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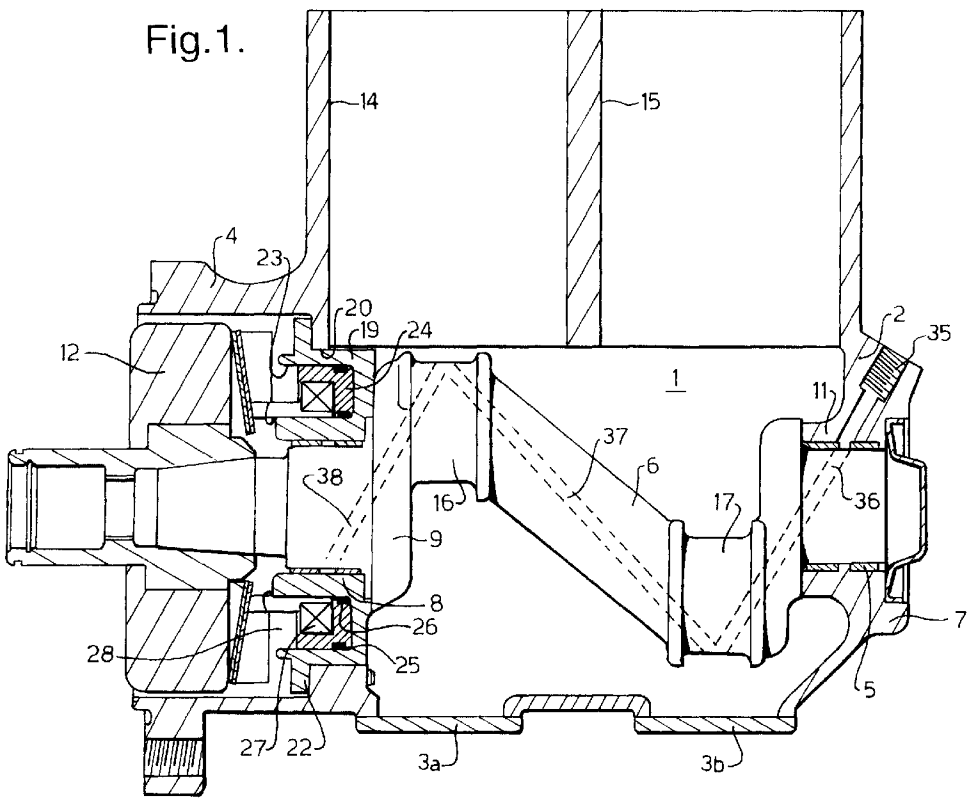
(54) **Clutch-driven gas compressor**

(57) In a clutch-driven piston and cylinder air compressor the crankcase (3) has a single closure component (19) provided between a clutch (12) and a crankshaft (6) which component closes an aperture (20) which provides access for assembly of the crankshaft to the crankcase, includes an actuator an annular cylinder (23) and a piston (24) sealingly movable therein for operating a clutch release mechanism (24,28) and occupying space included in a projection of the adjacent cylinder (14) of the compressor.

Fig.1.



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Description

This invention relates to clutch-driven gas compressors especially but not exclusively a clutch-driven air compressor for use in automotive vehicles.

It is usual to employ engine-driven air compressors in heavy commercial vehicles to charge storage reservoirs for compressed air braking and other systems. Such reservoirs comprise part of the pneumatic braking and other systems of the vehicle. When the reservoirs are fully charged, the compressor can be rendered inoperative by means of governor-operated unloader valve located either in the compressor delivery line or within the compressor itself. In each case the compressor continues to rotate when unloaded and therefore can absorb some energy. An alternative to an unloader valve is to provide an air compressor with a friction clutch which can be disengaged by a pressure signal from a governor when the compressor is required to cease charging. In such an arrangement because the compressor ceases to rotate when not on-load it can use less energy and can have a longer life than a compressor controlled by an unloader valve.

