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(71) Applicant: **SANDEN CORPORATION**
20 Kotobuki-cho
Isesaki-shi Gunma, 372(JP)

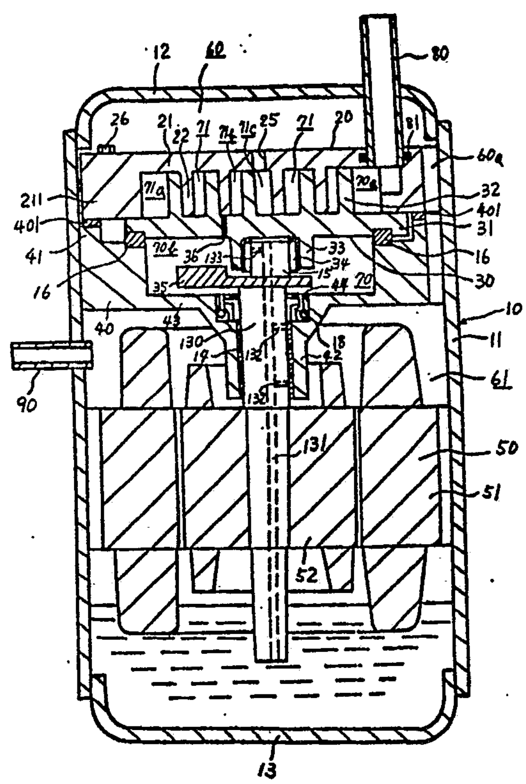
(72) Inventor: **Kikuchi, Kazuto**
1-3-14, Hinode Honjo-shi
Saitama 367(JP)

(74) Representative: **Jackson, Peter Arthur et al**
GILL JENNINGS & EVERY 53-64 Chancery Lane
London WC2A 1HN(GB)

(54) **Hermetically sealed scroll type refrigerant compressor.**

(57) A shaft seal mechanism of a vertically installed hermetic type scroll compressor in which an inner chamber of a housing is kept at discharge pressure is disclosed. The compressor in accordance with one aspect of the present invention includes a drive shaft (130) supported by a plain bearing in an inner block member (40). The drive shaft is operatively linked to an orbiting scroll (30) which orbits within a stationary scroll (20). An isolated cavity (70) is defined in the inner chamber of the compressor housing by the stationary scroll and the inner block member. Spiral elements (22,32) of both stationary and orbiting scrolls, a driving mechanism and a rotation preventing mechanism (16) are disposed within the isolated cavity. The isolated cavity is divided into an upper and lower cavities by an end plate (31) of the orbiting scroll. A small aperture (36) is axially formed through the end plate of the orbiting scroll to introduce the intermediately compressed refrigerant gas into the lower cavity from an intermediately located fluid pocket defined by the spiral elements. A mechanical seal (18) is disposed within the lower isolated cavity and is mounted around the drive shaft, thereby preventing discharged refrigerant gas from the inner chamber entering into the lower isolated cavity. Therefore, an axially urging force which acts upwardly on the orbiting scroll is maintained at the constant intermediate refrigerant gas pressure, thereby obtaining an appropriate axial seal of fluid pockets (71) of the scrolls.

Fig. 1



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HERMETICALLY SEALED SCROLL TYPE REFRIGERANT COMPRESSOR

This invention relates to a hermetically sealed scroll type compressor, and more particularly, to a sealing mechanism disposed within an isolated cavity in a compressor housing for insulating the isolated cavity from discharge pressure in a compressor inner housing.

A hermetically sealed scroll type compressor is disclosed in Japanese Patent Application Publication No. 59-110,883 and is shown in Figure 3. Hermetically sealed housing 200 includes inner chamber 210 which is maintained at discharge pressure. The compression mechanism, including inner fitting scrolls 220, 230 and the upward end of the drive mechanism including drive shaft 240, are disposed between partition 250 and the end plate of stationary scroll 220, and are isolated from inner chamber 210. Drive shaft 240 is rotatably and closely supported by partition 250 through fixed plain bearing 251. A plurality of fluid pockets 300 are formed between the spiral portions of inner fitting scrolls 220 and 230. Channel 260 extends through the end plate of orbiting scroll 230 and links intermediate fluid pocket 301 with isolated chamber 270 formed between the end plate of orbiting scroll 230 and partition 250.

In operation, refrigerant gas flows through inlet port 260 and is compressed inwardly by scrolls 220 and 230 towards central fluid pocket 302 due to orbital motion of orbiting scroll 230. Compressed fluid in central fluid pocket 302 is discharged into discharge chamber 211 through hole 221 extending through the end plate of stationary scroll 220. Compressed refrigerant gas flows discharge chamber 211 into inner chamber 210 through cavity 210a, and thereafter flows out of the compressor to the external fluid circuit through outlet port (not shown). After circulating through the refrigerating system, the refrigerant gas which exits through the outlet port returns to the compressor.

In the prior art, channel 260 extends through the end plate of orbiting scroll 230 and links intermediate fluid pocket 301 with isolated chamber 270. Thereby, a part of the intermediately compressed refrigerant gas is conducted into isolated chamber 270. Consequently, isolated chamber 270 is maintained at intermediate pressure which generates the appropriate upwardly axial urging force acting or orbiting scroll 230. Accordingly, the axial seal of fluid pockets 300 can be well done without generation of the excessive friction between the spiral portion and the end plate of scrolls 220 and 230.

