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Allen

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[54] **SELF ADJUSTING TANGENCY-CLEARANCE COMPRESSOR WITH LIQUID PURGE CAPABILITY**

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[73] Assignee: **TRW Inc.,** Cleveland, Ohio

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[52] U.S. Cl. **417/283,** 417/310, 418/97, 418/107, 418/1

[51] **Int. Cl.... F01c 19/00,** F01c 21/04, F04b 49/00

[58] **Field of Search** 418/107, 30, 97, 98, 99; 417/283, 310

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Assistant Examiner—Richard E. Gluck
Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

A vane-type compressor especially adapted for compressing refrigerant in air-conditioning systems has a vane carrying rotor mounted on fixed center bearings and surrounded by an eccentrically positioned cylinder guiding the vane motion and confining and controlling the compression process which is free to swing toward the rotor and maintain a line of tangency contact therewith providing a direct barrier between the discharge and suction sides of the compression chamber. A spring loaded end plate pressed against one end of the cylinder serves as a relief valve to purge liquid such as lubricant which might collect in the compression cavities during a shut-down period and which could otherwise create a lock-up condition. A fixed front bearing plate or end head has a cup-shaped housing piloted thereon surrounding the cylinder and providing a rear bearing mounting for the rotor. The front plate has an inlet port supplying the compression cavities between the rotor and cylinder. The cylinder has an outlet adjacent the tangency seal line of contact between the rotor and cylinder which discharges to a chamber between the housing and cylinder that is surrounded by porous fibrous strips effective to separate lubricant entrained in the compressed refrigerant. The refrigerant is discharged to an outlet port in the front bearing plate and the separated lubricant collects in the bottom of the housing and is circulated back to the bearings and vane slots of the rotor.

26 Claims, 10 Drawing Figures

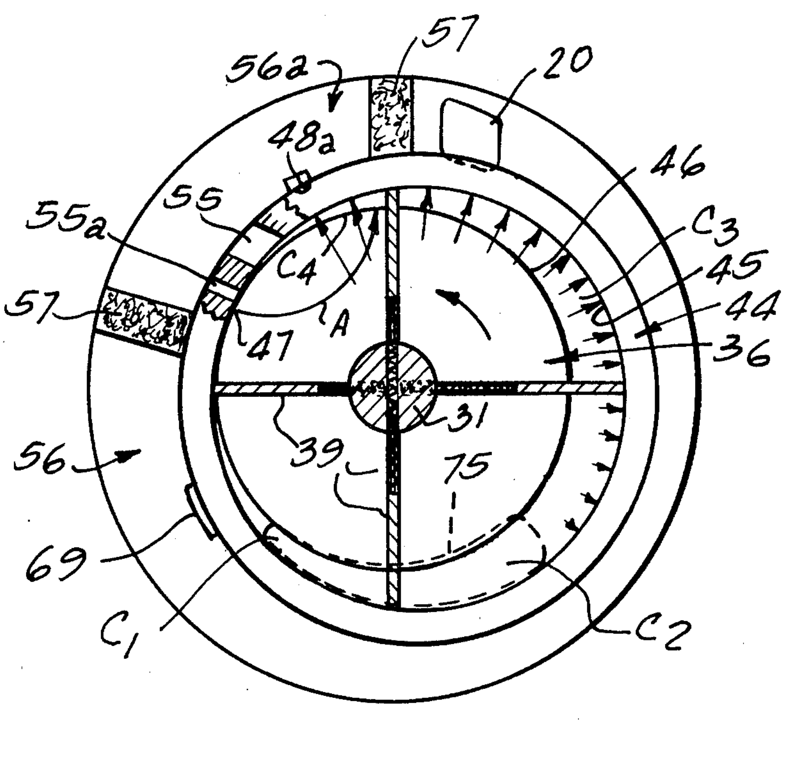
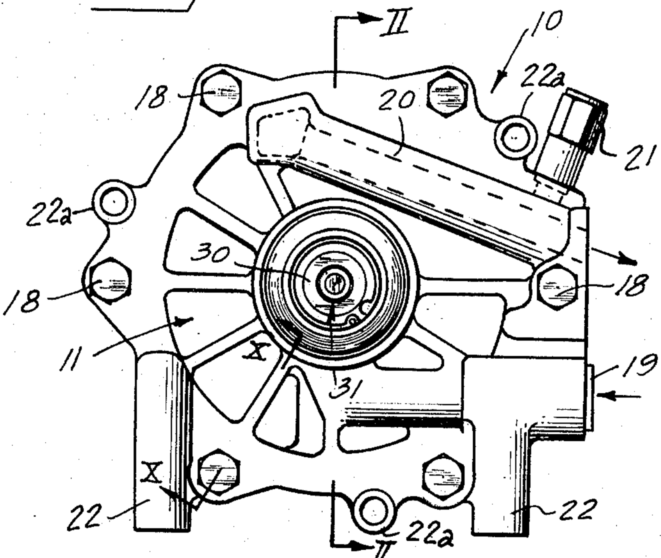


