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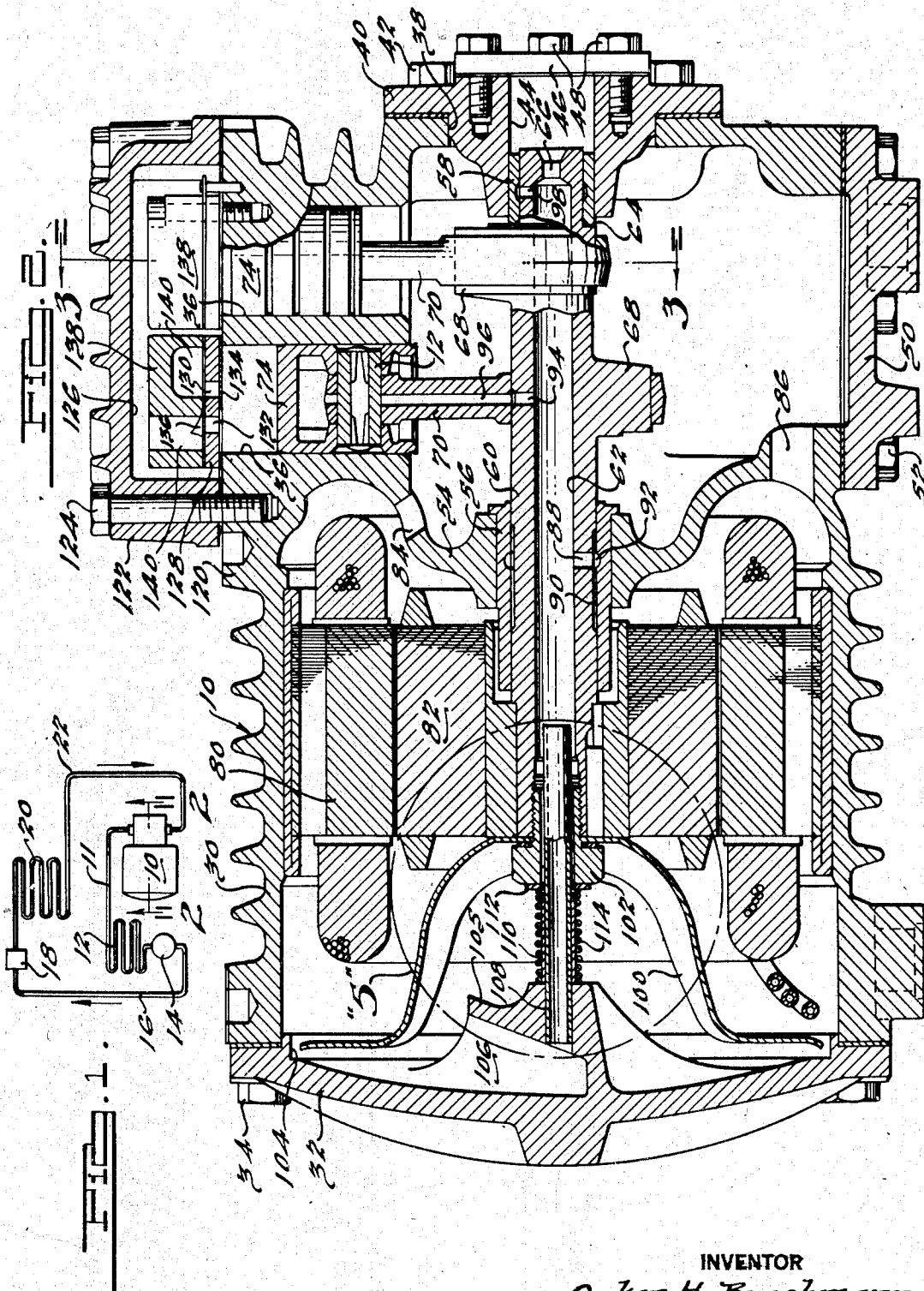
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2,298,749

