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SOUND-ABSORBING SYSTEM FOR REFRIGERANT COMPRESSOR

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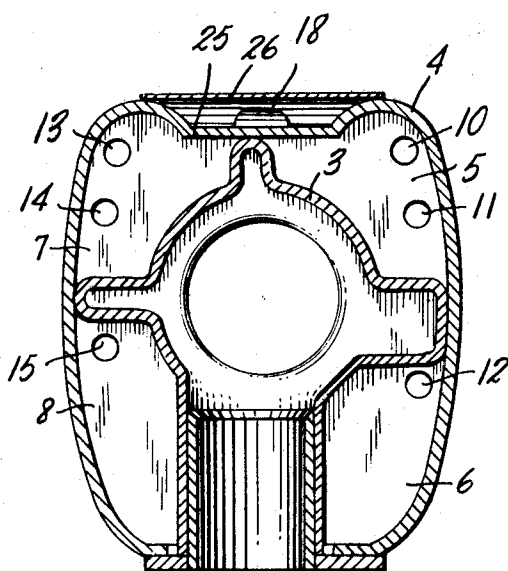


FIG. 2

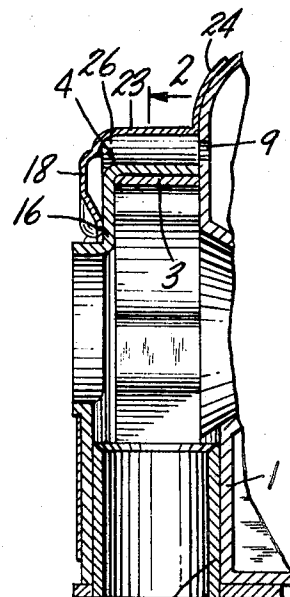


FIG. 1

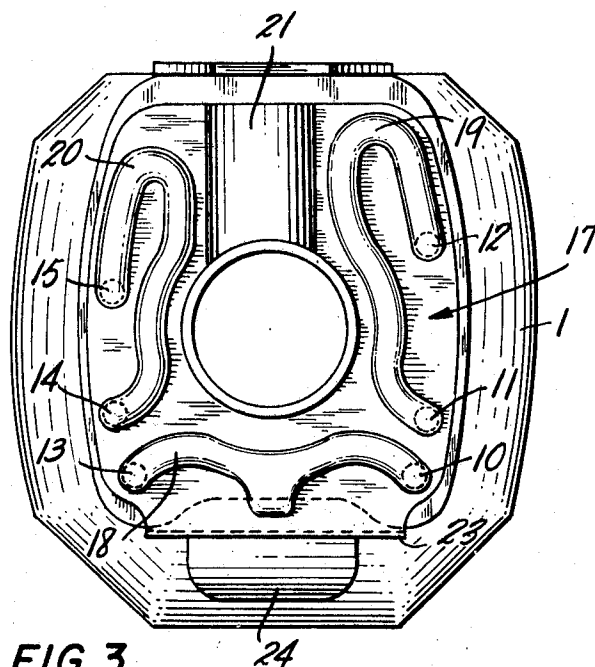


FIG. 3

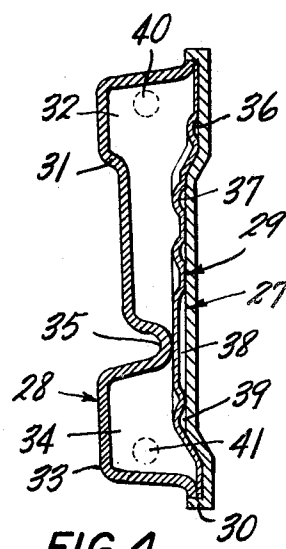


FIG. 4

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2 Claims

ABSTRACT OF THE DISCLOSURE

A sound-absorbing system for refrigerant compressors consisting of throttle passages cooperative with and in communication with one or more sound-absorbing or silencer chambers which are constructed from independently pre-fabricated components made from metallic sheet material and assembled in fixed relationship. A wall of a component common to the silencer chambers has a plate provided with channels that define jointly with the wall elongated throttle passages of suitable cross section and sinuous paths for absorbing noise of suction or discharge refrigerant gas.

This invention relates generally to refrigerant compressors and more particularly to a sound-absorbing system for a compressor housing for hermetically encapsulated refrigerant compressors having at least one sound-absorbing chamber and at least one throttle passage.

