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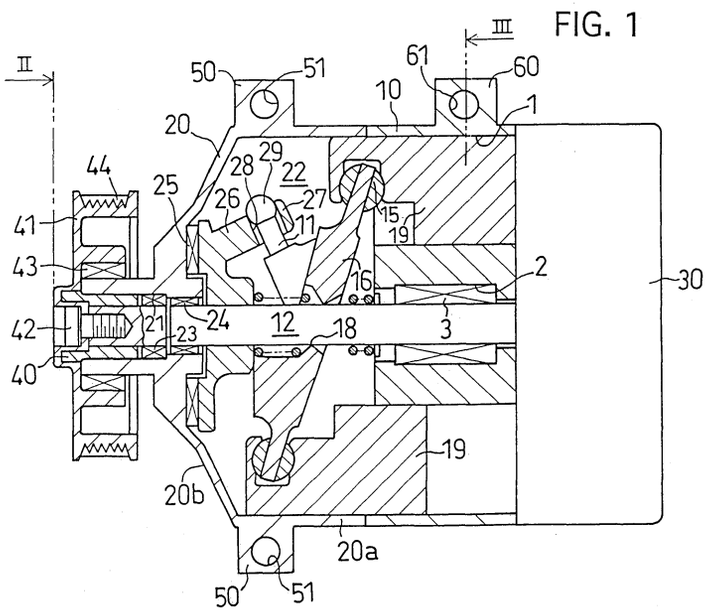
(54) Compressor

(57) The present invention intends to provide a compressor having a mounting construction which can be mounted to the mounted body even in a limited setting space in the vehicle.

That is, in the compressor comprised of a bore housing 10, plural pistons 19, a driving shaft 12, and a side housing 20, the side housing 20 has at least two main mounting portions 50 each having a fitting portion which extends in a tangential direction of the side housing and into which a main fixing bolt means 53 is inserted; and the bore housing 10 has at least one sub mounting portion 60 having a fitting portion which extends in a tangential direction of the bore housing and into which a sub fixing bolt means 63 is inserted.

FIG. 1



EP 1 113 172 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to a compressor which has a peculiar mounting construction to a mounted body.

Related Background Art

[0002] A compressor is mounted to a mounted body such an engine in a vehicle by various types of mounting constructions. On example of them is disclosed in Japanese U.M. Laid-Open No. 2-43478. In this mounting construction, a compressor has a mounting portion having a fitting hole, and an engaging pin provided below the fitting hole, while a mounted body has a screw hole into which a bolt is inserted, and a pin hole into which the engaging pin is inserted. When the compressor is mounted to the mounted body, the engaging pin is engaged with the pin hole for a provisional fixing.

[0003] This mounting construction can make the mounting of the compressor to the mounted body easy, and reduce load of workers required for a mounting work.

[0004] On the other hand, Japanese U.M. Laid-Open No. 7-14178 discloses an another type of mounting construction of a compressor.

[0005] This compressor includes a first mounting portion having a fitting hole, and a second mounting portion of U-shape. When the compressor is mounted to a mounted body, the second mounting portion is engaged with a bolt provided for fixing the compressor to the mounted body. This mounting construction can also render the same advantage as the above.

[0006] However, both of the above compressors, mounted to the mounted bodies by the engaging style, need to be tilted or swayed in a setting space. This is not satisfactory as the mounting construction used in the narrow or limited setting space. For example, in a vehicle having installed a fuel saving (small fuel consuming) engine, a special apparatus such as a fuel injection control device or an ignite timing control device is set in an engine room, which limits the space for setting an apparatus driven by the engine such as the compressor. Also, in a small-size vehicle having been developed from an aspect of environment protection and having small amount of an exhausting gas, an engine room is small. This is also limits the setting space for the compressor.

[0007] However, a compactness of the mounting portion corresponding to the limited setting space weakens the mounting portion, deforming a housing, and causing troubles of the compressor. For securing a necessary compressing capacity of a refrigerant gas, a main body of the compressor can be hardly made small excessively.

[0008] Here, a radial dimension of the compressor may be shortened by positioning the mounting portion near to a cylinder bore in a radial direction of the housing. However, the cylinder bore may be deformed by a fastening force applied to the mounting portion upon the mounting of the compressor to the mounted body.

SUMMARY OF THE INVENTION

[0009] In view of the above circumstances, the present invention has been made to provide a compressor having a mounting construction which can be mounted to the mounted body even in a limited setting space in the vehicle, and which hardly causes a bad sliding of the piston. For overcoming the above problem, inventors of the present invention have hit upon to mount the compressor to the mounted body strongly by a main mounting portion at a point remote from the piston, and weakly by a sub mounting portion at a point near to the piston.

[0010] That is, the compressor is comprised of a bore housing including plural cylinder chambers spaced in a circumferential direction thereof, plural pistons each being slidably inserted into the cylinder chamber, a driving shaft disposed coaxialy with the bore housing and a side housing including a driving means driven by the driving shaft to drive the pistons.

[0011] In such compressor, the side housing has, on an outer peripheral surface thereof, at least two main mounting portions each having a fitting portion which extends in a tangential direction of the side housing and into which a main fixing bolt means is inserted; and
the bore housing has, on an outer peripheral surface thereof, at least one sub mounting portions having a fitting portion which extends in a tangential direction of the bore housing and into which a sub fixing bolt means is inserted.

[0012] The compressor of the present invention is mounted to the mounted body strongly by the at least two main mounting portions formed on the side housing, and is weakly mounted thereto by the at least one sub mounting portion formed on the bore housing. The compressor can be fixed to the mounted body by the main mounting portions with being held by the sub mounting portion, without being tilted or swayed even in the limited setting space. Even in the compressor in which the sub mounting portion is disposed near to the cylinder bore in the radial direction thereof, the sub mounting portion is mounted to the mounted body by the sufficiently small fastening force. As a result, the deformation of the bore housing upon the mounting can be prevented.

[0013] The present invention can have various embodying modes to be explained below.

<Compressor>

[0014] The bore housing of the compressor can have

a cylindrical shape, and the side housing to be connected therewith can have a cap or container shape. In a space formed by the bore housing and the side housing, a driving shaft rotatably supported by the both housings etc. is rotated by a driving source provided outside the housings. On a swash plate mounted on the driving shaft to be rotated together therewith, plural pistons are provided via shoe connecting portions. The pistons reciprocately slide in cylinder chambers formed in the cylinder block to compressor the refrigerant gas in the bore housing.

<Side Housing, Main mounting portions, Main Fixing Bolt Means>

[0015] For example, two main mounting portions can be provided on the side housing at two positions facing to the mounted body and separated by a predetermined distance. They can be positioned at the same position or at the different position in an axial direction of the side housing, and can be disposed to be parallel or to make a predetermined angle (eg. right angle) in a circumferential direction thereof. The main mounting portion, together with the main fixing bolt means such as bolts, fixes the compressor to the mounted body strongly. The side housing of cap shape having large rigidity does not deform even when large fastening force is applied to the main mounting portions by the main fixing bolt means.