REFRIGERATING MECHANISM

Filed Oct. 25, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

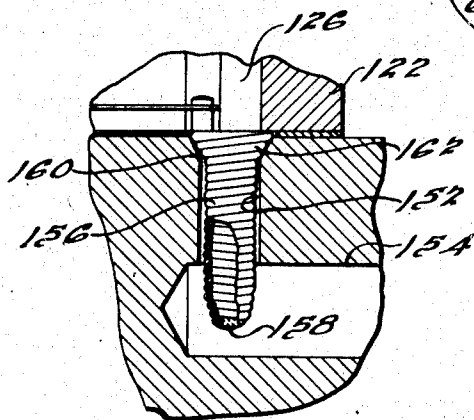
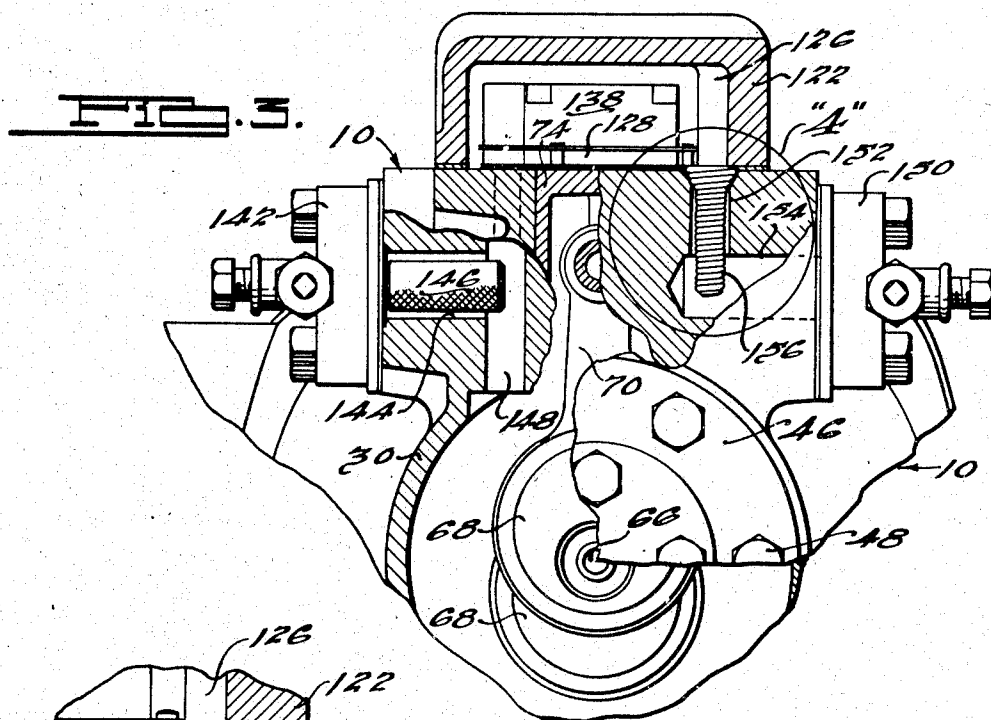


FIG. 4.

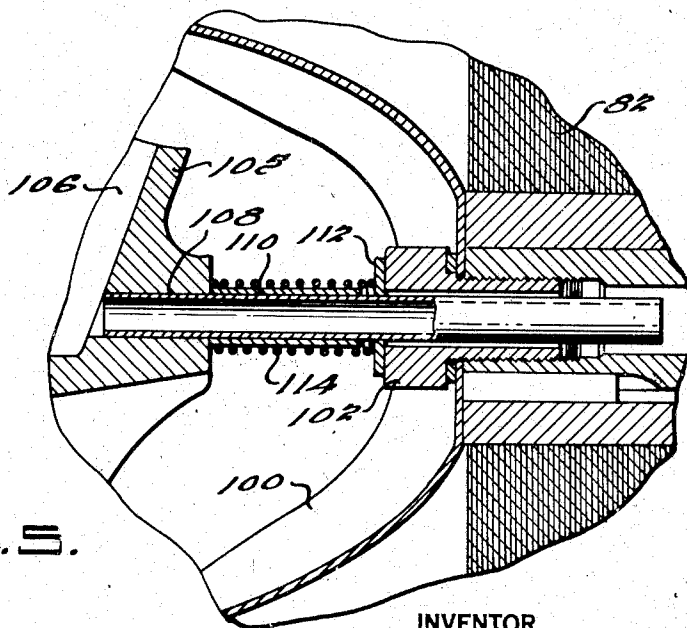


FIG. 5.

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UNITED STATES PATENT OFFICE

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REFRIGERATING MECHANISM

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Application October 25, 1940, Serial No. 362,823

14 Claims. (Cl. 230—206)

This invention relates to refrigerating mechanism and particularly to a sealed motor compressor unit, the principal object being the provision of a device of the type described having certain new and novel features of construction.

Objects of the invention include the provision of a novel lubricating mechanism for a sealed motor compressor unit; the provision of novel means for maintaining the axial position of the shaft and rotor assembly of a motor compressor unit; the provision of a novel construction for maintaining the drive shaft and rotor of a motor compressor unit against undesirable axial displacement and serving to provide a seal for a supply of lubricant within the shaft; and the provision of a sealed motor compressor unit for refrigerating mechanisms including a motor housing the lower portion of which serves as an oil reservoir, an oil throw being provided on the motor shaft and the housing means provided with a pocket for collecting oil thrown about by the throw, the motor shaft being hollow and a shouldered tube communicating with a pocket projecting into the interior of the shaft, a washer substantially fitting the tube being interposed between the shoulder on the tube and the end of the shaft whereby to limit movement of the shaft in one direction, and spring means constantly urging the washer against the end of the shaft whereby to minimize the escape of oil from the interior of the shaft about the exterior of the tube.