Fig. 1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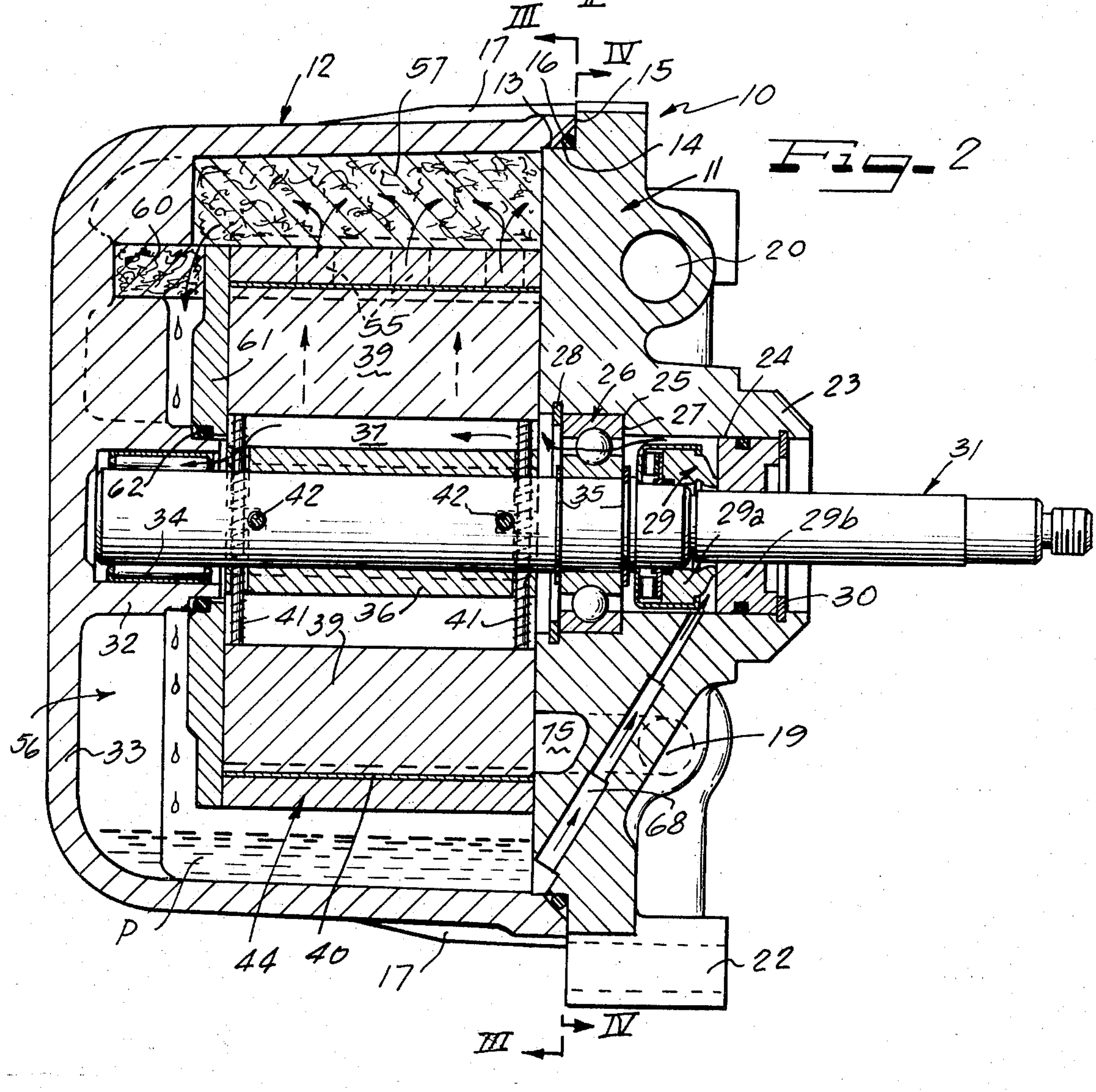
III
17
IV
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57
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60
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61
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62
42
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29
29a
29b
34
41
39
36
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32
56
P
33
75
19
68
P
44
40
17
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IV
III