Even though drive shaft 240 is closely supported by partition 250 through fixed plain bearing 251, slight air gaps are created between drive shaft 240 and fixed plain bearing 251 due to manufacturing and assembling errors of the compressor, and frictional abrasion of both drive shaft 240 and fixed plain bearing 251. This may allow leakage of discharge refrigerant gas from inner chamber 210 into isolated chamber 270, thereby causing increase of pressure in isolated chamber 270. Therefore, the upwardly axial urging force acting on orbiting scroll 230 may exceed the certain value which can maintain the appropriate axial seal of fluid pockets 300. Eventually, the excessive friction between the spiral portion and the end plate of scrolls 220 and 230 is occurred, thereby causing serious damage to the compressor.

Furthermore, a hermetically sealed scroll type compressor as another prior art of this invention was imagined by an inventor of this invention. The imagined compressor comprises an isolated chamber formed between a stationary scroll and a partition both which are substantially identical to stationary scroll 220 and partition 250 in Figure 3, respectively. The isolated chamber is maintained suction pressure due to suction pressure refrigerant gas being conducted thereinto from an external refrigeration circuit through a pipe member. In this prior art, slight air gaps are created between a drive shaft and a fixed plain bearing as well as the above mentioned prior art. This may allow leakage of discharge refrigerant gas from an inner chamber, which is substantially identical to inner chamber 210 in Figure 3, into the isolated chamber, thereby causing increase of pressure in the isolated chamber, that is, causing a rise in temperature of suction refrigerant gas. Eventually, the defects of the compressor, such as, a decline of compression efficiency and an excessive rise in temperature of discharged refrigerant gas may be occurred.

Accordingly, it is an object of this invention to provide a shaft seal mechanism for insulating an isolated intermediate pressure cavity from discharge pressure in an interior or a housing of a hermetically sealed scroll type compressor. This object is accomplished by one subject matter of the present invention.

Furthermore, it is another object of the present invention to provide a shaft seal mechanism for insulating an isolated suction pressure cavity from discharge pressure in an interior of a housing of a hermetically sealed scroll type compressor. This object is accomplished by another subject matter of the present invention.

A compressor according to the present invention includes a fixed scroll and an orbiting scroll disposed within a hermetically sealed housing. The fixed scroll includes a first end plate from which a first wrap or spiral element extends into the interior of the housing. The orbiting scroll includes a second end plate from which a second spiral element extends. The first and second spiral elements interfit at an angular and radial offset to form a plurality of line contacts which define at least one pair of sealed off fluid pockets therebetween.

An inner block member is fixedly secured within the compressor housing. The first end plate of the fixed scroll is in contact with an annular upward extension of the inner block member to define an isolated cavity therebetween. The discharge chamber is formed upward of the first end plate. The remainder of the compressor housing which is exterior to the isolated cavity is linked to the discharge chamber. A drive mechanism is operatively connected to the orbiting scroll to effect orbital motion thereof. The drive mechanism includes a drive shaft rotatably supported by a fixed plain bearing within an axially downward extension of the inner block member. A rotation preventing device prevents rotation of the orbiting scroll during orbital motion so that rotation of the drive shaft creates orbital motion of the orbiting scroll. During orbital motion of the orbiting scroll, the volume of the fluid pockets is progressively decreased to compress refrigerant gas in the pockets inwardly from outermost pockets toward a central pocket. The compressed gas in the central pocket flows through a channel formed in the first end plate of the fixed scroll and into the discharge chamber.

According to the one subject matter of the present invention, the second end plate of the orbiting scroll divides the isolated cavity into a first and second isolated cavities. The first and second spiral elements are disposed in the first isolated cavity. A communication path is axially formed through the second end plate of the orbiting scroll to introduce intermediately compressed refrigerant gas from an intermediately located fluid pocket into the second isolated cavity. The first isolated cavity is provided with an inlet portion which introduces suction refrigerant gas thereinto from an external refrigeration circuit. The remainder of the compressor housing is provided with an outlet portion which conducts the discharged refrigerant gas to the external refrigeration circuit from the remainder of the compressor housing. A shaft seal mechanism is mounted around the drive shaft at a location within the second isolated cavity to insulate the second isolated cavity from the discharge pressure in the remainder of the compressor housing.

According to the other subject matter of the present invention, the isolated cavity is provided with an inlet portion which introduces suction refrigerant gas thereinto from an external refrigeration circuit. The remainder of the compressor housing is provided with an outlet portion which conducts discharged refrigerant gas to the external refrigeration circuit from the remainder of the compressor housing. A shaft seal mechanism is mounted around the drive shaft at a location within the isolated cavity to insulate the isolated cavity from discharge pressure in the remainder of the compressor housing.

In the accompanying drawings:-

Figure 1 is a vertical longitudinal section of a hermetically sealed scroll type compressor in accordance with one embodiment of the present invention;

Figure 2 is a vertical longitudinal section of a hermetically sealed scroll type compressor in accordance with another embodiment of the present invention; and

Figure 3 is a vertical longitudinal section of a hermetically sealed scroll type compressor in accordance with one prior art.