Other objects of the invention include the provision of means for quieting the operation of a refrigerant or other compressor; the provision of means in a refrigerating mechanism for minimizing the noise accompanying the discharge of and pulsations in compressed refrigerant from being telegraphed from the compressor to remote parts of the system; the provision of means in a refrigerant compressor for preventing undesirable noises which might otherwise occur due to discharging a slug of lubricant from the compressor; the provision of means in a refrigerant compressor for muffling the sound of the refrigerant discharged from the compressor and reducing the effects of pulsations in the refrigerant lines; the provision of a novel form of muffling means for use in a refrigerant circuit; and the provision of a muffling means for a gas circuit subjected to intermittent impulses comprising a coil of closely wound spring wire closed at one end and through which the refrigerant must pass in flowing through the circuit, the turns in the

coil separating under pressure to permit the gas to escape therethrough.

The above being among the objects of the present invention the same consists in certain novel features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawings, and then claimed, having the above and other objects in view.

In the accompanying drawings which illustrate a suitable embodiment of the present invention and in which like numerals refer to like parts throughout the several different views,

Fig. 1 is a more or less diagrammatic representation of a refrigerant circuit embodying a sealed motor compressor unit;

Fig. 2 is an enlarged vertical sectional view taken axially through a sealed motor compressor unit for a refrigerating system embodying features of the present invention and taken as, for instance, on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary, transverse sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary, sectional view taken in the same plane as the view in Fig. 3 and illustrating the mechanism included in the circle 4 of Fig. 3 in greater detail and in further partially broken state; and,

Fig. 5 is an enlarged fragmentary, sectional view taken in the same plane as Fig. 2 and illustrating those parts within the circle 5 in greater detail.

The present invention has particular relation to sealed motor compressor units for refrigerating mechanism and is of the general type of construction shown and claimed in United States Patent No. 2,035,276, filed by John R. Replogle and issued March 4, 1936, the same now being owned by the assignee of the present invention. As is well understood by those skilled in the art, in this type of compressor all moving parts of the motor and compressor are contained in a single gas-tight housing eliminating the need of shaft seals or the like to prevent the escape of refrigerant therefrom or the introduction of air thereto. In the Replogle patent above mentioned the motor and compressor have a common shaft which is hollow and through which the refrigerant is fed to the compressor end of the structure and lubricating oil is fed to the same end and is distributed therefrom to the various wearing surfaces of the motor and compressor.

In accordance with the present invention the feature of feeding the refrigerant through the hollow drive shaft is eliminated but the hollow conformation of the shaft is retained and em-

played solely for lubricating purposes. In this case the shaft is not supported in the same manner as in the Replogle patent and, therefore, requires a variation in the means for feeding the lubricant to the hollow interior of the shaft. Because of the fact that there is no material flow of refrigerant through the shaft as in the Replogle patent and which flow of refrigerant in the Replogle patent serves to draw the lubricating oil towards the compressor end of the shaft, means must be provided in the present construction for maintaining a body of oil in the hollow shaft and such construction forms one of the features of the present invention. Also in devices of this type it is preferable to allow the power shaft a small latitude of freedom in an axial direction in order to permit the rotor of the motor to seek its natural position axially of the stator, but, at the same time, means must be provided for limiting the axial movement of the shaft so that in handling of the unit in shipping, service, or otherwise displacement of the shaft and the parts carried thereby will not be permitted to an undesirable degree. In accordance with the present invention the means provided for introducing oil into the interior of the hollow drive shaft affords a means whereby the axial movement of the power shaft may be limited to the desired degree.

Another feature of the invention which is applicable to compressors generally but which is particularly adaptable for use in connection with refrigerant compressors whether they be of the sealed type or not, is in connection with muffling means for the discharge side of the compressor. As is appreciated by those skilled in the art the compressed refrigerant discharged by the piston from the cylinder of a compressor into the high side of the system often sets up pulsations of a distinctly audible nature and, because all parts of the refrigerating system and particularly the refrigerant circulating passages are constructed entirely of metal, this pulsation noise is telegraphed through the entire system. Moreover on occasions a slug of oil will be discharged from the compressor and will be forced through the refrigerant circulating system, and when such slug is carried through the system as such distinctly audible sounds are created which are considered undesirable. In accordance with the phase of the present invention under discussion means are provided whereby the pulsations of pressure occurring at the outlet side of the compressor are smoothed out so that the refrigerant discharged into the circulation system is substantially devoid of pulsations, thus preventing the audible effects thereof from being telegraphed through the system and from being apparent therein. At the same time it serves to break up any slug of oil that attempts to flow through the system as such and thereby eliminates the undesirable effects thereof.

Referring now to the accompanying drawings and particularly to Fig. 1 there is diagrammatically illustrated a typical refrigerating system in which the numeral 10 indicates generally a motor compressor unit from which refrigerant is discharged through a tube 11 to a condenser 12 in which the refrigerant is condensed and then delivered to a receiver 14 from which it is led through a tube 16 to an expansion valve 18 and then to an evaporator 20 in which the expanded gas absorbs heat and then returns through a tube 22 to the motor compressor unit 10 to again be compressed and re-circulated. The present in-

vention particularly relates to the motor compressor unit 10.