Fig. 2

Fig. 3

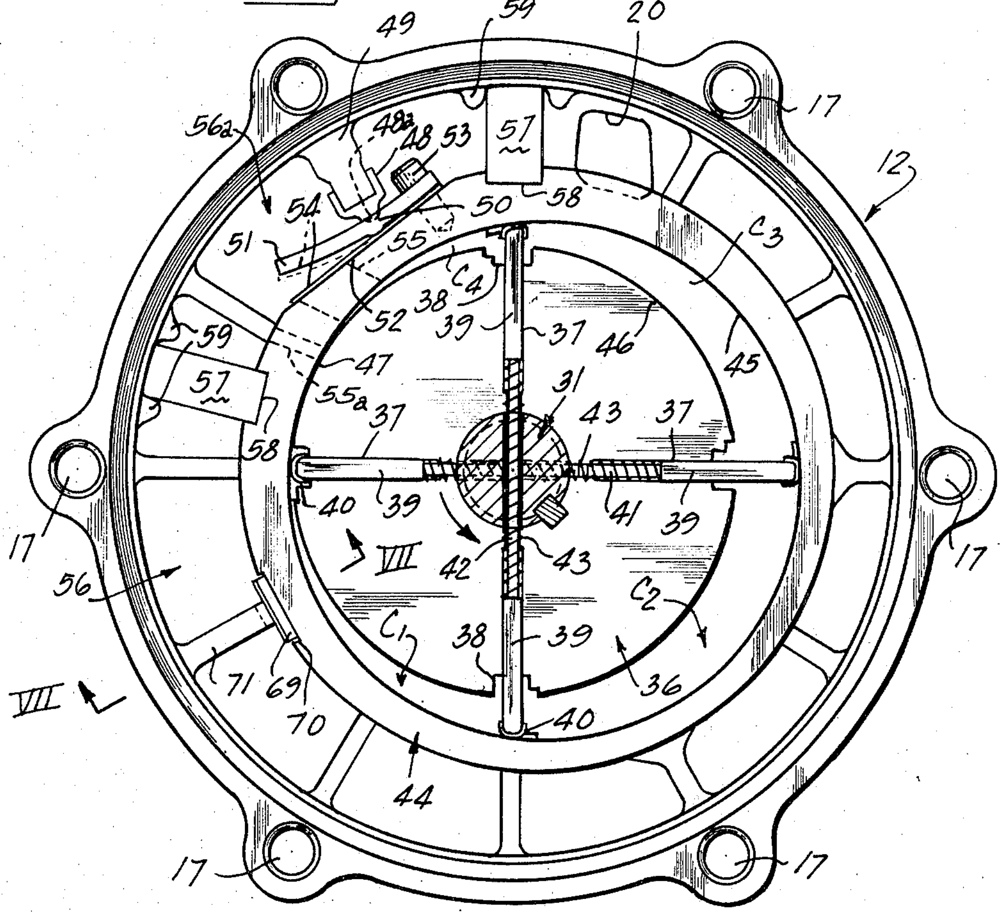


Fig. 8

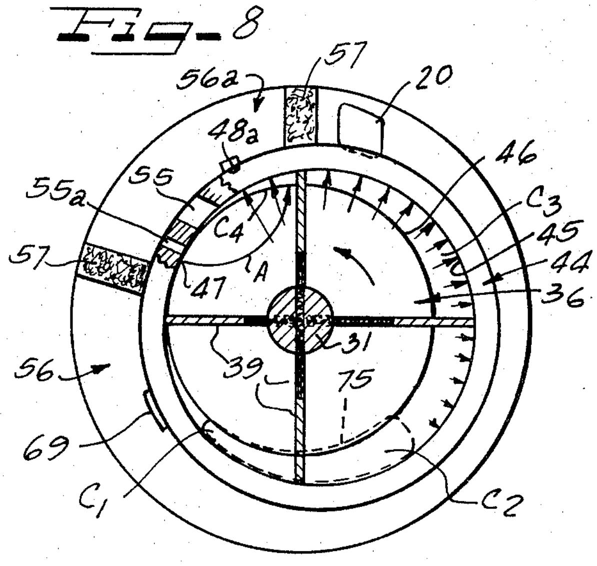


Fig. 7

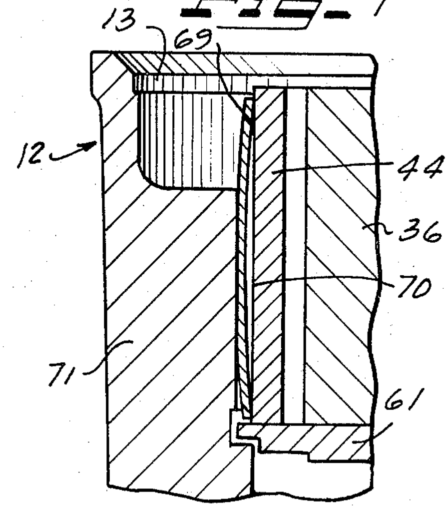


Fig. 5

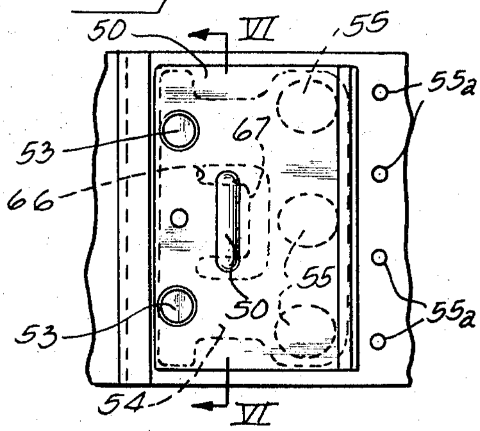


Fig. 6

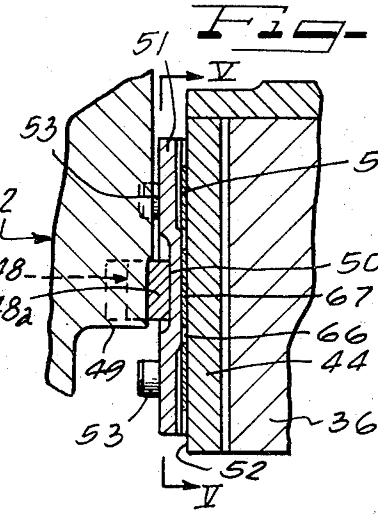


Fig. 4

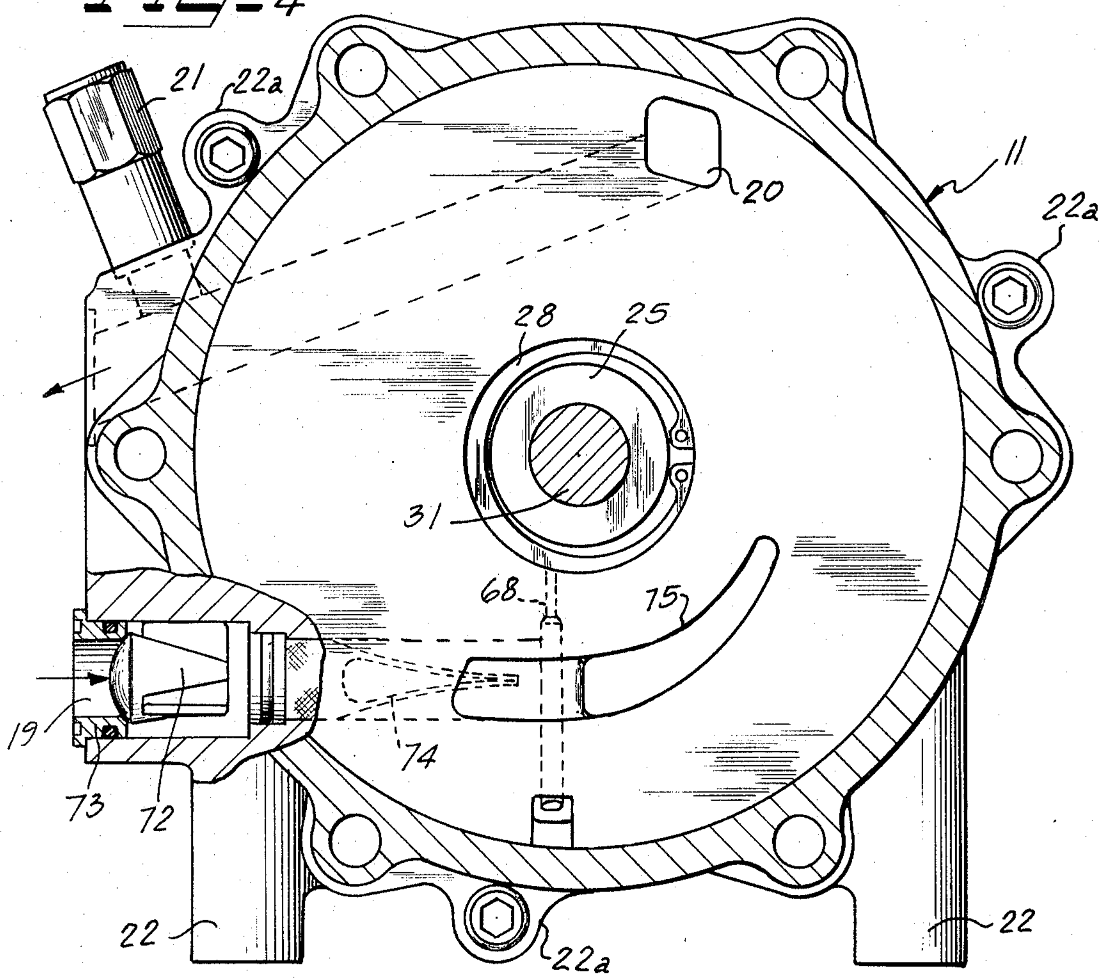
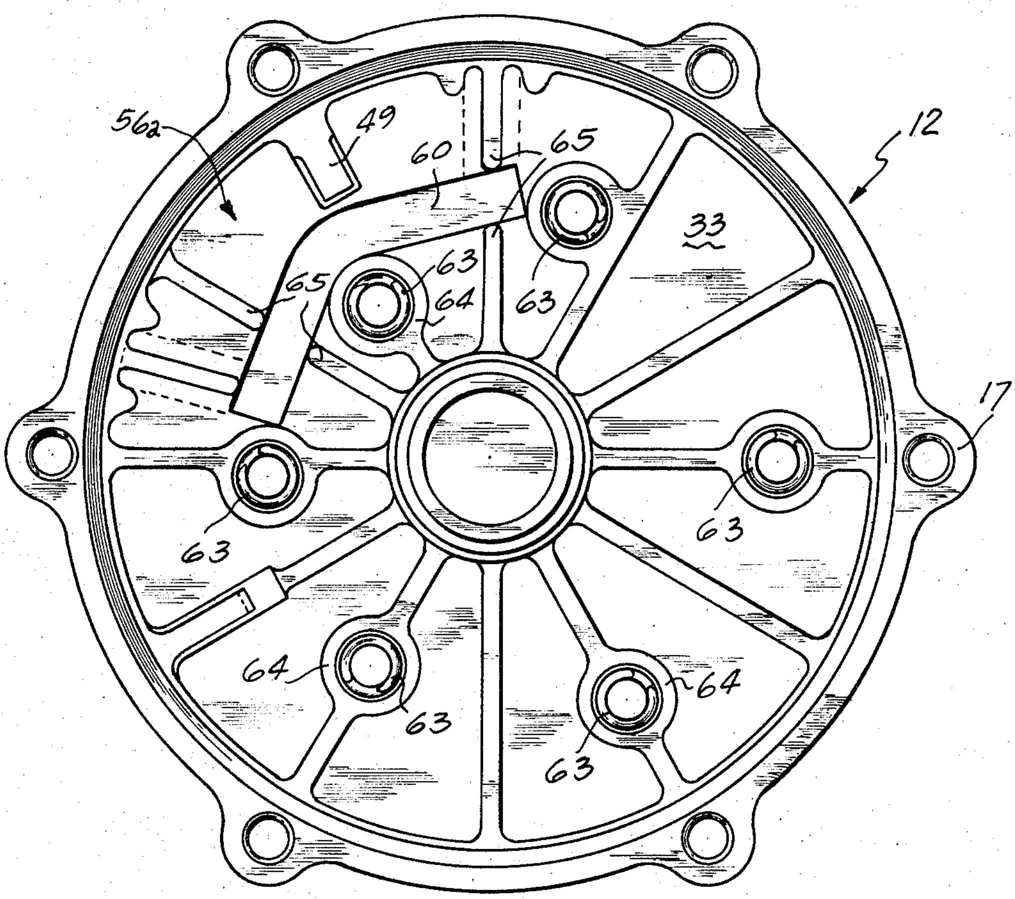


