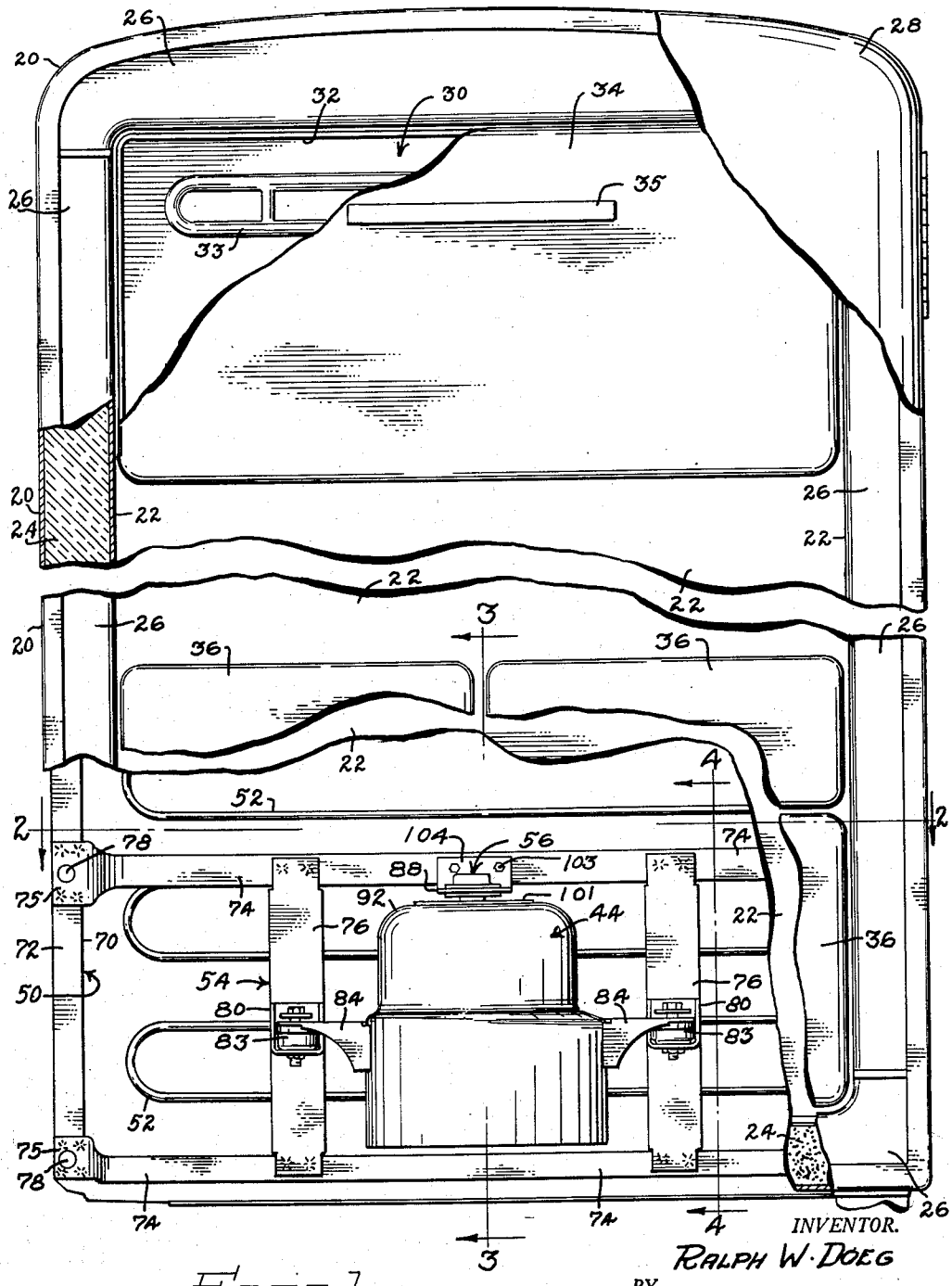


Fig-1

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MOUNTING REFRIGERATING APPARATUS

