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(71) Applicant(s)
Bi.Ci.Di. s.r.l.

(72) Inventor(s)
Cibien, Angelo

(74) Agent / Attorney
Davies Collison Cave, 1 Nicholson Street, Melbourne, VIC, 3000

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ABSTRACT

Device suitable for transmitting a torque from a first shaft (5) to at least one second shaft (6), wherein the first shaft (5) is mechanically connected to a first cylindrical sleeve (12) which can be mechanically coupled or uncoupled with a second sleeve (13) mechanically connected to the second shaft (6) and arranged in a coaxial way around the first sleeve (12), by extracting or retracting, respectively, a mobile tooth (14) which can rotate in a seat made in the first sleeve (12), a third sleeve (18) being arranged in a coaxial and rotating manner around the first sleeve (12) and being provided with braking means (19; 25), wherein the mobile tooth (14) is provided with a cursor (21) suitable for sliding in a substantially radial manner in a groove (22) made in the third sleeve (18), so that the relative rotation of the third sleeve (18) with respect to the first sleeve (12) causes the extension or the retraction of the mobile tooth (14) according to the direction of this relative rotation.

Fig. 3

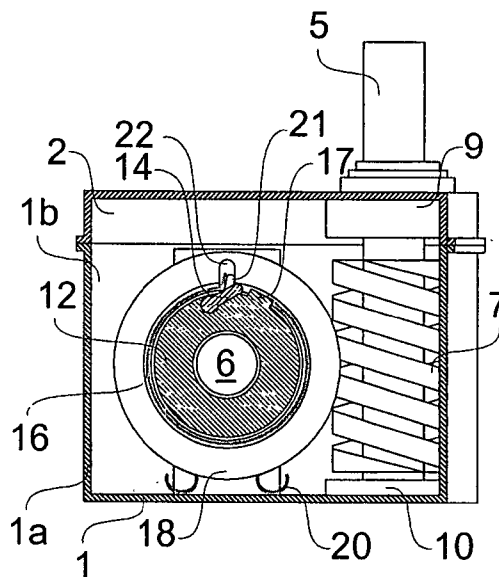


Fig. 4

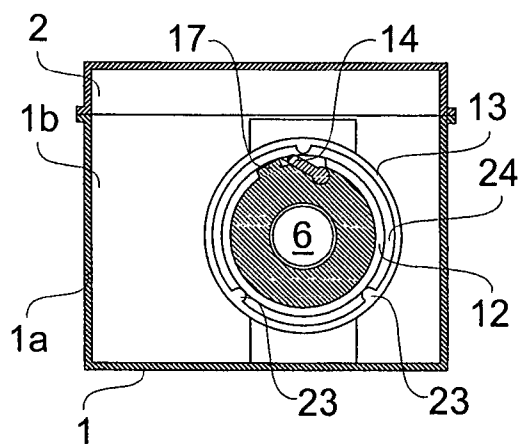
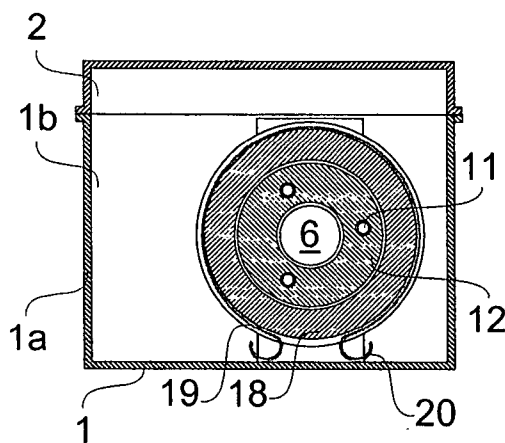


Fig. 5



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COMPLETE SPECIFICATION

NAME OF APPLICANT(S)::

Bi.Ci.Di. s.r.l.

ADDRESS FOR SERVICE:

DAVIES COLLISON CAVE

Patent Attorneys

1 Nicholson Street, Melbourne, 3000, Australia

INVENTION TITLE:

Mechanical transmission device

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

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The present invention relates to a mechanical transmission device, and in particular to a mechanical device which can transmit a torque from a drive shaft to at least one driven shaft.

