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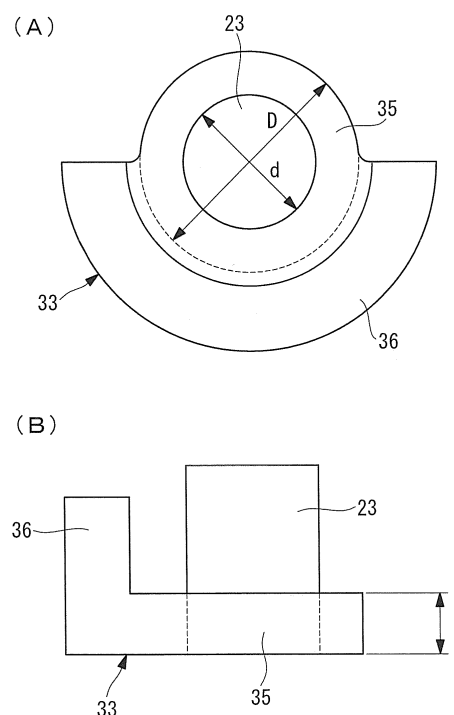
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(54) **SCROLL COMPRESSOR WITH BALANCE WEIGHT**

(57) A scroll compressor comprising:
an orbiting scroll (20) joined with a crank pin (12) provided at an end of a drive shaft (11), the orbiting scroll (20) being supported about the shaft (11) by a bearing member (6) via a drive bush (23), so that the orbiting scroll (20) can be driven in a revolving orbital manner,
a balance weight (33) provided on the drive bush (23) by means of shrink fitting, and such that $l/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that, in a shrink fitted portion (35), an axial-direction length of a fitting portion (35) of the balance weight (33) to be shrink fitted to the drive bush (23) is l , that an inner diameter thereof is d , and that an outer diameter thereof is D .

FIG. 2



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Description

{Technical Field}

5 **[0001]** The present invention relates to a scroll compressor provided with a balance weight that is integrated with a drive bush by means of shrink fitting.

{Background Art}

10 **[0002]** With a scroll compressor, because an orbiting scroll is eccentrically driven in a revolving orbital manner, the configuration thereof causes an unbalanced load to act on a drive shaft. In order to cancel out or adjust a tooth-surface load due to this unbalanced load or the centrifugal force exerted by the orbiting scroll, a balance weight is provided in a drive shaft system. The balance weight is integrally provided on, for example, a drive bush that is for driving an orbiting scroll and that is mounted to a crank pin provided at an end of the drive shaft, on the drive shaft, on an end surface of a motor rotor that is joined with the drive shaft, or the like.

15 **[0003]** Patent Literature 1 discloses a system in which a balance weight is integrally provided on a drive bush, and Patent Literature 2 discloses a system in which a balance weight is integrally provided on a crank-pin portion of a drive shaft and the balance weight is also integrally provided on an end surface of a motor rotor that is joined with the drive shaft. In the case in which a balance weight is integrally provided on a drive bush, the usual method is to integrally mold the two or to shrink fit a fitting portion of the balance weight to the drive bush.

{Citation List}

{Patent Literature}

25

[0004]

{PTL 1} Japanese Unexamined Patent Application, Publication No. 2013-119820

{PTL 2} Japanese Unexamined Patent Application, Publication No. Sho 59-110887

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{Summary of Invention}

{Technical Problem}

35 **[0005]** In recent years, there has been a demand for enhancing the capacity of compressors to be installed in refrigerators, air conditioners, heat pumps, or the like, and scroll compressors are no exception. In order to enhance the capacity of a compressor, first, it is conceivable to increase the volume by increasing the displacement volume thereof; however, this has not been considered to be a preferable method because the size of the compressor is increased. Therefore, alternative measures are being developed, where the capacity of a compressor is enhanced by increasing the rotational speed thereof so that, for example, a capacity previously achieved by using two compressors is achieved by using one compressor.

40 **[0006]** In this case, with a scroll compressor, the tooth-surface load is increased due to the centrifugal force exerted by an orbiting scroll, or the unbalanced load is increased due to eccentric orbiting of the orbiting scroll; therefore, unless a balance weight is appropriately provided, the balance with the drive shaft or the like is shifted, and there is a risk of problems occurring, such as vibrations generated in a high-rotational-speed region. Because of this, although it is essential to increase the size of a balance weight when increasing the rotational speed of a scroll compressor, it is necessary to solve the problems described below in order to increase the size of the balance weight.

50 (1) Because an increase in the size of the balance weight increases the centrifugal force exerted by the balance weight, in the case of a unit in which the balance weight is integrally provided on the drive bush by means of shrink fitting, there is a risk of causing damage due to a lack of strength in the shrink fitted portion.

(2) There is a problem of ensuring a space for installing and accommodating the balance weight to be increased in size without increasing the size of the compressor.

55 **[0007]** The present invention has been conceived in light of the above-described circumstances, and an object thereof is to provide a scroll compressor with which it is possible to enhance the strength by which a balance weight is shrink fitted to a drive bush, where the size of the balance weight is increased in correspondence with an increase in the rotational speed of a compressor, and with which it is also possible to ensure a space for installing and accommodating

the balance weight.

{Solution to Problem}

5 **[0008]** In order to solve the above-described problems, a scroll compressor of the present invention will employ the following solutions.

[0009] Specifically, a scroll compressor according to an aspect of the present invention is a scroll compressor including a crank pin that is provided at an end of a drive shaft that is supported about a shaft by a bearing member; and an orbiting scroll that is joined with the crank pin via a drive bush so that the orbiting scroll can be driven in a revolving orbital manner, wherein a balance weight is integrally provided on the drive bush by means of shrink fitting, and $l/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that, in a shrink fitted portion, an axial-direction length of a fitting portion of the balance weight to be shrink fitted to a drive bush is l , that an inner diameter is d , and that an outer diameter is D .

