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H. DIETLER

2,629,542

MOTOR-DRIVEN COMPRESSOR

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Fig. 1.

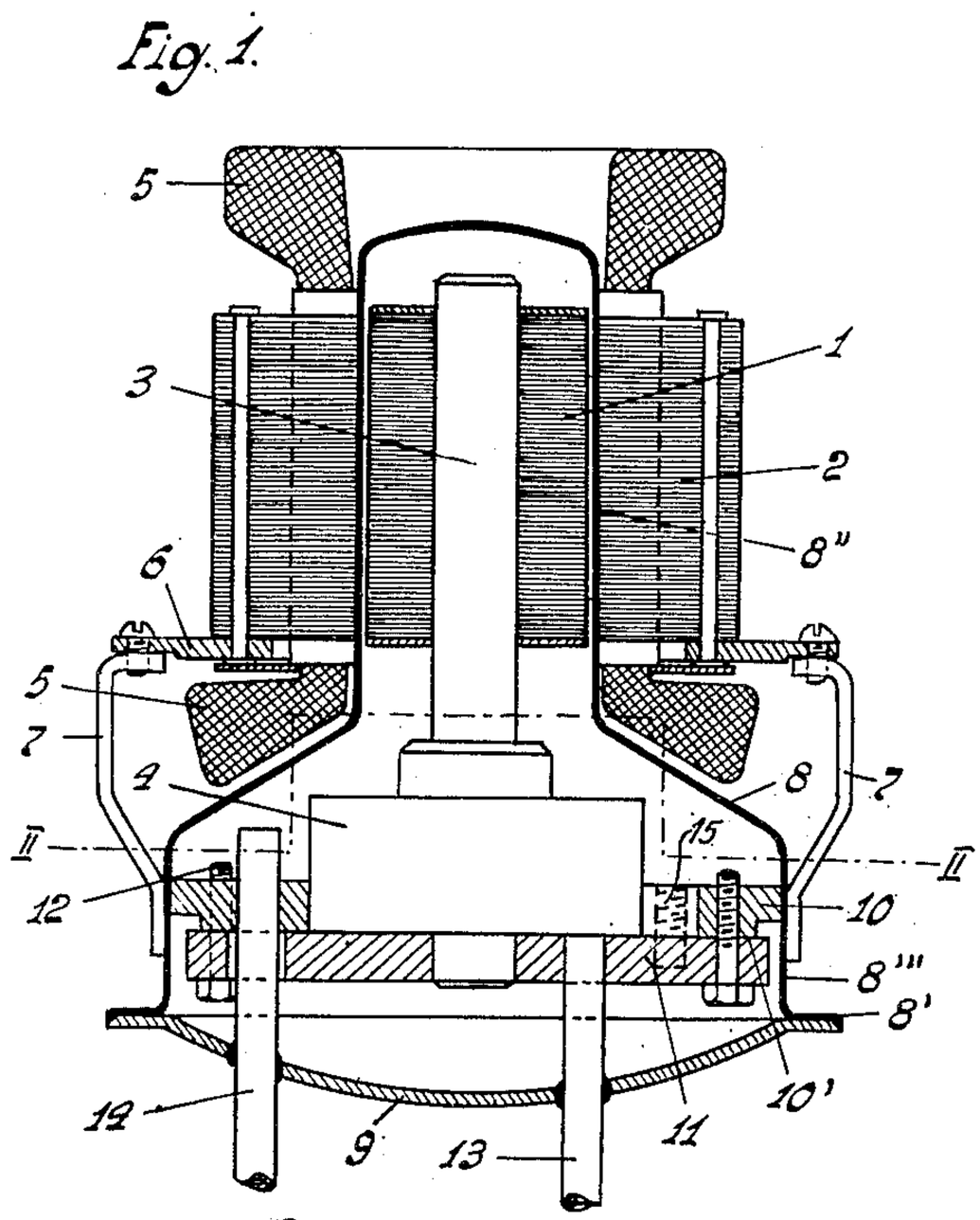
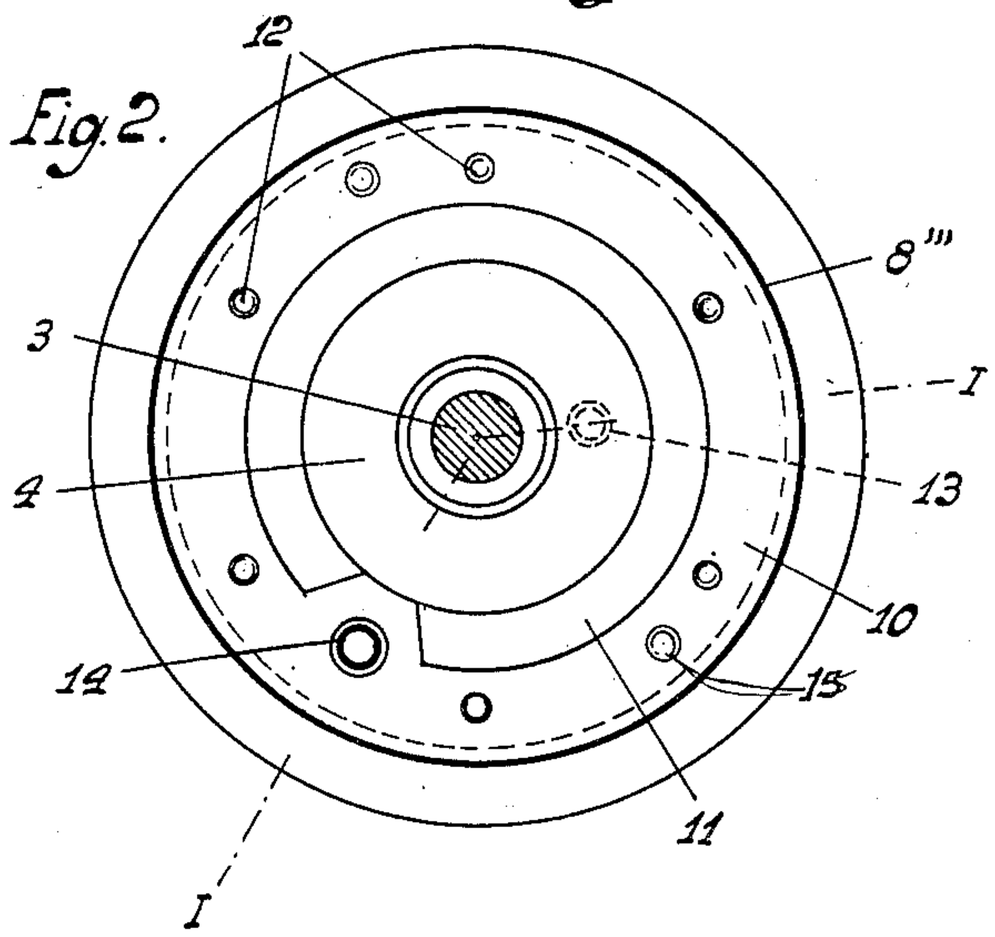