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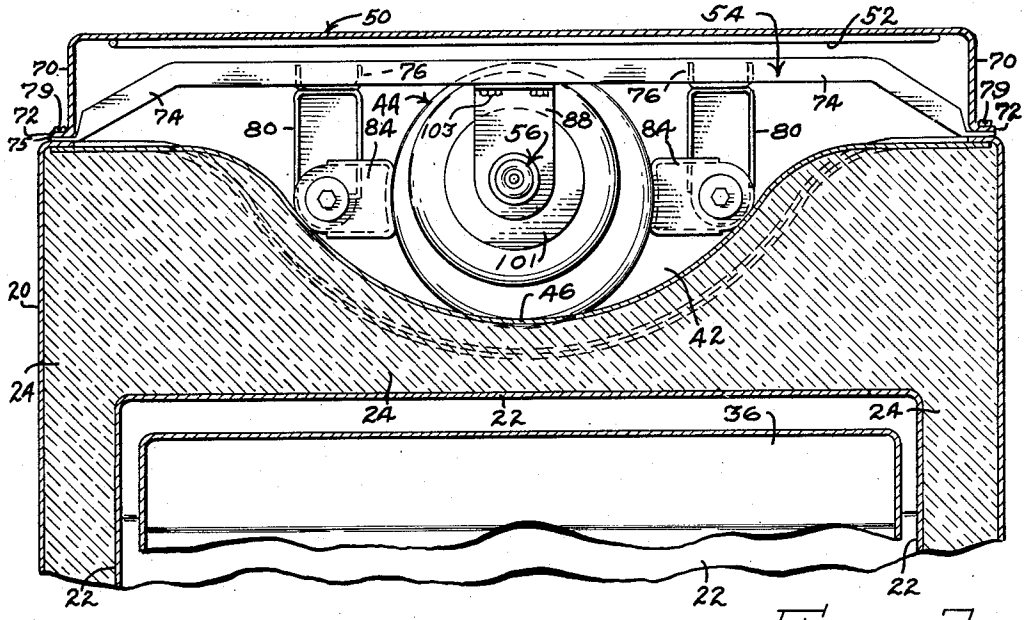