10 **[0010]** With the above-described aspect, because the balance weight is provided by being shrink fitted to the drive bush and $l/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that, in the shrink fitted portion, the axial-direction length of the fitting portion of the balance weight to be shrink fitted to the drive bush is l , that the inner diameter is d , and that the outer diameter is D , by setting the axial-direction length l and the outer diameter D to be sufficiently large relative to the inner diameter d of the fitting portion of the balance weight to be shrink fitted to the drive bush, it is possible to increase the shrink fitting strength by alleviating the contact pressure at the shrink fitted portion or stress due to the centrifugal force or the like, and, when increasing the rotational speed of the scroll compressor, even if the size of the balance weight is increased and the centrifugal force thereof is increased, it is possible to prevent damage or the like due to a lack of strength in the shrink fitted portion. Therefore, it is possible to enhance the capacity of the scroll compressor by realizing high rotational speed in the scroll compressor by reliably canceling out or adjusting the unbalanced load and the tooth-surface load that are increased by increasing the rotational speed of the orbiting scroll, by means of the balance weight.

15 **[0011]** When a currently available unit (for which l/d and D/d are substantially 0.21 and 1.28, respectively), which is a model preceding the present invention and whose maximum rotational speed is set to 140 rps, was rotated at 200 rps, the above-described shrink fitted portion was damaged; however, by satisfying the above-described conditions, it was confirmed that the shrink fitted portion is not damaged even if the maximum rotational speed is set to 200 rps.

[0012] In the above-described scroll compressor, the balance weight may be provided with a weight portion in an arc-shape at an outer circumferential portion of the fitting portion to be shrink fitted to the drive bush, and the weight portion may have a shape that is extended in an axial direction from both surfaces of the fitting portion.

20 **[0013]** By doing so, with the balance weight, because the arc-shaped weight portion is provided at an outer circumferential portion of the fitting portion to be shrink fitted to the drive bush and the weight portion has a shape that is extended in the axial direction from both surfaces of the fitting portion, by employing the balance weight having a T-shaped cross-section, it is possible to decrease the distance from the fitting portion to the center-of-gravity of the weight portion as compared with the case of an L-shaped balance weight, it is possible to decrease a bending moment that acts on the fitting portion (shrink fitted portion) due to the centrifugal force exerted by the balance weight, thus allowing the stress thereof to be alleviated, and, moreover, it is possible to increase the size of the balance weight without expanding it in a radial direction. Therefore, it is possible to sufficiently increase the size of the balance weight so as to match the increase in the unbalanced load or the like, and it is also possible to contribute to increasing the rotational speed of the scroll compressor by further increasing the shrink fitting strength.

25 **[0014]** In the above-described scroll compressor, the bearing member may be provided with a concave portion that receives a weight portion that is extended from a surface of the fitting portion of the balance weight away from the orbiting scroll.

30 **[0015]** By doing so, because the bearing member is provided with the concave portion that receives the weight portion that is extended from the surface of the fitting portion of the balance weight away from the orbiting scroll, even if a balance weight having a T-shaped cross-section whose weight portion is extended from a surface of the fitting portion away from the orbiting scroll is employed as the balance weight, it is possible to accommodate the weight portion that is extended from the surface away from the orbiting scroll in the concave portion of the bearing member and to rotate the weight portion in the interior thereof. Therefore, even if the size of the balance weight is sufficiently increased without increasing the size of the scroll compressor, it is possible to ensure space to accommodate it and to contribute to increasing the rotational speed of the scroll compressor.

35 **[0016]** In any one of the above-described scroll compressors, the balance weight may be provided with a cut-out portion at a distal end of a weight portion at an outer circumferential side thereof, which is extended from an orbiting-scroll-side surface of the fitting portion, interference with a thrust bearing portion of the orbiting scroll, provided in the bearing member, may be avoided by means of the cut-out portion, and thus, the weight portion may be extended toward the orbiting scroll.

40 **[0017]** By doing so, with the balance weight, the cut-out portion is provided at the distal end of the weight portion at

the outer circumferential side thereof, which is extended from the surface of the fitting portion on the orbiting scroll side, and, because the weight portion is extended toward the orbiting scroll by avoiding, by means of the cut-out portion, interference with the thrust bearing portion of the orbiting scroll, provided in the bearing member, it is possible to increase the size of the balance weight by an amount corresponding to the amount of the extension toward the orbiting scroll by providing the cut-out portion at the distal end of the weight portion at the outer circumferential side thereof and by avoiding interference with the thrust bearing portion. Therefore, by installing and accommodating the larger balance weight without increasing the size of the scroll compressor, it is possible to contribute to increasing the rotational speed of the scroll compressor by satisfactorily canceling out the unbalanced load or the like.

{Advantageous Effects of Invention}

[0018] With the present invention, by setting the axial-direction length 1 and the outer diameter D to be sufficiently large relative to the inner diameter d of a fitting portion of a balance weight to be shrink fitted to a drive bush, it is possible to increase the shrink fitting strength by alleviating the contact pressure at a shrink fitted portion or stress due to the centrifugal force or the like, and, when increasing the rotational speed of a scroll compressor, even if the size of the balance weight is increased and the centrifugal force thereof is increased, it is possible to prevent damage or the like due to a lack of strength in the shrink fitted portion; therefore, it is possible to enhance the capacity of the scroll compressor by realizing high rotational speed in the scroll compressor by reliably canceling out or adjusting, by means of the balance weight, the unbalanced load and the tooth-surface load that are increased by increasing the rotational speed of the orbiting scroll.

{Brief Description of Drawings}

[0019]

{Fig. 1} Fig. 1 is a longitudinal sectional view of a scroll compressor according to a first embodiment of the present invention.