Forms of friction clutch for use with an air compressor described for example in French Patent Specification No. 2452011 or United Kingdom Patent Specification No. 2125114. In each of these examples, the clutch mechanism is seen to have a possible disadvantage in that the overall dimensions of the compressor combined with its clutch mechanism may be greater than desirable having regard to possible space considerations in a vehicle engine or its compartment.

The object of the present invention is to provide an improved clutch-driven compressor by which such space considerations are more easily accommodated.

According to the present invention there is provided a gas compressor comprising a housing and a reciprocable wall said wall being movable in said housing to cyclicly increase and decrease the volume of a compression chamber to induce and deliver gas under pressure said wall being connected to an eccentric bearing of a shaft rotatable in a main bearing of the housing said shaft being drivable via a coupling means said coupling means being disengageable by an actuator to interrupt operation of the compressor characterised in that said actuator is located in a region of the housing surrounding said main bearing at least partially contained in a projection of said chamber in the direction of movement of said wall.

Preferably said coupling means comprises a friction clutch. Said region may be provided in an assembly which serves also as a sole end cover of the compressor of an aperture via which the crank shaft may be assembled into the compressor crankcase end through which bearing the drive end of the shaft extends to couple with a drive-side of the clutch.

In order that the invention may be more clearly understood and readily carried into effect the invention will now be further described by way of example with reference to the accompanying drawings of which:

Fig. 1,	illustrates a side sectional view of part of a crank-case assembly of a clutch-driven twin cylinder air compressor
Fig. 2,	illustrates a top sectional view with the crank shaft turned to mid position and with the clutch in released condition
Figs. 3a and 3b,	illustrate a section X X showing one form of connection means through the housing and bearing component of Fig. 2.
Fig. 4,	illustrates a section of a preferred connection means.

Referring to Fig. 1 and 2 of the drawings, the compressor housing 1 comprises an integral cast metal crank-case 2, two parallel cylinder bores 14 and 15 a clutch housing 4 enclosing a multiplate wet-clutch 12 which receives a drive end of a crank shaft 6. The details of the release clutch (12) and details of the cylinder head (not shown) are omitted from Fig. 1 in the interest of simplicity. The non-driven end bearing 5 of the crankshaft 6 is carried in an integral end plate 7 of the crank-case whereas the driven-end main bearing 8 is carried in a generally annular closure component 19, which is accessible for assembly purposes through the clutch housing 4. The aperture 20 which receives component 19 is of such external dimensions as to permit assembly of the crankshaft (6) into the crankcase 2 through aperture 20. Component 19 is then secured by a plurality of peripherally spaced bolts such as 22 before insertion of a multiplate clutch mechanism (not shown) of clutch 12. The annular closure component 19 and the bearing 8 carried thereby extend inwardly of the aperture 20 of the crankcase into an axial projection of the cylinder 14 and provide an axial abutment with the adjacent crank web 9. This and a corresponding inward projection 11 of the end 7 which carries the other main bearing 5 afford optimal use of the overall axial length of the crankcase housing.

The annular closure component 19 is formed to provide an annular cylinder bore 23 surrounding and coaxial with bearing 8. An annular piston 24 has outer and inner annular seals 25 and 26 axially sealingly slideable in the annular bore 23. A thrust ring 27 carried by 24 is engageable with a release thrust bearing ring 28 of the clutch.

The compressor main bearings 5 and 8 are supplied with oil under pressure from the vehicle engine via a further port 35 and oil-ways 36, 37, 38 breaking out at big-end crank pins 16 and 17 and at main bearings to provide the usual lubrication. A further oil-way (not shown) is provided to maintain oil irrigation of the plates in the present example of a multiplate wet-clutch.

The cylinder head (not shown) conventionally has air inlet and delivery ports and respective reed-valves communicating with the compression chambers of the respective cylinders. The compressor operates in known manner whilst offering the energy saving to be expected from a governor-controlled clutch-driven compressor which only rotates when required to do so. Moreover by virtue of use of a single housing drive-side end cover such as 19 which carries the annular release piston and according to the invention extends axially inwardly of the crankcase to utilise space in a projection of the cylinder bore 14, overall axial dimensions can be minimised.

