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SPECIFICATION

SYO-9704

TITLE OF THE INVENTION

HERMETICALLY SEALED TYPE COMPRESSOR

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

This invention relates to a hermetically sealed type compressor. More specifically, it relates to a hermetically sealed type compressor which is closed up tight by storing an electric element having a rotary shaft in an upper portion of a cylindrical rolled case and a compression element driven by the rotary shaft of the electric element in a lower portion of the rolled case, joining a bottom end cap to a lower opening of the rolled case, and joining an end cap to an upper opening of the rolled case.

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2. Background Art

Fig. 4 shows the cross section of a hermetically sealed type compressor of the prior art (as disclosed in Japanese Utility Model Application Nos. Sho 60-87391 and Hei 20 3-26309).

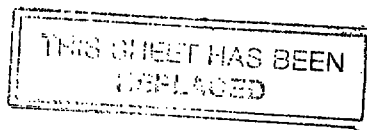
Reference numeral 50 denotes a hermetically sealed container having an oil reservoir 51 for storing oil in a bottom portion thereof, and an electric element 52 is housed in an upper portion thereof and a rotary compression element 25 53 is housed in a lower portion thereof. The electric



element 52 comprises a rotor 55 fitted onto a rotary shaft 54
and a stator 57 having oil return holes 56 formed in the
outer periphery thereof. Reference numeral 58 represents an
air gap defined by the outer periphery of the rotor 55 and
5 the inner periphery of the stator 57, and 59 an coil end of a
coil incorporated in the stator 57. The rotary compression
element 53 comprises a cylinder 60, a roller 62 which rotates
in the cylinder 60 by an eccentric portion 61 of the rotary
shaft 54, a vane 63, in contact with the roller, for
10 partitioning the cylinder 60, an upper bearing 64 and a lower
bearing 65 for covering the openings of the cylinder, a
discharge valve 66 provided in this upper bearing, and a cup
muffler 67 for covering the discharge valve. Reference
numeral 68 denotes a discharge hole formed in the cup muffler
15 67, 69 a refrigerant discharge pipe extending through an
upper central portion of the hermetically sealed container 50
whose upper portion is closed up tight by joining the end cap
70, 71 an accumulator and 72 a fixing base welded to a bottom
portion of the hermetically sealed container 1. Arrows
20 indicate the flow directions of the refrigerant.

In the hermetically sealed type compressor
structured above, a refrigerant compressed by the rotary
compression element 53 passes through the air gap 58 of the
electric element 52 and is supplied above this electric
25 element. Oil contained in the refrigerant supplied above the





electric element 52 is separated by centrifugal forced generated by the rotation of the rotor 55. This separated oil is scattered to the side of the stator 57. Therefore, this refrigerant gas is discharged to the outside of the hermetically sealed container 50 from the refrigerant discharge pipe 69. The separated oil is returned to the oil reservoir 51 of the hermetically sealed container 50 from the oil return holes 56 formed in the outer periphery of the stator 57.

10 However, since a barrel portion 50A of the hermetically sealed container 50 excluding the end cap 70 is formed by deep drawing a steel plate, a special steel plate (such as SPHE for deep drawing) which can be deep drawn must be used. When the draw ratio is large, there occur such
15 problems as uneven thickness and high costs.

To overcome these problems, there has been proposed a hermetically sealed type compressor which is closed up tight by using a cylindrical rolled case formed by rolling a normal steel plate and welding joint portions, storing the
20 electric element having a rotary shaft in an upper portion of the rolled case and the compression element driven by the rotary shaft of the electric element in a lower portion of the rolled case by such means as shrinkage fitting, joining a bottom end cap to a lower opening of the rolled case by such
25 means as arc welding and joining an end cap having a



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refrigerant discharge pipe to an upper opening of the rolled case.

However, when the bottom end cap is to be joined to the lower opening of the rolled case which houses the electric element and the compression element by such means as arc welding, the lower portion of the rolled case is deformed by heat at the time of joining and the stored compression element is thermally distorted, whereby sliding cannot be carried out smoothly.

