

REFRIGERANT COMPRESSOR

5 This invention relates to a piston type refrigerant compressor, and more particularly to the structure of a suction chamber and a discharge chamber formed in a cylinder head of the compressor.

10 A conventional piston type refrigerant compressor is provided with a cylinder block and a cylinder head, which is connected to one end of the cylinder block with interposed valve plate and gasket elements. The cylinder head is divided into two chambers, a suction chamber and a discharge chamber,
15 by an inner partition wall within an outer peripheral wall. These wall portions extend parallel to one another and contact against one gasket element to secure the sealing between the suction and discharge chambers, and between the ambient and the outer one
20 of the suction and discharge chambers. The ends of these wall portions contacting the gasket element are generally coplanar.

 In the above construction of compressor, the cylinder head is normally secured to the compressor
25 housing through the gasket elements and valve plate by a plurality of bolts. The bolts are equiangularly arranged on the outer peripheral portion of the cylinder head and penetrate the outer wall portion. Therefore, the contact force of the end surface of
30 the outer wall portion against the gasket element may be greater than that between the end surface of the inner wall portion against the gasket element. Also, the suction chamber is usually formed within the outer peripheral portion of the cylinder head, and
35 pressure in the suction chamber is relatively lower than ambient. Therefore, the sealing between the suction chamber and ambient should be secure.

However, the pressure in the discharge chamber is higher than in the suction chamber, and this exacerbates the lower contact force of the end surface of the inner partition wall portion against the gasket element. Therefore, the sealing between the gasket element and the end surface of the inner partition wall portion may fail. As a result, the compressed fluid in the discharge chamber will leak into the suction chamber and reduce the compression efficiency.

It is a primary object of this invention to provide a refrigerant compressor wherein sealing between a suction chamber and a discharge chamber is secure, and compression efficiency is maintained with a small modification to existing compressor construction.

In accordance with the invention, in a refrigerant compressor including a compressor housing; a cylinder block mounted within the compressor housing and having a plurality of equiangularly spaced cylinders and a plurality of pistons slidably and closely fitted into respective ones of the cylinders; a cylinder head provided with an outer peripheral wall and an inner partition wall dividing the interior of the cylinder head into suction and discharge chambers, and fixed to one end surface of the cylinder block with an interposed valve plate means; and gasket elements disposed, one between the end surface of the cylinder block and the valve plate means, and the other between the valve plate means and the cylinder head; the inner partition wall of the cylinder head projects further towards the other gasket element than does the outer peripheral wall.

The full benefits of the invention are achieved when the inner partition wall is annular, one of the chambers being located within the inner partition

wall and the other of the chambers being formed in the annular space between the inner partition wall and the outer peripheral wall; and when the one chamber is the discharge chamber.

5 On example of a compressor constructed in accordance with the invention is illustrated in the accompanying drawings, in which:-

 Figure 1 is a cross-sectional view of the compressor;

10 Figure 2 is an enlarged, more detailed view of part of Figure 1; and,

 Figure 3 is a section taken on the line II-II in Figure 2.

 The illustrated piston type refrigerant
15 compressor includes a cylindrical housing 10 comprising a cylinder block 11, a front housing 12 and a cylinder head 13. The interior of the housing 10, defined between the cylinder block 11 and the front housing 12, functions as a crank chamber 14. A
20 rotor 15, which is disposed within the crank chamber 14, is fixedly mounted on an inner end of a drive shaft 16. The drive shaft 16 extends through a central portion of the front housing 12, and is rotatably supported by a bearing, such as a needle
25 bearing 17, in the front housing 12. The rotor 15 is also supported by a thrust needle bearing 18 against the inner surface of the front housing 12. A wobble plate 19 is disposed on an inclined surface 15a of the rotor 15 through a needle bearing 20. The wobble
30 plate 19 is non-rotatably supported on a steel ball 21 seated at an end of a supporting member 22.