Fig. 2.



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MOTOR-DRIVEN COMPRESSOR

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1 Claim. (Cl. 230—117)

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The present invention relates to a motor-driven compressor in which the rotor of the electric motor and the rotary compressor coupled to it are totally enclosed in a casing and the stator of the motor lies outside this casing.

All attempts to employ motor-driven compressors of this kind in refrigerators have hitherto failed because of the poor efficiency of such sets, which is to be attributed to the difficulty in assembling and, in connection therewith, the necessarily too large dimensions of the air gap in the electric motor. In fact, the outwardly situated stator makes it necessary to have a cylindrical part lying in the air gap and surrounding the rotor; this cylindrical part must be gastight and sufficiently strong because of the internal pressure.

The present invention aims at providing a practically satisfactory elimination of the drawbacks, in that according to the invention the casing, made of non-magnetic material, is accurately mechanically machined to exact dimensions outwardly and inwardly at its cylindrical part lying in the air gap, after which—on a supporting ring arranged in the part intended for taking the rotary compressor—a surface standing at right angles to the axis of the motor-driven compressor is machined accurately flat, and then to this surface—by adopting fitting members serving for centering—the exactly flat-machined part of a plate carrying the rotary compressor, the rotor of the motor and their common shaft is fixed, and to a flange surrounding an opening on the casing a cover is welded gastight, through which pass the suction and delivery pipes of the compressor.

This method has the special advantage that the set can be run in trial service before the cover—made for instance of sheet metal—is welded to the casing. This cover, with the delivery pipe passing through it and the passage for the suction pipe inserted airtight in the bearing plate, can finally be laid on and connected airtight with the enclosed casing and the suction pipe by welding or suchlike, the risk of distortion being already reduced by the fact that casing-foot, bearing ring and plate form together a stable construction, and this risk is completely eliminated in that the casing may be provided with a flange of the diameter of the cover edge and the edges can be welded together on their periphery, and a distorting of the turned-over edge is not transmitted to the casing.

