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COMPRESSOR MANIFOLD SEAL

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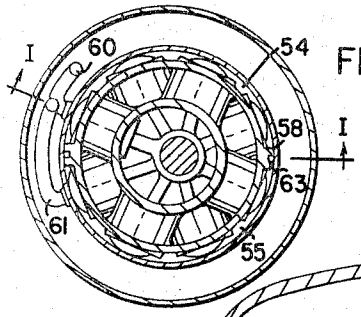


FIG. 2

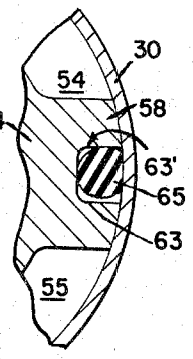


FIG. 3

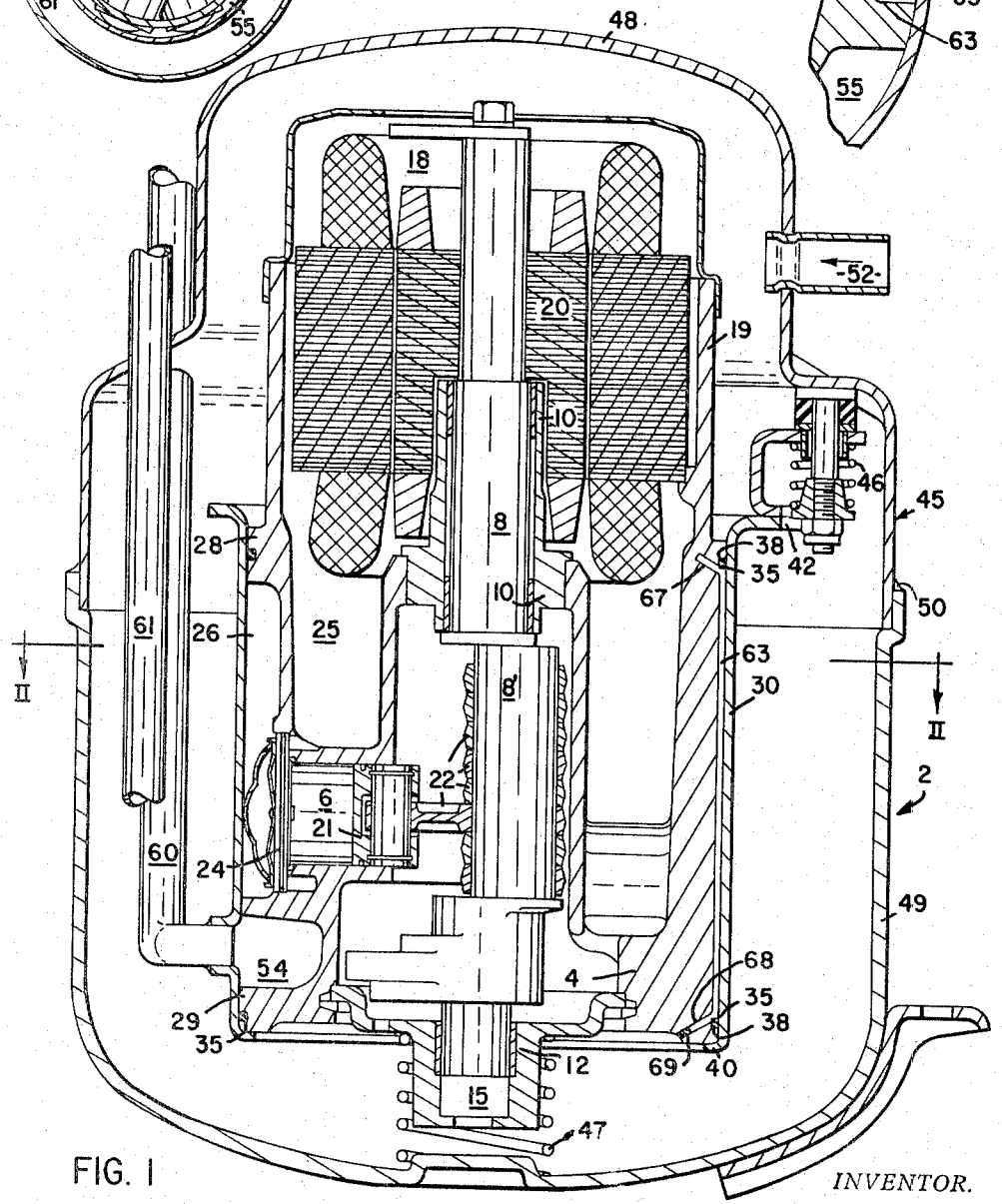


FIG. 1

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COMPRESSOR MANIFOLD SEAL

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This invention relates to hermetic motor compressors and, more particularly, to a manifold sealing arrangement for hermetic motor compressors.