With reference to Figs. 2 and 3 a screw-in control pressure port seal member 31 is seen to be provided in a control pressure port 30 in the crankcase housing to seal against assembly 19 and communicate with the interior of the annular clutch release cylinder 23 of the closure component 19 such that when pressurised by a control pressure from a governor device, the piston is urged leftwards as seen in Figs. 1 and 2 to act upon thrust ring 28 to release the friction clutch and unload the compressor.

In a preferred connection means as shown in Fig. 3a and the enlarged fragment of Fig. 3b, a spool seal 32 has two peripheral O-ring seals 33 and 34 and the component 19 is provided with a boss 19a of sufficient axial length to accommodate the innermost seal 33. The spool seal 32 is located in port 31 of the housing by a screw-in member 31a. The spool seal 32 is located at its inner end with a port 19b of a boss 19a which provides location with an axial recess 1b of the housing. The seal 32 is therefore able to tilt sufficiently to accommodate for only approximate alignment between 19a and 31a without leakage.

In the further alternative control pressure connection arrangement such as shown in Fig. 4, a fluid tight communication between a screw-in port 41 may include a seal member 42 having a peripheral O-ring 43 which mutually seals with 41 and an end face sealing O-ring 44. The member 42 is urged by member 31 via a pair of disc-springs 45 into sealing engagement with a flat surface 19c of the component 19. By such means it is not necessary to accommodate a boss of the component 19 and the arrangement can be more compact than that of Fig. 3.

As indicated above, the compressor is assembled by inserting the crankshaft (6) before closing the crankcase with the closure component 19 and securing same with the five spaced retaining bolts such as 22 inserted in respective tapped holes. Pistons with connecting rods (not shown) are then lowered in the respective cylinder bores 14 and 15 for connection via connection rods (not shown) to crank pins 16 and 17 in a conventional manner employing access via respective cover plates 3a and 3b of the crankcase. The release clutch 12 is then installed to drivingly engage the drive-end of the crankshaft via splines or a key (not shown).

The compressor described in the foregoing is flange-mounted to an internal combustion engine of a motor vehicle and operates in known manner to supply compressed air to one or more reservoirs of a vehicle braking and or other system of a vehicle. When such reservoir or reservoirs are at required cut-out pressure or pressures as sensed by a governor the governor provides a control pressure signal to the release clutch to disengage the compressor drive from the engine until a lower cut in pressure is sensed.

Claims

1. A gas compressor comprising a housing and a reciprocable wall said wall being movable in said housing to cyclicly increase and decrease the volume of a compression chamber to induce and deliver gas under pressure said wall being connected to an eccentric bearing (16) of a shaft (6) rotatable in a main bearing (8) of the housing said shaft being drivable via a coupling means (12) said coupling means being disengageable by an actuator (24,27) to interrupt operation of the compressor characterised in that said actuator is located in a region of the housing surrounding said main bearing (8) at least partially contained in a projection of said chamber in the direction of movement of said wall.

2. A gas compressor as claimed in claim 1, characterised in that said coupling means comprising a friction clutch (12).

3. A gas compressor as claimed in claim 1 or 2 characterised in that said region is provided in an assembly which serves as a drive side end cover (19) of the compressor.

4. A gas compressor as claimed in claim 3 characterised in that said drive-side end cover (19) closes an aperture (20) of the housing through which said shaft (6) can be assembled to the housing.

5. A gas compressor as claimed in claim 1, 2, 3 or 4 characterised in that said housing has a control pressure port (31) and said assembly has a control pressure port (19b) said ports being interconnected via a spool-seal (32).

6. A gas compressor as claimed in claim 1, 2, 3 or 4 characterised in that said housing has a control pressure port (31) and said assembly has a control pressure port (19b) said ports being interconnected via a member which seals circumferentially (43) with said housing and via an end seal (44) with said

assembly.

