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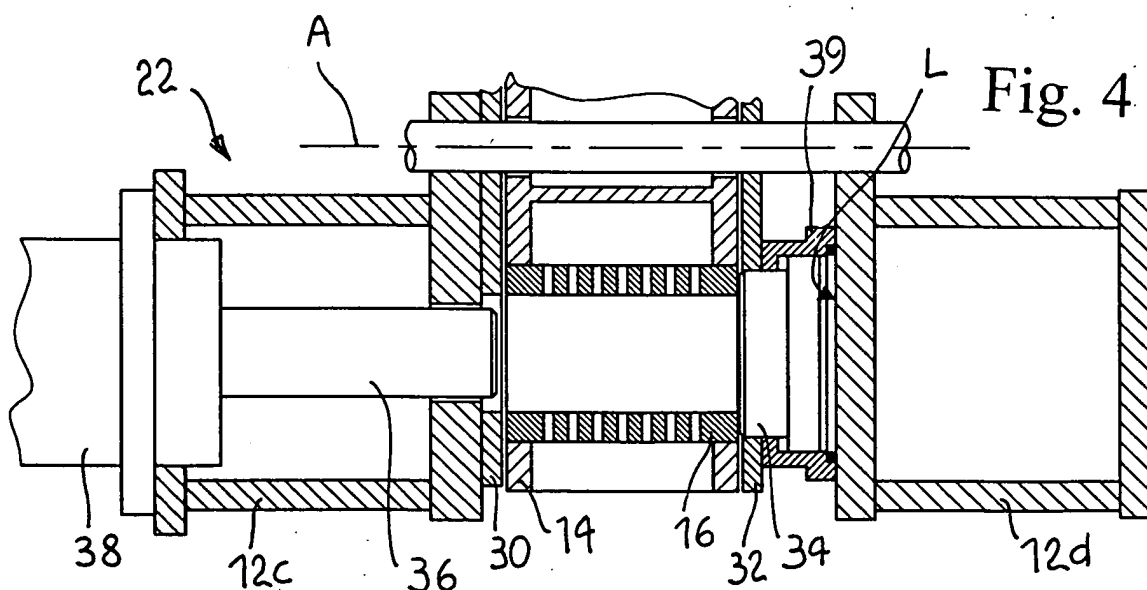
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(54) **Waste-compacting machine**

(57) The machine comprises a frame (12), a perforated cylinder (C) having two opposite, open ends, a shutting member (34) biased by a counter-cylinder (39) against one of the ends for shutting it, and a pushing member (36) driven by motor means (38) to penetrate into the compaction chamber (C) through the other end for pressing wastes. A pressurized chamber is defined within the counter-cylinder (39), which is sealed, at one

first axial end, by a slidable shutter (39b) that is operatively connected for biasing the shutting member (34). The second end of the pressurized chamber is abutted against a wall (L) of the frame (12) which is reinforced at the area engaged by the cylinder. A toroidal gasket (41, 141) is arranged to provide seal between the wall (L) and the corresponding end of the pressurized chamber.



Description

[0001] The present invention relates to an improvement in a waste-compacting machine, particularly for urban solid waste.

[0002] Machines are known which compact urban solid waste by pressing it under very high pressure, thereby causing its humid fraction, which can be recycled for production of fertilizers, to be separated from its dry fraction, which can be recycled as fuel.

[0003] In particular, for an increased productivity, a waste-compacting machine is known which comprises three perforated cylinders supported on a revolving drum and arranged to be cyclically filled with the material to be compacted. The drum is driven to rotate by steps so that all the cylinders are successively conveyed in front of a plunger, which penetrates into the cylinder and squeezes the material contained therein, thereby causing the fluid fraction to be drained through the holes.

[0004] However, it has been found that the drained fluid has a high abrasive power, mainly in consideration of the very high pressure reached during squeezing so that, when draining the fluid, a tight seal should be provided at the ends of the perforated cylinder, in order to prevent humid material from being drained there-through, thereby causing precocious wear of the sealing surfaces.