In the accompanying drawing one execution of the object of the invention is diagrammatically illustrated by way of example, where:

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Fig. 1 shows a vertical section of a motor-driven compressor on the line I—I in Fig. 2 and

Fig. 2 a cross-section on the line II—II in Fig. 1.

The motor-driven compressor in the drawing has the electric motor with the rotor 1 and the stator 2 and the rotary compressor 4 arranged with the rotor on a common shaft 3. The stator 2 with the windings 5 is fixed by means of a ring 6 which is carried by arms 7 on a casing 8. The casing 8 encloses the rotor 1 and the rotary compressor 4 airtight against the outside, for which purpose a closing cover 9 is welded to the flange 8′ of the casing 8.

A narrowed cylindrical part 8″ of the casing lies in the air gap of the electric motor between its rotor 1 and stator 2. In a widened lower part 8‴ of the casing 8, which contains the rotary compressor 4, a bearing ring 10 is fixed, for instance by firm welding, whose under surface 10′ is machined exactly flat and lies in a plane standing at right angles to the axis of the motor-driven compressor. The ring 10 serves as erecting ring for the bearing plate 11 of the rotary compressor 4. The edge of the plate 11 projecting over the periphery of this compressor is, together with the whole plate, ground accurately flat. Between plate 11 and ring 10 dowel pins 15 are arranged and screw-bolts 12 serve to connect plate 11 to ring 10.

Suction pipe 13 of the rotary compressor 4 is inserted airtight into plate 11, whilst the delivery pipe 14 is welded into the closing cover 9 and passes with its inner end through a hole in plate 11.

The assembling of the described motor-driven compressor is effected in the following manner.

The cylindrical part 8″ of the casing 8 is machined accurately to dimensions outwardly and inwardly, for instance by drawing, turning and grinding. After that, the supporting ring 10, which is fitted on the part 8‴ of the casing 8, is accurately flat machined on the surface 10′ on a plane standing exactly at right angles to the axis of the casing 8. The supporting plate 11 is now also accurately machined; then the rotor 1, fixed exactly central on the plate, the shaft 3 and the rotary compressor, are securely fixed by means of this plate to the supporting ring 10.

The exactly central position of these parts to the ring 10 is ensured by the above-mentioned dowel pins. The centering could, however, also be effected by means of annular shoulders and grooves on ring 10 and plate 11.

The cover 9 with the delivery pipe 14 welded in it is then firmly welded airtight by means of its

edge to the flange part 8' of the casing 8 and likewise the suction pipe 13 passing through an opening in the cover 9 in this opening.

The casing 8 consists naturally of non-magnetic material and for instance of stainless steel. In order that the air gap in the motor may not be too large, the wall thickness of the casing, or at least of the part 8'' must be as small as possible. But within the casing 8 there is overpressure while the compressor is working, and this circumstance must also be taken into consideration when choosing the wall thickness.

It is therefore well, with slight wall thickness of the casing, to keep the diameter of the part 8'' of the casing 8 also slight and to give a correspondingly greater axial length to the rotor 1 and the stator 2 in order that the requisite motor output may nevertheless be attained. The part 8'' can then be inserted as a close fit into the stator bore in order that the stator may take over a part of the pressure exerted on the casing.

What I claim is:

In a combined motor-compressor assembly; the combination of a motor stator defining a central hollow space, a stepped cylindrical sheath having a small diameter portion fitting closely into said hollow space and an integral and coaxial large diameter portion, said sheath being axially open at the end defined by said large diameter portion and closed at the opposite end thereof, a rotor adapted to be rotatably enclosed in said small diameter portion of the sheath, a rotary compressor operatively connected to said rotor in

axial alignment with the latter and adapted to be disposed within said large diameter portion of the sheath, a mounting ring fixedly secured within said large diameter portion of the sheath and having an internal diameter sufficient to permit said rotor and compressor to pass therethrough, a supporting plate for said compressor having a diameter less than that of said large diameter portion of the sheath but greater than said internal diameter of the ring to abut against the face of the latter directed toward said open end of the sheath, means for detachably securing said supporting plate to said mounting ring with said rotor and compressor centered relative to said hollow space defined by the stator, and closure means for sealing said open end of said sheath.

HANS DIETLER.

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