To obtain good sound-absorption, sound absorbing chambers and throttle passages are required in a compressor in the path, suction and discharge, of flow of a gas refrigerant being compressed in the compressor. While no difficulties are involved in producing well-defined sound-absorbing chambers, for example from castings which can be sealed by means of a cover or from two pre-formed sheet-metal parts, provided with pressed-out zones, and so on, very considerable problems have arisen in providing throttle points and paths having a high throttle resistance. A simple transverse hole in a separating wall between chambers offers too low a throttle resistance. It is true that the passage can be lengthened by causing the hole to run obliquely to, instead of parallel with, a separating wall, for example in a casting, or by inserting a small tube in the hole. Even with these measures however, in most cases it is not possible to provide an adequate length of throttle passage with a reasonable cross-section. Furthermore, the method of production may cause trouble, particularly when a fairly large number of throttle passages are present. Thus, it is known, to provide two pre-formed or prefabricated sheet-metal parts with pressed-out zones such that the sound-absorbing chambers and the associated connecting passages are formed between them. These connecting passages cannot offer a large throttle resistance either. Their length is limited since otherwise there would be no space for the sound-absorbing chambers. Moreover, the cross-section of such throttle passages must be of a certain minimum size, since otherwise they would become stopped up or clogged when the pre-formed sheet-metal parts are soldered together.

A principal object of the present invention is to provide a sound-absorbing system which enables throttle points of a desired throttle resistance to be manufactured by simple means. This object is achieved by a throttle passage extending along a silencer chamber wall and being formed between the wall and a plate fitted onto it.

The throttle passage according to the invention runs as required around the chamber wall, for example it may take a meandering or sinuous path, or may be disposed as a labyrinth. Since the entire wall area, and in some circumstances the area of the throttle passage, the latter can be of any desired length. This means that the size of the cross-section of the throttle passage can, in each case, be so selected that, when the plate is soldered to the chamber wall, the passage is not stopped up or undesirably affected by soldering material from the soldering of the components. The additional plate can be simply laid on and then connected to the chamber wall compared with the introduction of small tubes into holes or with the drilling of long holes or passages this is a very simple operation.

The cross-section of the passage is preferably formed in the plate. Such a plate can be produced from a very thin, readily deformable sheet material.

In a pressure-type noise-absorbing system, the plate containing the passage should be preferably fitted inside the noise-absorbing chamber. There the plate is loaded on both sides equally by a great pressure, so that a small wall thickness suffices. Moreover, the pressed-out portions, the portions shaped as channels, for the passage occupy only a little space in the noise-absorbing chamber, since the cross-section of the passage is small because the refrigerant gas is under pressure.

In a suction-type sound-absorbing system however, the plate containing or defining the passage can be fitted outside the sound-absorbing chamber. There is more space there for providing the throttle passage with a larger cross-section for the refrigerant gas which has not yet been compressed. Furthermore, the plate is subjected on both sides to the same pressure since the interior of the hermetic capsule, in which the refrigerant compressor is enclosed, is normally under suction pressure. In another embodiment of the invention, the plate can extend over several chambers and, together with the wall to which it is applied, can preferably form connecting passages having a throttling effect. The plate may extend over several chambers and form several throttle or connecting passages separated from each other. Thus, with a single plate and therefore by a single assembly operation, it is possible to provide a number of throttle and connecting passages, whereas previously a corresponding number of operations has been necessary. Moreover, in this way the plate has a larger area so that it can be handled and fixed better.

In one embodiment of the invention, the plate, together with the wall of the sound-absorbing chamber, forms an antechamber for the sound-absorbing system. Thus, this plate can be used not only for forming passages, but also for forming an additional chamber. This antechamber is preferably formed between a bent-over extension of the plate and a side wall of the sound-absorbing chamber.

Other features and advantages of the sound-absorbing system in accordance with the present invention will be better understood as described in the following specification and appended claims in conjunction with the following drawings in which:

FIG. 1, is a longitudinal section view through a suctiontype sound-absorbing system, illustrated in operating position in conjunction with a refrigerant compressor illustrated fragmentarily,

FIG. 2, is a longitudinal section view on the section line A—A of FIG. 1,

FIG. 3, is a plan view of the arrangement of FIG. 2 turned through 180° about the cylinder, and

FIG. 4, is a longitudinal section view through a pressure-type sound-absorbing system according to the invention.