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SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a hermetically sealed type compressor which is closed up right by storing an electric element having a rotary shaft in an upper portion of a cylindrical rolled case and a compression element driven by the rotary shaft of the electric element in a lower portion of the rolled case, joining a bottom end cap to a lower opening of the rolled case, and joining an end cap to an upper opening of the rolled case and which eliminates the above inconvenience caused by heat at the time of joining even when the bottom end cap is joined to the lower opening of the rolled case which stores the electric element and the compression element by such means as arc welding.

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The inventors of the present invention have

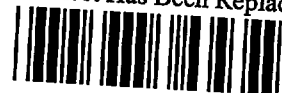


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conducted intensive studies on the above problem and have found that the above inconvenience occurs in this type of hermetically sealed type compressor of the prior art when the bottom end cap is joined to the lower opening of the rolled case which stores the electric element and the compression element by such means as arc welding because the distance from the fixed center of the cylinder of the compression element to a lower end of the rolled case is generally 35 to 37.5 mm and that the above inconvenience can be eliminated in any type of hermetically sealed type compressor when the distance is increased to at least 40 mm.

According to a first aspect of the present invention, there is provided a hermetically sealed type compressor which is closed up tight by storing an electric element having a rotary shaft in an upper portion of a cylindrical rolled case and a compression element driven by the rotary shaft of this electric element in a lower portion of the rolled case, joining a bottom end cap for covering a lower opening of the rolled case to the lower opening, and joining an end cap having a refrigerant discharge pipe to an upper opening of the rolled case so that an absorbed refrigerant is compressed by the compression element, discharged into the hermetically sealed container and then discharged to the outside of the hermetically sealed container from the refrigerant discharge pipe, wherein the

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distance from the fixed center of the cylinder of the compression element to a lower end of the rolled case is set to at least 40 mm.

According to a second aspect of the present invention, there is provided a hermetically sealed type compressor according to the first aspect wherein the bottom end cap is joined by arc welding.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects as well as advantages of the present invention will become clear by the following description of a preferred embodiment of the present invention with reference to the accompanying drawings, wherein:

Fig. 1 is a sectional view of a hermetically sealed type compressor according to an embodiment of the present invention;

Fig. 2 is a diagram for explaining an exemplary production process of the hermetically sealed type compressor of the present invention;

Fig. 3 is a perspective view of the hermetically sealed type compressor of the present invention; and

Fig. 4 is a sectional view of a hermetically sealed type compressor of the prior art.



DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 is a sectional view of a hermetically sealed type compressor according to a preferred embodiment of the present invention.

5 In Fig. 1, reference numeral 1 denotes a hermetically sealed container having an oil reservoir 2 for storing oil in a bottom portion thereof, and an electric element 3 is housed in an upper portion of the container and a rotary compression element 5 driven by the rotary shaft 4
10 of the electric element is housed in a lower portion of the container. The electric element 3 comprises a stator 6 fixed to the interior wall of the hermetically sealed container 1 and a rotor 8 fitted onto the rotary shaft 4 through an air gap 7 within the stator. The stator 6 comprises an iron core
15 10 having oil return holes 9 formed by cutting away the outer periphery thereof and a coil 12 having coil ends 11 arranged at upper and lower ends thereof. The rotor 8 comprises an iron core 13 and end rings 14 provided at upper and lower ends of the iron core.

20 A half-ring upper balancer 15 and lower balancer 16 are attached to the respective end rings. The rotary compression element 5 comprises a cylinder 17, a roller 19 which rotates in the cylinder 17 by the eccentric portion 18 of the rotary shaft 4, a vane 20, in contact with the roller,
25 for partitioning the cylinder 17, an upper bearing 21 and a



lower bearing 22 for covering the openings of the cylinder 17, a discharge valve provided in the upper bearing, and a cup muffler 24 for covering the discharge valve. A discharge port 25 is formed in the top surface of the cup muffler in such a manner that it faces the rotary orbit of the lower balancer 16.

Reference numeral 26 denotes a refrigerant discharge pipe extending through the end cap 27 for covering a top portion of the hermetically sealed container 1.

Reference numeral 28 represents an accumulator, 29 a separation plate, 30 a bottom end cap joined to the lower opening of the rolled case 1A by arc welding, and 31 a base joined to the bottom end cap 30. Arrows show the flow directions of a refrigerant.

