Aug. 27, 1935. W. B. ANDERSON 2,012,704

REFRIGERANT COMPRESSING APPARATUS

Filed Oct. 5, 1932 2 Sheets-Sheet 1

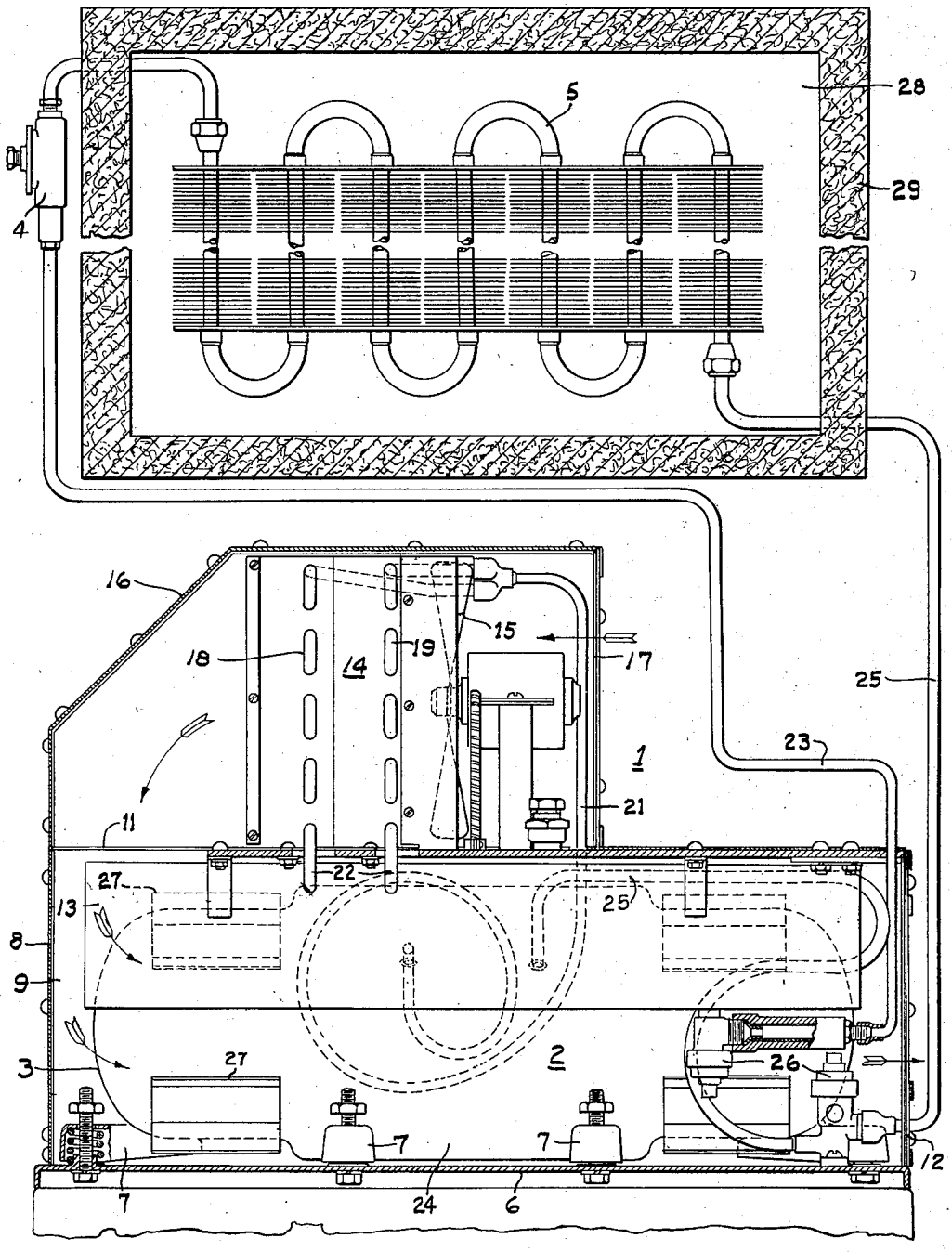


FIG. 1.