Referring now particularly to Fig. 2 it will be noted that the motor compressor unit 10 comprises a housing 30 the lefthand portion of which is of generally circular section and the open end of which is closed and sealed in gas tight relation by means of a removable cover 32 secured in place by screws 34. The opposite end of the housing may be formed to provide one or more cylinders although in the present case by way of illustration it is shown as formed to provide two cylinder bores 36 therein. The righthand end of the housing is provided with an integral end wall provided with an axial bore 38 which is closed and sealed by a plug 40 secured in place by screws 42 but which plug is provided with an axial bore 44 in turn closed by a cap 46 secured in place by screws 48. The housing 30 is also provided with an opening below the cylinder bores 36 which is closed and sealed by means of a cap 50 secured in place by screws 52, this latter opening being for the purpose of facilitating the insertion of the piston assemblies in the cylinders.

Intermediate the opposite ends of the housing 30 is a central integral wall 54 provided with a central bore in which an elongated bearing bushing 56 is fixedly received. A shorter bearing bushing 58 is fixedly received within the inner end of the bore 44 of the plug 40. Rotatably received by and between the bushings 56 and 58 is a power shaft 60 having a bore 62. The righthand end of the shaft 60 is reduced in diameter so as to form a shoulder 64 which axially abuts the inner end of the bushing 58 to thus limit movement of the shaft 60 to the right as viewed in Fig. 1. The bore 62 at the extreme righthand end of the shaft 60 is reduced in diameter as indicated at 66 for a purpose which will hereinafter be more apparent.

Upon the shaft 60 and integrally therewith are two eccentrics 68 aligned with respect to the cylinder bores 36 and encircling each of the eccentrics 68 is the big end of a connecting rod 70 the upper end of each of which is connected by means of a piston pin 72 with a piston 74 received in the corresponding bore 36. Accordingly, it will be appreciated that rotation of the shaft 60 causes reciprocation of the pistons 74, the eccentrics being displaced from one another angularly through 180 degrees so as to obtain alternate pumping strokes of the pistons 74.

The lefthand end of the housing 30 interiorly receives the stator 80 of the motor, it preferably being pressed into position in a conventional manner which thereby fixes it with respect to the housing 30. The rotor 82 for the motor is pressed upon the corresponding end of the shaft 60 and, of course, is radially aligned with the stator 80. Openings 84 and 86 are provided in the central wall 54 so as to permit equalization of pressures between the opposite ends of the housing 30 and additionally the lower opening 86 provides for the return of lubricating oil from the compressor end of the housing to the motor end thereof.

In order to provide lubrication for the various wearing surfaces of the unit lubricating oil is fed into the bore 62 of the shaft 60 and it is distributed therefrom to the various wearing surfaces. To aid in effecting this result the shaft 62 is provided with a radial hole 88 therethrough in line with the bearing bushing 56 and the shaft 60 is peripherally cut away as at 90 on either side of the hole 88 to provide an annular pocket for reception of the oil discharged thereinto from the

bore 62 of the shaft 60. Additionally the bore of the bearing bushing 56 in line with the hole 58 is internally provided with an annular groove 92 to further aid in the flow of oil through the opening 88. It will be appreciated that during rotation of the shaft 60 the oil in the shaft will be subjected to centrifugal force which will tend to discharge it radially outwardly through the hole 88 as well as other oil passages about to be described. In any event it will be appreciated that the passage just described affords a means whereby an ample supply of oil may be fed to the wearing surfaces between the shaft 60 and bearing bushing 56.

Another radial oil hole 94 is drilled through the shaft 60 centrally of each of the eccentrics 68 and on the radially low side of such eccentrics. Each connecting rod 70 is provided with a central oil passage 96 which is aligned with the corresponding oil passage 94 once during each revolution of the shaft 60 so that oil discharged through the passages 94 not only is fed to wearing surfaces between the connecting rods and their corresponding eccentrics 68, but is also fed through the passages 96 to the wearing surface between each of the connecting rods 70 and its corresponding piston pin 72. The small bore 66 in the righthand end of the shaft previously referred to serves as a dam for maintaining a predetermined level of oil in the bore 62 of the shaft 60 and immediately to the left of the small bore 66 the shaft 60 is provided with an additional radial oil hole or passage 98 for feeding oil to the wearing surfaces between the corresponding end of the shaft and the bearing bushing 58. The wearing surfaces between the pistons 74 and their cylinder bores 36 are lubricated by means of oil thrown off of the periphery of the eccentrics 68 during operation.

In order to introduce oil into the interior of the shaft 60 an oil thrower 100 is fixed to the lefthand end of the shaft 60 by means of a hollow nut member 102 threaded into the corresponding end of the bore 62. The radial extremities of the oil thrower 100 extend into close proximity to the bottom side of the bore in the housing 30 at the corresponding end of the housing 30 and sufficient lubricating oil is introduced into the system so as to provide a pool of oil in the lower part of the housing into which the ends of the oil thrower dip. The ends of the oil thrower thus throw a spray of oil around the interior housing and particularly against the inner circumferential shoulder 104 of the cover 32 and the cover 32 is provided on its inner side with a web 105 integral therewith and cooperating with the inner face of the cover to provide a central pocket 106 into which a portion of this oil drains by gravity. A tube 108 arranged in concentric relation with respect to the shaft 60 has one end fixed in the web 105 in open communication with the pocket 106 and the tube 108 extends through the bore of the nut member 102 and into the hollow interior or bore 62 of the shaft 60, sufficient clearance being provided between its periphery and the bore of the nut member 102 to prevent any friction being set up at this point and preferably being in the nature of a good running or bearing fit, the amount of clearance shown in the drawings being greatly exaggerated for the purpose of illustration only.