<Bore Housing, Sub Mounting Portion, Sub Fixing Bolt Means>

[0016] For example, one main mounting portion can be provided on the bore housing at an upper portion or a lower portion facing to the mounted body. Two sub mounting portions can be provided at the upper and lower portions of the bore housing. They can be disposed at the same position or the different positions in the axial direction of the bore housing, and can be disposed to be parallel or to make a predetermined angle in the circumferential direction thereof. In the circumferential direction, the main mounting portions and the sub mounting portion can be disposed at the same position or the different position.

[0017] One or two sub mounting portion(s) fixes, together with the sub fixing bolt means such as a bolt, the compressor to the mounted body weakly. Small fastening force applied to the sub mounting portion by the sub fixing bolt means does not deform the bore housing even if it has the small rigidity.

[0018] The sub mounting portion protrudes radially outwardly from an outer peripheral surface of the bore housing, having a predetermined width in the axial direction thereof. It can have a small dimension or large dimension in a tangential direction of the bore housing, to respectively have a thin-plate shape or a rod shape.

[0019] The thin-plate shape mounting portion can be preferably shifted form a top portion of the bore housing in the circumferential direction thereof, and can have a thickness smaller than the fitting portion(inserting hole or fitting groove). Due to the orientation of the fitting portion, the sub mouning portion may be deformed by the sub fixing bolt means, but the bore housing may not be deformed. The sub mounting portion is preferably disposed, relative to a contacted point between the fitting portion extending tangentially and the bore housing, to be separated by the distance as small as possible. Such relative position can shorten the distance between the sub mounting portion and the mounted body, so that the compressor can be mounted to the mounted body even in the limited setting space such as the engine room.

[0020] When the thin-plate shape sub mounting portion has the inserting hole of circular shape in section, the sub fixing bolt means can be made of a metal such as a steel having a large rigidity, and can be comprised of a bushing and a bolt. The bushing abuts at one portion thereof to the sub mounting portion and abuts to the outer peripheral surface of the cylinder block at other portion thereof. The bolt is fitted into an axial hole of the bushing and the fitting portion of the sub mounting portion. The bushing can be comprised of, for example, a main body and one flange or two flanges provided at one end or both ends thereof to have a L shape or a U shape. Preferably, a portion of the main body facing to the outer peripheral surface of the bore housing is notched. The notch portion allows the bushing to be come closer to the outer peripheral surface of the bore housing, whereby the setting space can be utilized effectively. The mounting work can be easily carried out by merely fastening the bolt by a fastening tool.

[0021] Also, the sub fixing bolt means can be comprised of a bolt having a taped female screw and a tapered male screw to be screwed thereinto. The tapered female screw is formed on an inner peripheral surface of a hollow portion formed in a head portion. With screwing of the tapered male screw into the tapered female screw, an outer diameter of the head portion increases to be abutted to the inserting hole by pressure. In addition, after having been screwed, the tapered male screw is inserted into the tapered female screw which is inserted into the inserting hole. For this reason, the bolt does not protrude from the sub mounting portion in the thickness direction thereof, which makes the mounting work in the limited setting space easier.

[0022] When the sub mounting portion has the U-shaped fitting groove, the sub fixing bolt means can be comprised of a bolt attached to the mounted body by screwing etc. and extended therefrom to be fitted into the fitting hole. The compressor can be fixed to the mounted body by merely engaging or latching the sub mounting portion with the sub fixing bolt means having been provisionally fixed to the mounting body in advance. In addition, the sub fixing bolt means can be comprised of a stud bolt extended from the mounted body and fitted into the fitting groove, and a nut to be screwed thereinto. This sub fixing bolt means can omit the bolt

to be fitted into the fitting groove.

[0023] On the other hand, the rod-shaped sub mounting portion can be comprised of a protruded portion and a fixed cylinder body. The protruded portion protrudes radially outwardly from the outer periphery of the bore housing and extending in the tangential direction, and has a sliding hole extending in a longitudinal direction thereof. The fixed cylinder body is inserted into the sliding hole slidably in the axial direction. The sub fixing bolt means is inserted into the fixed cylinder body to be fixed to the mounted body. Upon the fixing, the fixing force by the sub fixing bolt means is mainly applied to the fixed cylinder body not to deform the bore housing.

BRIEF EXPLANATION OF THE DRAWINGS

[0024]

Fig. 1 is a longitudinal sectional view of a compressor according to an embodiment 1;
Fig. 2 is a view observed along a line II - II in Fig. 1, and shows a main mounting portion of the compressor;
Fig. 3 is a view observed along a line III - III in Fig. 1, and shows
a sub mounting portion of the compressor;
Fig. 4 is a cross sectional view showing a sub mounting portion of a compressor according to an embodiment 2;
Fig. 5 is a front view of a compressor according to an embodiment 3;
Fig. 6 is a cross sectional view of a the sub mounting portion according to the embodiment 3;
Fig. 7 is a front view of a compressor according to an embodiment 4;
Fig. 8 is a cross sectional view of a sub mounting portion according to the embodiment 4;
Fig. 9 is a cross sectional view showing a sub mounting portion of a compressor according to the embodiment 5;
Fig. 10 is cross sectional view showing a sub mounting portion of a compressor according to the embodiment 6; and
Fig. 11 is cross sectional view showing a sub mounting portion of a compressor according to the embodiment 7.

PREFERRED EMBODIMENT OF THE INVENTION

[0025] Hereinafter, various embodiments of the present invention will be explained with reference to attached drawings.

<Embodiment 1>

[0026] As shown in Fig. 1, a cylinder block (bore housing) 10 has therein plural cylinder bores (cylinder chambers) 1 and an axial hole 2. At a front end of the cylinder block 10, a cap-shaped front housing (side housing) 20 is joined. At a rear end of the cylinder block 10, a rear housing 30 is joined via a sucking valves, valve plate, discharge valves and a retainer (not shown).

[0027] The front housing 20 is formed an axial hole 21. In a containing chamber 22 formed by the front end of the cylinder block 10 and the front housing 20, a driving shaft 12 is disposed. The driving shaft 12 is rotatably supported by the axial hole 21 via a seal 23 and a radial bearing 24, and by the axial hole 2 via a radial bearing 3. A swash plate 16 is mounted on the driving shaft 12 at a throughhole 18.

[0028] A lug plate 26 is fixed to the driving shaft 12 and supported by the front housing 20 via a thrust bearing 25. Each of a pair of arms 27 protruded from the lug plate 26 rearwardly is formed a guiding hole 26 having a cylindrical inner surface. From the front end of the swash plate 16, a pair of guiding pins 29 protrude toward each of the arms 27. Each of the guiding pins 29 is provided, at a tip end thereof, a guiding portion 11 having a spherical outer surface which rotates with sliding in the guiding hole 28. At one side of the swash plate 16, plural pistons 19 are disposed via a shoes 15 engaging with an outer periphery of the swash plate 16, being contained within each of the cylinder bore 1.