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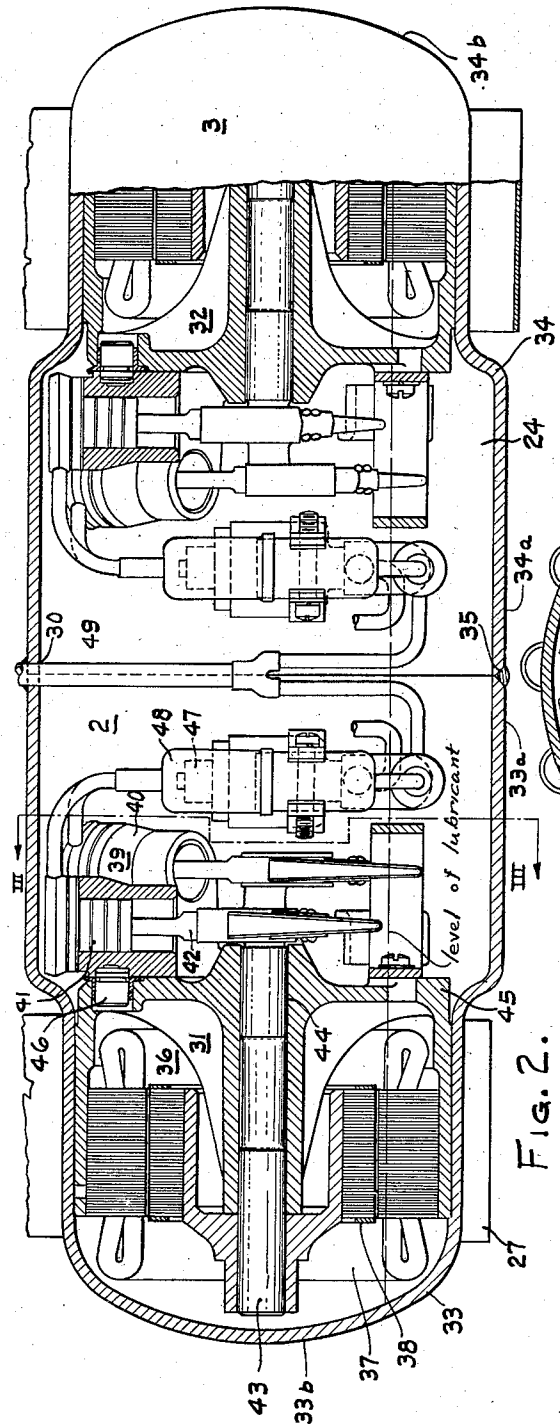


FIG. 2.

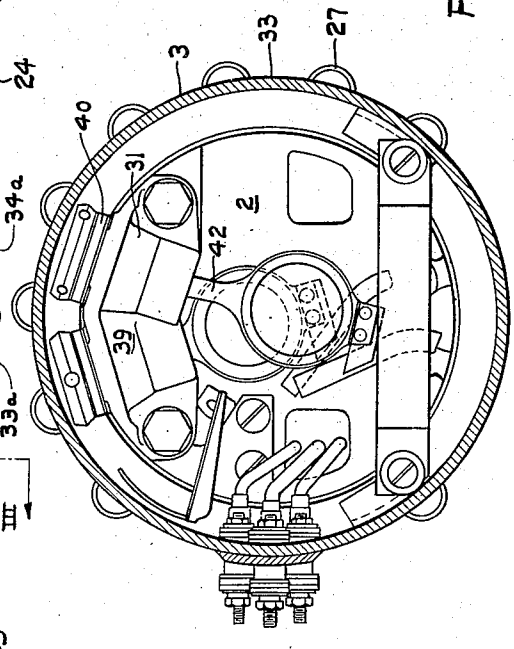


FIG. 3.

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UNITED STATES PATENT OFFICE

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REFRIGERANT COMPRESSING APPARATUS

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Application October 5, 1932, Serial No. 636,393

9 Claims. (Cl. 230—58)

My invention relates to refrigeration apparatus, and particularly to the means for compressing the refrigerant therein.

My invention stated broadly is to combine a plurality of identical complete motor-compressor units for refrigeration apparatus into one complete unit of greater capacity than any one of the plurality of units. It is customary to construct several sizes of motor-compressor units for domestic and light commercial refrigeration, and it is an object of my invention to reduce the number of sizes which must be manufactured and to provide larger capacity units from a plurality of smaller standard units by combining them into a single complete and compact unit.