{Fig. 2A} Fig. 2A is a plan view showing shrink fitting structures of a drive bush and a balance weight of the above-described scroll compressor.

{Fig. 2B} Fig. 2B is a longitudinal sectional view (B) showing the shrink fitting structures of the drive bush and the balance weight of the above-described scroll compressor.

{Fig. 3} Fig. 3 is a longitudinal sectional view of a scroll compressor according to a second embodiment of the present invention.

{Fig. 4} Fig. 4 is a longitudinal sectional view of a scroll compressor according to a third embodiment of the present invention.

{Description of Embodiments}

[0020] Embodiments according to the present invention will be described below with reference to the drawings.

{First Embodiment}

[0021] A first embodiment of the present invention will be described by using Fig. 1, Fig. 2A, and Fig. 2B.

[0022] Fig. 1 is a longitudinal sectional view of a scroll compressor according to the first embodiment of the present invention, Fig. 2A is a plan view of shrink fitting structures of a drive bush and balance weight, and Fig. 2B is a longitudinal sectional view thereof.

[0023] In this embodiment, a closed-type scroll compressor will be described as an example of a scroll compressor 1. This scroll compressor 1 is provided with a closed housing (closed container) 2 has a cylindrical shape whose bottom portion is sealed with a lower-portion cover and that is elongated in the top-to-bottom direction.

[0024] The upper portion of the closed housing 2 is sealed with a discharge cover 3 and an upper-portion cover 4, and a discharge chamber 5 into which compressed high-pressure gas is discharged is formed between the discharge cover 3 and the upper-portion cover 4. Inside the closed housing 2, an upper bearing member 6 is securely installed at an upper portion thereof, a scroll compression mechanism 7 is mounted via this upper bearing member 6, and a motor 8 constituted of a stator 9 and a rotor 10 is installed at a lower portion thereof. This motor 8 is mounted by having the stator 9 thereof securely installed in the closed housing 2, and the drive shaft (crank shaft) 11 is secured to the rotor 10 thereof.

[0025] At the upper end of the drive shaft 11, a crank pin 12, whose shaft center is decentered by a predetermined amount, is provided, and, by joining the crank pin 12 with the scroll compression mechanism 7, the scroll compression

mechanism 7 can be driven by the motor 8. The upper-end portion of the drive shaft 11 is supported about the shaft by a journal bearing portion 6A of the upper bearing member 6 in a freely rotatable manner, and a lower end portion thereof is supported by a lower journal bearing 13 provided at a lower portion of the closed housing 2 in a freely rotatable manner.

5 [0026] A displacement-type oil supplying pump 14 is provided between the lower journal bearing 13 and a bottom-end portion of the crank shaft 11 and is configured so as to take in lubrication oil 16 loaded in an oil sump 15 formed at a bottom portion of the closed housing 2 via an intake pipe 17 and so as to discharge the lubrication oil 16 into an oil supplying hole 18 provided inside the crank shaft 11 in the axial direction thereof. This lubrication oil 16 can be supplied, via the oil supplying hole 18, to sites requiring lubrication, such as the upper bearing member 6, the scroll compression mechanism 7, the lower journal bearing 13, or the like.

10 [0027] The scroll compression mechanism 7 includes the upper bearing member 6 as a constituent component thereof; is provided with a stationary scroll 19 that is securely installed on this upper bearing member 6, an orbiting scroll 20 that is supported by a thrust bearing portion 6B of the upper bearing member 6 in a freely slidable manner and that forms a compression chamber 21 by being engaged with the stationary scroll 19, a self-rotation preventing mechanism 22, such as an Oldham ring or the like, that is interposed between the upper bearing member 6 and the orbiting scroll 20, that prevents self rotation of the orbiting scroll 20, and that allows a revolving orbital motion thereof, and a drive bush 23 and an orbit bearing 24 that are provided between the crank pin 12 of the crank shaft 11 and a bearing boss 20A provided at the back face of the orbiting scroll 20 and that transmit the rotational force exerted by the crank shaft 11 to the orbiting scroll 20; and is installed on the upper bearing member 6 in a state in which a center portion of an end plate of the stationary scroll 19 is connected to the discharge cover 3.

20 [0028] As it is widely known, the stationary scroll 19 is provided with an end plate and a spiral wrap that is vertically provided on the end plate, and is configured such that a discharge port 25 is provided at a center portion of the end plate and a tip seal (not shown) is installed at a wrap tooth-tip surface of the spiral wrap; similarly, the orbiting scroll 20 is provided with an end plate and a spiral wrap that is vertically provided on the end plate, and is configured such that a bearing boss 20A is provided at a back face of the end plate and a tip seal (not shown) is installed at a wrap tooth-tip surface of the spiral wrap.

25 [0029] This scroll compression mechanism 7 takes in refrigerant gas, which is taken into the closed housing 2 via the intake pipe 26, into the compression chamber 21 from an intake port 27 provided in the closed housing 2 and compresses the refrigerant gas into high-temperature, high-pressure gas. This compressed gas is discharged into the discharge chamber 5 via the discharge port 25, which is provided at the center portion of the stationary scroll 19, and a discharge valve 28, which is provided in the discharge cover 3, and is discharged further toward the refrigeration cycle to which the scroll compressor 1 is connected via a discharge pipe 29 connected to the discharge chamber 5.

30 [0030] On the other hand, the lubrication oil 16 is supplied, by means of the oil supplying pump 14, to the drive bush 23 and the orbit bearing 24 from an end portion of the crank pin 12 via the oil supplying hole 18, and the lubrication oil 16 that has lubricated these components is drained into a motor upper space (intake region) in the closed housing 2 via an oil draining hole 30 provided in the upper bearing member 6, and is made to drop into the oil sump 15 at the bottom portion of the closed housing 2 via an oil guide 31 and an oil pathway 32 that is provided at the outer circumference of the motor stator 9.