[0005] To this purpose, it is known to seal that end of the perforated cylinder opposing the insertion end for the plunger, by an auxiliary piston that is biased by a bulky, hydraulic cylinder.

[0006] However, the bottom of the hydraulic cylinder is closed by a very thick cover suited to stand the high pressures to which the cylinder is subjected, so that the above sealing system is very cumbersome in relation to the size of the frame of the machine, as well as very expensive, mainly considering that a perfect seal is required along the perimeter of the bottom.

[0007] Therefore, it is a main object of the present invention to provide a waste-compacting machines of the above-mentioned type, in which the material is squeezed in a perforated cylinder closed at one end by a shutting member biased against the end by a hydraulic cylinder, which is improved so that the cost and the size of the hydraulic cylinder are reduced, while an enhanced seal is provided.

[0008] The above and other objects and advantages of the invention, which will better appear below, are achieved by a waste-compacting machine having the features recited in claim 1, while the other claims state other advantageous, though secondary features.

[0009] The invention will be now described in more detail with reference to a preferred, non-exclusive embodiment, shown by way of non-limiting example in the attached drawings,

Fig. 1 is a side view of the waste-compacting machine according to this invention;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is a diagrammatical cross-section view along line III-III of Fig. 2 of a portion of the machine according to the invention;

Fig. 4 is a diagrammatical, cross-section view along line IV-IV of Fig. 2 of a portion of the machine according to the invention;

Fig. 5 is a diagrammatical, cross-section view along line V-V of Fig. 2 of a portion of the machine according to the invention;

Fig. 6 shows a detail of Fig. 4 to an enlarged scale;

Fig. 7 is a cross-section view similar to Fig. 5, showing an alternative embodiment of the machine according to the invention.

Fig. 8 shows a detail of Fig. 7 to an enlarged scale;

[0010] With reference to the above Figures, a waste-compacting machine 10 comprises a frame 12 consisting of two longitudinal, side members 12a, 12b joined at their ends by respective cross-pieces 12c, 12d, which pivotally support a drum 14 about longitudinal, horizontal axis A (Fig. 4) therebetween.

[0011] Drum 14 supports three cylinders 16 which are open at their ends and also have horizontal axes. The cylinders are spaced at equal angles from each other around the axis A of the drum, and are provided with a plurality of radial holes 18. A cylindrical chamber C is defined within each cylinder for receiving the material to be compacted therein.

[0012] A loading station 20, a squeezing station 22 and an unloading station 24 are arranged in front of the drum and are angularly spaced from each other around the axis A, correspondingly to cylinders 16. The drum is driven to rotate by steps by a motor (not shown), in order to cyclically convey one cylinder in front of the loading station, another cylinder in front of the squeezing station, and the last cylinder in front of the unloading station.

[0013] Loading station 20 comprises a pressing member 26, or any other suitable feeding device such as, e. g., a screw feeder, which is coaxial to cylinder 16 when the latter is positioned in front of the loading station, and is axially operated for conveying the material from a hopper 28 to the cylinder.

[0014] A screen 30 integral with stationary frame 12 is arranged in front of the base of drum 14 on the side of hopper 28, and is provided with three openings which are aligned to cylinders 16 when they are positioned in front of stations 20, 22, 24. A wall 32 integral with stationary frame 12 is arranged in front of the opposite side of the drum, and is provided with two openings which are aligned to those cylinders 16 which are positioned

in front of squeezing station 22 and unloading station 24. On the contrary, wall 32 shuts the end of that cylinder which is arranged in front of loading station 20.

[0015] Squeezing station 22 comprises a shutting piston 34, which is coaxial to the cylinder positioned in front of such station and sealingly closes one of its ends, as well as a pushing member or plunger 36 that is operable to penetrate into cylinder 16 through the other end, thereby causing the material contained therein to be squeezed and the humid fraction to be drained through holes 18. Plunger 36 is driven by a hydraulic cylinder 38 supported on the frame.