5 In previously-proposed transmission devices the drive shaft transmits a torque to a driven shaft in the rotation direction of the motor, while the driven shaft is free to rotate in the opposite direction. However, when the drive shaft is still and the driven shaft is rotated in the same rotation direction of the motor, the shafts are mutually coupled and the driven shaft is not free to rotate.

10 It is therefore desirable to provide a transmission device which is free from said disadvantage. Said object is achieved with a device, the main features of which are disclosed in the first claim and other features are disclosed in the subsequent claims.

According to the present invention, there is provided device suitable for transmitting a torque from a first shaft to at least one second shaft, characterized in that the first shaft is mechanically connected to a first cylindrical sleeve which can be mechanically
15 coupled or uncoupled with a second sleeve mechanically connected to the second shaft and arranged in a coaxial way around the first sleeve, by extracting or retracting, respectively, at least one mobile tooth which can rotate in a seat made in the first sleeve, a third sleeve being arranged in a coaxial and rotating manner around the first sleeve and being provided with braking means, wherein the mobile tooth is provided with a cursor suitable for sliding
20 in a substantially radial manner in a groove made in the third sleeve, so that the relative rotation of the third sleeve with respect to the first sleeve causes the extension or the retraction of the mobile tooth according to the direction of this relative rotation.

Thanks to the particular mechanism made up of the sleeves and the mobile tooth, the transmission device according to an embodiment of the present invention allows to
25 automatically couple or uncouple the driven shaft with the drive shaft when the motor is running or not, respectively, so that the driven shaft is idle, i.e. free to rotate in both directions, when the drive shaft is still.

The mobile tooth preferably rotates in its seat thanks to particular elastic means and/or according to a particular rotation angle, so as to improve and/or simplify the
30 automatic uncoupling between driven shaft and drive shaft.

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According to another particular embodiment of the invention, one or more sleeves are preferably arranged in a coaxial manner around a shaft, so as to simplify the construction of the device and to reduce its size.

5 According to a further particular embodiment of the invention, the drive shaft preferably transmits the torque to the driven shaft by means of a worm screw mechanically coupled with a toothed wheel joined in a coaxial manner to a sleeve of the device.

Thanks to the particular shape of the container and/or to the particular mutual arrangement of the shafts and of the mechanical members in this container, the device according to an embodiment of the present invention can be easily mounted and
10 maintained, and has a

minimum size.

Further advantages and features of the device according to the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of two embodiments thereof, with reference to the attached drawings, wherein:

- figure 1 shows a top view of the first embodiment of the device in the uncoupled position;
- figure 2 shows a top view of the device of figure 1, without cover;
- figure 3 shows a view cross-sectioned along plane III-III of the device of figure 1;
- 10. – figure 4 shows a view cross-sectioned along plane IV-IV of the device of figure 1;
- figure 5 shows a view cross-sectioned along plane V-V of the device of figure 1;
- figures 6 and 7 correspond to figures 3 and 4, but with the device in the coupled position;
- figure 8 shows a top view of the second embodiment of the device, without cover;
- 15. and
- figure 9 shows a view cross-sectioned along plane IX-IX of the device of figure 8.

Referring to figures 1 to 5, it is seen that the transmission device according to the first embodiment of the invention comprises a container 1 which is closed by an upper cover 2 by means of a plurality of screws 3 inserted into corresponding seats 4 arranged
20. along the upper edges of container 1. The container has a substantially prismatic shape, wherein the front wall 1a is perpendicular to the two lateral walls 1b and the rear wall 1c is curved outwards. Cover 2 is provided with a hole in which a first shaft 5, in particular a drive shaft, is inserted. A second shaft 6, in particular a driven shaft, is instead arranged perpendicular to shaft 5 and crosses one or both lateral walls 1b of
25. container 1.