Fig. 9


56a
49
60
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64
63
17
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63
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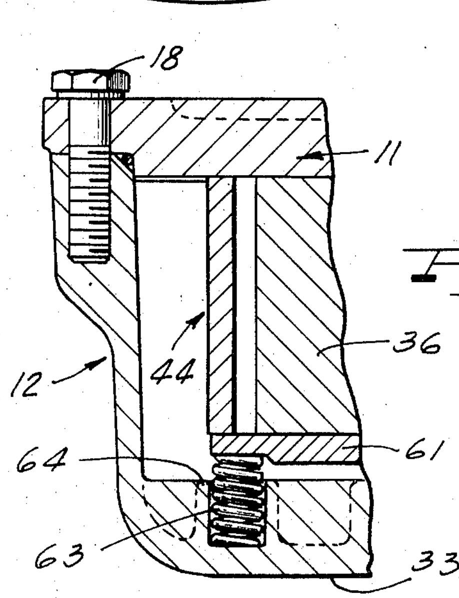
64
63


18
11
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44
36
61
64
63
33

Fig. 10

SELF ADJUSTING TANGENCY-CLEARANCE COMPRESSOR WITH LIQUID PURGE CAPABILITY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the art of tangency sealed vane-type compressors and particularly deals with a compressor having a free swinging cylinder contacting the rotor along a line of tangency between the high pressure and low pressure compressor cavities with a sealing force established by the pressures in the cavities and having wick means separating liquid from compressed gases together with relief means preventing liquid lock-up of the rotor.

2. Prior Art

The volumetric efficiency of vane-type compressors is dependent upon close clearances between the internal components to minimize leakage between high pressure and low pressure cavities and a particular critical leakage path is across the line of contact between the rotor and cylinder commonly referred to as the line of tangency. Since this line is a direct barrier between the discharge and suction pressures of the compressor, any leakage across the line involves a loss of compression work done on the leakage volume. In spite of the best efforts in assembling prior art compressors to set the tangency line clearance as close to zero as possible, these clearances tend to get larger in actual service due to operating factors such as differential thermal expansion, pressure loading on the rotor and cylinder tending to drive them apart, hydrodynamic lubricating oil forces and wear and bearing clearances.

One of the disadvantages of the use of tangency seals to control tangency line leakage is inherent in the necessity for said seals to maintain sealing contact with the surface of the rotor while simultaneously permitting the uninhibited movements of the vanes past the tangency line. Such a seal is difficult to design and construct, is subject to fatigue and to the likelihood of mechanical interference with the vane movement.

In my prior U. S. Pat. No. 3,729,277 issued Apr. 24, 1973, there is disclosed and claimed a tangency sealed vane compressor which avoided many of the deficiencies of the earlier prior art. In this patented compressor, the cylindrical compression chamber defining member was pivoted so that upon assembly it could be swung into a tangency seal line of contact with the rotor and then be locked in this sealing position. In this construction the rotor and cylinder components together with a rear bearing plate were stacked on the front bearing plate or main end head of the compressor and the stacked assembly was mounted to this end head by draw bolts which did not provide a positive alignment of the rotor shaft bearings nor could it accommodate relief of liquid which might collect in the compression cavities during periods of non-use and might tend to lock up the rotor especially on rapid starts. Further, any wear at the initially created tangency line of contact between the rotor was not automatically taken up nor was the sealing load dependent upon the pressures in the pressure cavities. In addition, pivoting of the cylinder on the pins extended into the end faces of the cylinder required accurate centering of holes for the pins.