35 [0031] At the scroll compression mechanism 7, because the orbiting scroll 20 is driven in a revolving orbital manner about the shaft center of the drive shaft (crank shaft) 11, where the amount by which the crank pin 12 is decentered is set as the radius, an unbalanced load is exerted on the drive shaft 11 due to the centrifugal force thereof, and, as is known, because the orbiting radius of the orbiting scroll 20 is made variable by employing a slide bush or an eccentric bush as the drive bush 23, a tooth-surface load is exerted between the orbiting scroll 20 and the stationary scroll 19 due to the centrifugal force that acts on the orbiting scroll 20.

40 [0032] In order to cancel out or adjust the unbalanced load and the tooth-surface load, balance weights 33 and 34 are provided in the drive bush 23 and the motor rotor 10. These balance weights 33 and 34 have a semicircular arc shape; the balance weight 33 is integrally joined with the bottom-end portion of the drive bush 23 by means of shrink fitting, and the balance weight 34 is securely installed, via bolts or the like, in an area that slightly exceeds 180° along an outer circumference on the top-end surface side that faces the upper bearing member 6 of the motor rotor 10.

45 [0033] In this embodiment, in order to increase the strength of a shrink fitted portion of the balance weight 33 to be shrink fitted to the drive bush 23 for the purpose of realizing high rotational speed in the scroll compressor 1, with regard to a fitting portion 35 of the balance weight 33 that has an L-shaped cross-section and that is constituted of the fitting portion 35 to be shrink fitted to the drive bush 23 and an arc-shaped weight portion 36 that extends in the axial direction at the outer circumferential portion thereof, dimensions l, d, and D are set so as to satisfy the following conditions, as shown in Figs. 2A and 2B.

50 [0034] Specifically, in order to increase the strength of the shrink fitted portion, at least $l/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that the axial-direction length of the fitting portion 35 of the balance weight 33 to be shrink fitted to the drive bush 23 is l, that the inner diameter of the fitting portion 35 to be mated with the outer circumference of the drive bush 23 is d, and that the outer diameter of the fitting portion 35 is D.

[0035] With the above-described configuration, this embodiment affords the following operational effects.

[0036] With the above-described scroll compressor 1, as is known, the compression chamber 21 that is formed between a pair consisting of the stationary scroll 19 and the orbiting scroll 20 is formed by engaging the pair consisting of the stationary scroll 19 and the orbiting scroll 20 so as to individually face the spiral wrap and so that the phases thereof are shifted by 180°.

[0037] When the scroll compressor 1 is driven by the motor 8, low-pressure refrigerant gas that has been taken into the closed housing 2 via the intake pipe 26 is taken into the compression chamber 21 via the intake port 27 and is trapped therein, and, in association with the revolving orbital motion of the orbiting scroll 20 in the state in which the compression chamber 21 is sealed, a compression operation is performed by moving the orbiting scroll 20 from an outer circumferential position to a center position while reducing the volume. By doing so, the refrigerant gas is compressed to high pressure, is discharged to the discharge chamber 5 via the discharge port 25 and the discharge valve 28, and is subsequently discharged toward the refrigeration cycle via the discharge pipe 29.

[0038] During this time, the drive shaft 11 and the orbiting scroll 20 are rotated by the motor 8, which is rotated at a rotational speed according to a required load, at a low rotational speed in a low-load region and at a high rotational speed in a high-load region. Because the orbiting scroll 20 is driven in an eccentric orbital manner, as described above, an unbalanced load is exerted on the drive shaft 11 due to the centrifugal force thereof. Because the orbiting scroll 20 is driven in an orbital manner, the tooth-surface load is exerted between the orbiting scroll 20 and the stationary scroll 19 due to the centrifugal force thereof.

[0039] The unbalanced load and the tooth-surface load are canceled out or adjusted to an appropriate load by the balance weights 33 and 34 provided in the drive shaft system.

[0040] Here, although the balance weight 33 is integrated with the bottom-end portion of the drive bush 23 by means of shrink fitting, regarding the shrink fitted portion thereof, at least $l/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that the axial-direction length of the fitting portion 35 is l , that the inner diameter of the fitting portion 35 is d , and that the outer diameter of the fitting portion 35 is D , and thus, by setting the axial-direction length l and the outer diameter D to be sufficiently large relative to the inner diameter d of the fitting portion 35, it is possible to considerably enhance the shrink fitting strength by alleviating the contact pressure at the shrink fitted portion or stress due to the centrifugal force or the like.

[0041] As above, with this embodiment, when increasing the rotational speed of the scroll compressor 1, even if the size of the balance weight 33 is increased and the centrifugal force is increased, it is possible to prevent damage or the like due to a lack of strength in the shrink fitted portion. Because of this, it is possible to enhance the capacity of the scroll compressor 1 by realizing high rotational speed in the scroll compressor 1 by reliably canceling out or adjusting, by means of the balance weight 33, the unbalanced load and the tooth-surface load that are increased by increasing the rotational speed of the orbiting scroll 20.

[0042] In a comparison with a currently-available scroll compressor, although the maximum rotational speed was set at 140 rps, $l/d = 0.214$ and $D/d = 1.286$ for a first compressor, and $l/d = 0.203$ and $D/d = 1.250$ for a second compressor in the currently-available scroll compressor, as a result of rotating the respective compressors at a maximum rotational speed of 200 rps, both compressors were damaged at the shrink fitted portions thereof, such that the shrink fitted portions came off or the like.