Fig-2

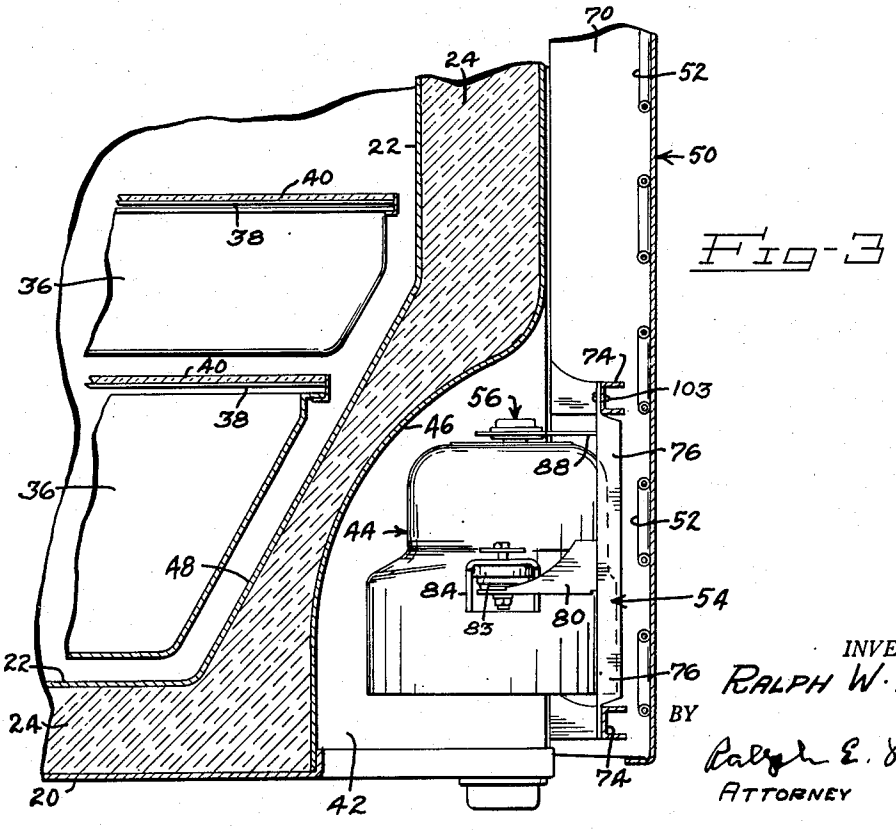


Fig-3

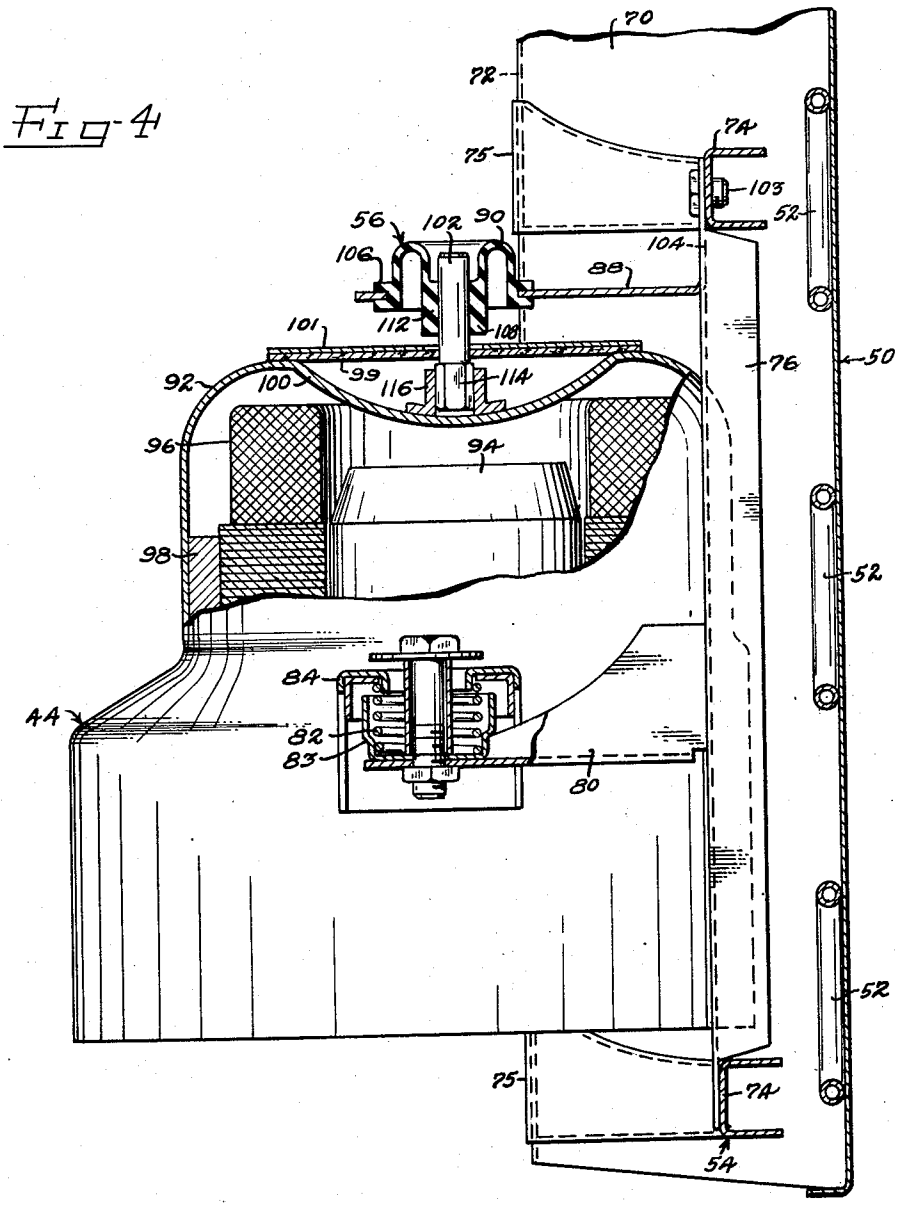
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MOUNTING REFRIGERATING APPARATUS