SUMMARY OF THIS INVENTION

According to this invention the above-mentioned deficiencies of the prior art are eliminated by piloting the rear bearing support for the rotor shaft on the front main bearing plate or end head to insure accurate alignment of the front and rear shaft bearings, by pivoting the cylinder on its outer periphery midway between its end faces, by allowing the cylinder to swing on its pivot during operation of the compressor so that the tangency seal load will be controlled by the pressures in the high-pressure cavities of the compressor and by providing a retractable end plate for the rotor and cylinder which will release liquid from the compressor cavities to prevent lock-up upon starting. In addition, the invention provides wick means for separating lubricant which might be entrained with compressed refrigerant enroute to the outlet port. The separated lubricant is collected in a sump provided in the bottom of the compressor housing and is recirculated back to the bearings and vane slots to lubricate the bearings and vanes.

The pivot for the cylinder is a shoe carried by the housing. A spring also carried by the housing urges the cylinder to rotate about its pivot into contact with the rotor to maintain a minimum load tangency seal which, of course, is additionally loaded by the pressures in the compression cavities. This arrangement eliminates the heretofore required accurate positioning of pivot pins and prevents binding of the swinging of the cylinder.

The cylinder is surrounded in spaced relation by a cup-shaped housing piloted on the end head or front bearing plate of the compressor and has outlet holes in the top thereof immediately ahead of the tangency line of contact with the rotor which discharge the compressed refrigerant into a localized compartment between the cylinder and housing bounded by fibrous strips. The refrigerant passes through these strips to an outlet port in the front bearing plate or main end head of the compressor. Any lubricant entrapped with the compressed refrigerant is wicked from the refrigerant by the fibrous strip material and accumulates to drip down to a collection sump in the bottom of the housing. A passageway in the end head conveys the collected lubricant from the sump through the shaft bearings and center of the rotor for lubricating the bearings and the vanes.

While this invention is specifically described as embodied in a vane-type refrigerant compressor especially adapted for air-conditioning systems, it should be understood that the principles of this invention are applicable to any tangency seal-type of pump or compressor and that the rotor instead of carrying vanes could carry slippers, rollers or the like finger members riding on the cylinder to create the isolated cavities between the eccentrically related outer periphery of the rotor and inner periphery of the cylinder. Therefore, the term, "vane-type compressors," as used herein will serve to encompass pumps, motors, and compressors having eccentrically related rotors and encompassing chamber defining members on which fingers projecting from the rotor will ride and wherein the rotor has a tangency seal relationship with the encompassing member between the high pressure and low pressure sides of the device.

It is then an object of this invention to enhance the volumetric efficiency of tangency seal-type rotary pumps, motors and compressors by providing a free swinging rotor housing maintaining the tangency seal.

Another object of the invention is to provide a self-liquid purging gas or vapor compressor.

Another object of the invention is to provide a vapor or gas compressor separating liquid from the compressed gas or vapor and utilizing the liquid to lubricate the compressor parts.

Another object of this invention is to provide a rotary vane compressor with a free swinging rotor encompassing cylinder which guides the vanes and establishes a tangency seal between the high and low pressure sides of the compressor at a sealing load created by the pressures in the compressor cavities.

Another object of the invention is to provide a rotary vane compressor with a swinging rotor encompassing cylinder on which the vanes ride which is spring-loaded into sealed contact with the rotor along a line of tangency between the high pressure and low pressure compressor cavities.

A further object of the invention is to provide a rotary vane compressor with a housing cylinder pivoted on an external shoe and swung into a tangency sealing line of contact with the rotor under the influence of pressures in the compressor cavities between the rotor and cylinder.

A further object of the invention is to provide a rotary vane compressor with a rotor mounted on fixed center bearings, a cylinder surrounding the rotor in eccentric relation, a housing surrounding the cylinder in spaced relation and a pivot shoe carried by the housing allowing the cylinder to swing for establishing and maintaining a tangency seal line of contact with the rotor between the high pressure and low pressure sides of the compressor.

A still further object of the invention is to provide a refrigerant compressor especially suited for air-conditioning systems having a front bearing carrying end head, a bearing carrying cup housing piloted on the end head, a vane carrying rotor mounted on a shaft supported in bearings carried by the end head and cup housing, a cylinder in the housing surrounding the rotor and guiding the rotor vanes, a pivot shoe carried by the housing cooperating with the periphery of the cylinder, a spring swinging the cylinder about the pivot shoe into sealed contact with the rotor, a spring loaded end plate in the housing pressed against an end face of the cylinder and adapted to be deflected therefrom and means between the housing and cylinder for separating lubricant from refrigerant compressed by the rotor and vane.

Other and further objects of this invention will become apparent to those skilled in this art from the following detailed description of the annexed sheets of drawings which by way of a preferred example illustrate one embodiment of the invention.

IN THE DRAWINGS

FIG. **1** is a front end elevational view of a rotary vane compressor of this invention;

FIG. **2** is a longitudinal, cross sectional view taken along the line II—II of FIG. **1**;

FIG. **3** is a transverse cross sectional view taken along the line III—III of FIG. **2**;

FIG. **4** is a transverse, cross sectional view taken along the line IV—IV of FIG. **4**;

FIG. **5** is a fragmentary plan view along the line V—V of FIG. **6**;

FIG. **6** is a cross sectional view along the line VI—VI of FIG. **5**;

FIG. **7** is a transverse, cross sectional view along the line VII—VII of FIG. **3**;

FIG. **8** is a somewhat diagrammatic view similar to FIG. **3** showing the forces for swinging the cylinder into tangency sealed relation with the rotor;

FIG. **9** is a view similar to FIG. **3** but with the internal parts omitted to show the back wall of the cup-shaped housing; and

FIG. **10** is a cross sectional view along the line X—X of FIG. **1**.

As shown in FIGS. **1** and **2**, the compressor **10** has a front bearing plate or main end head **11**, a cup-shaped housing **12** with a cylindrical mouth **13** seated on a cylindrical pilot portion **14** of the end head **11** and bottomed against an end shoulder **15** of the end head. An O-ring seal **16** is confined between the mouth **13**, the pilot **14** and the end face **15**. The cup housing **12** has internally threaded boss portions **17** spaced around its periphery as shown in FIGS. **2** and **3** opening to the shoulder **15** of the end head **11** and bolts **18** having heads bottomed on the outer face of the end head **11** are threaded into these bosses to unite the end head **11** and cup **12** in integral, fixed, sealed relationship.

The end head **11** as shown in FIGS. **1, 2,** and **4** has an inlet port **19** and an outlet port **20**. A relief valve **21** communicates with the port passageway **20** to relieve excess pressures which might damage the system supplied by the compressor. The end head also has legs **22** and bosses **22*a*** to mount the compressor in a refrigerant system such as an automobile air-conditioning system assembly.