In hermetic motor compressors the advantages realized, particularly in terms of economy and simplicity, in the use of a common discharge manifold render that construction highly desirable. However, in multi-cylinder versions of the compressor, it is often desired to operate the compressor at reduced capacity. A reduction in compressor capacity may be effected advantageously by interconnecting the discharge and suction sides of some of the compressor cylinders thereby neutralizing any compressive effect by those cylinders. Where the compressor has individual or paired discharge manifolds, this form of compressor reduction is readily applicable since the several discharge manifolds are each sealed from and independent of the other. Where the compressor uses a common discharge manifold, however, it is necessary that some arrangement be provided for sub-dividing the discharge manifold to permit a part of the discharge manifold to be connected with the suction side of the compressor without impairing effective operation of other cylinders operatively joined to the remaining part of the discharge manifold.

It is a principal object of the present invention to provide a new and improved hermetic motor compressor apparatus.

It is an object of the present invention to provide, in a hermetic motor compressor of the type having a common discharge manifold, an improved arrangement for isolating one part of the discharge manifold from another part of the manifold to enable the compressor to be unloaded.

It is an object of the present invention to provide a simple, economical and effective sealing arrangement for separating the discharge manifold of a hermetic motor compressor into plural sections to permit part capacity operation of the compressor.

This invention relates to a hermetic motor compressor apparatus comprising in combination a housing defining a generally cylindrical chamber; a compressor block telescopically received in the chamber, the block having first and second annular sides projecting therefrom engageable with the inner wall of the housing to define in cooperation therewith a substantially annular discharge manifold; the part of the block between the first and second projecting sides defining a plurality of radially oriented cylinders opening into the discharge manifold; a crankshaft rotatably journalled in the block; a piston slidably received in each cylinder operatively secured to the crankshaft; a suction manifold; valve means regulating communication of each cylinder with the suction manifold and the discharge manifold; and means for sub-dividing the discharge manifold into a first manifold section communicating with at least one of the cylinders and a second manifold section to permit the first manifold section to be connected with the suction manifold to thereby render the one cylinder ineffective including an outwardly projecting flange on the block on each side of the one cylinder engageable with the inner wall of the housing, the flanges extending between the first and second projecting sides, the outer surface of each flange having a shallow groove therewithin continuing from the first projecting side to the second projecting side, and a length of resilient seal in each

flange groove, the dimension of the seals being greater than the depth of the flange grooves so that the seals project into sealing engagement with the inner wall of the housing.

Other objects and advantages will be apparent from the ensuing description and drawings in which:

FIGURE 1 is a view partly in section along lines I—I of FIGURE 2 of the hermetic motor compressor apparatus of the present invention;

FIGURE 2 is a cross-sectional view taken along lines II—II of FIGURE 1; and

FIGURE 3 is an enlarged view showing the sealing arrangement of the present invention.

Referring to the drawings, a multi-cylinder hermetic type reciprocating compressor **2** is therein shown incorporating a common discharge manifold sub-divided into sections which enables one section of the discharge manifold to be connected with the suction manifold to render the cylinders associated with that manifold section ineffective without impairing operation of the other compressor cylinders. Compressor **2** has an open ended block **4** with plural cylinders **6** emanating radially therefrom. Crankshaft **8** is rotatably journalled in upper and lower bearing members **10**, **12**, fixedly supported on block **4**. Crankshaft **8** is drivingly connected to a suitable oil pump **15** housed within lower bearing member **12**.

Drive motor **18**, fastened within the upper end **19** of compressor block **4**, has rotor **20** thereof drivingly secured to crankshaft **8**. A piston **21** is movably disposed within each cylinder **6**. Each piston **21** is operatively secured to eccentric portion **8'** of crankshaft **8** by a connecting rod **22**. A suitable suction and discharge valve mechanism **24** operatively communicates each cylinder **6** with suction and discharge manifolds **25**, **26**, respectively.

Compressor block **4** has outwardly projecting annular flanges **28**, **29** adapted to abut the inside wall of cylindrical inner shell **30**. The dimension of flanges **28**, **29** is preferably slightly less than the inside dimension of inner shell **30**. Cylinder block **4**, including flanges **28**, **29** thereof and inner shell **30**, cooperate to delimit the generally annular discharge manifold **26**. Recess or groove **35** in flanges **28**, **29** has O-ring seal **38** therewithin.

The base of inner shell **30** is formed inwardly at **40** to support compressor block **4** therewithin. The top of shell **30** is flanged outwardly at **42**. Springs **46** fasten inner shell **30** and compressor block **4** to outer shell **45** while spring **47** centrally supports block **4** through lower bearing member **12**. Outer shell **45** may be comprised of generally cylindrical upper and lower parts **48**, **49**, respectively, which are sealed together at **50**.

Opening **52** in outer shell **45** communicates compressor **2** with a suitable source of suction gas. Suction gas entering opening **52** flows through motor **18** to cool motor **18** and into suction manifold **25**.