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Fig. 4



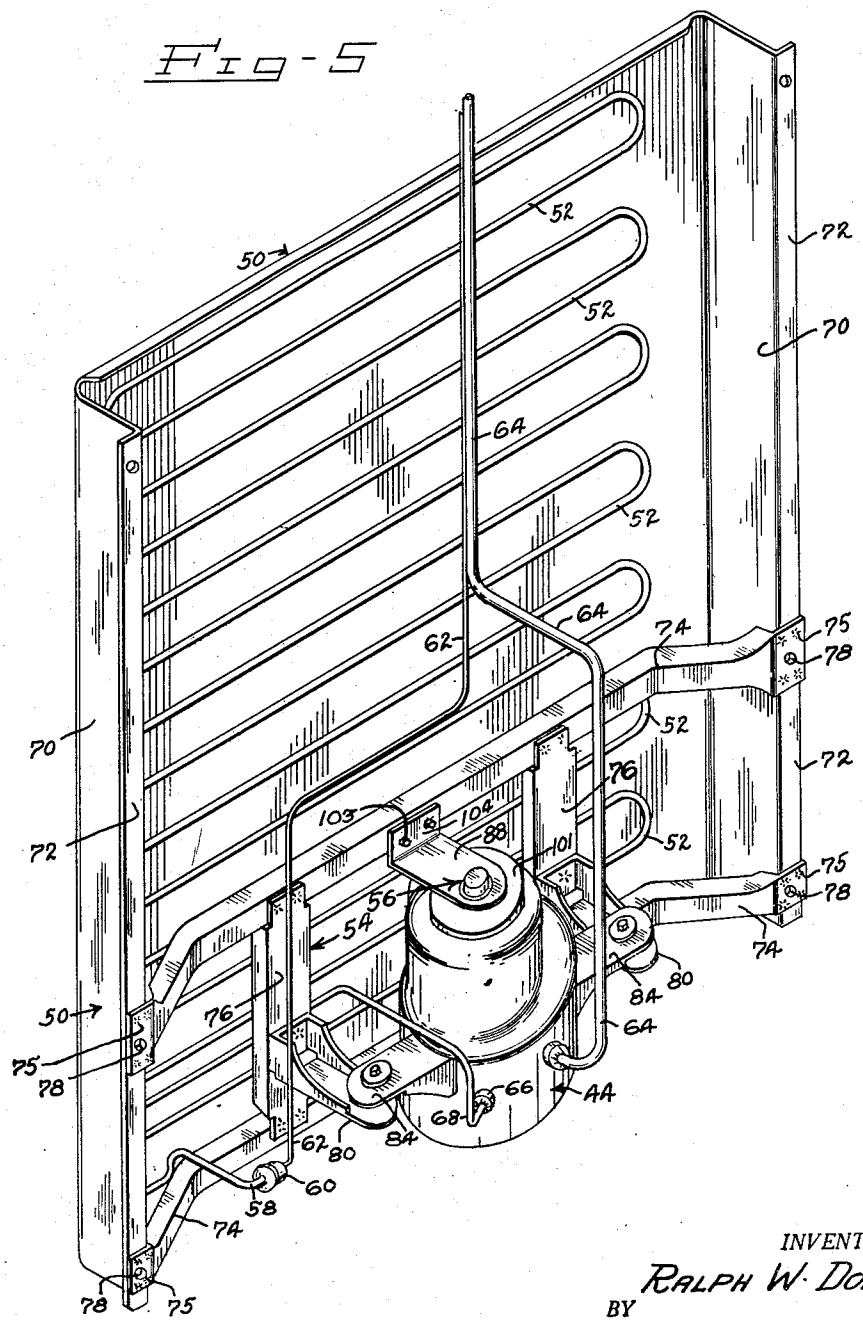
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Fig-5



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MOUNTING REFRIGERATING APPARATUS

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4 Claims. (Cl. 62—117.4)

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

One of the objects of the present invention is to provide an improved refrigerator condensing element assembly, detachably mounted on a refrigerator cabinet.