A worm screw 7 mechanically coupled with a cogwheel 8 provided with an axial hole, in which the second shaft 6 is arranged in a rotating manner, is keyed on the first shaft 5, which is kept in position in container 1 by a pair of bearings 9, 10. The worm screw 7 is arranged at least partially in the curvature of the rear wall 1c of container 1.
30. Cogwheel 8 is provided with a plurality of longitudinal holes in which an end of longitudinal pins 11 is inserted. The opposite ends of pins 11 are in turn inserted into

longitudinal holes made in a first cylindrical sleeve 12 arranged in a coaxial manner beside cogwheel 8, so that this sleeve rotates together with cogwheel 8. Also the first cylindrical sleeve 12 is provided with an axial hole in which the second shaft 6 is arranged in a rotating manner. The first sleeve 12 can be mechanically coupled or uncoupled with a second sleeve 13, arranged in a coaxial manner beside and around the first sleeve 12, by extracting or retracting, respectively, at least one mobile tooth 14 which can rotate in a seat made close to the outer cylindrical surface of the first sleeve 12. The rotation angle of the mobile tooth 14 is preferably less than 45° . The second sleeve 13 is provided with an axial hole so that it can be keyed on the second shaft 6 by means of a transversal pin 15. The mobile tooth 14 is urged to its retracted position by elastic means 16, in particular by a spring made of a curved metal wire arranged around the first sleeve 12. An end of spring 16 urges the mobile tooth 14 into its seat, while the other end is locked with respect to the first sleeve 12, for example by a tooth 17 protruding from its outer cylindrical surface. A third sleeve 18 is arranged in a coaxial and rotating manner around the first sleeve 12 between cogwheel 8 and the second sleeve 13. The third sleeve 18 is provided with braking means, which in the present embodiment comprise a spring 19 made up of a curved metal wire arranged in a circular groove made around the third sleeve 18. The ends 20 of spring 19 are bent and locked by the base of container 1, so that spring 19 is stationary with respect to container 1 and opposes a friction to the rotation of the third sleeve 18 with respect to container 1. The mobile tooth 14 is provided with a cursor 21 suitable for sliding in a substantially radial manner in a groove 22 made in the third sleeve 18, so that the relative rotation of the third sleeve 18 with respect to the first sleeve 12 causes the extension or the retraction of the mobile tooth 14 according to the direction of this relative rotation between sleeves 12 and 18. In figures 3 to 5 the mobile tooth 14 is shown in the retracted position, i.e. with the first shaft 5 not mechanically coupled with the second shaft 6. This condition occurs when the first shaft 5 is not rotated by external means, for example by a motor, so that cogwheel 8, the first sleeve 12 and the third sleeve 18 are still, while the second shaft 6 and the second sleeve 13 can freely rotate in both directions, since the second sleeve 13 is not mechanically coupled with the first sleeve 12.

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Referring also to figures 6 and 7, it is seen that when the first shaft 5 is rotated, for example by a motor, in a determined direction, the rotation of the first shaft 5 is transmitted to the first sleeve 12 through the worm screw 7 and cogwheel 8. The third sleeve 18, braked by spring 19, is still or rotates slowly with respect to the first sleeve 12, so that a relative rotation is generated and the mobile tooth 14 is extracted, after which it begins to rotate together with the first sleeve 12 when the mobile tooth 14 has been completely extracted and has reached the final position in its seat. The extracted mobile tooth 14, by rotating with the first sleeve 12, hits against at least one protrusion 23 which protrudes into a cavity 24 made in the second sleeve 13 around the first sleeve 12, so that the second shaft 6 is rotated by the second sleeve 13 mutually coupled with the first sleeve 12 by means of the extracted mobile tooth 14.

When the first shaft is stopped, spring 16 urges the mobile tooth 14 into its seat, thereby slightly rotating the first sleeve 18 with respect to the first sleeve 12 and overcoming the friction opposed by spring 19 to this relative rotation. If the first shaft 5 rotates in the inverse direction, the relative rotation of the first sleeve 12 with respect to the third sleeve 18 causes the retraction of the mobile tooth 14 into its seat, even if spring 16 were not present.