A hub **23** at the center of the end head **11**, as shown in FIG. **2**, has a cylindrical bore **24** therethrough with an enlarged counterbore **25** at the inner end thereof. This counterbore mounts a ball bearing assembly **26** which is held against the shoulder **27** between the counterbore **25** and bore **24** by a snap ring **28**.

A shaft seal assembly **29** is mounted in the bore **24** including a shaft mounted spring loaded face ring part **29*a*** and a hub mounted fixed mating ring part **29*b*** held in the bore **24** by a snap retaining ring **30**.

A rotor shaft **31** projects through the hub **23** of the end head **11** into a cylindrical hub **32** projecting from the rear end **33** of the cup-shaped housing **12** toward the end head **11**. Roller or needle bearings **34** support this end of the shaft **31** in the hub **32** of the housing **12**.

The shaft **31** has retainer rings **35** projecting from grooves therein into abutting relation with both end faces of the inner race ring of the ball bearing assembly **26**, thereby holding the shaft against axial shifting relative to the hubs **23** and **32**.

It will therefore be understood that the shaft **31** is rotatably mounted on bearing supports provided by the end head **11** and the housing **12** which is accurately piloted on this end head so that true alignment of the bearing supports is established and maintained.

The rotor **36** for the compressor **10** is mounted on the rotor shaft **31** for corotation therewith. The rotor **36** has four radial slots **37** in equally spaced circumferential relation extending inwardly from pockets **38** in the periphery of the rotor as shown in FIG. **3** for a depth to accommodate the height of vanes **39** slidably mounted therein when shoes **40** on the ends of the vanes are retracted into the pockets. Two pairs of pins **41** and **42** extend through holes through the shaft and inner portion of the rotor into the slots **37** and receive coil springs **43** therearound acting on the inner ends of the vanes **39** to urge them outwardly from the bottoms of the slots. Thus, one pair of pins **41** with the springs **43** therearound act on one pair of diametrically opposite vanes **39** while the other pair of pins **42** and their springs **43**, offset from the pins **41**, act on the other pair of diametrically opposite vanes **39**.

A cylinder **44** as shown in FIGS. **2** and **3** is mounted in the housing **12** and envelops the rotor **36**. This cylinder has an inner peripheral wall **45** eccentrically related to the periphery **46** of the rotor **36** and spaced therefrom except at a single line of contact **47** at the point of tangency between the cylinder and rotor to establish a tangency seal between the low and high pressure sides of the compressor. The vanes **39** projecting from the rotor to have their slippers or pivot ends **40** riding on the inner wall **45** of the cylinder **44** divide the space between the wall **45** of the cylinder **44** and the periphery **46** of the rotor **36** into cavities receiving refrigerant from the inlet port **19** and discharging compressed refrigerant to the outlet port **20** as will be more fully hereinafter explained.

The cylinder **44** is pivoted in the housing **12** on a shoe **48** carried by a rib **49** of the housing **12** which projects inwardly from the periphery of the housing in circumferentially spaced relation upstream from the tangency seal line **47**. The shoe **48** has a nose **48***a* seated in a groove or recess **50** of a pivot plate **51** which is bolted to a flat peripheral portion **52** of the cylinder **44** by means of bolts **53**. The rib **49** carrying the shoe **48** and the recess **50** receiving the nose **48***a* of the shoe must be located within relatively broad limits at a point on the circumference of the cylinder **44** where the resultant couple due to pressures in the cylinder tends to pivot the cylinder in a direction tending to eliminate clearance at the line of tangency between the cylinder and rotor **36**. However, in manufacture, tolerances relative to locations of the pivot are not critical.

A reed valve **54** composed of a thin metal plate is clamped under the plate **51** by the bolts **53** and as shown in FIG. **3** the plate **51** is bowed outwardly from the flat surface **52** of the cylinder **44** at its unbolted or free end so that the reed valve **54** may be deflected outwardly from its seat on this flat area **52**.

The cylinder **44** has a row of outlet ports **55** therethrough underlying the free end of the reed valve **54** and positioned just upstream or ahead of the tangency seal line **47** of the cylinder **44** with the rotor **36**. The compressed refrigerant is discharged through these ports **55** and raises the reed valve **54** to flow into a localized chamber **56***a* separated from the main annular space **56** between the housing **12** and cylinder **44** by fibrous side strips **57** extending from the end head **11** to the back wall **33** of the housing **12**. The inner ends of these strips **57** are seated in grooves **58** and the outer ends of these strips fit between ribs **59** on the inner periphery of the housing **12** as shown in FIG. **3**. The rear end of this localized chamber **56***a* is bounded by a third fibrous strip **60** which, as shown in FIG. **2**, spans the gap between the back wall **33** of the housing **12** and an end plate **61** which is bottomed on the end face of the cylinder **44** to define with the cylinder and end head **11**, the working chamber of the compressor. The plate **61** is pivotally seated on the hub **32** of the end wall **33** of the housing **12** and an o-ring seal **62** seals the inner periphery of the plate to the hub but accommodates tilting and sliding of the plate on the hub.

As shown in FIGS. **9** and **10**, the plate **61** is spring pressed against the end of the cylinder **44** by a plurality of coil springs **63** seated in pockets defined by ribs **64** projecting from the end wall **33** of the housing **12**. The strip **60** is bent over one of these pocket-defining ribs **64** as shown in FIG. **9** and has its end legs seated between opposed ribs **65**. The strip **60** is sufficiently resilient so that the plate **61** may tilt or slide away from the cylinder **44** to provide its relief function as more fully hereinafter described.

To facilitate opening of the reed valve **54** by the compressed refrigerant from the ports **55**, the valve plate **54**, as shown in FIGS. **5** and **6**, has a U-shaped slot **66** isolating a tongue **69** which underlies the embossment forming the groove **50** in the pivot plate **51** that receives the nose **48***a* of the shoe **48**. In this manner, the free end of the reed valve **54** can flex without interference from the embossed portion of the overlying plate.

The compressed refrigerant in the localized chamber **56***a* flows through the strips **57** and **60** into the main space or chamber **56** where it is effective to cooperate with the springs **63** in holding the plate **61** against the cylinder **44**. The strips are composed of a fibrous material which will coalesce or wick out the lubricant entrained in the compressed refrigerant. Such materials are optically opaque, synthetic fibers and are known in the trade as synthetic felt composed of nylon, "Dacron" (trademark) and the like. The felt is porous and is wet by the oil lubricant thereby acting as a demister. The material must be capable of withstanding high temperatures in the order of 400°F.