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In a first embodiment of a sound-absorbing system according to the invention, shown in FIGS. 1 to 3, a support element 1 for a motor for driving a refrigerant compressor piston, not shown, is connected with a cylinder 2. A strip or band 3 bent generally to the shape of a star has a lateral extension which embraces the cylinder. A pot-shaped fabricated component 4 is placed over the band 3, in its up-ended position, and the cylinder 2. Four suction-type sound-absorbing chambers 5, 6, 7 and 8 are formed between the parts 1, 3 and 4 since the projections on the band 3 engage the peripheral wall of the pot-shaped component 4. A drilled hole 9 is provided, for the passage of refrigerant gas, in the support element 1 and drilled holes 10-15 are provided in the end wall 16 of the pot-shaped component 4. Other orifices leading out of the chambers 6 and are not illustrated are located in the plane of the end face of the cylinder.

A plate 17, containing the passage, is placed on the end wall 16 of the pot-shaped element 4. This planar plate 17 has three through-shaped pressed-out portions 18, 19 and 20, which serve to form throttling connecting passages as well as a cylindrical pressed-out portion 21 which, precisely as is a corresponding pressed-out portion 22 of the pot-shaped element 4, is matched to the circumference of the cylinder, and a laterally bent-up extension 23, incorporating a fixing flange 24. The extension 23, together with a re-entrant or inwardly offset side wall 25 of the pot-shaped element 4, forms an antechamber 26.

The throttle passages 19 and 20 connect the sound-absorbing chambers 5 and 6, and 7 and 8, through the drilled holes 11 and 12, and 14 and 15, respectively. This connection however does not take the shortest path, but follows a winding path, utilizing the entire free area of the plate. The throttle passage 18 leads from the antechamber 26 to the two drilled holes 10 and 13 and therefore to the sound-absorbing chambers 5 and 7.

The gas in this sound-absorbing system accordingly flows from the orifices 9 into the antechamber 26, and then through the throttle passage 18 into the chambers 5 and 7 arranged in parallel. From the chamber 5 it passes through the throttle passage 19 into chamber 6 and thence into the suction valve parallel therewith through the throttle passage 20 into the chamber 8 and from there into the suction valve chamber.

The parts 1, 2, 3, 4, and 17 are simply laid one upon the other for assembly or are inserted one within the other and are soldered together, if necessary having previously been spot welded to make sure of obtaining the soldering gap.

FIG. 4 illustrates a pressure-type noise-absorbing system which consists of a first pre-formed or pre-fabricated sheet-metal part 27, a second pre-formed sheet-metal part 28 and a plate 29 defining in conjunction with the part 27 a passage interiorly of silencer chambers as later explained. The pre-formed sheet-metal part 27 has an edge 30 which holds the other two parts in the correct position for assembly. While the preformed part 27 is roughly flat, the pre-formed part 28 has a first pressed-out portion 31 for forming a pressure-type noise-absorbing chamber 32, and a second pressed-out portion 33 for forming a pressure-type sound-absorbing chamber 34. The pre-formed part is brought close to the part 27 at an intermediate point 35, only a small cross-section being reserved for a connecting passage,

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The plate 29 defining the passage lies against the pre-formed part 27 over the major part of its area. It has trough-shaped pressed-out portions 36, which form a throttle and connecting passage extending over the basic surface of both chambers 32 and 34. This throttle passage consists of a sinuous portion 37 in the chamber 32, a rectilinear connecting portion 38 at the point 35, and a sinuous portion 39 in the region of the chamber 34. The beginning and end of the trough-shaped pressed-out portion 36 is simply cut open to form an inlet cross-section and a discharge cross-section. Connecting points 40 and 41, for a supply and a discharge pressure pipe respectively, are shown in broken lines in the two sound-absorbing chambers 32 and 34.

While preferred embodiments of the invention have been shown and described, it will be understood that many modifications and changes can be made within the true spirit and scope of the invention.

What we claim and desire to secure by Letters Patent is:

1. In a refrigerant compressor having at least one silencer chamber having a wall, a sound-absorbing system for refrigerant gas comprising, a plate defining in conjunction with said wall a throttle and silencer passage in a flow path for refrigerant gas flow between said silencer chamber and said compressor, and said plate being disposed internally of said chamber thereby defining a pressure-type sound-absorbing unit with said chamber, said chamber and passage receiving compressed refrigerant gas discharged from the compressor.

2. In a refrigerant compressor having at least one silencer chamber having a wall, a sound-absorbing system for refrigerant gas comprising, a plate defining in conjunction with said wall a throttle and silencer passage in a flow path for refrigerant gas flow between said silencer chamber and said compressor, said wall having an offset portion in a direction inwardly of said silencer chamber and defining an ante-chamber jointly with a part of said plate, said part of said plate being offset relative to a main portion of said plate, and said passage communicating with both said silencer chamber and said ante-chamber.

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