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NOISE CONTROL FOR HERMETIC MOTOR COMPRESSORS

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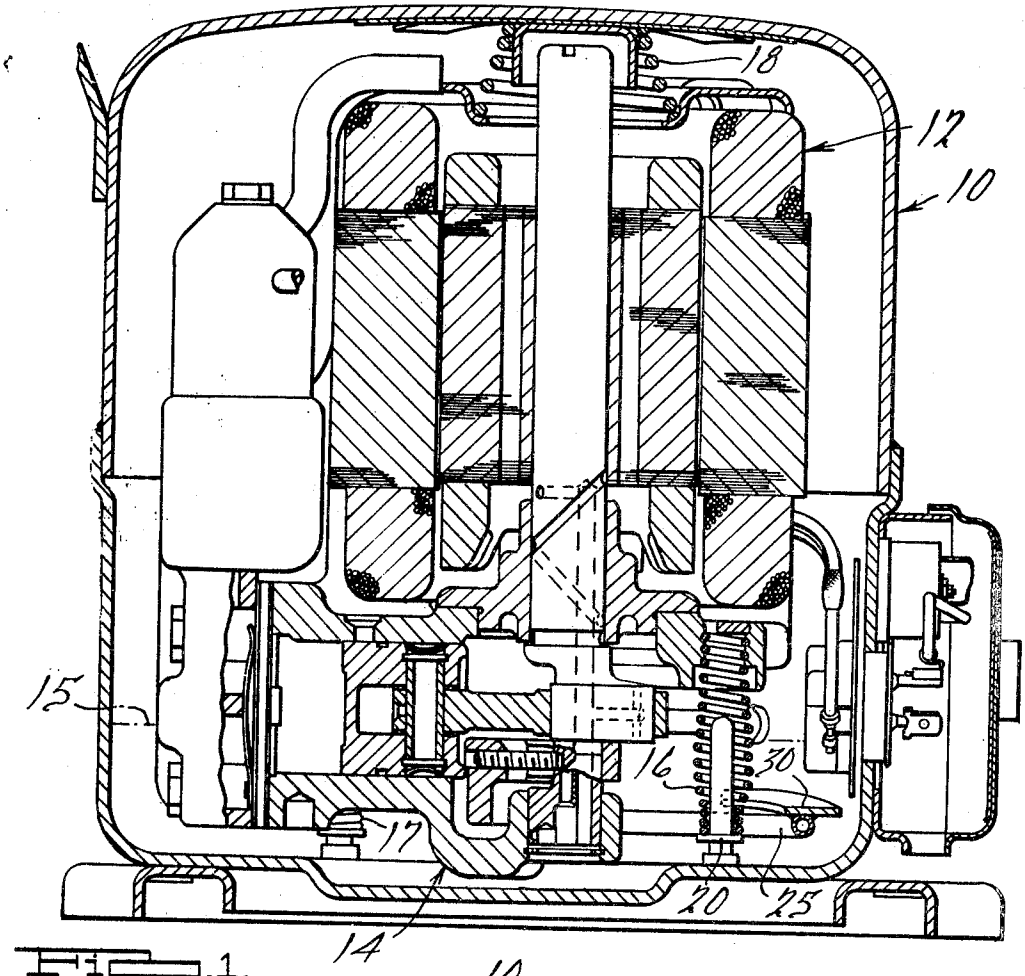


FIG. 1.

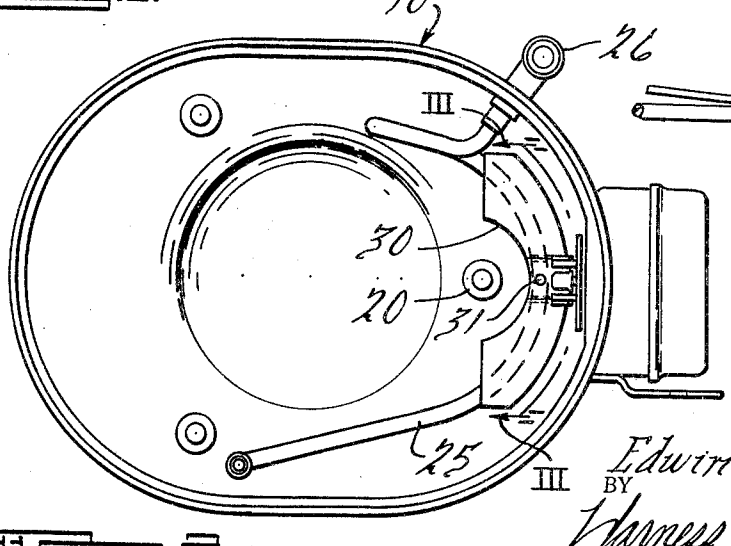


FIG. 2.

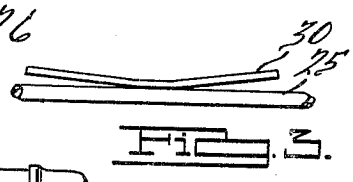


FIG. 3.

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NOISE CONTROL FOR HERMETIC MOTOR COMPRESSORS

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U.S. Cl. 230—232 1 Claim

ABSTRACT OF THE DISCLOSURE

The tendency of the sheet metal shell of an hermetic refrigeration motor-compressor unit to radiate noise is reduced by a damping plate secured to the discharge tube inside the shell at a position below the normal oil level in the sump.