To prevent liquid, such as oil, in the system from building up to form a liquid wedge tending to open up the tangency seal **47**, the cylinder **44** has a plurality of bleeder holes **55***a* therethrough downstream from the port holes **55** and just ahead of the tangency seal line as shown in FIGS. **3**, **5**, and **8**. These bleeder holes vent to the chamber **56***a* any oil trapped at the tangency line.

The compressed refrigerant free of lubricant in the chamber **56** flows to the outlet port **20** in the end **11** from which it is discharged.

The wicked-out oil drips from the fibrous strips **57** and **60** to the bottom of the housing **12** where, as shown in FIG. **2**, it collects in a pond P which is exposed to the pressure of the compressed refrigerant in the chamber **56**. The end head **11** is drilled to provide a passageway **68** joining the pond P with the hub **23** behind the seal ring **29***b* so that oil backed by pressure in the chamber **56** flows from the pond into the hub to lubricate the shaft seal **29** and the bearing **26**. From the bearing **26** the pressured oil flows through the vane slots **37** of the rotor to lubricate the vanes **39** and cylinder wall **45** and also flows into the hub **32** to lubricate the rear bearing **34**. Thus the oil is returned to the cavities between the rotor and cylinder, and the moving parts of the compressor are amply lubricated from oil that is separated from the compressed refrigerant and returned to the refrigerant being compressed.

In the event the compression cavities between the rotor and cylinder become flooded with oil during periods of non-use of the compressor, lock-up of the rotor during rapid start-ups by this oil is prevented because liquid in the compressor cavities between the rotor and cylinder wall, when pumped by the vanes **39**, will unseat the plate **61** from the end face of the cylinder allowing this liquid to escape to the pond P. The spring load on the plate **60** is calibrated so that the plate will unseat at pressures in the compression cavities which are below pressures that might damage the vanes and other components of the compressor.

In order to maintain a minimum sealing load at the tangency seal line **47**, a helper spring **69** shown in FIGS. **3** and **7** is provided to rock the cylinder **44** about the pivot nose **48***a* so as to place a minimum load at the tangency seal line **47.** The spring **69** is in the form of a finger or leaf seated in a recess **70** in the outer face of the cylinder **44** and bottomed on a rib **71** of the housing **12.** As shown in FIG. **7**, the spring **69** extends from the end plate **61** to the mouth **13** of the housing **12.** The spring is positioned in spaced relation downstream from the tangency seal line **47** and since the pivot nose **49** is upstream from this tangency seal line **47,** the spring will rock the cylinder **44** into contact with the rotor **36** at the tangency line **47.**

As shown in FIG. **4,** the refrigerant to be compressed enters the inlet port **19** and in operation of the compressor a suction stop valve **72** in the inlet port is unseated from its seat **73** to allow the refrigerant to flow through a screen **74** to an inlet port **75** on the inner face of the end head **11.** This port **75** feeds the expanding cavities C_1 and C_2 between the rotor **36** and cylinder **44** thereby drawing the refrigerant into the suction side of the compressor. The valve **72** will not open unless the pressure in the cavities C_1 and C_2 is less than the pressure of the refrigerant being fed to the compressor. Thus, the valve is effective to close for maintaining a negative pressure in the expanding cavities C_1 and C_2.

The refrigerant is then compressed in the contracting cavities C_3 and C_4 to be discharged through the port holes **55** unseating the reed valve **54** and enters the fibrous strip bounded chamber **56***a*. As explained above, the compressed refrigerant is then freed of its oil as it passes through the fibrous strips **57** and **60** into the main chamber **56** and is then discharged through the port **20** in the end head **11.**

As illustrated in FIG. **8**, the pressures designated by the arrows in the contracting cavities C_3 and C_4 act on the cylinder **44** causing it to swing about the pivot nose **48***a* in the direction shown by the arrow A. This swinging of the cylinder **44** will press it against the rotor **36** at the tangency seal line **47,** thereby increasing the seal load as the pressures in the contracting cavities C_3 and C_4 increase. Since the helper spring **69** only maintains a very light sealing load at the tangency seal line **47** and since the pressure developed by the operating compressor increases this load as needed to maintain a seal between the inlet and outlet sides of the compressor, operating friction of the compressor is minimized without loss of sealing capacity.

From the above descriptions it should, therefore, be understood that this invention provides a tangency seal rotary fluid pressure apparatus such as a pump, a motor or a compressor which develops its own tangency seal pressure in operation, purges itself of liquid that might cause a lock-up on rapid starting, separates liquid from compressed vapor or gas or lubricates the bearings and other components thereof with the separated liquid. The preferred embodiment of the invention is a rotary sliding vane refrigerant compressor for automotive air-conditioning systems which has a free swinging eccentric cylinder guiding the vanes and loaded against the vane carrying rotor at a line of tangency by pressure of the refrigerant being compressed.

I claim as my invention:

1. In a tangency seal fluid pressure device of the type having a housing with a fluid inlet and outlet, a rotor rotatably mounted in the housing and means projecting from the rotor acting on fluid between the inlet and outlet, the improvement of a free swinging member in said housing eccentrically enveloping said rotor, guiding said means projecting from the rotor and pressed against the rotor along a line of tangency between the member and rotor by pressures between the rotor and member, said inlet and outlet communicating with the interior of the member on opposite sides of the tangency line.

2. A tangency seal fluid pressure apparatus which comprises a rotor, fixed bearings supporting the rotor, a member enveloping the rotor in eccentric relation therewith and defining expanding and contracting cavities around the rotor, fluid inlet and outlet means communicating with said cavities means carried by the rotor riding on said member through said cavities, said member being sealed relative to the rotor along a line of tangency between the minimum volume contracting and expanding cavities, and a pivot support for said member accommodating swinging of the member in response to pressures in the contracting cavities to increase the sealing pressure between the rotor and enveloping member at the line of tangency contact therebetween.

3. A tangency seal fluid pressure device comprising a housing, a rotor rotatably mounted in the housing, a cylinder swingable in the housing and surrounding the rotor in eccentric spaced relation therewith, members carried by the rotor riding on the inner wall of said cylinder dividing the space between the rotor and cylinder into expanding fluid receiving cavities and contracting fluid expelling cavities, an inlet port in the housing communicating with the expanding cavities, a pivot in the housing for said cylinder, said pivot being positioned in the housing relative to the contracting cavities so that pressure therein will swing the cylinder into sealing contact with the rotor along the line of tangency separating the expanding and contracting cavities, said cylinder having a discharge opening therethrough immediately upstream from the tangency line of contact with the rotor for discharging the fluid into the housing around the cylinder, and said housing having an outlet port receiving said fluid.