This tube 108 forming a means of communication between the pocket 106 and the bore 62 of the shaft 60 is, in accordance with the present invention, also employed as a means for limiting

axial movement of the shaft 60 to the left. In order to accomplish this result a shoulder is formed on the tube and while in the broader aspects of the present invention it makes no difference whether this shoulder is formed as an integral part of the tube or formed separately therefrom, the latter is illustrated as the preferable and more economical manner of accomplishing this result. Accordingly, in order to provide such shoulder a second tube 110 is sleeved upon the tube 108 and the lefthand end thereof is arranged in abutting relationship with respect to the web 105. The opposite end of the tube 110 terminates short of the corresponding end of the nut member 102, and particularly where a washer as hereinafter described in conjunction therewith is not employed, will be of sufficient diameter to engage the nut member 102 to limit movement thereof, and accordingly the shaft 60, to the left as viewed in the drawings. Thus the righthand end of the tube 110 and the lefthand end of the bearing bushing 58 will cooperate with the shaft 60 to maintain it against material axial movement between them, a certain amount of such axial movement being permitted so as to permit the rotor 82 to seek its natural center within the stator 80 as is conventionally desirable.

The nut member 102 having a bore smaller than the bore 62 of the shaft 60, its inner end serves in the nature of a dam in the bore 62 serving to maintain a level of oil in the bore 62. A greater level of oil in the bore 62 may tend to produce leakage of the lubricating oil from the bore 62 of the shaft 60 between the bore of the nut 102 and the tube 108 unless otherwise prevented and this particularly where a relatively free fit is provided between these parts. Such leakage may be prevented where considered necessary or desirable by means of a washer 112 which rotatably but relatively closely surrounds the tube 108 between the corresponding face of the nut member 102 and the righthand end of the tube 110, this washer in effect cooperating between the nut member and the tube 110 to limit axial movement of the shaft 60 to the left, and suitable axial clearance being left between the washer and the end of the tube 110 for the purposes previously described. A coil spring 114 surrounds the tube 110 and is maintained under a comparative light compressive stress between the cover member 32 and the washer 112 to maintain the washer 112 pressed against the corresponding end of the nut member 102 to prevent an unwarranted leakage of lubricant therebetween. The washer 112 will ordinarily turn with respect to the nut member 102 during operation of the unit although it is free to turn with respect to the spring 114.

From the above it will be understood that in accordance with the construction thus far described means are provided for introducing lubricant into the hollow interior of the shaft 60 and distributing it therefrom to the various wearing parts of the unit, the means provided for introducing the lubricant to the hollow interior of the shaft also providing a means for limiting the axial movement of the shaft 60 in one direction and further providing means whereby an unwarranted escape of lubricant from the lefthand end of the shaft is prevented.

The casing 30 above the cylinder bores 36 is provided with a flat face 120 to which a hollow cylinder head 122 is secured in sealed relation by means of bolts 124. The cylinder head 122 is in-

teriorly formed to provide a relatively large chamber 126 and received within the chamber 126 over each of the bores 36 is a valve plate 128 provided with an inlet port 130 and a discharge port 132. A flat spring type valve 134 is arranged below each plate 128 in cooperating relation with respect to the corresponding inlet port 130 and a similar valve 136 is arranged above each valve plate 128 in cooperating relation with respect to the discharge port 132. A member 138 overlies each valve plate 128 and is provided with a passage 140 extending completely therethrough in line with the corresponding discharge port 132 and is provided with a pocket 142 therein in open communication with the corresponding inlet port 130. As best illustrated in Fig. 3 one side of the housing 30 is provided with an inlet connection member 142 of conventional construction to which the tube 22 of Fig. 1 or its equivalent is connected and through which refrigerant flows into a bore 144 in the casing 30. A wire screen strainer 146 is provided in the bore 144 as illustrated in Fig. 3 not only to entrap particles of foreign material carried by the refrigerant and preventing them from being carried to the interior of the motor compressor unit, but also to separate out any oil from the refrigerant flowing into the compressor. The bore 144 opens into a vertical bore 148 which opens into the crankcase portion of the compressor end of the housing 30 at its lower end and thereby affords a means whereby any lubricant separated out from the gaseous refrigerant in the strainer 146 may flow by gravity into the lower part of the housing 30. The upper end of the passage 148 extends into open communication with the pocket 140 of both members 138 so that upon each down stroke of each piston 74 the gaseous refrigerant will be drawn through the bore 144 and through the bore 148 to the corresponding pocket 140 and then down through the corresponding suction passage 130 into the corresponding cylinder 36. The gas thus drawn into each cylinder 36 during the down stroke of the corresponding piston 74 therein is compressed upon the ensuing up-stroke of the piston and is caused to be discharged through the corresponding discharge port 32 and through the corresponding passage 140 into the chamber 126 of the cylinder head 122.