Another object of the invention is to provide a refrigerator condensing element assembly having an arrangement of a refrigerant motor-compressor mounting on a sheet metal panel without incurring audible vibrations from the panel.

Another object of the invention is to provide an improved arrangement of a refrigerant motor-compressor mounting on a thin sheet metal machinery compartment flue without warping the flue.

Another object of the invention is to provide a detachable sub-assembly of the above mentioned character including a refrigerant condensing element and a vibration noise suppressor therefor.

Another object of the invention is to provide an improved noise suppressor arrangement relative to a motor-compressor mounting member so that the noise suppressor, although highly effective may be small, light in weight and inexpensive.

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 having parts broken away of a household refrigerator embodying features of my invention;

Fig. 2 is a fragmentary, cross sectional view of the refrigerator, taken along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary, vertical sectional view of the refrigerator, taken substantially along the line 3—3 of Fig. 1;

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

Fig. 5 is an isometric view of an assembly of the refrigerator.

In the drawings, the refrigerator has a household type cabinet comprising, in general, a casing 20 and a liner 22. Preferably, the casing 20 and the liner 22 are made of sheet metal, such as sheet steel. Interposed between the casing 20 and the liner 22, suitable heat insulation 24 is

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preferably provided to decrease the rate of heat leakage into the interior of the cabinet. At the front of the cabinet, the space between the liner 22 and the casing 20 is closed by heat breaker strips 26 which extend around the top, bottom and sides of the cabinet, attached to the casing and liner. In the present cabinet construction, the cabinet liner 22 extends substantially from top to bottom of the cabinet forming the walls of a large storage space which may be closed at the front of the cabinet by a hinged door 28.

Disposed within the cabinet is a refrigerant evaporator 30 which may be of any of the well-known suitable types. This evaporator 30 may comprise a box-like container 32, and refrigerant passages including a refrigerant accumulator 33. Occupying substantially an entire upper portion of the cabinet space, the evaporator 30 is of a storage capacity suitable for the storage of foods to be frozen, ice trays, etc. At the front of the cabinet, the evaporator container 32 has an access opening which may be closed by a door 34 hinged along its bottom edge and provided with a hand grip 35.

Adjacent the bottom of the cabinet, storage drawers 36, may be provided for the storage and preservation of fresh vegetables in a fresh or moist state. The drawers 36 may be slidably supported on slideways 38, secured to the liner side walls. These drawers 36 slide beneath shelves 40 which are preferably made of an impervious material such as glass to decrease air circulation in the cabinet so as to prevent dehydration of foodstuffs in the drawers 36. Rearwardly and below the drawers 36, a machinery compartment 42 is provided to receive a motor-compressor unit 44 of the refrigerating system. The machinery compartment 42 may be formed, as in the present construction, by providing an inwardly directed offset, as at 46 in the rear wall of the casing 20. As shown by the plan view of Fig. 2, the casing rear wall offset 46 is preferably rounded or arcuate in shape. To allow clearance for the machinery compartment wall 46, the liner rear wall is inclined, as at 48.

In accordance with my invention, I provide a sub-assembly comprising, a machinery compartment flue 50, a refrigerant condensing element including the motor-compressor unit 44 and a condenser coil 52, a mounting support 54, and a noise suppressor or diaphragm 56. The mounting support 54 is carried by the flue 50 adjacent the bottom thereof and supports both the motor-compressor 44 and its noise suppressor 56. The refrigerant condenser coil 52 is secured in good

heat transfer relationship to the inner wall surface of the flue 50; the coil 52 preferably extending in sinuous form substantially from top to bottom of the flue to take advantage of and benefit by the large heat dissipating area thereof. A suitable cement or other securing means may be employed to secure the refrigerant condenser coil 52 to the flue member 50. At the outlet end, as at 58, of the condenser coil 52, a refrigerant strainer 60 is provided from which refrigerant is supplied to the evaporator 30 through a small diameter or capillary tube 62. A refrigerant return conduit 64, connected to the refrigerant accumulator 33, returns refrigerant to the motor-compressor unit 44. A suitable fitting 66 connects the inlet end, as at 68, of the condenser coil 52 to the motor-compressor unit 44. Preferably, portions of the capillary tube 62 and of the refrigerant conduit 64 are arranged in contact with each other or in good heat exchange relationship for the purpose of cooling the refrigerant en route to the evaporator 30 through the capillary tube 62.