 The supporting member 22 comprises a shank portion 22a having an axial bore 22b at its other end and a bevel gear portion 22c at the end of the shank
35 portion 22a which has a seat for the steel ball 21 at the centre thereof. The supporting member 22 is axially slidable but non-rotatably supported within

the cylinder block 21 by insertion of the shank portion 22a into an axial bore 23 formed in the cylinder block 11. Rotation of the supporting member 22 is prevented by a key (not shown) and a key groove 23a. A coil spring 24 is disposed in the axial bore 22b of the supporting member 22, and the outer end of the spring 24 is in contact with a screw member 25, so that the shank portion 22a is urged towards the wobble plate 19. The bevel gear portion 22c of the supporting member 22 meshes with a bevel gear 26 mounted on the wobble plate 19, so that rotation of the wobble plate is prevented. The steel ball 21 is seated on the seat formed at the central portion of the bevel portion 22c and is also seated on the seat formed at the central portion of the bevel gear 26, so that the wobble plate 19 may be nutatably, but non-rotatably, supported on the steel ball 21.

The cylinder block 11 is provided with a plurality of axial cylinders 27, within which pistons 28 are slidably and closely fitted. Each piston 28 is connected to the wobble plate 19 through a piston rod 29. The connection between the wobble plate 29 and one end of each piston rod 29, and the connection between the respective pistons 28 and the other ends of the piston rods 29, are by ball joints.

On the outer end of the cylinder block 11, the cylinder head 13 is mounted with interposed gasket elements 32 and 33 and a valve plate 31, and is secured thereto by a plurality bolts 30. The interior of the cylinder head 13 is divided into two chambers, a suction chamber 34 and a discharge chamber 35, by an inner partition wall 13b, within an outer peripheral wall 13a. Both of the walls project parallel to the axial direction from an end plate portion 13c of the cylinder head, and contact against the gasket element 33. The length of the inner partition wall 13b extends a little further from the

end plate portion 13c than the outer wall 13a, so that the inner partition wall 13b can reliably separate the suction chamber 34 from the discharge chamber 35, as the inner partition wall 13b is pressed firmly against the gasket element 33 when the cylinder head 13 is secured to the valve plate 31 through the gasket element 33 by the bolts 30. Because the end surface of the inner partition wall 13b first contacts against the gasket element 33 during the fastening operation of the cylinder head 13, the contact between the inner partition wall 13b and the gasket element 33 is more secure than that between the outer wall 13a and the gasket element 33.

A valve plate assembly comprises the valve plate 31, which is formed with a plurality of suction ports 36 connecting the suction chamber 34 and respective cylinders 27, and a plurality of discharge ports 37 connecting the discharge chamber 35 and respective cylinders 27, a suction reed valve (not shown), a discharge reed valve (not shown), a stopper plate 38 for suppressing excessive deformation of the discharge reed valve, and bolt and nut means 39 for securing the suction reed valve, the discharge reed valve and stopper plate 38 to the valve plate 31. The cylinder head 13 is secured on the end surface of the cylinder block 11 through the valve plate assembly and gasket element 33 by the bolts 30.

In operation of the compressor, the drive shaft 16 is driven by any suitable driving source, such as an automobile engine. The rotor 16 rotates with the drive shaft 16, so that the wobble plate 19 may nutate about the steel ball 21 according to the rotation of the inclined surface 15a of the rotor 15. The nutation of the wobble plate 19 causes successive reciprocation of the pistons 28. Therefore, evacuation and compression of the refrigerant gas is repeatedly and successively

performed in each cylinder. The refrigerant gas circulates through a cooling circuit which is connected between an inlet port 40 and an outlet port 41, which are provided on the cylinder head 13 and
5 connected with the suction chamber 34 and the discharge chamber 35, respectively.

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CLAIMS

1. A piston type refrigerant compressor including
a compressor housing; a cylinder block mounted within
5 the compressor housing and having a plurality of
equiangularly spaced cylinders and a plurality of
pistons slidably and closely fitted into respective
ones of the cylinders; a cylinder head provided with
an outer peripheral wall and an inner partition wall
10 dividing the interior of the cylinder head into
suction and discharge chambers, and fixed to one end
surface of the cylinder block with an interposed
valve plate means; and gasket elements disposed, one
between the end surface of the cylinder block and the
15 valve plate means, and the other between the valve
plate means and the cylinder head; wherein the inner
partition wall of the cylinder head projects further
towards the other gasket element than does the outer
peripheral wall.

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2. A compressor according to claim 1, wherein the
inner partition wall is annular, one of the chambers
being located within the inner partition wall and the
other of the chambers being formed in the annular
25 space between the inner partition wall and the outer
peripheral wall.

3. A compressor according to claim 2, wherein the
one chamber is the discharge chamber.

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4. A refrigerant compressor, substantially as
described with reference to the accompanying drawings.

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