[0016] Piston 34 is biased against the end of perforated cylinder 16 by a counter-cylinder 39, in which is defined a pressurized chamber 39c that is sealed at one first of its axial ends by a slidable shutter 39b integral with piston 34. The other axial end of the pressurized chamber is abutted against an inner, side wall L of the adjacent cross-piece 12d. A toroidal gasket 41 is received within an annular seat S cut on the bottom of counter-cylinder 39, and sealingly engages a corresponding, smooth annular area R of inner, side wall L.

[0017] In a known way, the unloading station comprises a knockout piston 40 which is coaxial to that cylinder positioned in front of such station, and is operable to penetrate cylinder 16 under control of a hydraulic actuator 42 for knocking the compacted material out through that opening cut in the wall on the opposite side with respect to the piston. The knocked-out material is unloaded onto a chute 43 for removal.

[0018] In the operation, the drum is driven to rotate by steps of 120° for cyclically subjecting each cylinder to:

- a loading step, in which a part of the material in hopper 28 is conveyed into the cylinder aligned to the loading station by pressing member 26 or the screw feeder,
- a squeezing step, in which plunger 36 penetrates into that cylinder 16 aligned to the squeezing station and causes the material contained therein to be squeezed, against piston 34, the fluid fraction being drained through the holes in the cylinder,
- an unloading step, in which knockout piston 40 penetrates through one end of the cylinder aligned to the unloading station and pushes the compacted material out through the opposite end.

[0019] During squeezing, piston 34 effectively seals the corresponding end of perforated cylinder 16, because the force opposed by counter-cylinder 39 directly acts upon frame 12, which has a structure suited to effectively stand the force of the cylinder without deforming, with reduction of cost and size with respect to the solution with the bottom of cylinder 39 closed by a thick cover.

[0020] Figs. 7, 8 show an alternative embodiment of

the invention, which is particularly advantageous when the material of the frame is difficult to be machined, so that smoothing the area engaged by the toroidal gasket is difficult to be carried out. The parts similar to those described in the previous embodiment will be referenced by adding 100 to their reference numbers.

[0021] According to this alternative embodiment, the inner wall of counter-cylinder 139 is provided with a smooth, cylindrical seat 139a adjacent to the base of the cylinder, in which is received a disc P supporting a toroidal gasket 141 along its perimeter, which gasket sealingly engages inner, cylindrical seat 139a.

[0022] In this embodiment, though the force applied by the counter-cylinder always acts against cross-piece 112d, however the seal is provided at the inner wall of the cylinder, which is more fit for being worked for smoothing.

[0023] A few preferred embodiment of the invention has been described herein, but of course many changes may be made by a person skilled in the art, depending on the circumstances, within the scope of the inventive concept.

Claims

1. A waste-compacting machine, comprising

- a frame (12),
- a compaction chamber (C) having two opposite, open ends,
- a shutting member (34) biased by a counter-cylinder (39) against one first of said ends for shutting it,
- a pushing member (36) driven by motor means (38) to penetrate into the compaction chamber (C) through one second of said ends for pressing wastes,

a pressurized chamber being defined within said counter-cylinder (39), which is sealed at one first of its axial ends by a slidable shutter (39b) that is operatively connected for biasing said shutting member (34),

characterized in that the second end of the pressurized chamber is abutted against a wall (L) which is integral with the frame (12) and is reinforced at the area engaged by the cylinder, and **in that** the machine comprises sealing means (41, 141) arranged to provide seal between said wall (L) and the corresponding end of the pressurized chamber.

2. The machine of claim 1, **characterized in that** said sealing means comprise a toroidal gasket (41), which is received within an annular seat (S) cut

along the edge of the pressurized chamber (39) adjacent to the wall (L), and sealingly engages a corresponding, smooth annular area (R) of the wall.