4. A tangency seal rotary vane compressor comprising a housing having an inlet and an outlet, front and rear fixed bearing supports in said housing, bearing in said supports, a shaft rotatably carried by said bearings, a rotor secured on said shaft for corrotation, said rotor having vane slots, vanes slidable in said slots, a cylinder swingable in said housing surrounding said rotor and receiving the ends of the vanes in riding contact therewith, a pivot support for said cylinder in said housing accommodating swinging of the cylinder in response to fluid pressure between the rotor and cylinder for swinging the cylinder into a tangency line contact with the rotor, said cylinder having outlet openings therethrough upstream from said tangency line contact with the rotor, oil separating fibrous material between the housing and cylinder defining with the housing and cylinder a first chamber receiving compressed fluid from said outlet openings, said housing and cylinder defining a second chamber receiving oil-freed fluid and separated oil passed through the fibrous material from said first chamber, said outlet discharging the oil-freed compressed fluid from said second chamber, an oil collection sump between the housing and cylinder collecting oil in the second chamber, means venting oil from said sump to the bearings, vanes and interior of the cylinder, a plate in the housing spring-pressed against an end of the cylinder and adapted to be unseated from the cylinder by liquid compressed between the rotor and cylinder for purging the liquid to the sump, and said inlet communicating with the interior of the cylinder dowstream from the tangency line contact between the rotor and cylinder.

5. A self-oil purging rotary vane compressor adapted for compressing refrigerant in automotive air-conditioning systems which comprises an end head having an inlet, an outlet, and a bearing supporting hub, a cup-shaped housing piloted on said end head having a bearing supporting hub aligned with the hub of the end head, bearings in the hubs of the end head and housing, a shaft rotatably mounted in said bearings, a vane carrying rotor mounted on said shaft between said bearings, a cylinder in said housing surrounding said rotor in eccentric relation and having one end bottomed on said end head, a plate slidably piloted on the hub of said housing spring-pressed against the other end of said cylinder, a pivot shoe carried by said housing cooperating with the outer periphery of said cylinder accommodating swinging of the cylinder in the housing in response to pressures developed between the rotor and cylinder to load the cylinder against the rotor along a line of tangency, said cylinder having openings therethrough joining the interior of the cylinder upstream from the tangency line of contact with the rotor to discharge fluid to the outlet, fibrous means in the path of the fluid between the openings in the cylinder and the outlet for separating oil from the fluid, said housing providing an oil collection sump in the bottom thereof receiving oil separated from the fluid, means in said end head venting oil from the sump back to the bearings, vanes, and interior of the cylinder, said plate adapted to be unseated from the cylinder to vent spaces between the rotor and cylinder to said sump to purge oil from the spaces, and said inlet communicating with the interior of the cylinder.

6. The apparatus of claim **2** wherein the pivot support for the member is a shoe cooperating with the outer periphery of the member.

7. The apparatus of claim **2** wherein a relief valve is provided to purge liquid from the cavities between the rotor and member enveloping the rotor upon development of excess pressures in the cavities.

8. The apparatus of claim **7** wherein the relief valve is a plate spring-pressed against an end of the member enveloping the rotor.

9. The apparatus of claim **2** wherein the fixed bearings supporting the rotor are carried by an end head and a cup-shaped housing piloted on the end head and cooperating with the end head to define an annular chamber surrounding the member receiving compressed fluid from the member.

10. The apparatus of claim **9** wherein fibrous strips are provided in the annular chamber between the member and housing to separate oil from the compressed fluid received in the chamber.

11. The device of claim **3** including a shoe carried by the housing cooperating with the cylinder to form the pivot support therefor.

12. The device of claim **3** including a reed valve on the cylinder controlling flow of fluid from the expelling cavities to the housing and a guard plate overlying the reed valve cooperating with a housing carried shoe to form the pivot for the cylinder.

13. The device of claim **3** including a liquid purge valve cooperating with the cylinder to relieve liquid from the cavities to the housing.

14. The apparatus of claim **2** including a helper spring acting on the member enveloping the rotor to rock the member about the pivot support for maintaining a minimum pressure at the line of tangency between the rotor and member.

15. The device of claim **3** wherein the pivot is positioned upstream from the line of tangency and a helper spring is positioned downstream from said line of tangency for urging the cylinder to rock about its pivot to maintain a minimum sealing load at the line of tangency between the rotor and cylinder.

16. The device of claim **3** wherein the members carried by the rotor riding on the inner wall of the cylinder are sliding vanes.

17. The device of claim **3** having an annular chamber between the housing and the cylinder with fibrous strips isolating a sub-chamber receiving fluid from the discharge opening of the cylinder effective to separate liquid entrained with the compressed fluid.

18. The device of claim **17** wherein the annular chamber has a collection sump for the separated liquid.

19. The device of claim **3** including a spring loaded plate engaging one end of the cylinder and adapted to be deflected from said one end to provide a relief passage connecting the cavities between the rotor and cylinder with the interior of the housing.

20. The compressor of claim **4** wherein the rotor has four radial vanes and springs urging said vanes outwardly from said slots to engage the cylinder.

21. The compressor of claim **4** wherein the housing includes an end bearing plate with the inlet and outlet and a cup-shaped housing member piloted on the bearing plate providing the rear bearing support.

22. The compressor of claim **4** wherein the fibrous material separating the first and second chambers are strips on nonmetallic high-temperature resisting fibers.

23. The compressor of claim **4** wherein the cylinder has one end bottomed against an end of the housing and a spring loaded relief plate is pressed against the other end of the cylinder and wherein the first and second chambers are separated by two radial strips of fibrous material between the cylinder and periphery of the housing and a third strip of fibrous material between the plate and back wall of the housing.

24. The compressor of claim **4** wherein the pivot support for the cylinder includes a rigid plate bolted to the periphery of the cylinder and having a recess midway between the ends of the cylinder and a shoe carried by the housing seats in said recess.

25. The compressor of claim **4** including bleeder holes through the cylinder immediately adjacent the upstream side of the tangency line contact with the rotor to vent liquid to the first chamber.

26. The method of sealing a rotor and an eccentric cylinder enveloping the rotor along a tangency line therebetween in a tangency seal fluid pressure device which comprises rocking the cylinder about a pivot upstream from the tangency line against the rotor with pressure developed by the device between the rotor and cylinder.

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