Now referring again to Fig. 3 it will be noted that an outlet connection member 150 is provided on that side of the housing 30 opposite the inlet connection member 142 and this member is in communication with the chamber 126 of the cylinder head 122 through a vertical passage 152 and horizontal passage 154, so that the refrigerant which is compressed and delivered into the chamber 126 may flow out of the compressor through the outlet connection 150 and thence to a condenser such as the condenser 12 illustrated in Fig. 1. It is in connection with the discharge of compressed refrigerant from the compressor that the remaining phase of the present invention is concerned. In other words, means are provided in accordance with the present invention whereby the pulsations which are commonly set up by the discharge of compressed refrigerant from the compressor are smoothed out and thereby muffled and prevented from being telegraphed as audible sounds throughout the entire system.

This means, as best illustrated in Figs. 3 and 4, comprises a coil 156 of spring wire the major portion of which is arranged in spaced relation

with respect to the walls of the bore 152 and the various coils of which are tightly wound together when in normal condition. The lower coils are reduced in diameter as best illustrated in Fig. 4 and the coil at the lower end is closed by brazing or the like as indicated at 158. In order to secure the coil 156 in position and in sealed relation with respect to the walls of the bore 152, the upper end of the bore 152 is outwardly flared as at 160 and the upper end of the coil 156 is outwardly flared as at 162, the dimensions of these last two parts being such that when the cylinder head 122 is drawn into place by the bolts 124 the flared portion 162 of the coil 156 is firmly pressed into contact with the walls of the flared portion 160 of the bore 152 and in substantially sealed relation with respect thereto.

It will be appreciated that because of the fact that the various turns of the coil 156 are wound tight against each other, that except for the inevitable imperfections in the wire itself and in the winding thereof the coil acts to block the flow of refrigerant therethrough. However, the refrigerant compressed by the compressor in being delivered under a relatively high pressure to the interior of the coil 156 causes the coil 156 to elongate sufficiently to separate the various, or at least sufficient, turns thereof to such an extent as to permit the escape of the refrigerant between them but, as will be appreciated, the coil delays the flow of refrigerant through it and requires a certain differential of pressure on opposite sides thereof before it will separate sufficiently to permit a material flow of refrigerant through it. From a practical standpoint it is preferable to so construct the coil 156 that a pressure differential of from one to five pounds will be sufficient to separate the various coils thereof to an extent sufficient to permit the normal output of the compressor to readily flow therethrough, and although its presence may create a slightly greater head for the compressor to work in the amount is not sufficient to be material. Nevertheless, the resistance which the coil 156 offers to the flow of refrigerant through it and the manner in which it inherently throttles the flow of refrigerant through it serves to smooth out any pulsations which would otherwise be apparent in the refrigerant flowing to the condenser and effectively eliminates the presence of such pulsations and any audible effects thereof. Consequently it is of material aid in quieting the operation of the system.

Furthermore, it will be appreciated that any oil collecting in the chamber 126 and attempting to flow through the passages 152 as a slug will be intercepted by the coil 156 and will be broken up and mixed with refrigerant in flowing through it, thus effectively eliminating the undesirable features which would otherwise be apparent from the presence of such slug.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In a sealed motor compressor unit, in combination, a housing having a pumping chamber formed integrally therewith at one end thereof, a hollow shaft assembly rotatably mounted within said housing, said shaft having a passage therethrough leading to a wearing surface of said assembly, a pumping element in said chamber operatively connected to said shaft for receiving

driving movement therefrom, a motor including a stator received within and fixed with respect to said housing and a rotor fixed with respect to said shaft, means adjacent one end of said shaft assembly for limiting axial movement thereof in one direction, a pocket formed on the end wall of said housing adjacent the opposite end of said shaft, means driven by said shaft for supplying lubricating oil to said pocket, tubular means in open communication with said pocket and projecting into the hollow interior of said shaft, and a shoulder on said tubular means arranged in cooperating relation with respect to said opposite end of said shaft assembly for limiting axial movement of said shaft in a direction opposite to the first mentioned axial movement.

2. In a sealed motor compressor unit, in combination, a housing having a pumping chamber formed integrally therewith at one end thereof, a hollow shaft assembly rotatably mounted within said housing, said shaft having a passage therethrough leading to a wearing surface of said assembly, a pumping element in said chamber operatively connected to said shaft for receiving driving movement therefrom, a motor including a stator received within and fixed with respect to said housing and a rotor fixed with respect to said shaft, means adjacent one end of said shaft assembly for limiting axial movement thereof in one direction, a pocket formed on the end wall of said housing adjacent the opposite end of said shaft, means driven by said shaft for supplying lubricating oil to said pocket, and means extending between said shaft assembly and said pocket providing for the flow of oil from said pocket to the hollow interior of said shaft assembly and cooperating with said shaft to limit axial movement of said shaft in a direction opposite to the first mentioned direction of axial movement.