3. The machine of claim 1, **characterized in that** said sealing means comprise a disc (P) supporting a toroidal gasket (141) along its perimeter, which gasket sealingly engages a smooth, cylindrical seat (139a) in the inner wall of the pressurized chamber (139c). 5 10

4. The machine of any of claims 1 to 3, **characterized in that** said frame (12) comprises two longitudinal, side members (12a, 12b) joined at their ends by respective cross-pieces (12c, 12d), and **in that** said wall (L) is made on one inner, side wall of one of said cross-pieces (12d), said motor means (38) being supported on the other cross-piece (12c). 15 20

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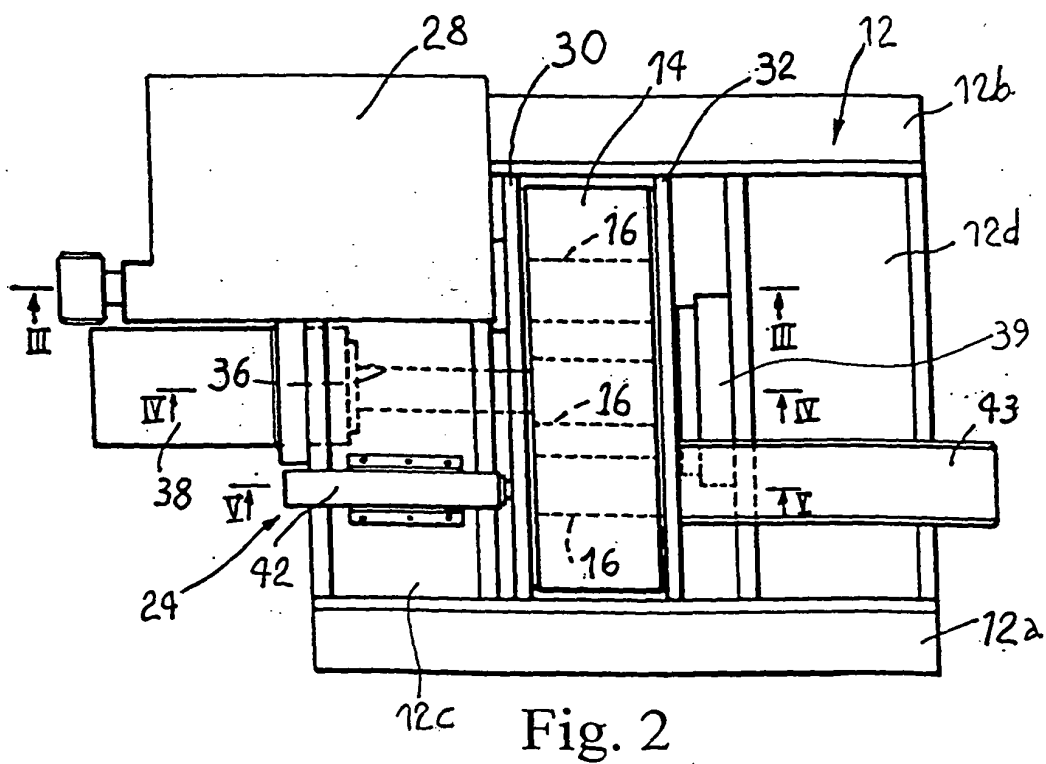
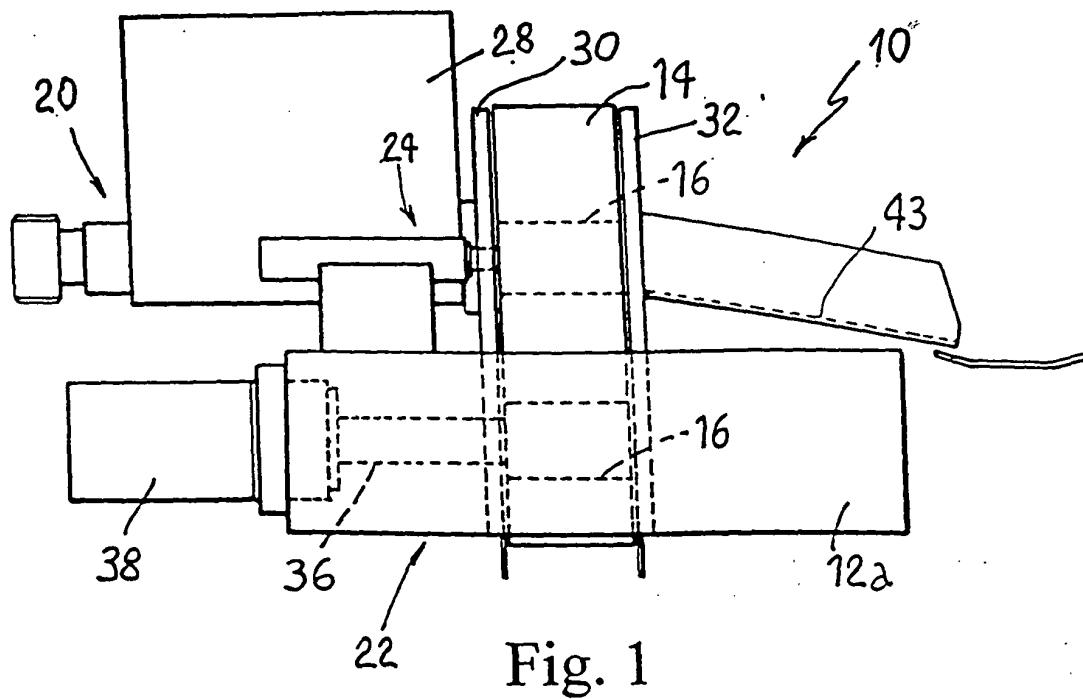
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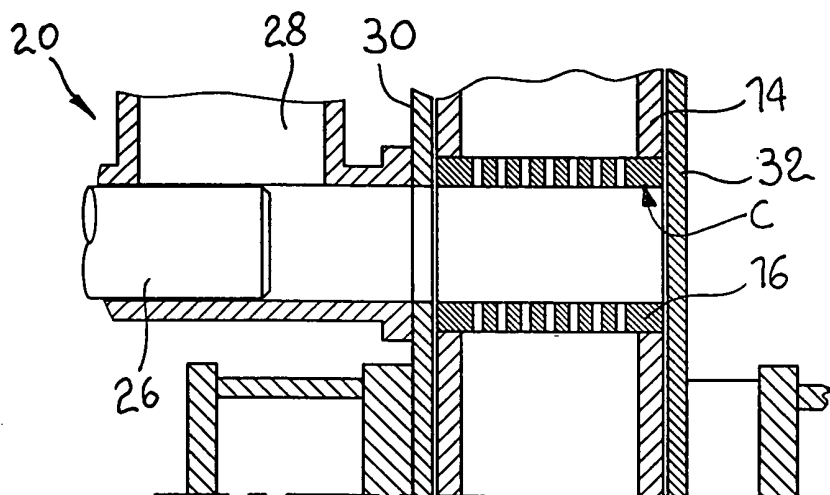