Dishcharge manifold **26** is, in the exemplary showing, divided into two sections **54**, **55** by flanges **58**. Flanges **58**, projecting outwardly from cylinder block **4** and extending from one annular flange **28** to the other flange **29**, are adapted to abut the inside wall of inner shell **30**. Flanges **58** are configured to pass between selected compressor cylinders. In the exemplary compressor construction, flanges **58** are substantially vertical separating one-half of the cylinders **6** from the remaining half. Discharge conduits **60**, **61** are connected to manifold sections **54**, **55**, respectively.

The outer faces of flanges **58** are grooved at **63**. A cord-like seal **65** is disposed in each groove **63**, a portion of the seal projecting therefrom. Seals **65** are comprised of a suitable elastomeric material having a high degree of resiliency, such as neoprene.

For assembly of compressor **2**, a length of seal **65** is

disposed in each flange groove **63** with the upper end thereof inserted within recess **67** in compressor block **4**. The other end of seal **65** extends through passage **68** in block **4** and is held against movement by suitable means (not shown). Recess **67** and passage **68** have a dimension slightly greater than that of seal **65** to permit movement of seal **65** therewithin. The depth of recess **67** is sufficient to accommodate an added length of seal **65**.

As compressor block **4** is moved downwardly within shell **30**, seals **65** are progressively trapped between block **4** and shell **30** within grooves **63**. If the relative movement between shell **30** and block **4** stretches seals **65** the added seal length enters recess **67**. When compressor block **4** is fully positioned within inner shell **30**, that portion of seals **65** protruding from passages **68** is released permitting each seal **65**, if stretched, to return to normal length and fill flange grooves **63**. The excess seal length projecting from passages **68** is cut off and pin-like closures **69** forced into passages **68**. Closures **69** drive seals **65** further into passages **68** and grooves **63** while preventing escape of high pressure discharge gas through passages **68** into the compressor crankcase.

The contact of seals **65** with the inside wall of shell **30** seals discharge manifold section **54** from manifold section **55**. Preferably, both the inside wall of shell **30** and flange grooves **63** are coated with a suitable lubricant to facilitate assembly.

Where compressor **2** is operated at part capacity, one discharge manifold section, for example section **54**, is connected by a suitable means (not shown) with suction manifold **25** to unload those compressor cylinders associated with manifold section **54**. The pressure in discharge manifold section **54** accordingly drops. Flange and seal assembly **58**, **65** acts to isolate manifold section **55** from manifold section **54** thereby preventing dissipation of the discharge pressures obtained in manifold section **55**. The pressure differential between discharge manifold sections **54**, **55** resulting from the connection of manifold section **54** with the suction manifold **25** tends to force seals **65** into tight abutment with the inside face of shell **30** and that side **63'** of groove **63** adjacent discharge manifold section **54**.

While I have described a preferred embodiment of this invention, it will be understood that the invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In a hermetic motor compressor apparatus, the combination of a housing defining a generally cylindrical chamber; a compressor block telescopically received in said chamber, said block having first and second annular sides projecting therefrom engageable with the inner wall of said housing to define in cooperation therewith a substantially annular discharge manifold; the part of said block between said first and second projecting sides defining a plurality of radially oriented cylinders opening into said discharge manifold; a crankshaft rotatably journalled in said block; a piston slidably received in each cylinder operatively secured to said crankshaft; a suction manifold; valve means regulating communication of each cylinder with said suction manifold and said discharge manifold; and means for sub-dividing said discharge manifold into a first manifold section communicating with at least one of said cylinders and a second manifold section to permit said first manifold section to be connected with said suction manifold to thereby render said one cylinder ineffective including, an outwardly projecting flange on said block on each side of said one cylinder engageable with the inner wall of said housing, said flanges extending between said first and second projecting sides, the outer surface of each flange having a shallow groove therewithin continuing from said first projecting side to said second projecting side, and a length of resilient seal in each flange groove, the dimension of said seals being greater than the depth of said flange grooves so that said seals project into sealing engagement with the inner wall of said housing.

2. A hermetic motor compressor apparatus according to claim **1** in which said seal is formed from neoprene.

3. A hermetic motor compressor apparatus according to claim **1** including a stop surface adjacent one end of said housing cooperable with said block first side to limit telescopic movement of said block into said chamber, and a receptacle communicating with the end of each flange groove adjacent said block second side, said receptacle being sized to accommodate any increased length in said seals upon movement of said block into said chamber.

4. A hermetic motor compressor apparatus according to claim **3** including a passage opening into the other end of each flange groove for supplying additional seal length to said flange grooves following insertion of said block into said chamber to permit said seals to assume normal length, and plug means for sealingly closing said passages.

References Cited by the Examiner

UNITED STATES PATENTS

3,008,628	11/1961	Gerteis et al.	230—58
3,229,901	1/1966	Parker	230—206

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