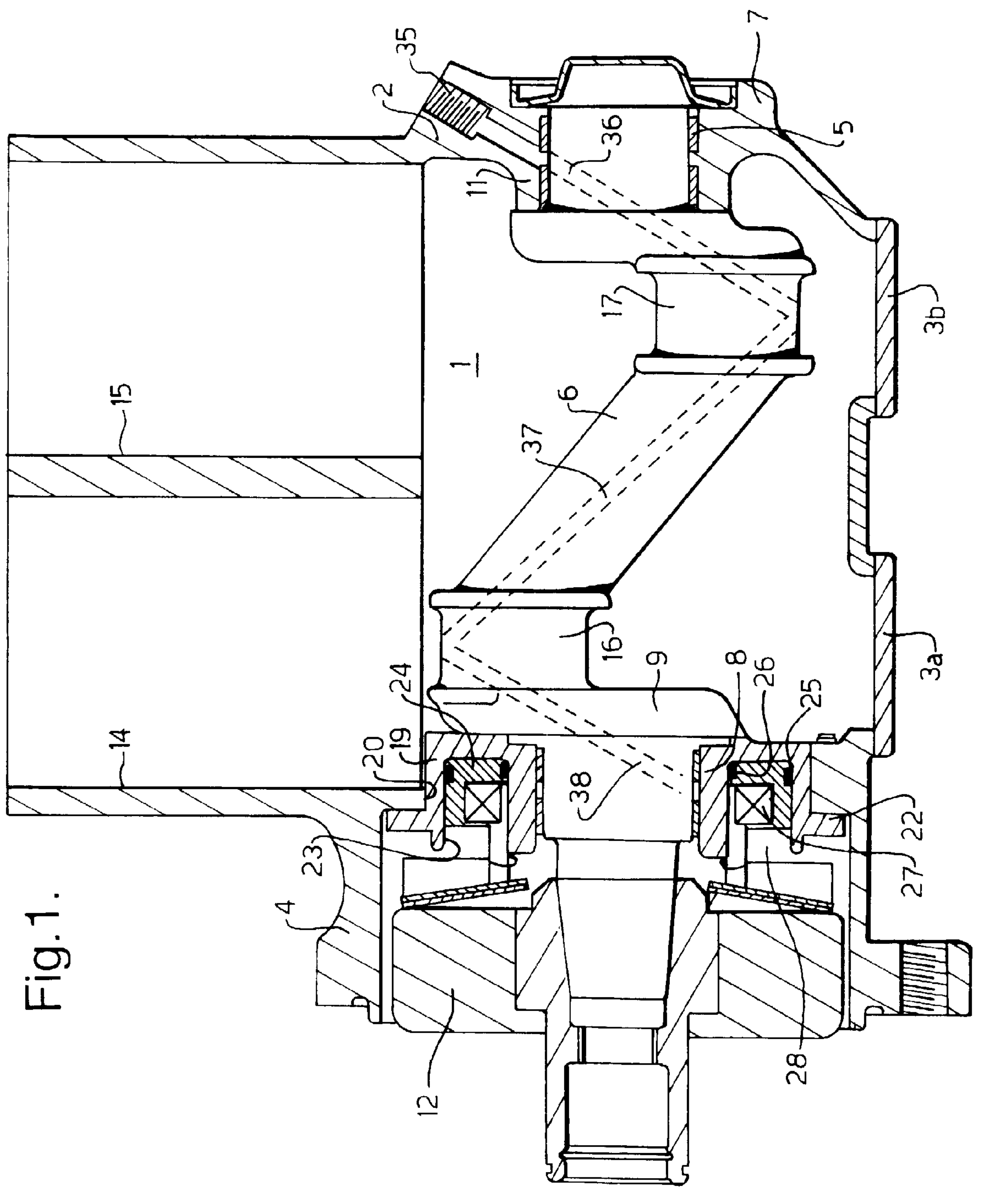
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Fig.1.

Fig.2.