Fig. 3

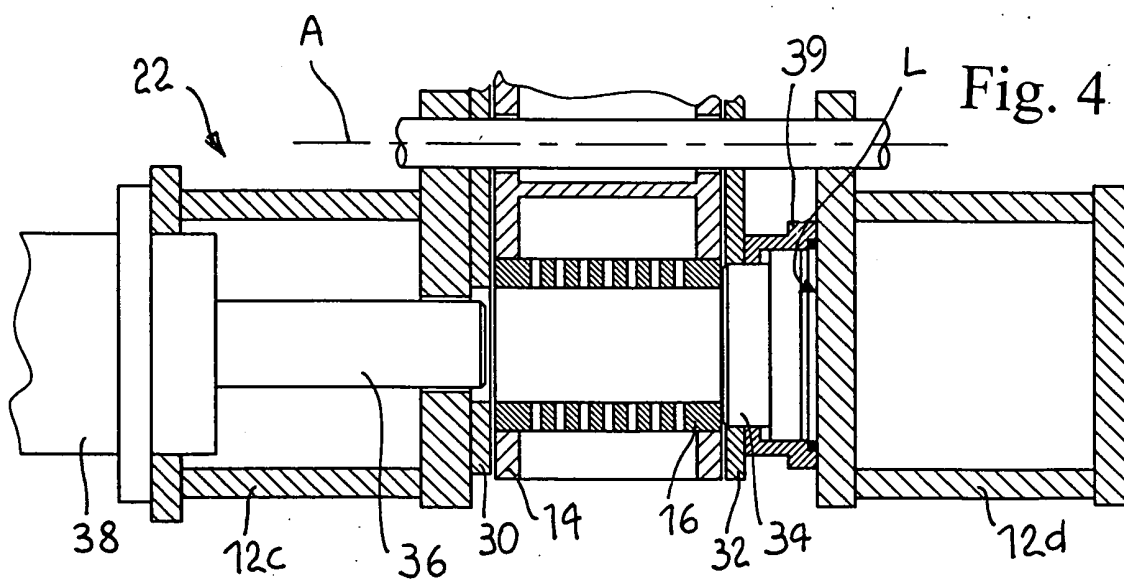


Fig. 4

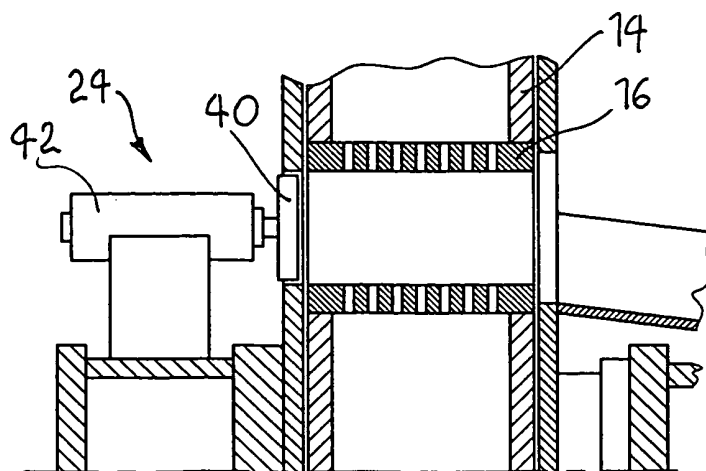
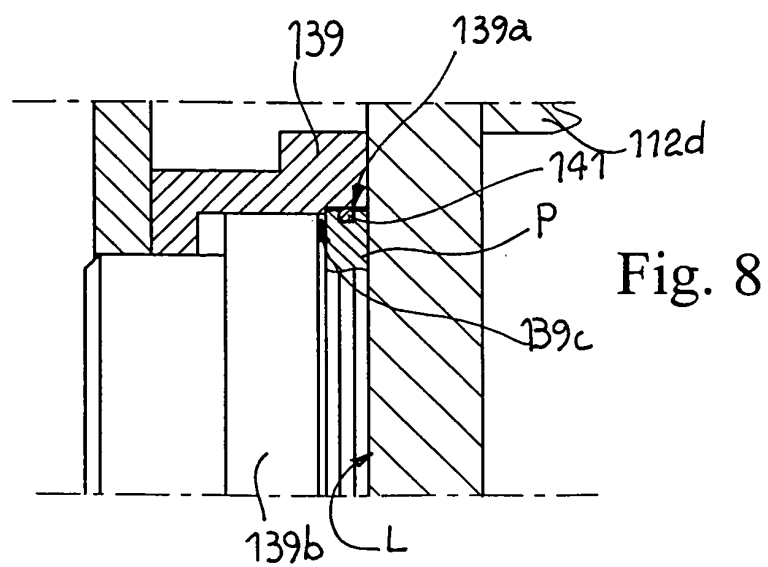
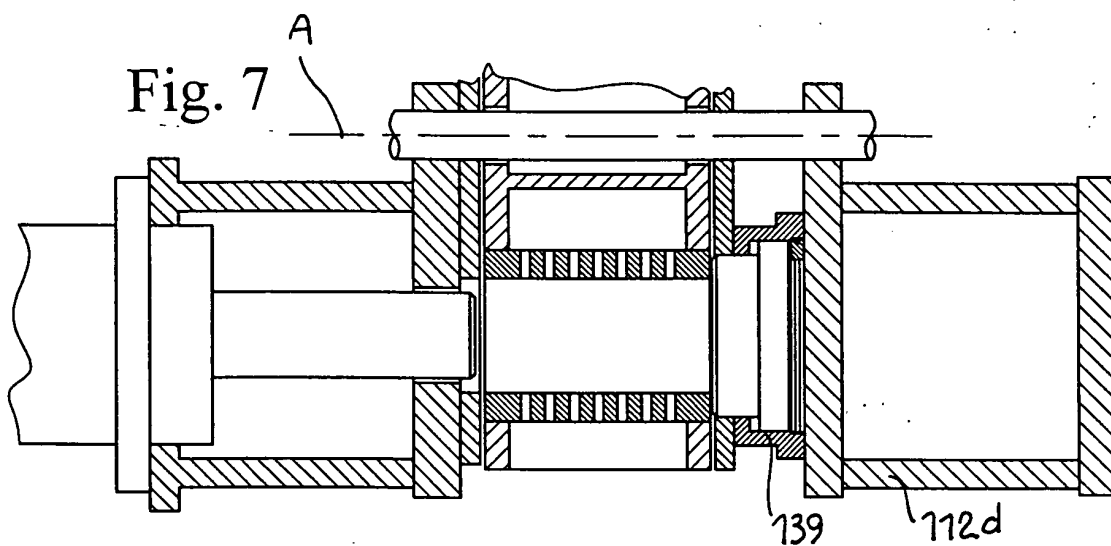
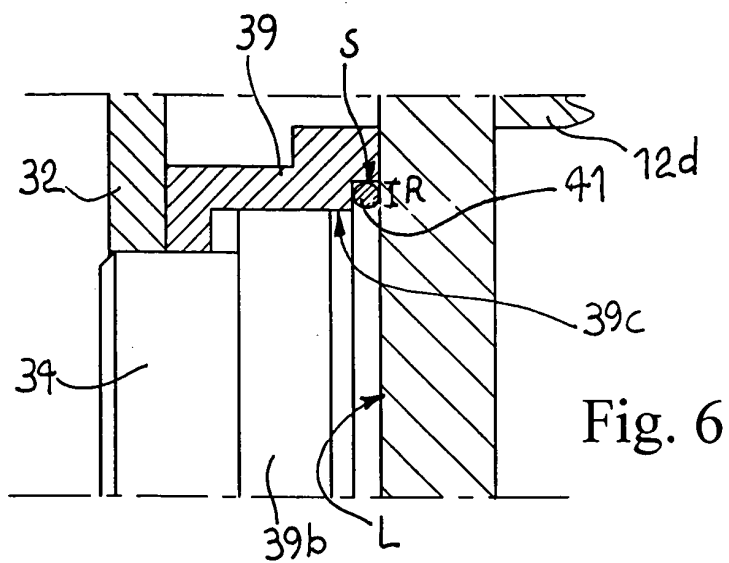


Fig. 5





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 3862

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X	EP 0 684 117 A (TECNOECO S.R.L) 29 November 1995 (1995-11-29)	1,4	B30B9/04 B30B9/06
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		22 June 2005	Belibel, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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