Referring to figures 8 and 9, it is seen that in a second embodiment of the invention the braking means comprise a ring 25 made of an elastomeric material arranged between the third sleeve 18 and a pair of opposing seats, for example semicircular-shaped, made in two vertical plates 26, 27 fixed to container 1 and cover 2, respectively.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Device suitable for transmitting a torque from a first shaft to at least one second shaft, characterized in that the first shaft is mechanically connected to a first cylindrical sleeve which can be mechanically coupled or uncoupled with a second sleeve mechanically connected to the second shaft and arranged in a coaxial way around the first sleeve, by extracting or retracting, respectively, at least one mobile tooth which can rotate in a seat made in the first sleeve, a third sleeve being arranged in a coaxial and rotating manner around the first sleeve and being provided with braking means, wherein the mobile tooth is provided with a cursor suitable for sliding in a substantially radial manner in a groove made in the third sleeve, so that the relative rotation of the third sleeve with respect to the first sleeve causes the extension or the retraction of the mobile tooth according to the direction of this relative rotation.
2. Device according to the previous claim, characterized in that the mobile tooth, extracted from the seat in the first sleeve, can hit against at least one protrusion which protrudes into a cavity made in the second sleeve around the first sleeve.
3. Device according to one of the previous claims, characterized in that the rotation angle of the mobile tooth in the seat of the first sleeve is less than 45° .
4. Device according to one of the previous claims, characterized in that the mobile tooth is urged in its retracted position in the seat of the first sleeve by elastic means.
5. Device according to the previous claim, characterized in that said elastic means comprise a spring made up of a curved metal wire arranged around the first sleeve.
6. Device according to the previous claim, characterized in that an end of the spring urges the mobile tooth into its seat of the first sleeve, while the other end is locked with respect to the first sleeve by a tooth protruding from its outer cylindrical surface.

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7. Device according to one of the previous claims, characterized in that first sleeve is provided with an axial hole in which the second shaft is arranged in a rotating manner.

8. Device according to one of the previous claims, characterized in that second sleeve is provided with an axial hole in which the second shaft is keyed.

9. Device according to one of the previous claims, characterized in that a cogwheel is joined to the first sleeve and is provided with an axial hole in which the second shaft is arranged in a rotating manner.

10

10. Device according to the previous claim, characterized in that the cogwheel is mechanically coupled with a worm screw keyed on the first shaft.

11. Device according to the claim 9 or 10, characterized in that the third sleeve is arranged between the cogwheel and the second sleeve.

12. Device according to one of the previous claims, characterized in that the sleeves are arranged in a container which is closed with an upper cover provided with a hole in which the first shaft is inserted, wherein the second shaft is perpendicular to the first shaft and crosses one or both lateral walls of the container.

13. Device according to the previous claim, characterized in that the container has a substantially prismatic shape, wherein the front wall is perpendicular to the two lateral walls and the rear wall is curved outwards.

25

14. Device according to the previous claim, characterized in that the worm screw is arranged at least partially in the curvature of the rear wall of the container.

15. Device according to one of claims 12 to 14, characterized in that said braking means comprise a spring made up of a curved metal wire arranged around the third sleeve and kept stationary with respect to the container.

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16. Device according to one of claims 12 to 14, characterized in that said braking means comprise a ring made of an elastomeric material arranged between the third sleeve and a pair of opposing seats made in two vertical plates fixed to the container and to the
5 cover, respectively.

17. Device according to one of the previous claims, characterized in that the first shaft is a drive shaft and the second shaft is a driven shaft.

10 18. A device for transmitting torque substantially as hereinbefore described with reference to the drawings and/or Examples.