[0029] To a boss 40 spline-engaged with a protruded portion of the driving shaft 12 protruded from the front housing 20, a pulley 41 is fixed. The pulley 41 is fixed to the driving shaft 12 via a bolt 42 and is rotatably supported by the front housing via a bearing 43. A belt 44 is wound on the pulley 41.

[0030] On an outer peripheral surface of the housing, main mounting portions 50 and a sub mounting portion 60 are formed. As shown in Figs. 1 and 2, the main mounting portions 50 protrude radially outwardly from an outer peripheral surface of the cap-shaped front housing 20 at a boundary area between a cylinder portion 20a and a lid portion 20b. One (upper) main mounting portion 50 is formed at a top portion 20c and other (lower) main mounting portion 50 is formed at a bottom portion 20d of the front housing 20. Each main mounting portion 50 has a rod shape of rectangular cross-section, and extends tangentially by a predetermined length, to be parallel each other. Each main mounting portion 50 has a inserting hole 51 having a circular shape in cross-section and extending in an axial direction thereof (tangential direction of the front housing 20). A bolt 53 is inserted into the inserting hole 51 via a washer 52 to be screwed into an engine (mounted body) EG at a tip end thereof. Thus, two main mounting portions 50 fix the front housing 20 to the engine EG strongly.

[0031] As shown in Fig. 1, on an outer peripheral surface of the cylinder block 10, at a position near to the rear housing 30 in the axial direction, the sub mounting portion 60 protruding radially outwardly is formed. As shown in Fig. 3, the sub mounting portion 60 is sligtly shifted or offset from a top portion 10a, protruding upwardly up to a same level (height) as an upper end of

the main mounting portion 50 (refer to Fig. 1). The sub mounting portion 60 has a width in the axial direction of the cylinder block 10 same as that of the main mounting portion 50, and has small length (thickness) in the tangential direction thereof to have a plate shape. In the circumferential direction of the cylinder block 10, the sub mounting portion 60 is formed at a position corresponding to one end of the main mounting portion 50. The thickness direction of the sub mounting portion 60 coincides with the longitudinal direction of the main mounting portion 50. A inserting hole 61 of circular shape in cross-section is formed in the sub mounting portion 60.

[0032] As shown in Fig. 3, between one end surface of the sub mounting portion 60 and the outer peripheral surface of the cylinder block 10, a bushing 62 made of an iron and having a L-shape longitudinal section is disposed. It is comprised of a main portion 62a of semicircular in cross section, and a bent portion 6 2b extended from one end of the main body 62a by the right angle and is provided with a circular throughhole. The other end of the main body 62a abuts to one end surface of the sub mounting portion 60, the main body 62 faces to the outer peripheral surface of the cylinder block 10, a tip end of the bent portion 62b abuts to the outer surface of the cylinder block 10. A bolt 63 inserted into the bent portion 62b via a washer 64 to be parallel to the main portion 62a is screwed into the engine EG at a tip end thereof.

[0033] When fixing the sub mounting portion 60 to the engine EG by the bushing 62 and the bolt 63, the fastening force is applied to the thickness direction of the sub mounting portion 60, but is not applied to the cylinder block 10. For this reason, the cylinder bore 1 in the cylinder block 10 does not deform.

[0034] The operation of compressor which is same as that of the conventional compressor and which has substantially no relevancy with the present invention. So, explanation of it is omitted.

[0035] Next, embodiment 2 to embodiment 7 of the present invention will be explained. They differ from the embodiment 1 only in a construction of the sub mounting portion.

<Embodiment 2>

[0036] In an embodiment 2 shown in Fig. 4, a sub mounting portion 6 0 has a construction substantially same as that of the embodiment 1. A bushing 62 is comprised of a plate-shaped main body 62a, and a pair of flange portions 62b1 and 62b2 bent by the right angle at both ends of the main body 62a, to have a U-shape in longitudinal section. One flange portion 62b1 abuts to the outer peripheral surface of the cylinder block 10 at a position remote from the sub mounting portion 60, and other flange portion 62b2 abuts to the side surface of the sub mounting portion 60 and the outer peripheral surface of the cylinder block 10. The cylinder block 10 is fixed to the engine EG by the bushing 62 and the bolt 63 in the same way as the embodiment 1.

[0037] The sub mounting portion 60 can render advantages same as that of the embodiment 1, and is excellent in simple construction of the bushing 62.

<Embodiment 3>

[0038] In an embodiment 3 shown in Figs. 5 and 6, a sub mounting portion 70 is slightly shifted on a peripheral surface of the cylinder block 10 from a top portion 10a in a circumferential direction. It protrudes radially outwardly, having a predetermined width in an axial direction, and being thin in a tangential direction. The sub mounting portion 70 has a U-shaped groove 71 extended in the thickness direction thereof (tangential direction of the cylinder block 10). A bolt 73 fitted into the fitting groove 71 via a washer 72 is screwed into an engine EG at a tip end thereof.

[0039] By engaging the sub mounting portion 70 with the bolt 73 provisionally fixed to the engine EG in advance, the cylinder block 10 is fixed to the engine EG. In addition, a head portion of the bolt 73 is contained within a space of triangle shape in cross-section formed by the cylinder 10 and the sub mounting portion 70, which is convenient for the effective utilization of the space.

<Embodiment 4>

[0040] In an embodiment 4 shown in Figs. 7 and 8, near to a top portion 10a a sub mounting portion 60 same as the above sub mounting portion 60 is provided, while near to a bottom portion lOb a sub mounting portion 70 same as the above sub mounting portion 70 is provided. As shown in Fig. 8, into a fitting groove 71 of the sub mounting portion 70 a bolt 73 is fitted via a washer 72 to be screwed into an engine EG at a tip end thereof. The sub mounting portion 60 not having been fixed to the engine EG in this embodiment 4 can be fixed therewith as ocassion demands. The sub mounting portion 70 can, in addition to the advantages of the embodiment 3, use the space below the cylinder block 10 effectively.

<Embodiment 5>

[0041] In an embodiment 5 shown in Fig. 9, into an fitting groove 6 1 of a sub mounting portion 60 same as the sub mounting portion 60 of the embodiment 1, a bolt 81 having a head portion and a leg portion is fitted. The head portion is formed a hollow hole with an axial slit to form a tapered female screw 80 on an inner peripheral surface thereof. The leg portion is screwed into the engine EG. Screwing a tapered male screw 82 with the female screw 80 expands the female 80 radially outwardly to be abutted to the fitting groove 61 of the sub mounting portion 60 with pressure. The male screw 82 is screwed into the female screw 80 which is in turn

screwed into the fitting groove.

[0042] According to the sub mounting portion 60, even in a narrow setting space, the cylinder block 10 is fixed to the engine EG by the sub mounting portion 60. The tapered male screw 82 and the female screw 80 do not protrude axially from the sub mounting portion 60 in the thickness direction thereof.