3. In a sealed motor compressor unit, in combination, a housing having a pumping chamber formed integrally therewith at one end thereof, a hollow shaft rotatably mounted within said housing, said shaft having a passage therethrough leading to a wearing surface of said assembly, a pumping element in said chamber operatively connected to said shaft for receiving driving movement therefrom, a motor including a stator received within and fixed with respect to said housing and a rotor fixed with respect to said shaft, means adjacent one end of said shaft for limiting axial movement thereof in one direction, a hollow member threaded into the bore of said shaft at that end thereof opposite to the first mentioned end, an oil slinger fixed to said shaft by said threaded member, a pocket in said housing arranged to receive therein oil acted upon by said oil slinger, a tube in open communication with said pocket extending into the bore of said threaded member, and shoulder means carried by said tube cooperable with said threaded member to limit axial movement of said shaft in a direction opposite to the direction of the first mentioned axial movement.

4. In a sealed motor compressor unit, in combination, a housing having a pumping chamber formed integrally therewith at one end thereof, a hollow shaft rotatably mounted within said housing, said shaft having a passage therethrough leading to a wearing surface of said assembly, a pumping element in said chamber operatively connected to said shaft for receiving driving movement therefrom, a motor including a stator received within and fixed with respect to said housing and a rotor fixed with respect to

said shaft, means adjacent one end of said shaft for limiting axial movement thereof in one direction, a hollow member threaded into the bore of said shaft at that end thereof opposite to the first mentioned end and forming an internal dam for retaining a body of oil in said shaft against escape from the corresponding end of said shaft, an oil slinger fixed to said shaft by said threaded member, a pocket in said housing arranged to receive therein oil acted upon by said oil slinger, a tube in open communication with said pocket extending into the bore of said threaded member, and shoulder means carried by said tube cooperable with said threaded member to limit axial movement of said shaft in a direction opposite to the direction of the first mentioned axial movement.

5. In a sealed motor compressor unit, in combination, a housing having a pumping chamber formed integrally therewith at one end thereof, a hollow shaft rotatably mounted within said housing, said shaft having a passage therethrough leading to a wearing surface of said assembly, a pumping element in said chamber operatively connected to said shaft for receiving driving movement therefrom, a motor including a stator received within and fixed with respect to said housing and a rotor fixed with respect to said shaft, means adjacent one end of said shaft for limiting axial movement thereof in one direction, a hollow member threaded into the bore of said shaft at that end thereof opposite to the first mentioned end, an oil slinger fixed to said shaft by said threaded member, a pocket in said housing arranged to receive therein oil acted upon by said oil slinger, and a tube in open communication with said pocket extending into the bore of said threaded member, said tube having a relatively close running fit in said threaded member whereby to minimize the escape of oil from said shaft at the corresponding end thereof between said tube and said threaded member.

6. In a motor compressor unit, in combination, a hollow casing providing a cylinder therein, a hollow shaft assembly rotatably mounted in said casing, an eccentric on said shaft assembly, a piston in said cylinder operatively connected to said eccentric, a pocket in said casing at one end thereof, means for supplying oil to said pocket during operation of said unit, a tube extending between said pocket and the interior of said shaft assembly whereby to convey oil from said pocket to the interior of said shaft assembly, shoulder means associated with said tube cooperating with an end of said shaft assembly for limiting axial movement of said shaft assembly in one direction, means for limiting axial movement of said shaft assembly in the opposite direction, said shaft assembly having radially directed openings therein for conveying oil from the interior of said shaft assembly to wearing surfaces of said unit, and sealing means for the joint between said shaft assembly and said tube.

7. In a motor compressor unit, in combination, a hollow casing providing a cylinder therein, a hollow shaft assembly rotatably mounted in said casing, an eccentric on said shaft assembly, a piston in said cylinder operatively connected to said eccentric, a pocket in said casing at one end thereof, means for supplying oil to said pocket during operation of said unit, a tube extending between said pocket and the interior of said shaft assembly whereby to convey oil from said pocket to the interior of said shaft assembly, shoulder means associated with said tube cooperating with

an end of said shaft assembly for limiting axial movement of said shaft assembly in one direction, means for limiting axial movement of said shaft assembly in the opposite direction, said shaft assembly having radially directed openings therein for conveying oil from the interior of said shaft assembly to wearing surfaces of said unit, a washer closely but axially slidably received on said tube, and spring means constantly urging said washer against the corresponding end of said shaft assembly whereby to seal the space between said tube and said shaft assembly against undesirable leakage of oil therebetween.

8. In a motor compressor unit, in combination, a hollow casing providing a cylinder therein, a hollow shaft assembly rotatably mounted in said casing, an eccentric on said shaft assembly, a piston in said cylinder operatively connected to said eccentric, a pocket in said casing at one end thereof, means for supplying oil to said pocket during operation of said unit, a tube extending between said pocket and the interior of said shaft assembly whereby to convey oil from said pocket to the interior of said shaft assembly, a washer surrounding said tube in abutting relationship with respect to said shaft assembly, a second tube surrounding the first mentioned tube and terminating short of said washer whereby to cooperate with said washer in limiting axial movement of said shaft assembly in one direction, means cooperating with said shaft assembly to limit axial movement thereof in the opposite direction, and said shaft assembly having radially directed oil passages therein for conveying oil from the interior of said shaft assembly to wearing surfaces of said unit.