The flue member 50 is preferably formed of thin sheet metal having opposite, inturned sides 70 provided with outturned reinforcing side flanges 72 for attachment to the cabinet rear wall. The flue member 50 overlies and forms the rear wall of the machinery compartment 42 to induce air flow upwardly through the machinery compartment so as to carry away efficiently the heat of condensation. In order to mount the motor-compressor unit 44 on the thin sheet metal flue 50 without warping the flue or incurring audible vibrations therein, I secure the motor-compressor mounting support 54 to the flue only at the outturned flue flanges 72 where the flue panel is reinforced by the flanges. The support 54 comprises, in general, spaced horizontal span or tie members 74 and spaced vertical uprights 76. The span members 74 extend across the flue joining the outturned flue flanges together, thus generally reinforcing the flue member 50. Preferably the mounting structural members 74, 76 are of channel section in the interests of strength and rigidity, the members 74, 76 being secured together preferably by welding. Extending across the full width of the flue 50, the spanning members 74 may have their side flanges cut away to provide extending end web portions 75 thereof which may lie flat against and be secured to the flue flanges 72 as by welding. Through the ends or flanges 75 of the spanning members 74 and through the flue flanges 72 aligning apertures 78 are provided to receive screws 79 for securing the sub-assembly as a unit to the cabinet rear wall. The mounting member support 54 is secured to the flue 50 at the flue flanges 72 so that the assembly may be shipped, as such, and be attached to and/or be detached from a cabinet, as a unitary structure. A pair of horizontal supports 80 are rigidly secured to the uprights 76 of the mounting support to support in turn resilient mountings 82 for the motor-compressor unit 44. The mountings 82 are preferably a pair of laterally spaced, helical coil springs arranged to receive and support oppositely disposed seating members 84 secured to the motor-compressor casing. Cup-shaped retainers 83 may be provided for the springs 82 and may be held to the supports 80 by nuts and bolts or by other suitable means.

Both the supports 80 and seating members 84 may be channel sections having their overlying end portions cut away for clearance for the springs 82, as shown for example, in Fig. 5. The seating members 84 are arranged relative to the motor-compressor unit 44 so that the latter will be substantially balanced on the springs 82. However, there is a tendency for the unit to tip which I have compensated for by utilizing my noise suppressor 56 to function also to limit tilting movement of the motor-compressor unit. Referring in detail to the noise suppressing device 56, this device comprises a support 88 and a noise absorber or rubber diaphragm 90. The support 88 is secured to and carried by the upper mounting member 74 immediately above and in spaced relationship to the motor-compressor unit 44 and offset outwardly from the mounting springs or toward the flue 50. The motor-compressor unit 44 is of the sealed type having a support or casing including a dome 92 housing an electric motor for driving the compressor. In Fig. 4, the electric motor is shown as comprising generally, a rotor 94 and a stator 96. The stator 96 surrounds the rotor 94 and is usually mounted on the inner wall surface of the casing dome by a securing ring 98. As a result, operation of the motor-compressor unit creates certain undesirable audible vibrations which are transmitted through the stator to the casing. To somewhat overcome these audible vibrations given off by the casing 92, the top of the dome, as at 100, preferably is pressed inwardly in concavo-convex form to reinforce or increase the rigidity of the dome. Also, a metal plate 101 is provided and covers the recessed dome of the motor-compressor casing which aids in decreasing motor-compressor noises. Between the plate 101 and the dome, I provide a gasket 99 to prevent foreign matter collecting in the dome recess. This gasket aids in dampening audible vibrations and may be made of sheet cork or other suitable material. However, certain audible vibrations remain and to suppress the same, I provide a vibration transmitting member or rod 102 which I arrange to connect the dome top wall 100 with the noise absorber 90.