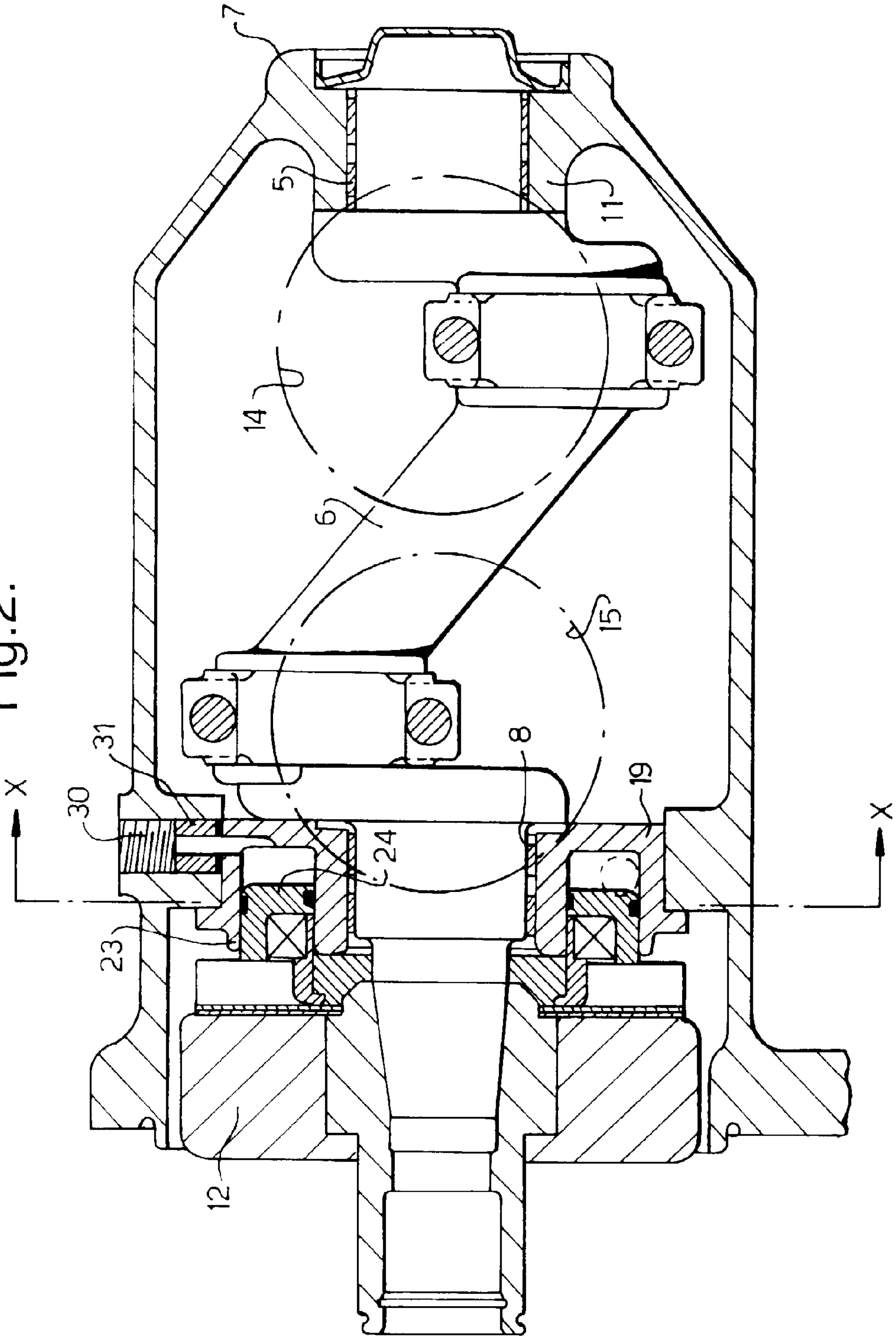

Fig.3a.