<Embodiment 6>

[0043] In an embodiment 6 shown in Fig. 10, into a fitting groove 61 of a sub mounting portion 60 same as the sub mounting portion 60 of the embodiment 1, a stud bolt 90 extends from an engine EG. With a tip end of the bolt 90 protruded from the fitting groove 91, a nut 9 1 is screwed via a washer 92. The sub mounting portion 60 can fix the cylinder block 10 to the engine EG even in the narrow setting space, and can omit the bolt.

<Embodiment 7>

[0044] In an embodiment 7 shown in Fig. 11, around a top portion 10a of a cylinder block 10, a rod-shaped sub mounting portion 95 is provided. The sub mounting portion 95 protrudes radially outwardly from an outer peripheral surface of the cylinder block 1 0, having a predetermined width in an axial direction, and extending in a tangential direction. In a sliding hole 96 penetrating the sub mounting portion 95 in the axial direction thereof (tangential direction of the cylinder block 10), a sleeve (fixed cylindrical body) 97 is slidably inserted. The sleeve 97 made of an iron has a cylindrical shape and is provided with a flange portion 97a at one end thereof. With the flange portion 97a being engaged with one end surface of the sub mounting portion 95 facing to the engine EG, other end protrudes from other end surface of the sub mounting portion 95. Into the sleeve 96, a bolt 99 is inserted from the protruded end via a washer 94 to be screwed into the engine EG at a tip end thereof.

[0045] According to the sub mounting portion 95, the elongated sleeve 97 is inserted into the sliding hole 96 elongated in the tangential direction of the cylinder block 10. Due to such construction, the fastening force to the sub mounting portion 95 by the bolt 99 is hardly applied to the cylinder bore 10. For this reason, there is no or only small fear for deformation of the cylinder block 10.

[0046] The present invention intends to provide a compressor having a mounting construction which can be mounted to the mounted body even in a limited setting space in the vehicle.

[0047] That is, in the compressor comprised of a bore housing 10, plural pistons 19, a driving shaft 12, and a side housing 20, the side housing 20 has at least two main mounting portions 50 each having a fitting portion which extends in a tangential direction of the side housing and into which a main fixing bolt means 53 is inserted; and the bore housing 10 has at least one sub mounting portion 60 having a fitting portion which extends in a tangential direction of the bore housing and into which a sub fixing bolt means 63 is inserted.

Claims

1. A compressor comprising a bore housing including plural cylinder chambers spaced in a circumferential direction thereof, plural pistons each being slidably inserted into the cylinder chamber,a driving shaft disposed coaxialy with the bore housing and a side housing including a driving means driven by the driving shaft to drive the pistons,
   characterized by that

   the side housing has, on an outer peripheral surface thereof, at least two main mounting portions each having an inserting portion which extends in a tangential direction of the side housing and into which a main fixing bolt means is inserted; and
   the bore housing has, on an outer peripheral surface thereof, at least one sub mounting portions having a fitting portion which extends in a tangential direction of the bore housing and into which a sub fixing bolt means is fitted.

2. A compressor according to claim 1, wherein the side housing has a cap shape including a cylindrical portion and lid portion, two main mounting portions being respectively formed at a top portion and a bottom portion in a circumferential direction, and at a boundary portion between the cylindrical portion and the lid portion in the axial direction.

3. A compressor according to claim 2, wherein each of the main mounting portions protrudes radially outwardly from the outer peripheral surface of the side housing, having a predetermined width in an axial direction thereof, and having a predetermined length in a tangential direction thereof; and the fitting portion extends in a thickness direction of the sub mounting portion.

4. A compressor according to claim 1, wherein the bore housing has a cylindrical shape; one sub mounting portion protrudes radially outwardly from the outer peripheral surface of the bore housing of cylindrical shape, having a predetermined width in an axial direction thereof, and having a predetermined thickness in a tangential direction thereof; and the inserting portion extends in the thickness direction of the sub mounting portion.

5. A compressor according to claim 4, wherein the sub mounting portion is shifted from a top portion of the bore housing in the circumferential direction thereof.

6. A compressor according to claim 5, wherein the fitting portion of the sub mounting portion is comprised of an inserting hole of circular shape in section; the sub fixing bolt means is comprised of a bushing abutting to the sub mounting portion at one portion, and abutting to the outer peripheral surface of the cylinder block at other portion, and a bolt penetrating the bushing and the sub mounting portion and being screwed into the mounted body.

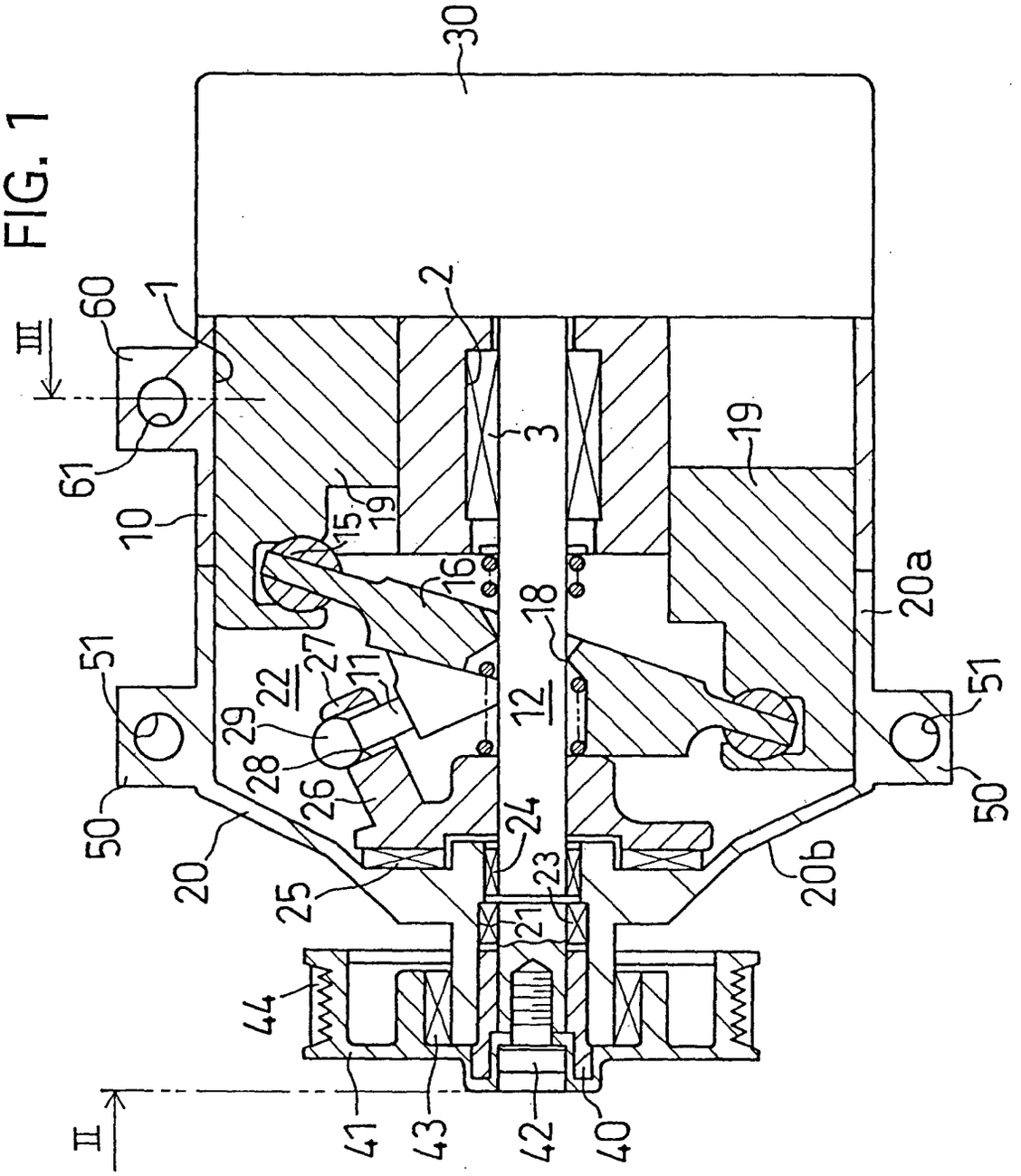
7. A compressor according to claim 5, wherein the fitting portion of the sub mounting portion is comprised of a U-shaped fitting groove; the sub fixing bolt means is comprised of a stud bolt extending from the mounted body and protrudes from the fitting groove, and a nut screwed with a protruded portion of the stud bolt.