With reference to Figure 1, a hermetically sealed scroll type compressor in accordance with one embodiment of the present invention is shown. As illustrated in Figure 1, the compressor is designed to locate an axis of a drive shaft generally perpendicular to a horizontal plane, when installed. Accordingly, in general, the compressor is called a vertically installed type compressor. The compressor includes hermetically sealed casing 10 comprising cylindrical portion 11 and a pair of shallow cup-shaped portions 12 and 13 hermetically fixed to the both opening ends of cylindrical portion 11, fixed and orbiting scrolls 20 and 30, inner block member 40 and motor 50. Fixed scroll 20 includes circular end plate 21 and spiral element or wrap 22 extending downwardly from one end surface of circular end plate 21. Circular end plate 21 is provided with annular wall 211 downwardly projecting from the one end surface thereof at an outermost peripheral location. Orbiting scroll 30 includes circular end plate 31 and spiral element or wrap 32 extending upwardly from one end surface of circular end plate 31. Spiral element 22 of fixed scroll 20 and spiral element 32 of orbiting scroll 30 interfit an an angular and radial offset to form a plurality of line contacts which define at least one pair of sealed off fluid pockets 71 therebetween. Annular projection 33 projects axially from the other end surface of circular end plate 31.

Inner block member 40 is firmly secured at an inner peripheral surface of cylindrical portion 11 by forcible insertion. Inner block member 40 includes central portion 43 and axial annular wall 41 upwardly projecting from central portion 43 at a peripheral location. Axially annular projection 42 projects downwardly from central portion 43 at a central location. The upward end surface of axial annular wall 41 is fixed by a plurality of screws 26 to the downward end surface of annular wall 211 through

O-ring seal element 401. Isolated cavity 70 is thereby created between annular wall 41 of inner block member 40, and fixed scroll 20. Orbiting scroll 30 is disposed entirely within isolated cavity 70. On the other hand, interior chamber 61 is created between inner block member 40, and cylindrical portion 11 and shallow cup-shaped portion 13.

Motor 50 includes stator 51 which is firmly secured at the inner peripheral surface of cylindrical portion 11 by forcible insertion. Rotor 52 of motor 50 is disposed within stator 51 and is fixed to drive shaft 130 extending therethrough. Drive shaft 130 extends through axial annular projection 42. Axial annular projection 42 extends within an opening in rotor 52. Drive shaft 130 is rotatably supported within axial annular projection 42 through fixed plain bearing 14 disposed between the exterior surface of drive shaft 130 and the interior surface of axial annular projection 42. Drive shaft 130 extends through central portion 43 of inner block member 40 and fixed plain bearing 14 extends entirely within annular projection 42 to support drive shaft 130 at that location.

Pin member 15 is integrated with and projects axially from upward end surface of drive shaft 130. Pin member 15 is radially offset from the axis of drive shaft 130. Pin member 15 is rotatably disposed within axial annular projection 33 of orbiting scroll 30 and is supported therein by bearing 34.

Rotation preventing device 16, for example, Oldham coupling mechanism is disposed between a downward peripheral surface of circular end plate 31, exterior of annular projection 33, and an upward surface of inner block member 40 to prevent rotation of orbiting scroll 30 during orbital motion. Rotation preventing device 16 and pin member 15, as well as spiral elements 22 and 32, are all contained in isolated cavity 70.

Since a radial outer peripheral portion of the one end surface of circular end plate 31 always contacts with the downward end surface of annular wall 211 of circular end plate 21 during orbital motion of orbiting scroll 30, circular end plate 31 partitions isolated cavity 70 into upward cavity 70a and downward cavity 70b. Suction gas inlet pipe 80 axially penetrates shallow cup-shaped portion 12 of casing 10 and circular end plate 21, and opens into upward cavity 70a. Therefore, upward cavity 70a is used for the suction chamber. O-ring seal 81 is disposed around the outer peripheral surface of inlet pipe 80 and seals the mating surfaces between inlet pipe 80 and circular end plate 21. Hole 25 if formed through a central location of circular end plate 21 and links cavity 60 at the top of circular end plate 21 with the central fluid pocket 71c formed between the spiral elements. Thereby, cavity 60 is maintained at discharge pressure.

Drive shaft 130 includes axial bore 131 extending from an opening at the downward end surface of drive shaft 130 and terminating to the upward end surface of pin member 15. A downward end portion of drive shaft 13 is immersed in the accumulated pool of lubricating oil at the inner bottom portion of casing 10. A plurality of radial bores 132 extend through drive shaft 130, at a location within annular projection 42. Another radial bore 133 extends through pin member 15 at a location within axial annular projection 33, near the terminal end of axial bore 131. Lubricating oil which accumulates at the inner bottom portion of casing 10 flows through axial bore 131, radial bores 132 and radial bore 133 into the gap between fixed plain bearing 14 and the exterior surface of drive shaft 130, and the gap between bearing 34 and the exterior surface of pin member 15 to lubricate the contact surfaces by virtue of the centrifugal force generated during operation of the compressor.

Interior chamber 61 is linked to cavity 60 via cavity 60a located between the interior surface of cylindrical portion 11 of casing 10 and the exterior surface of forward annular wall 41. Therefore, interior chamber 61 is maintained at discharge chamber pressure. Discharge gas outlet pipe 90 radially penetrates cylindrical portion 11 of casing 10, and opens to interior chamber 61.