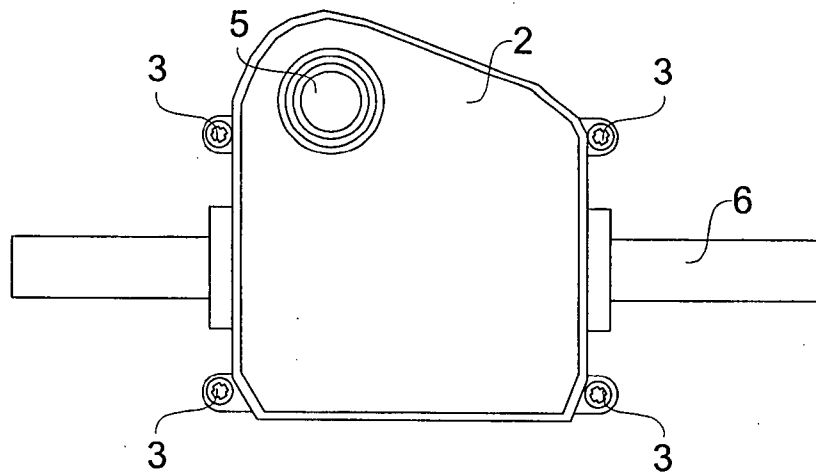


Fig. 1

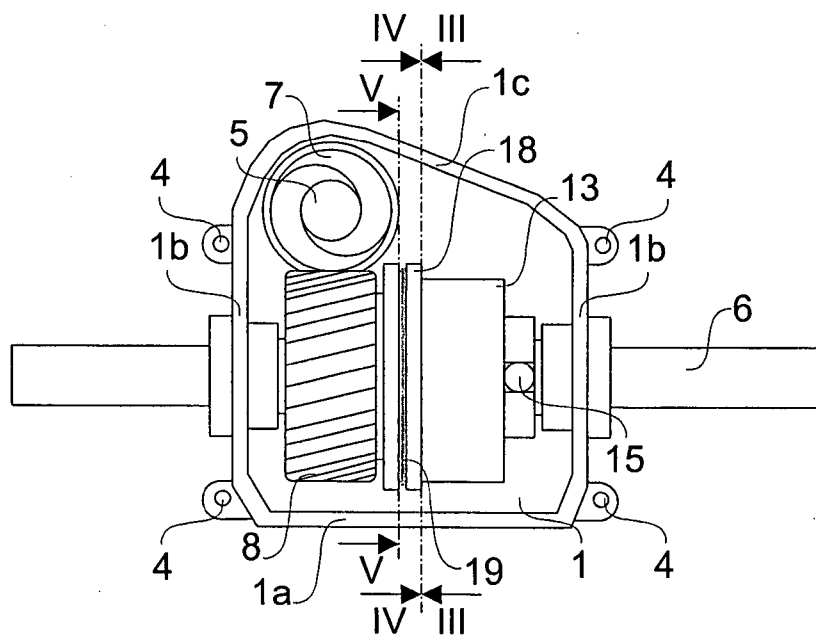


Fig. 2

Fig. 3

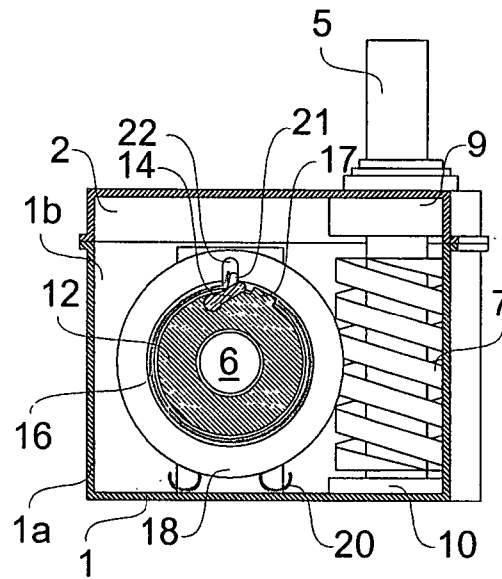


Fig. 4

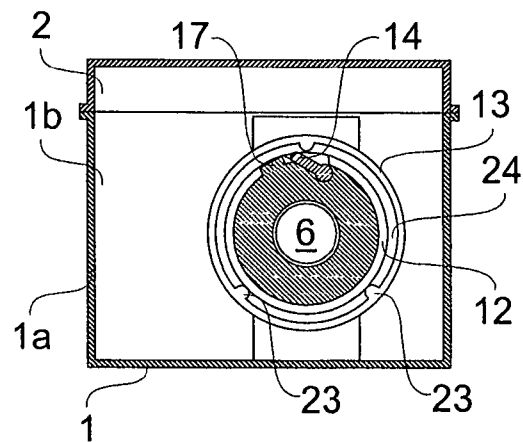