It is another object of my invention to provide motor-compressor unit by combining a plurality of motor-compressor units in such a way as to minimize vibration and promote quietness.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a view, partly in section, of a complete refrigeration apparatus constructed in accordance with one embodiment of my invention;

Fig. 2 is a view, partly in section, of compression means for refrigeration apparatus, constructed in accordance with a preferred embodiment of my invention; and,

Fig. 3 is a view taken on line III—III of Fig. 2 showing one of the two identical motor-compressor units which form the complete compression means contemplated in this embodiment of my invention.

Referring specifically to the drawings for a detailed description of the invention, numeral 1 designates a complete "high side" of a refrigerating apparatus and includes motor and compressor means, generally designated by the numeral 2 enclosed in a sealed casing 3. An expansion valve 4 and an evaporator 5 generally complete the refrigeration apparatus.

The casing 3 is resiliently supported on a base plate 6 by means of legs 7. A structure 8 surrounds the sealed casing 3 and forms a chamber 9 having an opening in the top thereof, as shown at 11, and an opening (not shown) in an end 12 thereof. A receiver 13 is suspended from the bottom of the structure 8, and condensing means 14 and a cooling fan 15 are mounted on top of the structure 8. A top casing 16 surrounds the fan 15 and condensing means 14 and has an opening (not shown) in an end 17. The top casing 16 also covers the top opening 11 in the structure 8. The condensing means 14 herein illustrated comprise two separate condensers 18 and 19.

The operation of the refrigerating apparatus is as follows: Refrigerant is compressed by the motor-compressor means 2 and is discharged through a suitable conduit 21 to the condensing means 14 wherein it is cooled and condensed by air forced over the condensers by the fan 15. Condensed refrigerant flows to the receiver 13 through conduits 22, and thence through the expansion valve 4 to the evaporator 5 through conduit 23, where the expanded refrigerant absorbs heat from the surrounding media, and returns to the common chamber 24 formed by the sealed casing 3 for the motor-compressor means 2 through conduit 25, whereupon the cycle is repeated. Suitable check valves 26 are provided in the system to facilitate test, shipment, repairs, and charging. The chamber 24 also provides a common lubricant reservoir and the lubrication cycle is fully explained in the copending application of M. C. Terry et al. for Refrigeration apparatus, filed November 4, 1932, Serial No. 641,284.

The cooling medium, which is in this instance air, as shown by the arrows in Fig. 1, is drawn in the open end 17 of the upper casing 16 and is forced over the condensing means 14. The air then travels downwardly through the aperture 11 in the structure 8 and its velocity carries it over the sealed casing 3 thereby absorbing heat therefrom, assisted by fins 27 thereon, and the air is discharged at the open end 12 of the structure 8.

The evaporator 5 is disposed in a chamber 28 formed by walls 29 such as shown in section in Fig. 1.

Referring specifically to Figs. 2 and 3 for a detailed disclosure of the motor-compressor unit utilized in a preferred embodiment of my invention, the unit, broadly stated, comprises two identical motor-compressor units 31 and 32 both contained in their own casings 33 and 34 respectively, which casings are open at one end as shown at 33*a* and 34*a* respectively and closed at the other, as shown at 33*b* and 34*b* respectively, with the open ends 33*a* and 33*b* placed together and the two casings 33 and 34 welded peripherally thereof as shown at 35. A notch 30 is provided in the casings 33 and 34.

Each motor-compressor unit comprises a motor 36 including field coils 37 and an armature 38 and a compression mechanism 39 including a cylinder block 40, two pistons 41 and connecting rods 42, whereby a compact arrangement is obtained. A shaft 43 attached operatively to the armature of the motor 36 and to the connecting rods 42 is provided with a bearing surface 44 in a web 45, which web also provides the support for the motor 36 and compressor 39, as fully shown and described in the copending application of M. C. Terry et al. for Refrigeration apparatus, Serial No. 641,284, filed November 4, 1932 and assigned to the assignee of the present invention.

A device **46** for adjusting the head clearance of the compressor **39** is provided, and is fully shown and described in the copending application of C. F. Nystrom, for Compressor, Serial No. 637,512, filed October 12, 1932, and also assigned to the assignee of the present invention.