Cavity 44 is formed in central portion 43 of inner block member 40, at a location upward of axial annular projection 42. Drive shaft 130 extends into cavity 44. A shaft seal mechanism, for example, mechanical seals 18 is disposed within cavity 44, around drive shaft 130 to prevent gas from leaking from interior chamber 61 into downward cavity 70b due to the rotation of drive shaft 130. The mechanical seals 18 can be replaced with a lip type seal. Balance weight 35 is disposed on a downward extension of pin member 15 and serves to average the torque of drive shaft 130 acting on pin member 15 during rotation.

Small aperture 36 is formed at circular end plate 31 in axial direction to link downward cavity 70b with the intermediately located fluid pocket 71b of spiral elements 22 and 32. Thereby, a part of the intermediately compressed refrigerant gas is conducted into downward cavity 70b. Consequently, downward cavity 70b is maintained at intermediate pressure. Therefore, downward cavity 70b can be named the intermediate pressure chamber.

In operation, stator 51 generates a magnetic field, causing rotation of rotor 52 to thereby rotate drive shaft 130. Rotation of drive shaft 130 is converted to orbital motion of orbiting scroll 30 by pin member 15, and rotational motion of orbiting scroll 30 is prevented by rotation preventing device 16. Refrigerant gas is introduced into suction chamber 70a from the external refrigeration circuit

through suction gas inlet pipe 80 and is taken into the outer of fluid pockets 71a between fixed scroll 20 and orbiting scroll 30. Refrigerant gas is compressed inwardly toward the central fluid pocket 71c of spiral elements 22 and 32 due to the orbital motion of orbiting scroll 30. As the refrigerant gas moves towards the central fluid pocket 71c, it undergoes a resultant volume reduction and compression and is discharged from the central fluid pocket 71c to cavity 60 through hole 25 covered by a one way valve (not shown).
Compressed refrigerant gas flows cavity 60 into interior chamber 61 through cavity 60a. Compressed discharge gas in interior chamber 61 flows out of the compressor to the external fluid circuit through discharge gas outlet pipe 90.

Furthermore, a part of the intermediately compressed refrigerant gas in the intermediately located fluid pockets 71b is conducted into intermediate pressure chamber 70b through small aperture 36. Consequently, intermediate pressure chamber 70b is maintained intermediate pressure of which value is less than the value of discharge chamber pressure, and is greater than the value of suction chamber pressure. The other end surface of circular end plate 31 opposite to spiral element 32 receives the intermediate pressure, thereby being urged axially upwardly. Since leakage of refrigerant gas from interior chamber 61 into intermediate pressure chamber 70b is prevented by mechanical seals 18, pressure in chamber 70b is maintained constant at intermediate pressure. Accordingly, the axially urging force which upwardly acts on orbiting scroll 30 is maintained constant value, thereby obtaining the sufficient axial seal of fluid pockets 71 without the generation of excessive friction between spiral elements 23, 32 and circular end plate 31, 21. With reference to Figure 2, a hermetically sealed scroll type compressor in accordance with another embodiment of the present invention is shown. In the drawing, the same numerals are used to denote the corresponding elements shown in Figure 1. As illustrated in Figure 2, this embodiment also refers to a vertically installed type compressor.

The compressor includes hermetically sealed casing 10′ comprising cup-shaped casings 12′ and 13′ hermetically fixed to each other at the opening end thereof, fixed and orbiting scrolls 20 and 30, inner block member 40 and motor 50. Fixed scroll 20 includes circular end plate 21 and spiral element of wrap 22 extending downwardly from one end surface of end plate 21. Orbiting scroll 30 includes circular end plate 31 and spiral element or wrap 32 extending upwardly from one end surface of circular end plate 31. Spiral element 22 of fixed scroll 20 and spiral element 32 of orbiting scroll 30 interfit at an angular and radial offset to form a plurality of line contacts which define at least one pair of sealed off fluid pockets 71 therebetween. Annular projection 33 projects axially from the other end surface of circular end plate 31.

Inner block member 40 includes central portion 43 and upward annular wall 41 axially projecting from central portion 43 at a peripheral location. Downward annular wall 45 projects axially from central portion 43 of block member 40 at a peripheral location and is fixedly disposed on the interior side surface of cup-shaped casing 13′ by forcible insertion. Axial annular projection 42 projects downwardly from central portion 43 at a central location. The upward end surface of upward annular wall 41 is fixed by a plurality of screws 26 to the peripheral one end surface of circular end plate 21 of fixed scroll 20. Isolated cavity 70′ is thereby created between annular wall 41 of inner block member 40, and fixed scroll 20. Orbiting scroll 30 is disposed entirely within isolated cavity 70′. On the other hand, interior chamber 61 is created between inner block member 40 and casing 13′.

Motor 50 includes stator 51 and rotor 52. Ring member 46 is disposed on the peripheral end surface of stator 51 and includes an outer surface which extends beyond the side surfaces of stator 51. Bolts 27 fit through a plurality of holes formed through the peripheral outer surface of ring member 46 and are fixedly secured within corresponding threaded receiving holes of downward annular wall 45. Stator 51 contacts the downward end surface of downward annular wall 45 on its upward end surface. Therefore, stator 51 of motor 50 is secured between ring member 46 and downward annular wall 45 of inner block member 40. Rotor 52 of motor 50 is disposed within stator 51 and is fixed to drive shaft 130 extending therethrough. Drive shaft 130 extends through axial annular projection 42. Axial annular projection 42 extends within an opening in rotor 52. Drive shaft 130 is rotatably supported within axial annular projection 42 through fixed plain bearing 14 disposed between the exterior surface of drive shaft 130 and the interior surface of axial annular projection 42. Drive shaft 130 extends through central portion 43 of inner block member 40 and fixed plain bearing 14 extends partly within central portion 43 to support drive shaft 13 at that location.