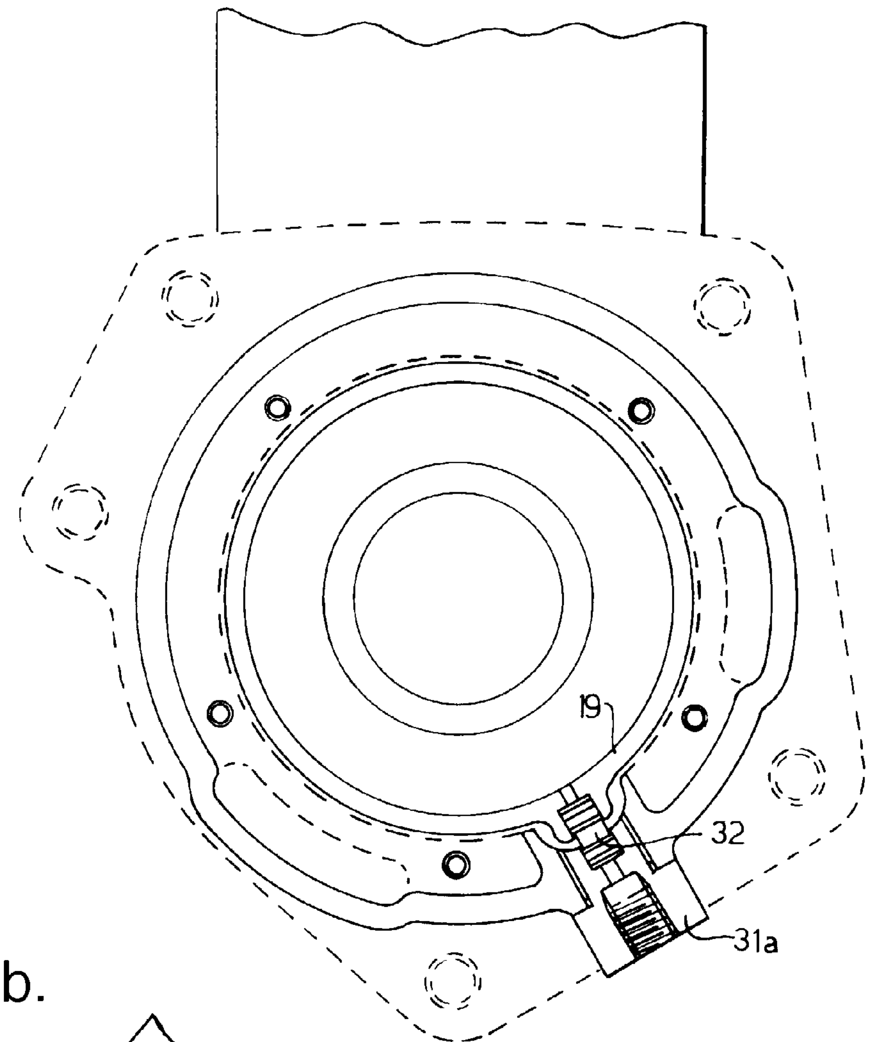

Fig.3b.

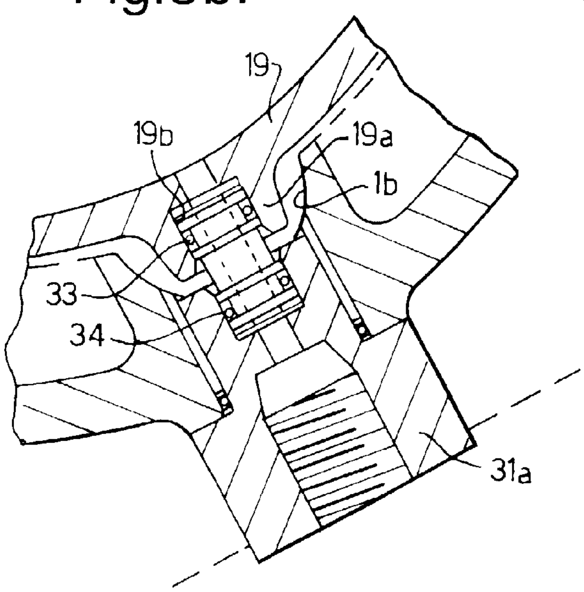

Fig.4.