An unloader **47** and mufflers **48** are provided for the compressor **39** and the discharge from both compressors, after passing through their respective mufflers, is conveyed to a common discharge conduit **49** which extends through notch **30** in sealed casing **3** and is welded thereto and connects through conduit **21** with the condensing means **14**, which in this instance comprises the two separate condensers **18** and **19**.

The units **31** and **32** are identical and reversed, in order that the compressors **39** will be adjacent, whereby the piping for the discharge therefrom is not complicated or expensive, and also so that, in this embodiment of my invention, the open ends of the casings **33** and **34** coincide, and may be fastened together with facility. It is obvious also that the directions of rotation of the various parts of the reversed identical units are opposite, whereby vibration is materially decreased in the unit as a whole.

I have shown as the preferred embodiment of my invention, a hermetically-sealed motor compressor unit, but it is obvious that many of the advantages of my invention would be gained in arranging two or more of the so-called "open type" units together in a manner similar to that shown in the drawings.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a circulatory compression refrigeration system, the combination of a casing embodying two cup-shaped members, a motor-compressor unit in each casing member with the compressor thereof disposed adjacent to the mouth end of the latter, said motor-compressor units being similar, and a gas-tight joint connecting adjacent mouth ends of the casing members whereby the joined mouth end portions provide a common refrigerant chamber for the compressors so that the chamber and the compressors constitute elements of the system.

2. In refrigerating apparatus, the combination of a casing embodying two cup-shaped casing members, a motor compressor unit disposed in each casing member with the compressor arranged adjacent to the mouth end of the latter, said motor compressor units being identical, a circumferential weld connecting adjacent mouth ends, and a discharge conduit having branches leading from each compressor, extending through the casing wall, and welded to the latter, said welded mouth end portions providing a common chamber within which the compressors are disposed and which supplies refrigerant to the inlets of the latter.

3. In refrigerating apparatus, the combination of a casing embodying two cup-shaped casing members having their mouth ends welded together with a conduit passing through the welded connection and welded thereto and to the casing members, a motor compressor unit disposed in each casing member with the compressors arranged adjacent to the welded connection, and branch conduits connecting the outlets of the compressors with said conduit, the welded-together casing member end portions providing a common chamber for the compressors for supplying gaseous refrigerant to the latter.

4. In a circulatory compression refrigeration system, the combination of a casing embodying two cup-shaped members, a motor-compressor unit in each casing member with the compressor thereof disposed adjacent to the mouth end of the latter, and a gas-tight joint connecting adjacent mouth ends of the casing members whereby the joined mouth end portions provide a common refrigerant and lubricant chamber for the compressors so that the chamber and the compressors constitute elements of the system.

5. In refrigerating apparatus, the combination of two motor-compressor units each assembled in separate lubricant-containing casings, said casings having corresponding openings therein, said openings being aligned, and means forming a gas-tight seal between the casings, whereby a unitary casing hermetically encloses both motor-compressor units and forms a common lubricant reservoir for both of said units.

6. In a circulatory compression system, the combination of a casing embodying two open ended members, a motor-compressor unit in each member and including a shaft connecting each motor to its respective compressor, and means forming a gas-tight joint between said members, whereby a unitary sealed motor and compressor chamber is formed.

7. In a circulatory compression system, the combination of a casing embodying two open-ended members, a motor-compressor unit in each member and including a shaft connecting each motor to its respective compressor, means providing a gas-tight joint between said members, whereby a common sealed motor and compressor chamber is formed, and a common discharge means for the fluid pumped by both motor-compressor units.

8. In refrigerating apparatus, the combination of two standard motor-compressor units, casings having similar open ends for the units, a notch formed in each casing in the edge of the open ends, means for forming a gas-tight joint between the casings at their open ends, whereby an assembled envelope is formed, said notches being aligned and forming an opening in the assembly, and a common discharge conduit from both compressors passing through said opening and bonded to the assembly to completely seal the assembly from the atmosphere.

9. In a fluid compression system, the combination of a casing embodying two open ended members, a motor compressor unit in each member and including a shaft connecting each motor to its respective compressor, means providing a gas-tight joint between said members, whereby a common sealed motor and compressor chamber is formed, a fluid intake embodied in each compressor and connecting with the interior of the common chamber, and means for admitting fluid for compression to said common chamber.

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