Pin member 15 is integrated with an projects axially from upward end surface of drive shaft 130. Pin member 15 is radially offset from the axis of drive shaft 130. Bushing 17 is rotatably disposed within downward axial annular projection 33 of orbiting scroll 30 and is supported therein by bearing 34. Pin member 15 is inserted in hole 19 of bushing 17 which is offset from the center of bushing 17.

Rotation preventing device 16′ is disposed between a downward peripheral surface of circular end plate 31, exterior of annular projection 33, and a upward surface of inner block member 40 to prevent rotation of orbiting scroll 30 during orbital motion. Rotation preventing device 16′ used in this embodiment is substantially identical to the device disclosed in U.S. Patent No. 4,492,543 issued to Iimori et al. O-ring seal 23 is disposed between an inner peripheral surface of upward annular wall 41 and a part of the exterior peripheral surface of circular end plate 21 to seal the mating surfaces therebetween. Rotation preventing device 16′, pin member 15 and bushing 17, as well as spiral elements 22 and 32, are all contained in isolated cavity 70′.

Suction gas inlet pipe 80 radially penetrates a side wall of casing 12′ and annular wall 41, and opens into isolated cavity 70′. Therefore, isolated cavity 70′ is used for suction chamber. O-ring seal 81 is disposed around the outer peripheral surface of inlet pipe 80 and seals the mating surfaces between inlet pipe 80 and annular wall 41. Hole 25 is formed through a central location of circular end plate 21 and links cavity 60 at the top of circular end plate 21 with the central fluid pocket 71c formed between the spiral elements. Thereby, cavity 60 is maintained at discharge pressure. Anti-wear plate 23 is disposed on the one end surface of circular end plate 21. Seal elements 221 and 321 are disposed between the end surface of spiral element 22 and the surface of circular end plate 31, and the end surface of spiral element 32 and anti-wear plate 23, respectively.

Interior chamber 61 is linked to cavity 60 via cavity 60a located between the interior side surface of casing 12′ and the exterior surface of annular wall 41. Therefore, interior chamber 61 is maintained at discharge chamber pressure. Discharge gas outlet pipe 90 penetrates a side wall of casing 13′, and opens to interior chamber 61.

Drive shaft 130 includes axial bore 131 extending from an opening at the downward end surface of drive shaft 130 and terminating within drive shaft 130 at a downward end of axial annular projection 42. A downward end portion of drive shaft 130 is immersed in the accumulated pool of lubricating oil at the inner bottom portion of casing 10′. Helical groove 134 is formed on the exterior surface of drive shaft 130 within axial annular projection 42. Hole 134a radially extends through drive shaft 130 to link upward end of axial bore 131 with the downward end of helical groove 134. A plurality of communication holes 135 are formed through axial annular projection 42 and fixed plain bearing 14, and links the upward end of helical groove 134 with interior chamber 61. Lubricating oil which accumulates at the inner bottom portion of casing 10′ flows through axial bore 131, hole 134a and helical groove 134 into the gap between fixed plain bearing 14 and the exterior surface of drive shaft 130 to lubricate the contact surfaces by virtue of the centrifugal force generated during operation of the compressor.

Cavity 44 is formed in central portion 43 of inner block member 40, at a location upward of axial annular projection 42. Drive shaft 130 extends into cavity 44. A shaft seal mechanism, for example, mechanical seals 18 is disposed within cavity 44, around drive shaft 130 to prevent gas from leaking from interior chamber 61 into suction chamber 70′ due to the rotation of drive shaft 13. The mechanical seals 18 can be replaced with a lip type seal. Balance weight 35 is disposed on a downward extension of bushing 17 and serves to average the torque of drive shaft 130 acting on bushing 17 during rotation.

Opening 121 is formed in the side wall of casing 13′. Hermetic seal base 120 is secured within opening 121 of casing 13′ and maintains the hermetic seal of casing 10′. Wires 110 extend from the bottom end of stator 51, and pass through hermetic seal base 120 for connection to an external electrical power source (not shown). Base 120 may be welded or brazed to the side wall of casing 13′ to provide the hermetic seal therebetween.

In operation, stator 51 generates a magnetic field, causing rotation of rotor 52 to thereby rotate drive shaft 130. Rotation of drive shaft 130 is converted to orbital motion of orbiting scroll 30 by pin member 15 and bushing 17, and rotational motion of orbiting scroll 30 is prevented by rotation preventing device 16′. Refrigerant gas is introduced into suction chamber 70′ from the external refrigeration circuit through suction gas inlet pipe 80 and is taken into the outer of fluid pockets 71a between fixed scroll 20 and orbiting scroll 30. Refrigerant gas is compressed inwardly toward the central fluid pocket 71c of spiral elements 22 and 32 due to the orbital motion of orbiting scroll 30. As the refrigerant gas moves towards the central fluid pocket 71c, it undergoes a resultant volume reduction and compression and is discharged from the central fluid pocket 71c to cavity 60 through hole 25 covered by a one way valve (not shown). Compressed refrigerant gas flows cavity 60 into interior chamber 61 through cavity 60a. Compressed discharge gas in interior chamber 61 flows out of the compressor to the external fluid circuit through discharge gas outlet pipe 90.