[0043] On the other hand, by using actual units developed as a solution according to the present invention, namely, one having $l/d = 0.268$ and $D/d = 1.429$ and the other having $l/d = 0.253$ and $D/d = 1.438$, it was confirmed that rotating at a maximum rotational speed of 200 rps resulted in no damage to the shrink fitted portions, and both units remained normal. Accordingly, results were obtained indicating that, by setting l/d and D/d so as to at least satisfy $l/d \geq 0.25$ and $D/d \geq 1.4$, it is possible to enhance the capacity of the scroll compressor 1 by increasing the rotational speed by raising the maximum rotational speed thereof to 200 rps.

{Second Embodiment}

[0044] Next, a second embodiment of the present invention will be described by using Fig. 3.

[0045] This embodiment partially differs from the above-described first embodiment in terms of the configuration of a balance weight 33A. Because other points are the same as those of the first embodiment, descriptions thereof will be omitted.

[0046] As shown in Fig. 3, in this embodiment, weight portions 36A and 36B of the balance weight 33A are extended in the axial direction from both surfaces of a fitting portion 35A, the balance weight 33A has a T-shaped cross-sectional shape, and a concave portion 6C that receives the weight portion 36B extended downward (away from the orbiting scroll) is provided at the bottom surface of an orbiting-scroll drive-portion accommodating space of the upper bearing member 6.

[0047] As described above, by configuring the balance weight 33A so that the weight portions 36A and 36B are extended in the axial direction from both surfaces of the fitting portion 35A, so as to have a T-shaped cross-section, and so that the concave portion 6C that receives the weight portion 36B, which is extended downward, is provided at the

bottom surface of the orbiting-scroll drive-portion accommodating space of the upper bearing member 6, it is possible to increase the size of the balance weight 33A by an amount corresponding to the size of the weight portion 36B. Even if the size of the balance weight 33A is increased, by accommodating the larger portion in the concave portion 6C provided in the upper bearing member 6, it is possible to install and accommodate the larger balance weight 33A without

5 increasing the size of the scroll compressor 1.
[0048] Because of this, as compared with the L-shaped balance weight 33A, by decreasing the distance from the fitting portion 35A to the centers-of-gravity of the weight portions 36A and 36B, it is possible to decrease a bending moment that acts on the fitting portion (shrink fitted portion) 35A due to the centrifugal force exerted by the balance weight 33A, which allows the stress thereof to be alleviated; moreover, it is possible to increase the size of the balance weight 33A without expanding it in the radial direction; and, consequently, it is possible to sufficiently increase the size of the balance weight 33A so as to match an increase in the unbalanced load or the like, and it is also possible to contribute to increasing the rotational speed of the scroll compressor 1 by further increasing the shrink fitting strength.

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[0049] Because the weight portion 36B extended downward from the bottom surface of the fitting portion 35A of the balance weight 33A, that is, the surface away from the orbiting scroll, is accommodated in the concave portion 6C of the bearing member 6 and is rotated at the interior thereof, by increasing the size of the balance weight 33A without increasing the size of the scroll compressor 1, it is possible to achieve a balance by satisfactorily canceling out the unbalanced load or the like resulting from increasing the rotational speed, and therefore, it is possible to enhance the capacity of the scroll compressor 1 by increasing the rotational speed thereof.

20 {Third Embodiment}

[0050] Next, a third embodiment of the present invention will be described by using Fig. 4.

[0051] This embodiment partially differs from the above-described second embodiment in terms of the configuration of the balance weight 33B. Because other points are the same as those of the second embodiment, descriptions thereof will be omitted.

25
[0052] As shown in Fig. 4, in this embodiment, a cut-out portion 36D is provided at a top surface of a fitting portion 35B of the balance weight 33B that has a T-shaped cross-section, that is, the distal end of the weight portion 36C at an outer circumferential side thereof, which is extended upward from a surface on the orbiting scroll side; interference with a thrust bearing portion 6C of the orbiting scroll 20, provided in the bearing member 6, is avoided by means of the cut-out portion 36D; and thus, the weight portion 36C is further extended toward the orbiting scroll.

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[0053] As has been described above, by providing the cut-out portion 36D at the distal end of the weight portion 36C at the outer circumferential side thereof, which is extended upward and by further extending the weight portion 36C toward the orbiting scroll by avoiding the interference with the thrust bearing portion 6C, it is possible to increase the size of the balance weight 33B by an amount corresponding to the amount of the extension. Therefore, by installing and accommodating the larger balance weight 33B without increasing the size of the scroll compressor 1, it is possible to contribute to increasing the rotational speed of the scroll compressor 1 by satisfactorily canceling out the unbalanced load or the like.

35
[0054] The present invention is not limited to the above-described embodiments, and appropriate modifications are possible within a range that does not depart from the scope thereof. For example, although an example in which the present invention is applied to the closed-type scroll compressor 1 having the motor 8 built into the closed housing 2 has been described in the above embodiments, it is needless to say that the present invention can similarly be applied to an open-type scroll compressor 1 having a non-built-in motor 8.

40
[0055] The unbalanced load exerted on the drive shaft (crank shaft) 11, which is caused by driving the orbiting scroll 20 in an eccentric manner, is dispersed and canceled out by the balance weights 33 and 34 or the like provided in the drive bush 23 and the motor rotor 10; however, a balance weight may directly be provided on the drive shaft 11.