8. A compressor according to claim 5, wherein the fitting portion of the sub mounting portion is comprised of a inserting hole of circular shape in section; the sub fixing bolt means is comprised of a bolt extending from the mounted body and having a head portion formed a tapered female screw portion fitted in the inserting hole, and a tapered male screw portion for enlarging the tapered female portion to be abutted to the sub mounting portion.

9. A compressor according to claim 1, wherein the sub mounting portion protrudes radially outwardly from the outer peripheral surface of the bore housing, having a predetermined width in an axial direction thereof, and having a predetermined length in a tangential direction thereof; and the fitting portion extends in a longitudinal direction of the sub mounting portion.

10. A compressor according to claim 9, wherein the fitting portion of the sub mounting portion is comprised of a sliding hole of circular shape in section in which a sleeve is mounted.

FIG. 1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20b
44
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II

FIG. 2

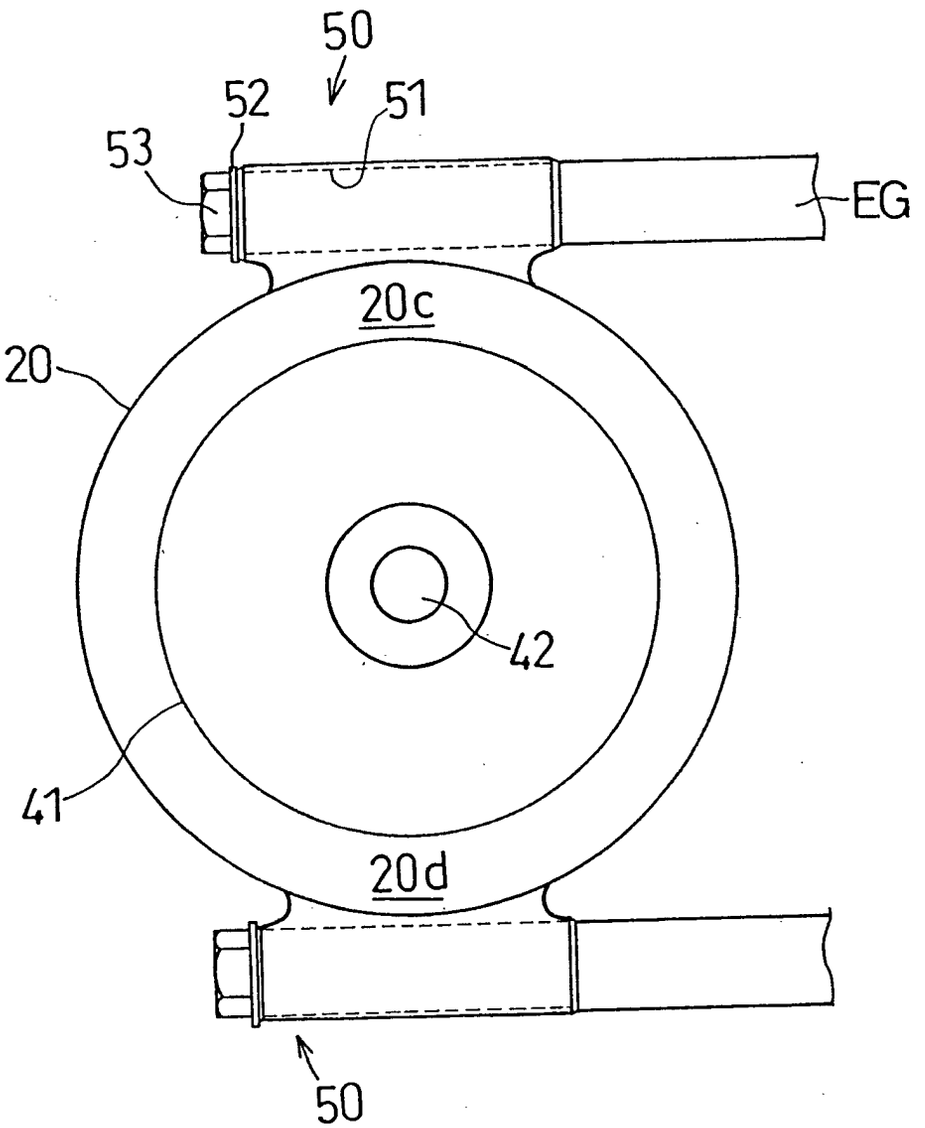
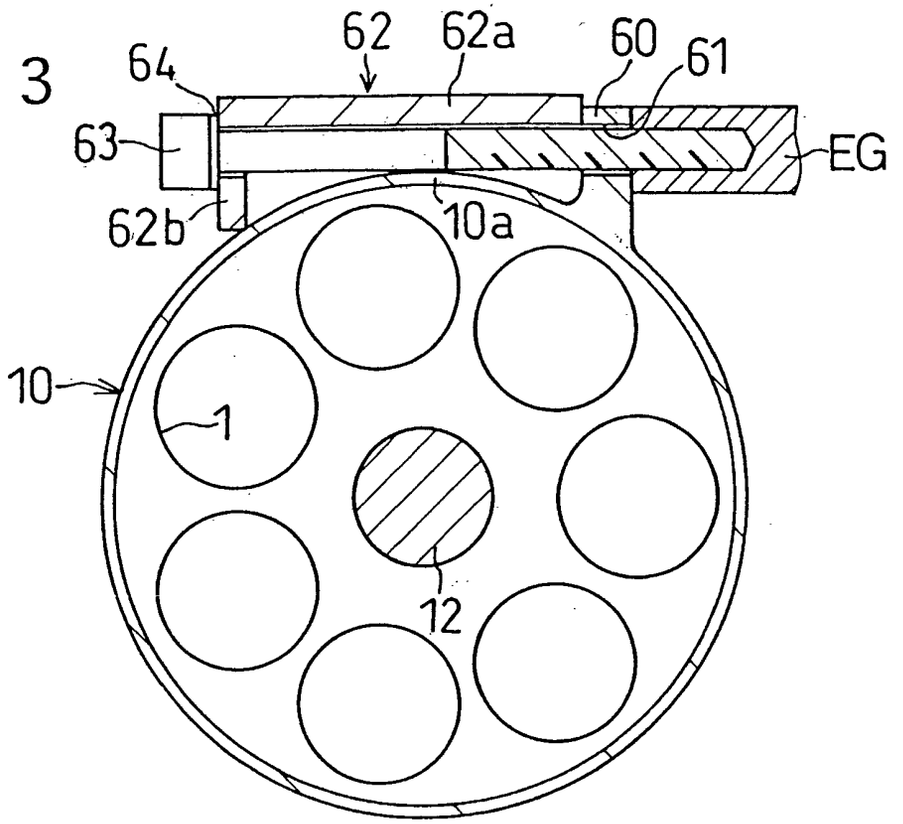