The noise absorber support 88 may be in the form of a plate type bracket having an upturned flange 104 which may be secured by screws 103 or by other suitable means to the upper spanning member 74 of the mounting support. Extending horizontally over and slightly spaced above the motor-compressor dome 100, the bracket 88 is provided with an aperture therethrough to receive and hold the diaphragm 90. Preferably, the diaphragm 90 is made of rubber having a base 106, provided with an annular groove in the outer periphery thereof to receive the bracket around the opening therein; the diaphragm being pressed into place in much the same manner as are conventional rubber grommets. The diaphragm 90 is generally tubular in shape having a reduced or free end portion 108 extending centrally and downwardly through the diaphragm base to within a short distance of the plate 101 to receive the vibration transmitter or rod 102. At its lower end, the wall of the diaphragm is thickened as at 112, and is apertured to receive and grip tightly, the upper end of the vibration transmitting rod 102. The other end 114 of the rod 102 extends through the plate 101 and gasket 99 and is secured in and to a cup 116 carried by the concavo-convex dome of the motor-compressor casing. The cup 116 may have an outturned flange welded or otherwise suitably secured to the concavo-convex dome.

From the foregoing description, it will be noted that I have provided an improved arrangement of a refrigerant condensing element, including a motor-compressor unit, mounted on a machinery compartment flue in such a manner as to avoid buckling the flue and to avoid also the incurring of so-called drumming vibration of the flue. In addition, I have provided a detachable refrigerator sub-assembly including a motor-compressor which I support on the flue in such a manner as to reinforce the flue so that the sub-assembly is sturdy and rigid to the point that it may be easily handled and shipped. Furthermore, it will be noted that I have provided for suppressing audible noises inherent in the motor-compressor by the provision of a noise or vibration absorber carried by the motor-compressor mounting support and a vibration transmitter carried by the motor-compressor casing arranged to transmit vibration thereof to the noise suppressor. In connection with the noise suppressor, it will be noted that I have mounted the motor-compressor on and between a pair of spaced oppositely disposed coil springs and arrange the noise suppressor above the springs in cooperation with the vibration transmitter to limit tilting of the motor-compressor on said pair of springs.

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 mounting member support, a motor-compressor casing supported by said mounting member support, lower resilient mounting means carried by said support and arranged as the sole support of said motor-compressor casing, an upper resilient member carried by said support solely to suppress motor-compressor noises, and a noise transmitting member operatively connecting said motor-compressor casing and said upper resilient member.

2. In refrigerating apparatus, a support, a motor-compressor casing, a resilient mounting supporting said motor-compressor casing, adjacent the bottom thereof on said support, an upper extension member carried by said casing, and a rubber diaphragm noise suppressor having an outer end attached to said support and an inner end attached to said extension.

3. In refrigerating apparatus, a motor-compressor support, resilient means supporting said motor-compressor support, a resilient noise suppressing diaphragm member spaced from said motor-compressor support having a fixed outer end and a movable inner end, and an audible vibration transmitter attached to said motor-compressor support and to the movable end of said noise suppressing member.

4. In refrigerating apparatus, a mounting support, a sealed motor-compressor casing having a dome, resilient mounting means below said dome supporting said motor-compressor casing on said support, a noise suppressing flexible tubular member overlying and spaced above the dome of said motor-compressor casing having a fixed end attached to said support and having a movable end, and a vibration transmitting member carried by the dome engaging in and attached to the movable end of said noise suppressing member.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,981,848	Drysdale	Nov. 27, 1934
2,036,098	Pieper et al.	Mar. 31, 1936
2,071,183	Steenstrup	Feb. 16, 1937
2,101,881	Terry et al.	Dec. 14, 1937
2,125,727	Kalischer	Aug. 2, 1938
2,185,228	Schweller	Jan. 2, 1940
2,204,510	Neeson	June 11, 1940
2,253,618	Grover	Aug. 26, 1941
2,279,272	Anderson et al.	Apr. 7, 1942
2,280,554	Steenstrup	Apr. 21, 1942
2,509,614	Phillip	May 30, 1950

OTHER REFERENCES

Ser. No. 337,854, Hintze (A. P. C.), published Apr. 27, 1943.