{Reference Signs List}

50 **[0056]**

1	scroll compressor
6	upper bearing member
6B	thrust bearing portion
7	scroll compression mechanism
55 11	drive shaft (crank shaft)
12	crank pin
20	orbiting scroll
23	drive bush

33, 33A, 33B	balance weight
35, 35A, 35B	fitting portion
36, 36A, 36B, 36C	weight portion
36D	cut-out portion

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Claims

1. A scroll compressor (1) comprising:

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a crank pin (12) that is provided at an end of a drive shaft (11), said end being supported about the shaft by a bearing member (6); and
 an orbiting scroll (20) that is joined with the crank pin (12) via a drive bush (23) so that the orbiting scroll (20) can be driven in a revolving orbital manner,

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wherein a balance weight (33; 33A; 33B) is integrally provided on the drive bush (23) by means of shrink fitting, and

$1/d \geq 0.25$ and $D/d \geq 1.4$ are satisfied, assuming that, in a shrink fitted portion, an axial-direction length of a fitting portion (35; 35A; 35B) of the balance weight (33; 33A; 33B) to be shrink fitted to a drive bush (23) is 1, that an inner diameter of the fitting portion (35; 35A; 35B) is d, and that an outer diameter of the fitting portion (35; 35A; 35B) is D.

20

2. A scroll compressor according to Claim 1, wherein the balance weight (33; 33A; 33B) is provided with a weight portion (36; 36A; 36B; 36C) in an arc-shape at an outer circumferential portion of the fitting portion (35; 35A; 35B) to be shrink fitted to the drive bush (23), and the weight portion (36; 36A; 36B; 36C) has a shape that is extended in an axial direction from both surfaces of the fitting portion (35).

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3. A scroll compressor according to Claim 2, wherein the bearing member (6) is provided with a concave portion (6C) that receives a weight portion (36B) that is extended from a surface of the fitting portion (35) of the balance weight (33; 33A; 33B) away from the orbiting scroll.

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4. A scroll compressor according to any one of Claims 1 to 3, wherein the balance weight (33B) is provided with a cut-out portion (36D) at a distal end of a weight portion (36A) at an outer circumferential side thereof, which is extended from an orbiting-scroll-side surface of the fitting portion (35).