Since leakage of refrigerant gas from interior chamber 61 into suction chamber 70′ is prevented by mechanical seals 18, a rise in temperature of suction refrigerant gas causing the defects of the compressor, such as, a decline in the compression efficiency and an excessive rise in temperature of discharged refrigerant gas is prevented.

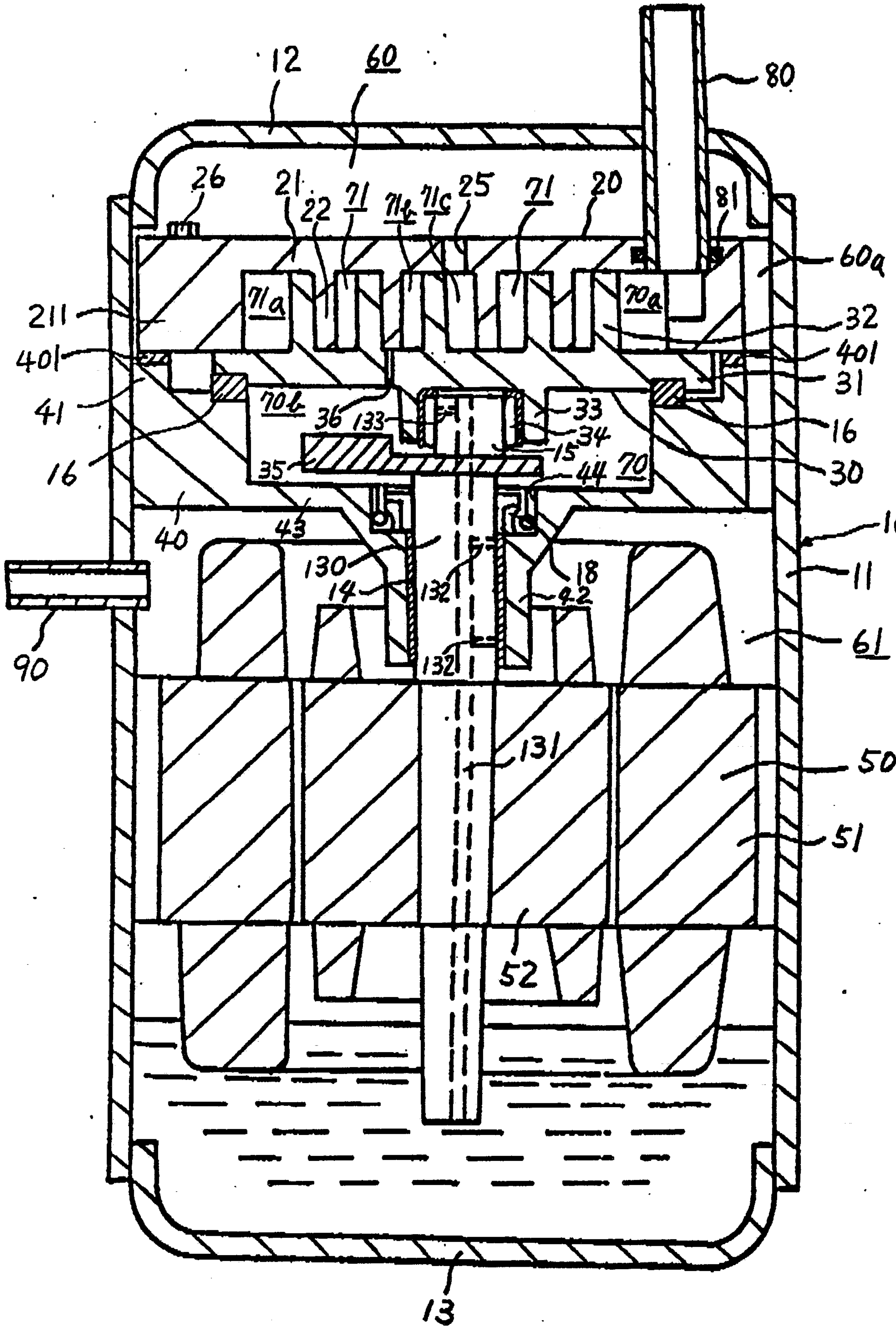
Claims

1. A scroll type compressor with a hermetically sealed housing (10); a fixed scroll (20) disposed within the housing, the fixed scroll having a first end plate (21) from which a first spiral element (22) extends; an orbiting scroll (30) having a second end plate (31) from which a second spiral element (32) extends, the first and second spiral elements (22,32) interfitting at an angular and radial offset to form a plurality of line contacts which define at least one pair of sealed fluid pockets (71); a drive mechanism operatively connected to the orbiting scroll (30) to effect orbital motion of the orbiting scroll; a rotation preventing means (16) for preventing the rotation of the orbiting scroll during orbital motion whereby the volume of the fluid pockets changes to compress fluid in the pockets, the drive mechanism including a drive shaft (130) rotatably supported within an inner block member (40) which is fixed to the housing, the first end plate (21) of the fixed scroll and the inner block member (40) forming an isolated cavity (70) therebetween; a discharge chamber (61) formed exterior to the isolated cavity between the outer surface of the first end plate (21), the inner block member (40) and the interior surface of the housing (11), the second end plate (31) of the orbiting scroll dividing the isolated cavity (70) into first and second isolated cavities (70a,70b), the first and second spiral elements (22,32), being disposed in the first isolated cavity; a communication path (36) formed through the second end plate of the orbiting scroll (30) to introduce intermediately compressed refrigerant gas from an intermediately located fluid pocket into the second isolated cavity; the first isolated cavity being provided with an inlet portion (80) which introduces suction refrigerant gas, in use, thereinto from an external refrigeration circuit; and the discharge chamber being provided with an outlet portion (90) which, in use, conducts discharged refrigerant gas to the external refrigeration circuit from the discharge chamber, characterised by shaft seal means (18) disposed within the second isolated cavity (70b) around the drive shaft (130), the shaft seal means being arranged to insulate the second isolated cavity from discharge pressure in the discharge chamber.

2. A compressor according to claim 1, further comprising an annular seal element (40) disposed between the first end plate (21) and the inner block member (40) at an outer peripheral location.

3. A scroll type compressor with a hermetically sealed housing (10′); a fixed scroll having a first end plate (21) from which a first spiral element (22) extends; an orbiting scroll (30) having a second end plate (31) from which a second spiral element (32) extends, the first and second spiral elements (22,32) interfitting at an angular and radial offset to form a plurality of line contacts which define at least one pair of sealed fluid pockets (71); a drive mechanism operatively connected to the orbiting scroll (30) to effect orbital motion of the orbiting scroll; a rotation preventing means (16′) for preventing the rotation of the orbiting scroll during orbital motion whereby the volume of the fluid pockets changes to compress fluid in the pockets; the drive mechanism including a drive shaft (130), the axis of which is substantially vertical when the compressor is in use, and which is rotatably supported within an inner block member (40) which is fixed to the housing; the first end plate (21) of the fixed scroll and the inner block member (40) forming an isolated cavity (70′) therebetween; a discharge chamber (61) formed exterior to the isolated cavity betweeen the outer surface of the first end plate (21) the inner block member (40) and the interior surface of the housing (10′), the first and second spiral elements (22,32) being disposed in the isolated cavity (70′); the isolated cavity (70′) being provided with an inlet portion (80) which, in use, introduces suction refrigerant gas thereinto from an external refrigerant circuit; and the discharge chamber (61) being provided with an outlet portion (90), which, in use, conducts discharged refrigerant gas to the external refrigeration circuit form the discharge chamber, characterised by shaft seal means (18) disposed within the isolated cavity (70′) around the drive shaft (130), the shaft seal means being arranged to insulate the isolated cavity from discharge pressure in the discharge chamber.