9. In a refrigerant compressor, a cylinder block having a flat head end and a refrigerant discharge passage opening on to said end, a cylinder head overlying said end and having a chamber therein opening onto said passage, that end of said passage opening onto said end being radially enlarged to form a seat, a hollow coil of wire wound with the turns thereof in substantial contact with each other positioned in said passage in generally spaced relation with respect to the walls thereof, one end of said coil being enlarged in diameter and being received in said seat and clamped therein by said cylinder head, and the opposite end of said coil being closed, said coil being formed of spring-like material whereby when the interior thereof is subjected to the discharge pressure of said compressor the turns thereof will separate axially from one another to permit the flow of refrigerant therethrough.

10. In a gas compressor of the type wherein a piston reciprocates in a cylinder and the cylinder is provided with a discharge passage having an associated valve permitting flow of gas from said cylinder therethrough only in a direction from said cylinder, the combination with said passage of means arranged in obstructing relation therein on the downstream side of said passage from said valve, said means being located at a sufficient distance from said valve as to provide a pulsation chamber of material volume in the fluid passage between it and said valve, and said means comprising a hollow coil of flexible wire wound with the coils thereof normally substantially in contact with one another and having one end thereof closed and the opposite end thereof sealed to the walls of said passage, said means being arranged to receive the flow

of gas from said compressor in the hollow interior thereof.

11. In a gas compressor of the type wherein a piston reciprocates in a cylinder and the cylinder is provided with a discharge passage having an associated valve permitting flow of gas from said cylinder therethrough only in a direction from said cylinder, the combination with said passage of means arranged in obstructing relation therein on the downstream side of said passage from said valve, said means being located at a sufficient distance from said valve as to provide a pulsation chamber of material volume in the fluid passage between it and said valve, and said means comprising a hollow coil of flexible wire arranged with its major portion in spaced relation with respect to the walls of said passage and the various turns thereof normally in substantial contact with one another, one end of said coil being closed and the opposite end of said coil being sealed to the walls of said passage, the latter end of said coil being disposed on the upstream side of the normal flow in said passage with respect to the closed end thereof.

12. In a gas compressor of the type wherein a piston reciprocates in a cylinder and the cylinder is provided with a discharge passage having an associated valve permitting flow of gas from said cylinder therethrough only in a direction from said cylinder, the combination with said passage of means arranged in obstructing relation therein on the downstream side of said passage from said valve, said means being located at a sufficient distance from said valve as to provide a pulsation chamber of material volume in the fluid passage between it and said valve, and said means comprising a hollow coil of wire arranged with its major portion in spaced relation with respect to the walls of said passage and the various turns thereof normally in substantial contact with one another, one end of said coil being closed and the opposite end of said coil being sealed to the walls of said passage, the latter end of said coil being disposed on the upstream side of the normal flow in said passage with respect to the closed end thereof, said wire being of a spring-like character and at least part of the turns thereof being adapted to separate from each other on the application of pressure internally of said coil whereby to permit the flow of gas therethrough.

13. In a gas compressor of the type wherein a piston reciprocates in a cylinder and the cylinder is provided with a discharge port having an associated valve permitting flow of gas from said cylinder therethrough in one direction only, the combination with said discharge port of a pair of associated members arranged to receive said gas discharged from said port past said valve, one of said members having a passage therein for the flow of said refrigerant and said passage being enlarged to provide a seat adjacent the line of junction of said members, a hollow coil of wire having the turns thereof in substantial contact with each other received within said passage, said coil being provided with a radial enlargement adjacent one end thereof received in said seat and clamped thereagainst by the other of said members when said members are secured together, the opposite end of said coil being closed, and said wire being of resilient characteristics whereby pressure on the interior of said coil materially in excess of that on the exterior thereof will effect elongation of said coil and separation of at least certain turns

thereof to permit the flow of refrigerant there-through.

14. In a gas compressor of the type wherein a piston reciprocates in a cylinder and the cylinder is provided with a discharge port having an associated valve permitting flow of gas from said cylinder therethrough in one direction only, the combination with said discharge port of a pair of associated members arranged to receive said gas discharged from said port past said valve, one of said members being provided with a passage therein and the other of said members overlying a face of the first mentioned member and arranged to deliver refrigerant to said passage, said passage being outwardly flared at that end

thereof closest to the second mentioned member, and a hollow coil of resilient wire disposed in said passage in generally spaced relation with respect to the walls thereof, said coil being wound with the various turns thereof in substantial contact with each other and the turns at one end thereof being enlarged to form a tapered end portion complementary in shape and size to said flared end of said passage and received therein, said tapered end being clamped against the walls of said flared end of said passage when said second mentioned member is secured to said first mentioned member, and the opposite end of said coil being closed.

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