

REFRIGERANT COMPRESSOR

5 The invention relates to a reciprocating piston type refrigerant compressor, and more particularly, to a gasket arrangement on both sides of a valve plate between a cylinder block and a cylinder head.

10 Figures 3 and 4 show a valve plate gasket arrangement in a conventional compressor. One face of a valve plate 1 is sealed to an end face of a cylinder block 2 by a gasket 3. The other face of the valve plate 1 is sealed to a face of a cylinder head 4 by a gasket 5. During the reciprocating
15 movement of the pistons, the refrigerant is drawn into the cylinders 6, of which only one is shown, from a suction chamber 7 through a suction hole 71 formed in the valve plate 1. Compressed refrigerant gas in the cylinders 6 is discharged to a discharge
20 chamber 8 through a discharge hole 81 formed in the valve plate 1. The end face of the cylinder block 2, the gaskets 3, 5, the valve plate 1 and the face of the cylinder head 4 are disposed parallel to one another. Thus, the pressure caused by compressed gas
25 normally acts against the gaskets 3, 5.

 In above described compressor, if a high pressure, caused by compression of liquid refrigerant, e.g. on start up, acts against the gasket disposed between the cylinder block and the
30 valve plate, the gasket is expanded outwardly and finally broken down.

 It is a primary object of the present invention to provide a refrigerant compressor, wherein durability is improved with small modification to
35 existing compressors, particularly with regard to the above mentioned gasket problem.

 In accordance with the present invention, a

refrigerant compressor comprises a compressor housing incorporating a cylinder block having a plurality of equiangularly spaced cylinders and a plurality of pistons slidably and closely fitted into respective one of the cylinders; a cylinder head fixed to one end of the cylinder block with an interposed valve plate; and gaskets disposed, one between an end face of the cylinder block and one face of the valve plate, and the other between the other face of the valve plate and the cylinder head; wherein a circular shaped depression is formed in the end face of the cylinder block and the gasket which is disposed between the cylinder block and the valve plate is located within the depression.

The invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a cross-sectional view through part of a refrigerant compressor in accordance with the present invention;

Figure 2 is a cross-sectional view of the compressor of the present invention;

Figure 3 is a view corresponding to Figure 1 but of a prior compressor;

Figure 4 is a view corresponding to a simplified version of Figure 2 but of the prior compressor.

Figures 1 and 2 show a refrigerant compressor in accordance with the present invention and comprising a cylindrical housing 10 incorporating a cylinder block 11, a front housing 12 and a cylinder head 13. The interior of the housing 10 defines a crank chamber 14 between the cylinder block 11 and the front housing 12. A 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 means of a bearing, such as a needle bearing 17, in the front housing 12. The rotor 15 is also supported on the inner surface of the front housing 12 by means of a thrust needle bearing 18. A wobble plate 19 is disposed on an inclined surface 15a of the rotor 15 through a thrust needle bearing 20. The wobble plate 19 is non-rotatably supported on a steel ball 21 seated at an end of a supporting member 22.

10 The supporting member 22 comprises a shank portion 22a having an axial bore 22b at one end, and a bevel gear portion 22c at the other end, which has a seat for the steel ball 21 at the centre thereof. The supporting member 22 is axially slidable but
15 non-rotatably supported within the cylinder block 11 by inserting the shank portion 22a into an axial bore 23 formed in the cylinder block 11. The rotation of the supporting member 22 is prevented by means of a key and key groove (not shown). A coil spring 24 is
20 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
25 22 engages with the bevel gear 26 mounted on the wobble plate 19 so that rotation of the wobble plate is prevented. The steel ball 21 is seated in the seat formed at the central portion of the bevel gear portion 22c and also seated in the seat formed at the
30 central portion of the bevel gear 26, so that the wobble plate 19 is rotatably but non-rotatably supported on the steel ball 21.

The cylinder block 11 is provided with a plurality of axial cylinders 27 formed therein,
35 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 connections

between the wobble plate 19 and one ends of the piston rods 29, and the connection between the pistons 28 and the other ends of the piston rods 29, are provided by ball joints.

5 On the outer end of the cylinder block 11, a cylinder head 13 is disposed and is secured thereto by means of bolts 30. A circular shaped depression 11a is formed on the outer end surface of the cylinder block 11. The depth of the depression 11a
10 is equal to, or a little smaller than, the axial thickness of a gasket 31 for receiving the gasket 31 therein. The gasket 31 is seated in the depression 11a and securely located therein by the fastening of a valve plate 32 to the outer end of the cylinder
15 block 11.

The cylinder head 13 is provided with a suction chamber 34 and discharge chamber 35 separated by a partition wall 131. A valve plate assembly 36 comprises the valve plate 32, having suction ports 37
20 connecting the suction chamber 34 and respective cylinders 27, and discharge ports 38 connecting the discharge chamber 35 and respective cylinders 27; a suction reed valve 39; a discharge reed valve 40; a stopper plate 41 for suppressing excessive
25 deformation of the discharge reed valve 40, and bolt and nut means 42 for securing the suction reed valve 39, the discharge reed valve 40 and the stopper plate 41 to the valve plate 32. The cylinder head 13 is secured on the end surface of the cylinder block 11,
30 through the valve plate assembly 36 and gasket 33 by mean of bolts 30. Thus, the interior of the compressor is sealed.

In operation of the compressor, the drive shaft 16 is driven by any suitable driving source, such as
35 an automobile engine. The rotor 15 rotates with the drive shaft 16, so that wobble plate 19 may nutate about the steel ball 21 according to the rotation of

5

- 5 -

the inclined surface 15a of the rotor 15. The nutation of the wobble plate 19 causes the reciprocation of the pistons 28. Therefore, the suction 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 43 and an outlet port 44, which are provided in the cylinder head 13 and connected with the suction chamber 34 and the discharge chamber 35, respectively.

15

20

25

30

35

CLAIMS

1. A refrigerant compressor comprising a
compressor housing incorporating a cylinder block
5 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 fixed to one end of the cylinder block
with an interposed valve plate; and gaskets disposed,
10 one between an end face of the cylinder block and one
face of the valve plate, and the other between the
other face of the valve plate and the cylinder head;
wherein a circular shaped depression is formed in the
end face of the cylinder block and the gasket which
15 is disposed between the cylinder block and the valve
plate is located within the depression.

2. A compressor according to claim 1, wherein the
depth of the depression is equal to, or a little
20 smaller than, the thickness of the gasket.

3. A refrigerant compressor, substantially as
described with reference to Figures 1 and 2 of the
accompanying drawings.

25

30

35