4. A compressor according to claim 3, further comprising an annular seal element (23) disposed between the first end plate (21) and the inner block member (40) at an outer peripheral location.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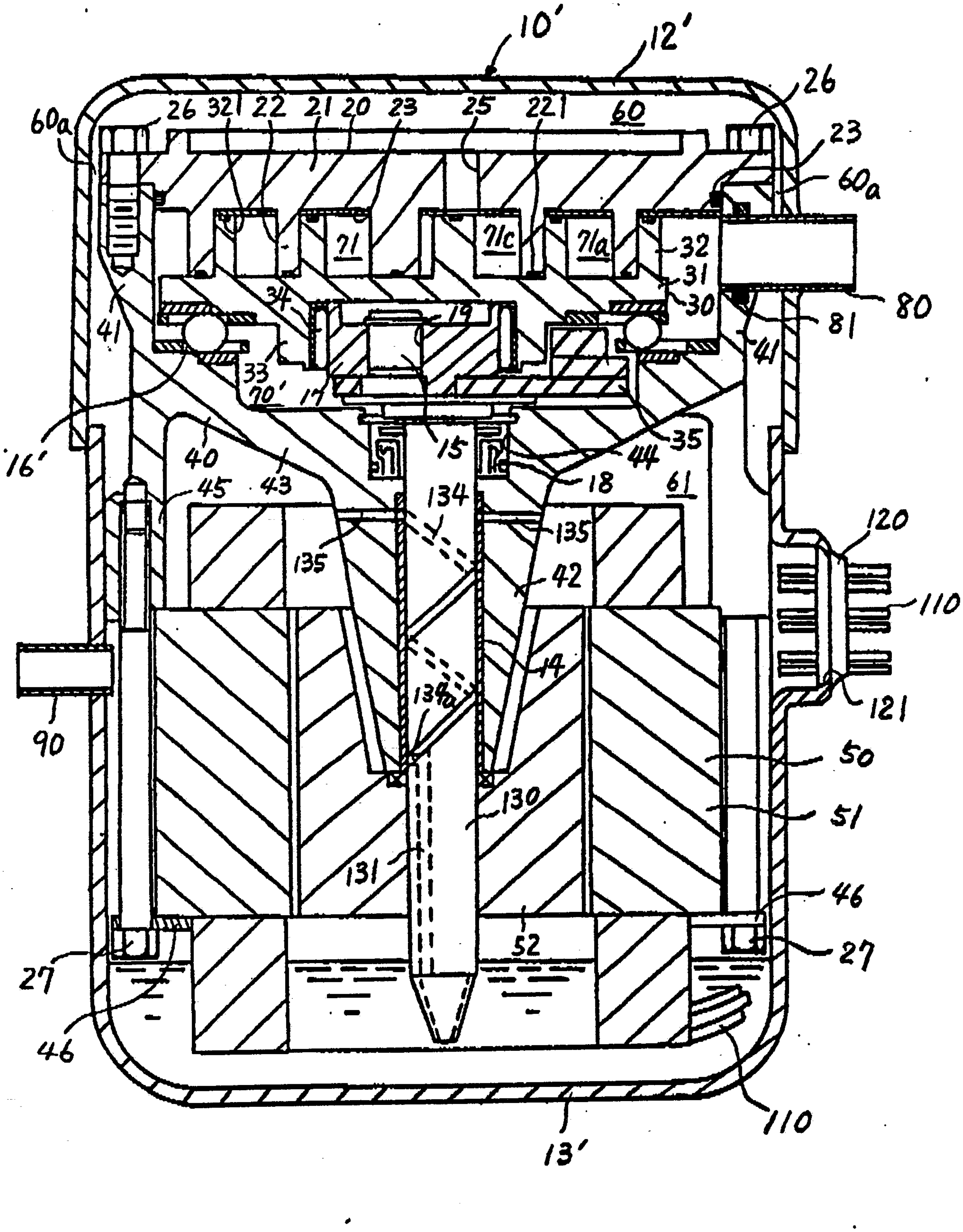
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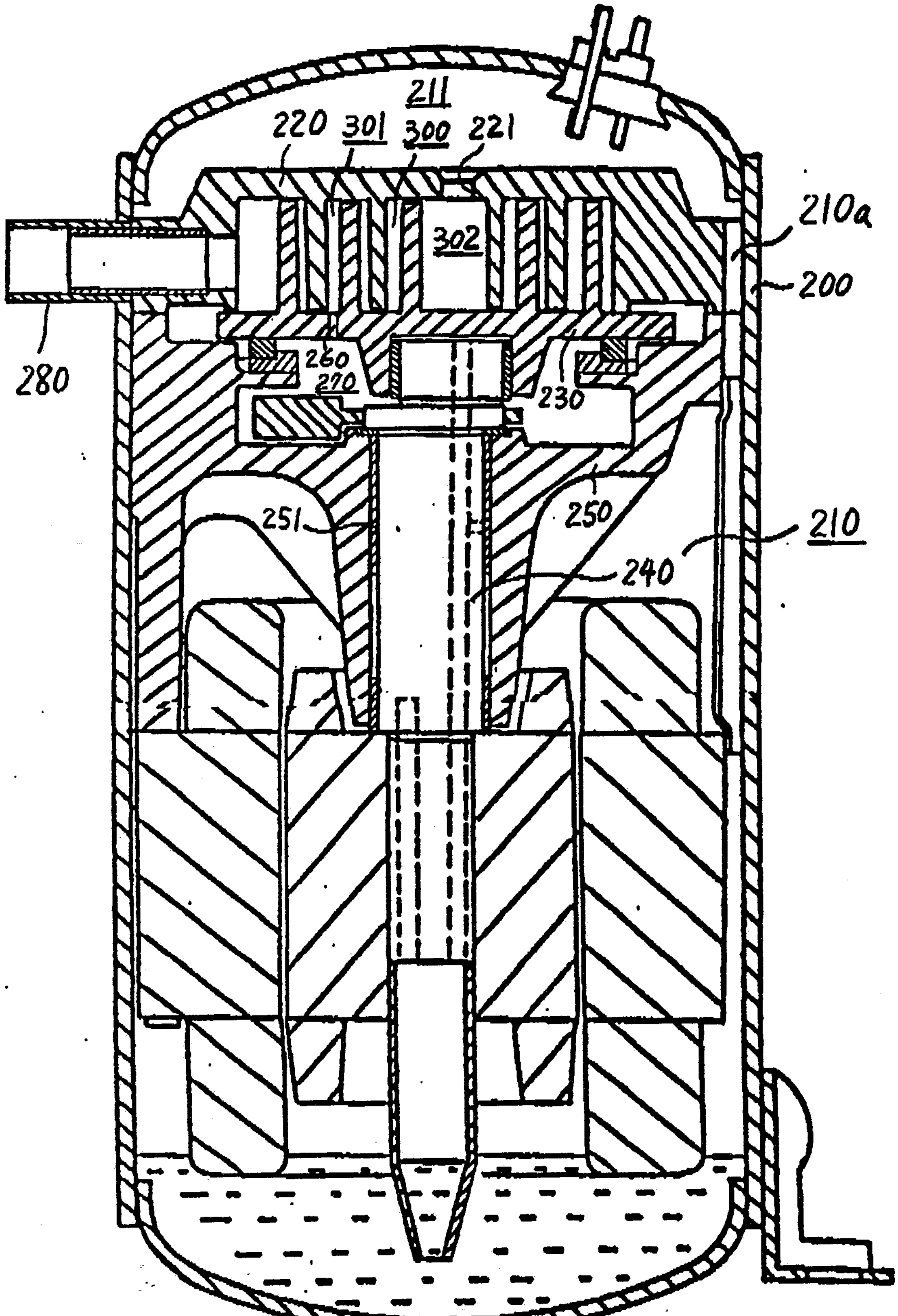
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