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FIG. 1

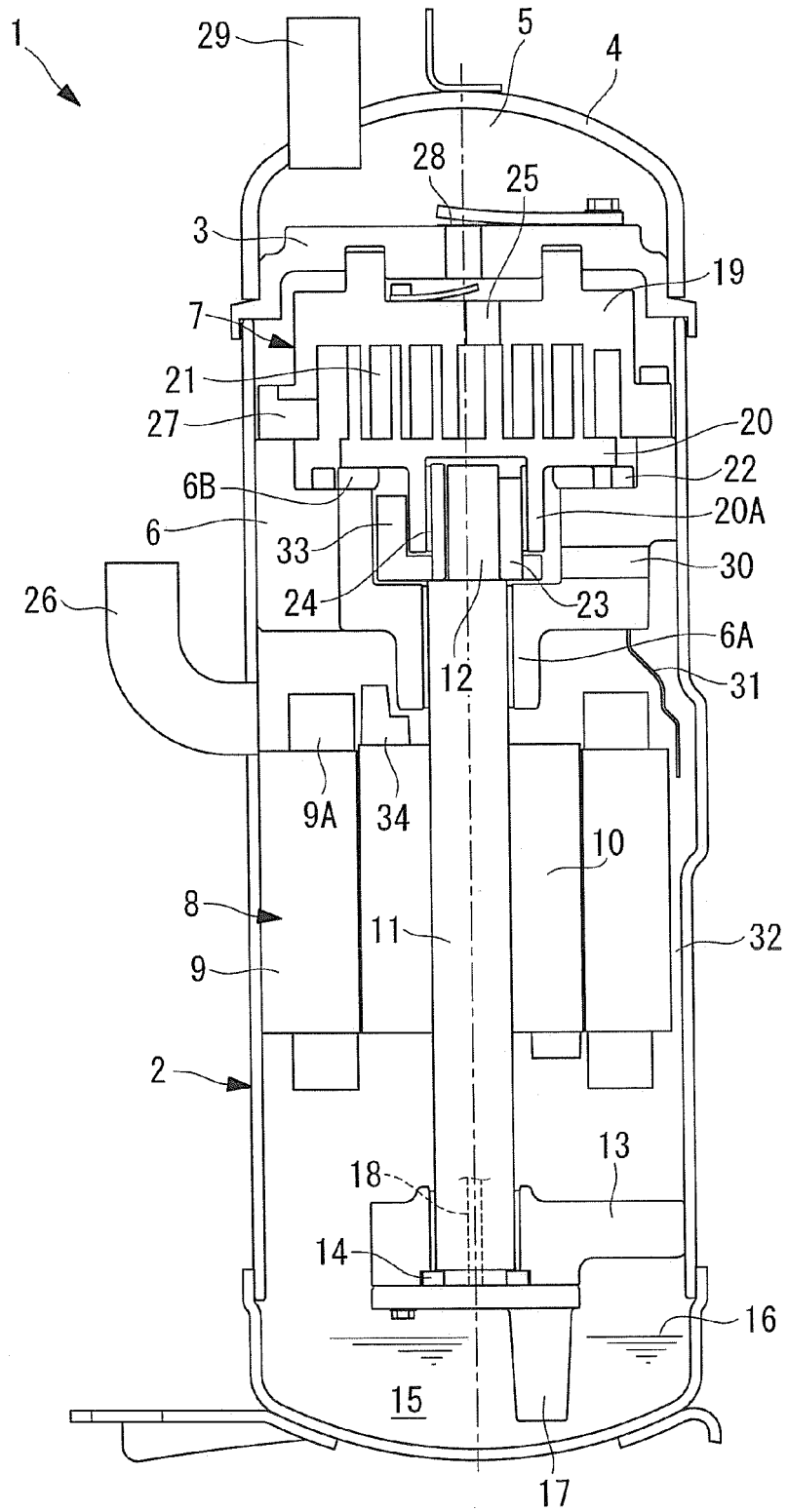


FIG. 2

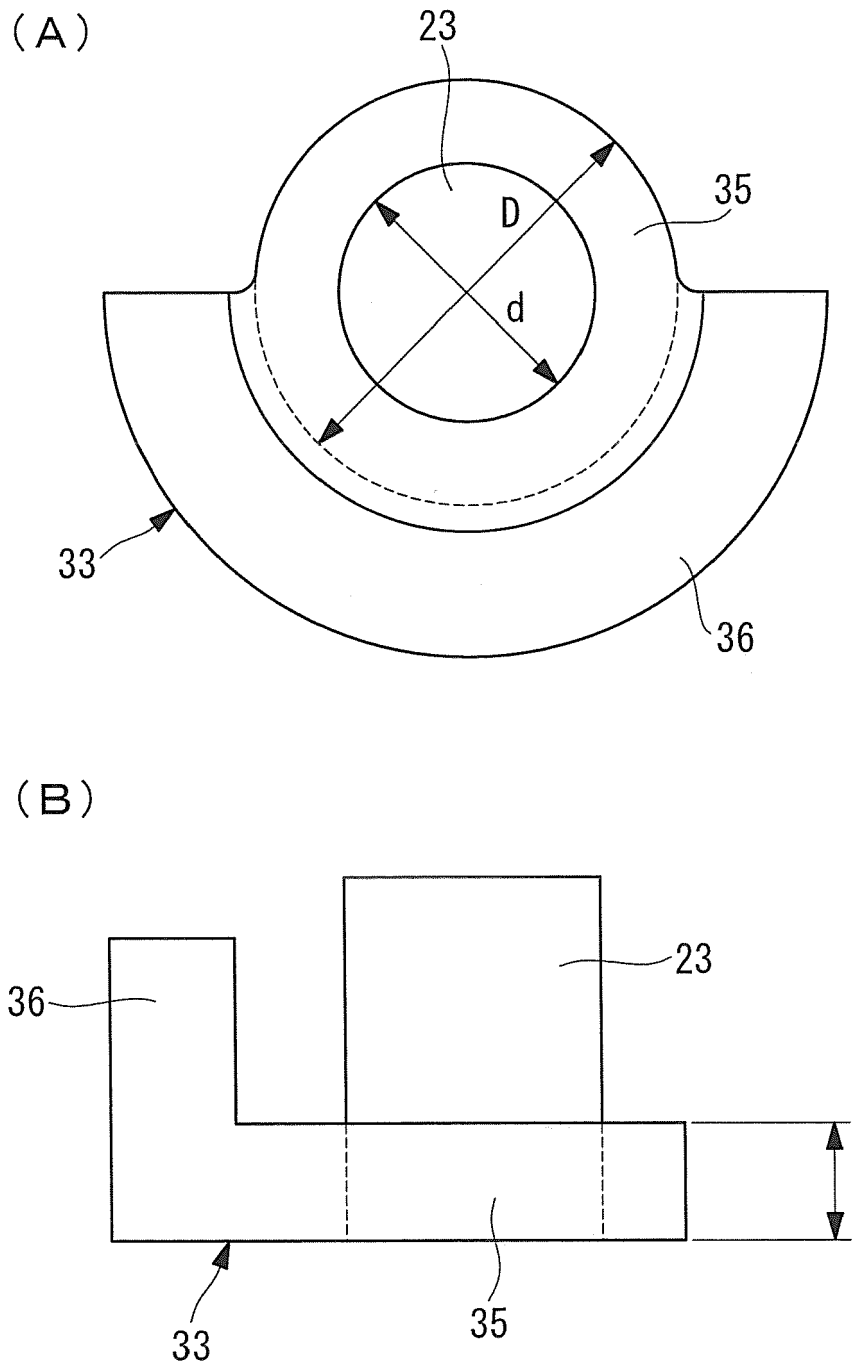