Fig. 5

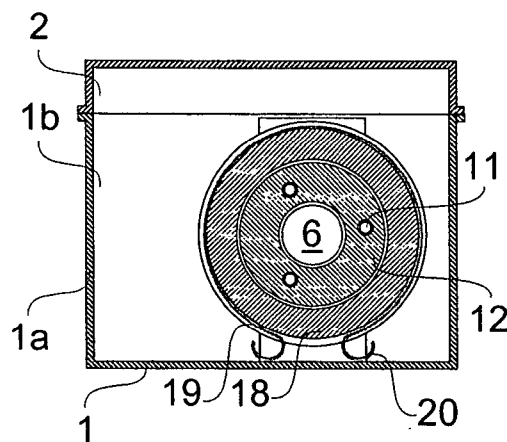


Fig. 6

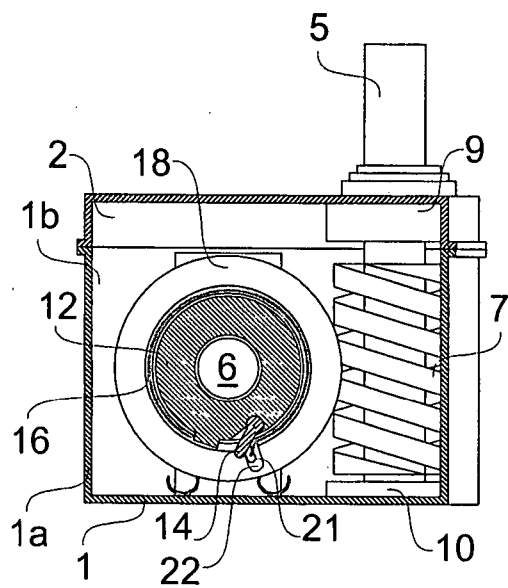
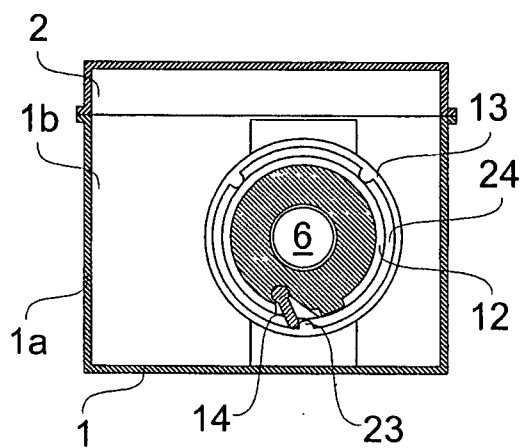


Fig. 7



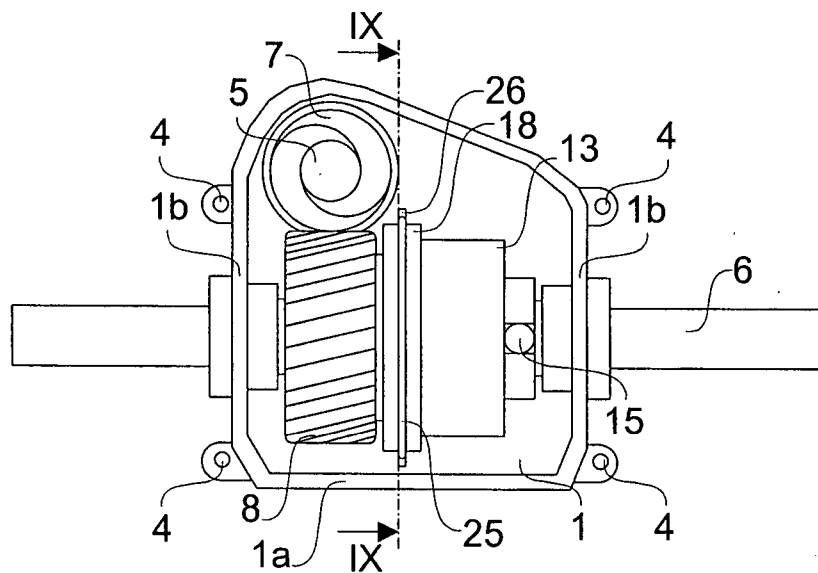


Fig. 8

Fig. 9