FIG. 3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EG
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12

FIG. 4

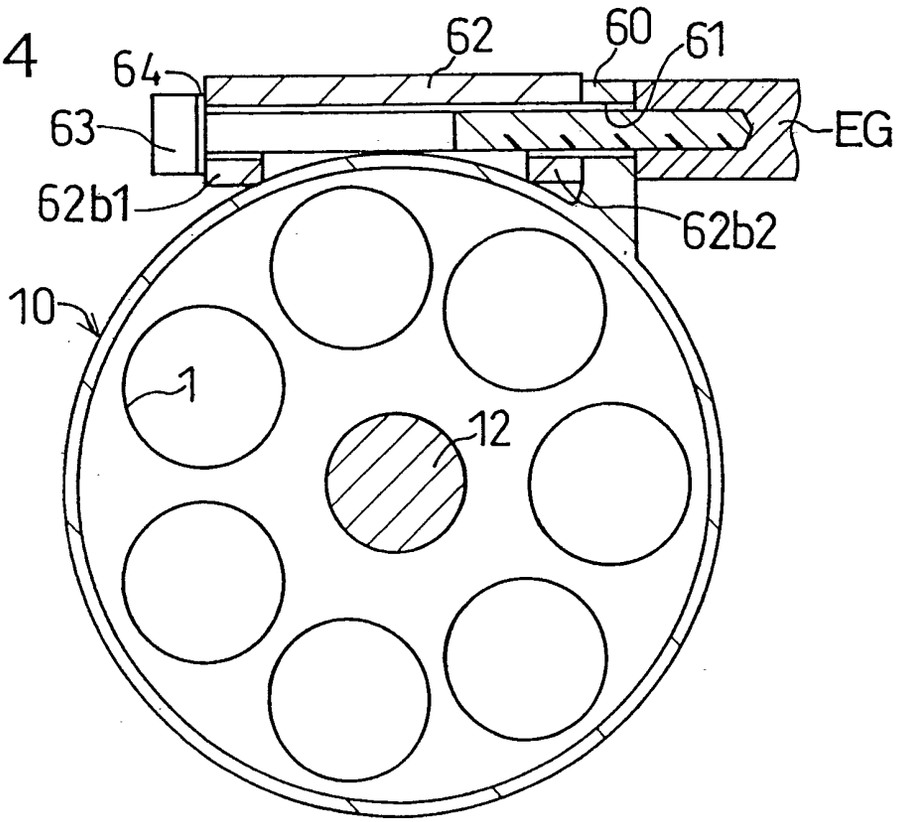
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FIG. 5