FIG. 3

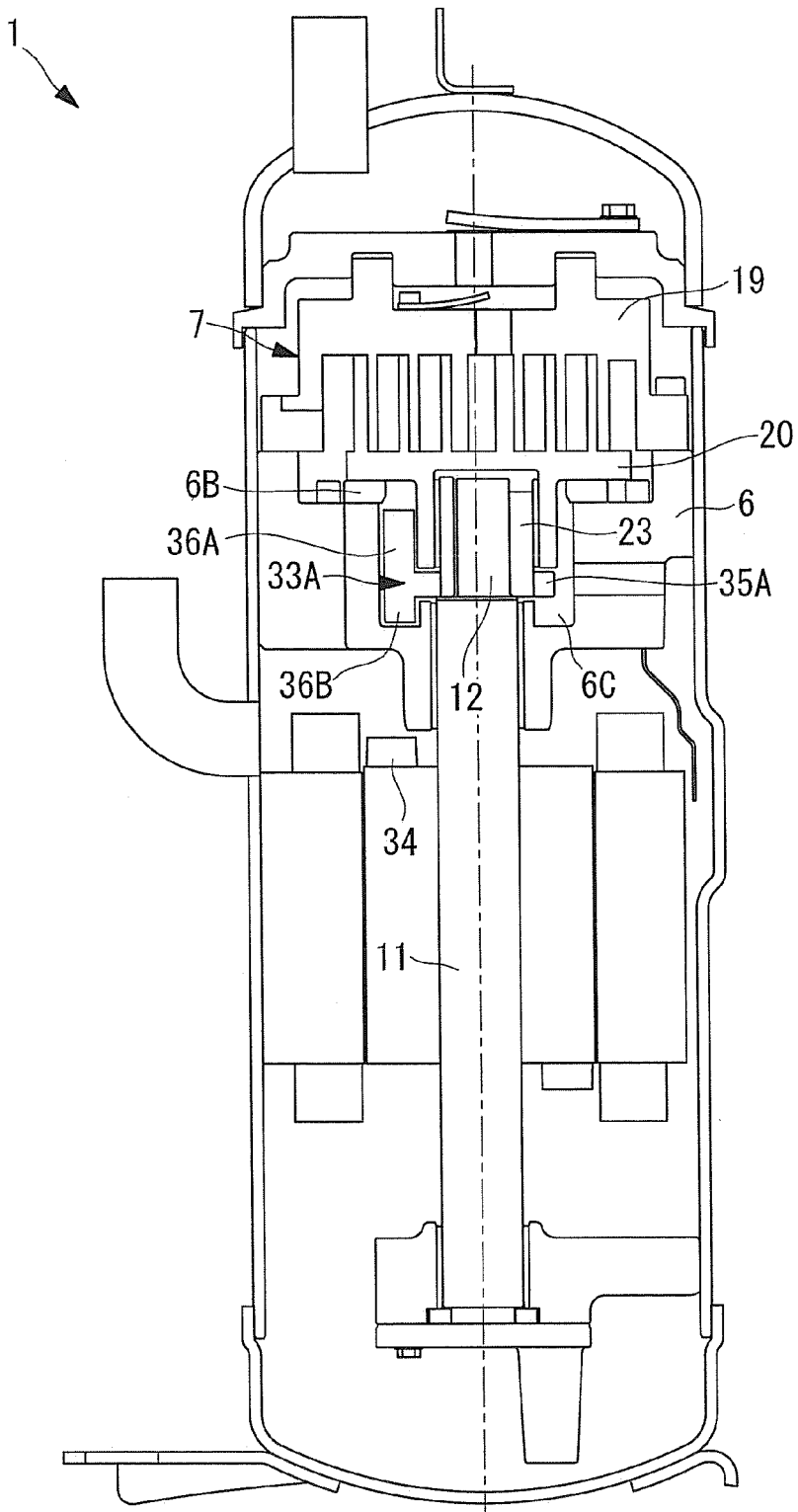
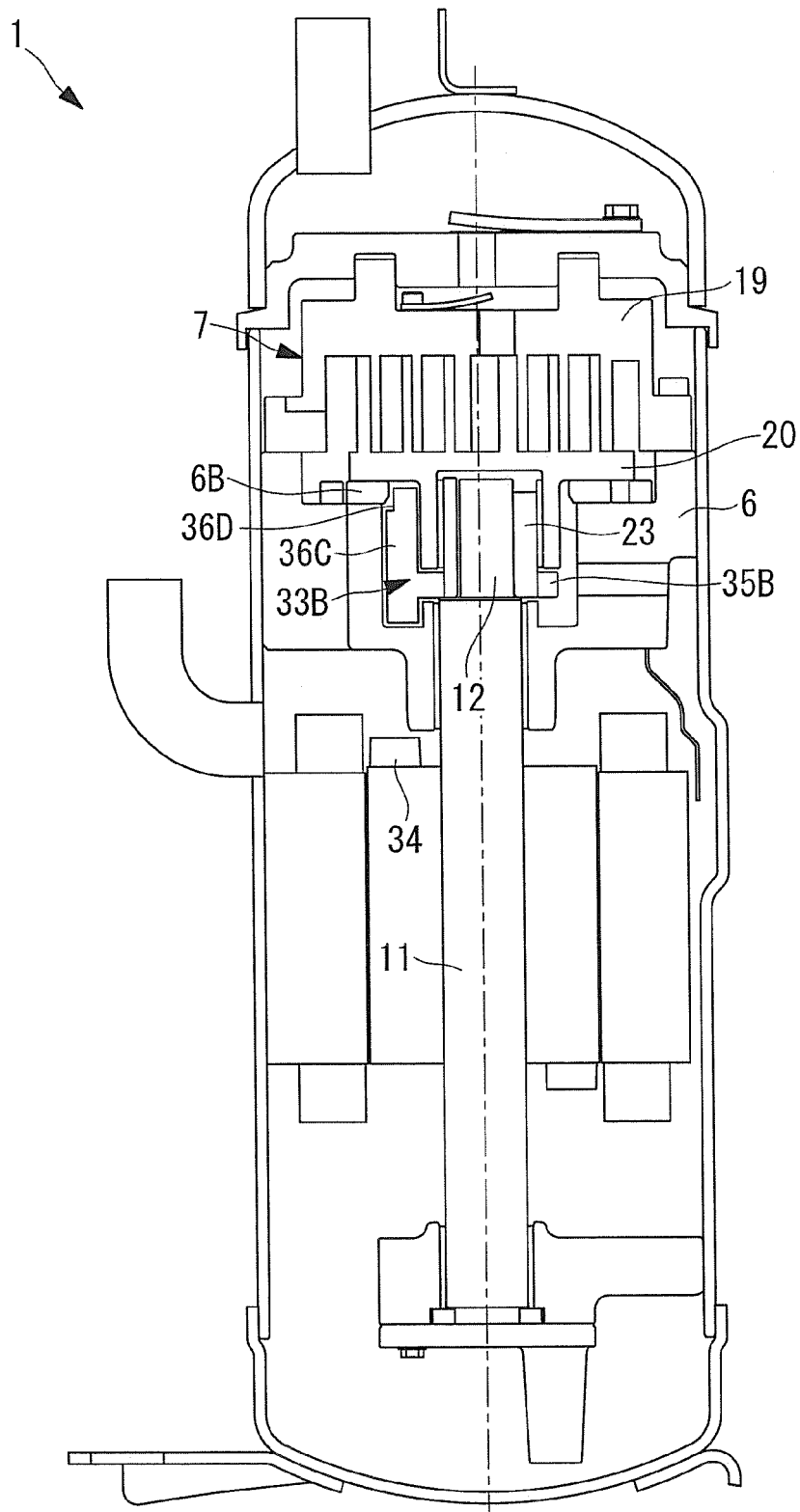


FIG. 4





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