Fig. 2 is a diagram for explaining an exemplary production process of the hermetically sealed type compressor of the present invention.

In Fig. 2, the stator and a pump (compression element) are first set and stored in an expanded cylindrical rolled case formed by rolling a normal steel plate and joining joint portions thereof at predetermined positions by shrinkage fitting in such a manner that the stator is located in an upper portion of the case and the pump (compression element) is located in a lower portion of the case. The cylinder of the stored pump (compression element) is



tackwelded and fixed to the rolled case by arc welding.

Thereafter, the bottom end cap is joined to the lower opening of the rolled case by arc welding and the base is welded to the bottom end cap. After a collet is removed, the rotor is
5 heated, placed in the container and stored by shrinkage fitting. After cooling, the end cap is welded to the upper opening of the rolled case. Thus, the hermetically sealed type compressor of the present invention is produced.

Fig. 3 is a perspective view of the hermetically
10 sealed type compressor of the present invention. In Fig. 3, the same or corresponding elements are given the same reference symbols as those of Fig. 1.

Since the distance h (see Fig. 1) from the fixed center of the cylinder 17 of the compression element 5 to the
15 lower end of the rolled case 1A is set to 40 mm or more, the hermetically sealed container 1 is free from such inconvenience that a lower portion of the rolled case 1A is deformed by heat generated at the time of joining, the compression element 5 is thermally distorted, or the roller
20 19 does not rotate or slide smoothly even when the bottom end cap 30 is joined to the lower opening of the rolled case 1A which stores the electric element 3 and the compression element 5.

In the hermetically sealed type compressor
25 structured above, the refrigerant flowing into the cylinder



17 is compressed by the roller 19 and the vane 20 which work together and discharged into the cup muffler 24 by opening the discharge valve 23. The refrigerant in the cup muffler passes through the air gap 7 of the electric element 3 from the discharge port 25 and is discharged above the electric element. The refrigerant discharged above the electric element 3 is turned by the rotation of the rotor 8 and oil having a heavy mass contained in the refrigerant is scattered to the side of the interior wall of the hermetically sealed container 1 and separated by centrifugal force generated by turning. The refrigerant from which the oil has been separated is discharged to the outside of the hermetically sealed container 1 from the discharge pipe 26. The separated oil is returned to the oil reservoir 2 from the oil return holes 9 of the stator 6.

The hermetically sealed type compressor of the present invention is closed up right by using a cylindrical rolled case formed by rolling a normal steel plate and welding joint portions thereof, storing an electric element having a rotary shaft in an upper portion of the rolled case and a compression element driven by the rotary shaft of the electric element in a lower portion of the rolled case by such means as shrinkage fitting, joining a bottom end cap to a lower opening of the rolled case by such means as arc welding, and joining an end cap having a refrigerant

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discharge pipe to an upper opening of the rolled case. Since the distance from the fixed center of the cylinder of the compression element to the lower end of the rolled case is set to 40 mm or more, even when the bottom end cap is joined, 5 such inconvenience that a lower portion of the rolled case is deformed by heat generated at the time of joining, the stored compression element is thermally distorted, or sliding is not carried out smoothly is eliminated in any type of hermetically sealed type compressor.

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WHAT IS CLAIMED IS:

1. A hermetically sealed type compressor which is closed up tight by storing an electric element having a rotary shaft in an upper portion of a cylindrical rolled case and a
5 compression element driven by the rotary shaft of this electric element in a lower portion of the rolled case, joining a bottom end cap for covering a lower opening of the rolled case to the lower opening, and joining an end cap having a refrigerant discharge pipe to an upper opening of
10 the rolled case so that an absorbed refrigerant is compressed by the compression element, discharged into the hermetically sealed container and then discharged to the outside of the hermetically sealed container from the refrigerant discharge pipe, wherein
15 the distance from the fixed center of the cylinder of the compression element to a lower end of the rolled case is set to at least 40 mm.
2. The hermetically sealed type compressor of claim 1,
20 wherein the bottom end cap is joined by arc welding.

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