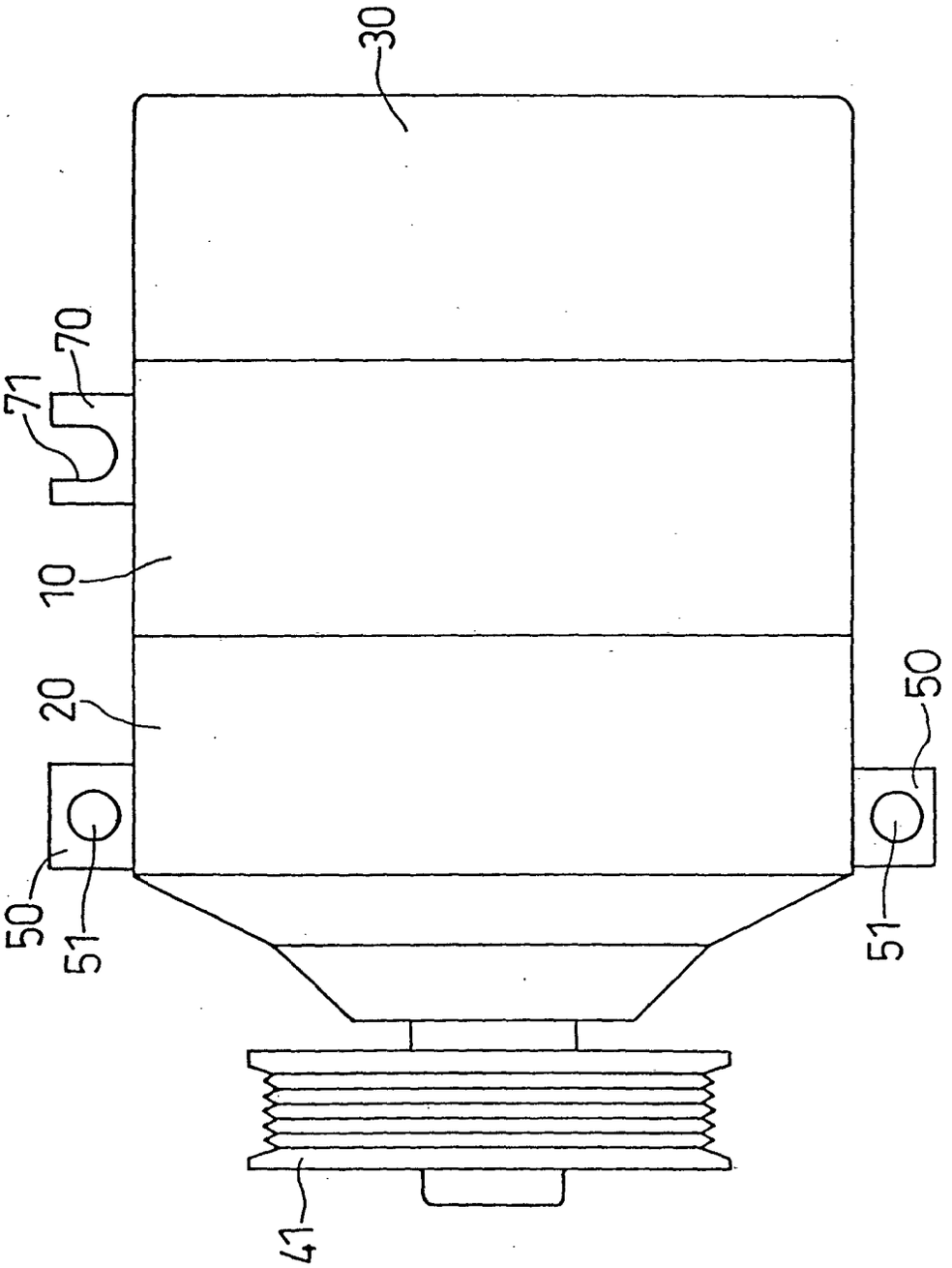

FIG. 6

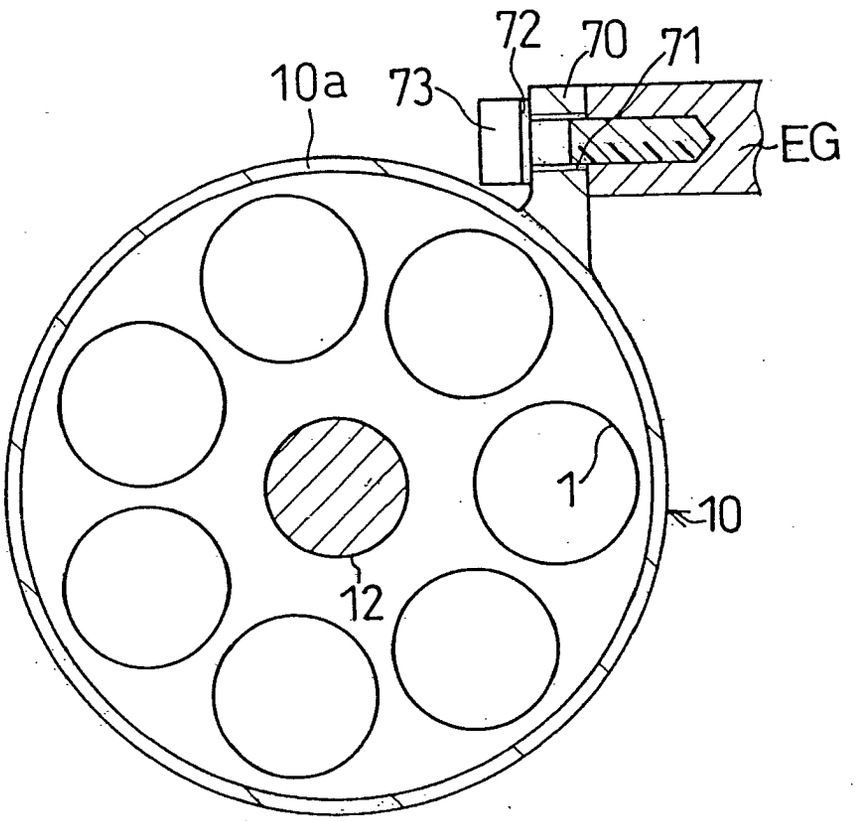

FIG. 7

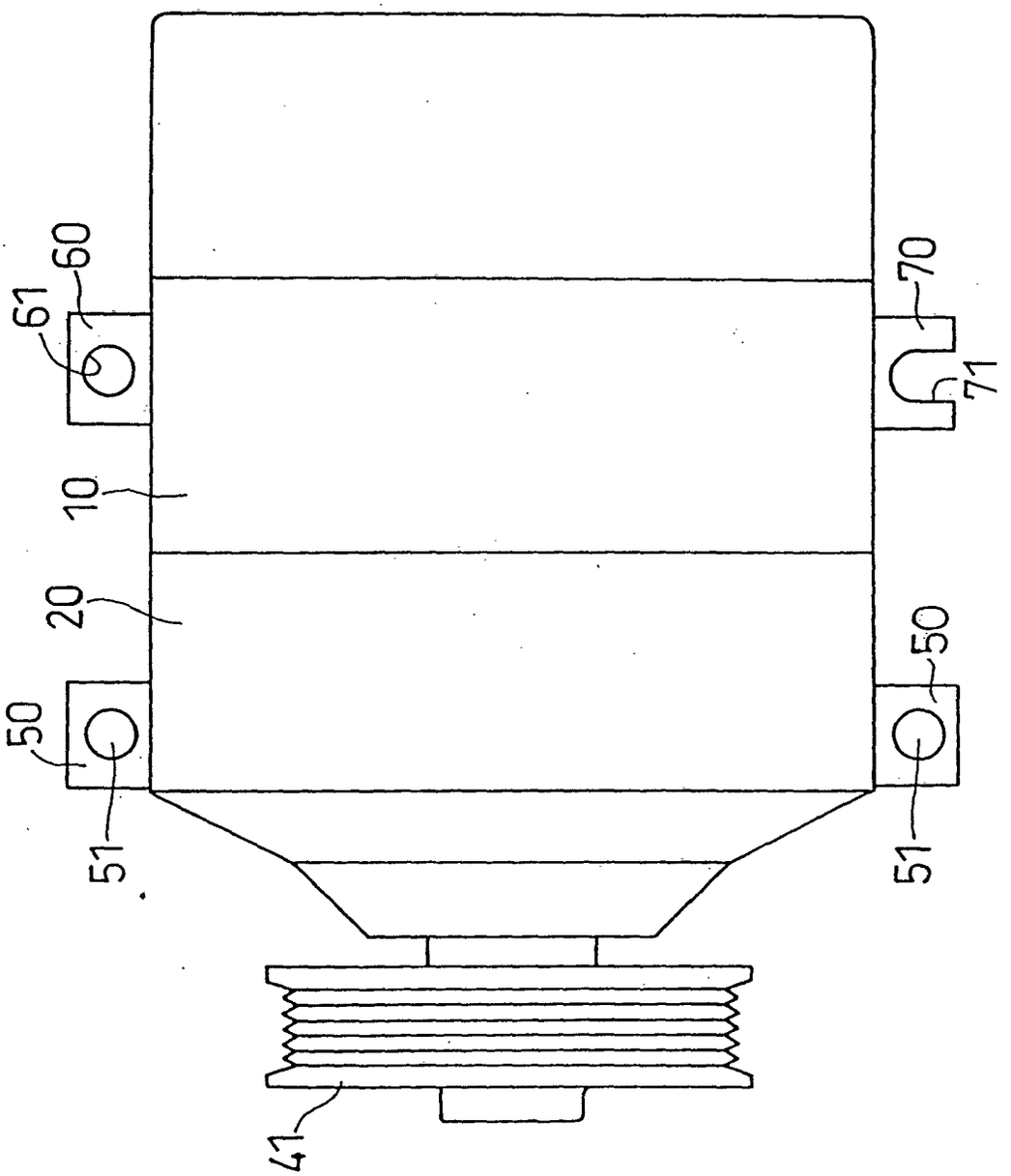

FIG. 8