BRIEF SUMMARY OF THE INVENTION

The present invention relates to improved means for reducing the noise of refrigeration compressors and particularly to reduction of the noise radiated from the shell or housing of a unit of the type having the compressor resiliently mounted therein. The overall objectives may be summarized as comprising the provision of extremely simple, inexpensive and reliable means involving no moving parts whatever and which effectively reduces the generation and transmission of noises to and their radiation from the shell or casing of the assembly.

Other objects and advantages will be apparent upon consideration of the present disclosure in its entirety.

In the drawing:

FIGURE 1 is a substantially diametric vertical sectional view of a hermetic motor-compressor unit of a known type equipped with the present invention,

FIGURE 2 is a plan view corresponding to a horizontal section of the shell with the motor-compressor unit removed showing the discharge tube and damper in position; and

FIGURE 3 is a fragmentary elevational view taken as indicated by the line and arrows III—III of FIGURE 2 and looking in the direction of the arrows.

Referring now to the drawing, the motor compressor unit will be recognized as of a known type wherein a sheet metal shell **10** encloses a motor-compressor assembly comprising an induction type electric motor **12** and a reciprocating piston type compressor direct-driven thereby and generally designated **14**. The structural details of the motor and compressor components are well known in the trade and will require no detailed description. These may in fact be varied without departure from the present invention.

The lower portion of the shell defines a sump which contains a quantity of lubricating oil which normally stands at a level **15**. Returning refrigerant gas to be compressed is delivered directly to the interior of the shell through an inlet (not shown) which opens into the space above the oil, from which space it is drawn into the compressor. The unitary motor-compressor assembly is carried within the shell upon resilient supports comprising springs **16**, **17** **18**. Elastic cushioning sleeves as **20** may be interposed between the springs and their supports. The transmission of operating noise of the motor-compressor assembly through the springs to the shell is very limited.

Aside from the supporting springs just mentioned, the only other mechanical connection between the resiliently supported motor-compressor assembly and the shell **10** is furnished by the compressor discharge tube **25** which conducts the compressor output to the discharge fitting **26**. Tube **25** and fitting **26** are of metal and these two elements are rigidly mechanically connected to each other and to the shell **10**, as by brazing.

It is known in the art that noise developed from the pulsations of the compressor output, augmented in some instances by induced vibrations of the discharge tube, are conducted to the shell **10** which may thus act as a diaphragm or radiator tending to amplify the noise components and render them distinctly audible exteriorly. The radiated noises frequently consist not only of fundamental discharge pulsation frequencies but of modes and harmonics resulting from excitation of the discharge tube and perhaps also of the shell or a portion thereof. Various expedients have been employed heretofore to reduce noise effects of the character indicated.

In my improved construction a portion of the discharge tube is conducted in a curved substantially horizontal path below the oil level in the sump but above the bottom of the shell, as best shown in FIGURE 1, and the submerged portion of the tube is provided with an extended surface area in the oil. In the preferred construction illustrated a stiff sheet metal damping plate **30** of substantial area is rigidly attached to the horizontal portion of the discharge tube by brazing the same thereto at the position designated **31**. Neither the damping plate nor the tube itself touch any other elements excepting for the connected ends of the tube.

It will be noted that the plate is secured to the tube only in one position in the central area of the plate. Thus the flexibility of the tube is not materially affected. As shown in FIGURE 3, both ends of the plate are slightly inclined upwardly away from the tube in a direction away from the central secured area in order to eliminate any possibility of noise-producing impacts.

In a small hermetic compressor unit of the type shown, wherein the horizontal dimensions of the shell viewed in plans as shown in FIGURE 2 are approximately 6 inches by 8 inches, the damping plate **30** has a length of 2.38 inches, and when proportioned and installed as indicated has been found to greatly reduce the noise radiated by the shell.

Although not desiring to be limited to the following explanation, it is believed that the beneficial effects are due at least partly to viscous damping and probably also to the fact that the added mass of the plate reduces the natural frequency of the tube and tends to prevent it from sympathetically exciting the higher and more objectionable shell frequencies.

This detailed description of preferred form of the invention, and the accompanying drawings, have been furnished in compliance with the statutory requirement to set forth the best mode contemplated by the inventor of carrying out the invention. The prior portions consisting of the abstract of the disclosure and the background of the invention are furnished without prejudice in an effort to comply with administrative requirements of the Patent Office.

What is claimed is:

1. In a motor-compressor assembly comprising a casing having an outlet, a compressor resiliently mounted therein and having an output, an oil sump section in said casing wherein a level of oil is normally maintained, a discharge conduit extending from said compressor output through said sump section to mechanical connection with the casing at said casing outlet, the improvement which comprises an extended damping surface portion carried by said discharge conduit below said level within the sump section, said conduit having a section which extends through the sump below the level of oil lying in one plane and said damping surface portion comprising a substantially flat stiff plate secured to said section of the conduit and lying below said level and generally parallel to said

plane, a restricted area of said plate being secured to said section of the conduit, said restricted area secured to the conduit being located in a mid-portion of the plate, and the plate diverging axially away from the conduit toward both ends of said conduit.

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