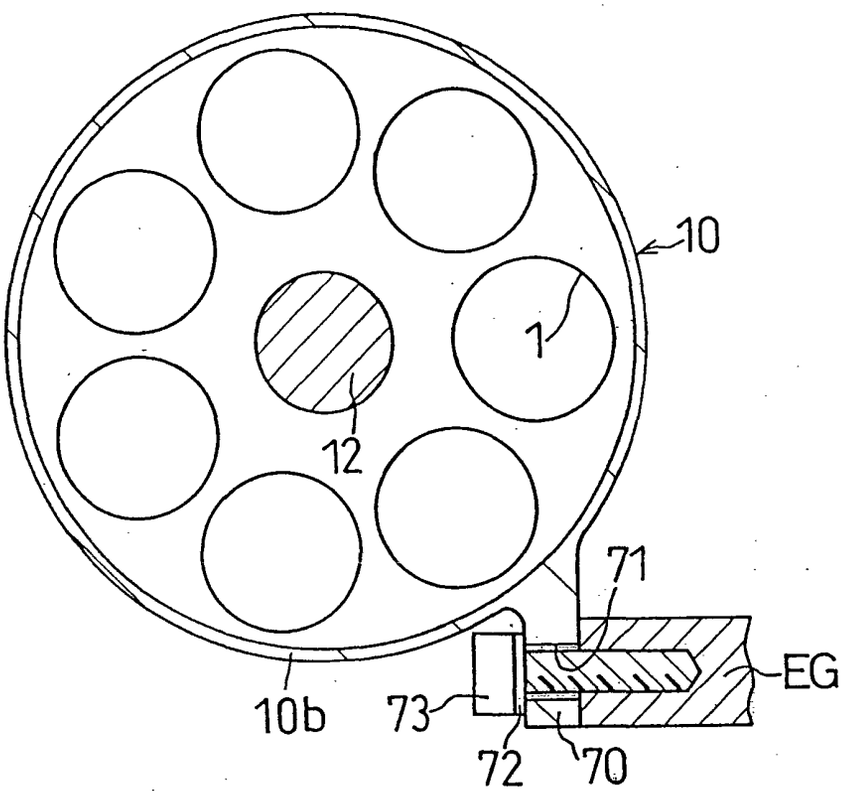

FIG. 9

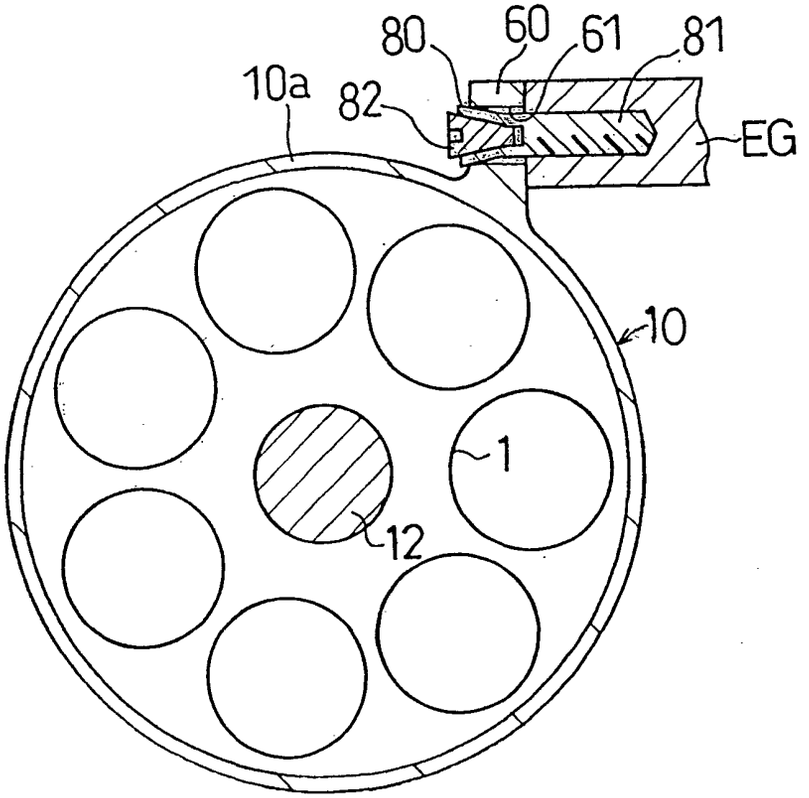

FIG. 10

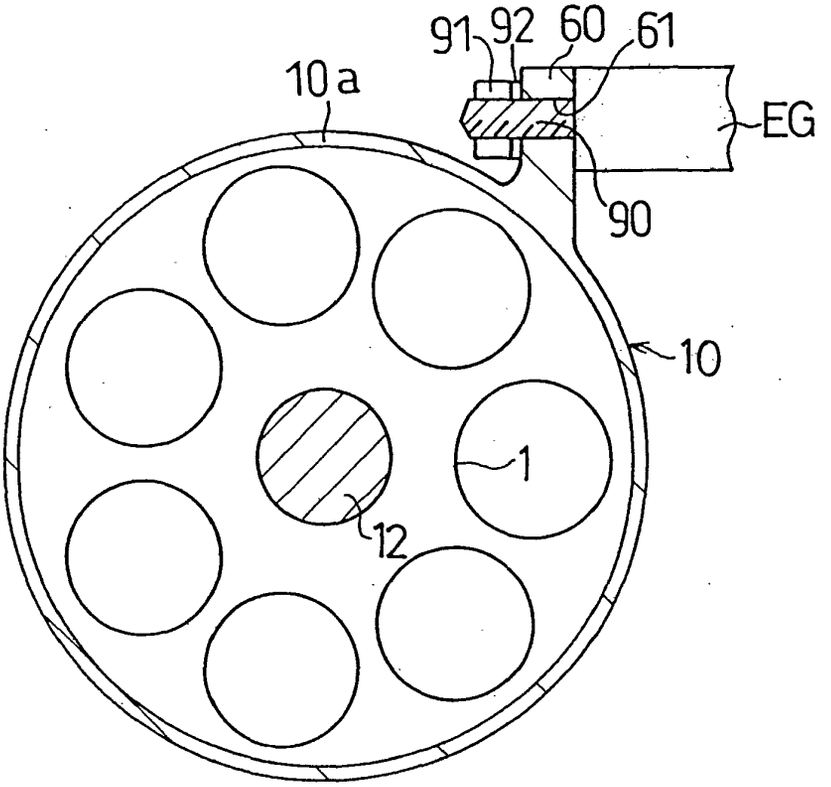

FIG. 11