(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 987 072 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.03.2000 Bulletin 2000/12

(51) Int Cl.[7]: **B21L 11/00**

(21) Application number: **99830481.0**

(22) Date of filing: **27.07.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **18.09.1998 IT LU980011**

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(54) Traction device for use in the manufacturing process of ornamental chains

(57) A device for exerting a traction of a chain (2) getting out of a manufacturing machine, fit to be connected to the chain (2) to keep it in traction with its own weight. The device comprises a drive roller (3), motor means (5) for controlling the rotation of drive roller (3), a movable pushing roller (4), elastic means (9) for keeping pushing roller (4) pushed against drive roller (3) with the interposition of chain (2). As a consequence of the friction between chain (2) and rollers (3, 4), the device is steady with respect to the chain when drive roller (3) is blocked, whereas it slides up with respect to chain (2) when drive roller (3) is rotated by motor means (5). Sensor means are associated to motor means (5) for controlling the rotation of drive roller (3) as a function of the level of the device.

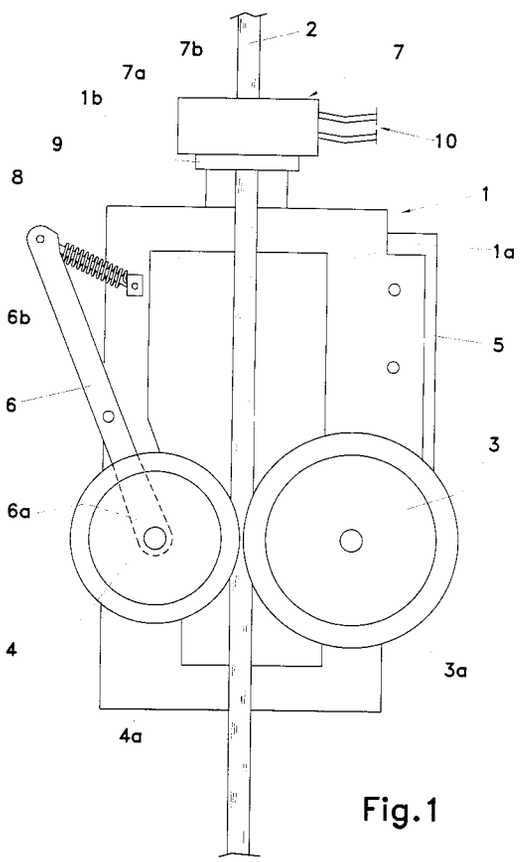

Fig.1

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Description

[0001] The present invention relates to the field of the manufacturing of ornamental chains, and more specifically to that of the manufacturing of chains of the type commonly known as "sock chain". More precisely the invention concerns a traction device for this type of chains, to be used in combination with a machine for the manufacturing thereof.

[0002] Sock chains are well known in the field of goldware and costume jewellery and are manufactured by means of suitable operating machines through a manufacturing process which, to be correctly accomplished, requires the chain itself to be kept in traction when getting out of the machine.

[0003] Such traction is conventionally exerted by means of a weight hooked to the chain. The weight is usually about 2 kg heavy, but in general terms may vary according to the features of the sock chain. As the formed chain progressively moves downward reaching a rotating collection plate, the weight drops down with it. When the weight reaches a predetermined level, nearby the plate, a sensor stops the machine, allowing an operator to remove the connection between the chain and the weight and to fit the latter again at a higher level. In this way the manufacturing process can go on.

[0004] The main drawback of the above described system consists in that an operator has necessarily to be employed, this resulting in a remarkable increase of the production costs. Furthermore, this system is unsatisfactory because the frequency of the machine stops, which approximately occur every few minutes, besides implying important productivity losses, increases the occurrence of operation troubles and breakdowns. In fact, the machine start-up is a very critical phase, in which for instance the risk of an inaccurate setting of the tools is much greater. Even when this does not result in an actual machine stop, nevertheless it can cause damages, and more generally, a lower quality of the product and an increase of the wastes.

[0005] Recently the company FASTI INDUSTRIALE S.p.A. has disclosed a device for an automatic refitting of the weight. By means of a lever mechanism the weight is disconnected from the sock chain, lifted it, and hooked again to the chain at a higher level. With this device the employ of an operator is not needed, but the above mentioned problem relating to the frequent machine stops is not solved.

[0006] According to another known system, the weight consists of a reel, around which the chain winds up with an intermittent motion by means of a pneumatic actuator. By means of a rack and a pinion integral to the reel and engaging with the rack, the actuator turns the reel itself intermittently in an unvarying direction of rotation.

[0007] In this case the weight, i. e. the reel, remains at a constant level, and so the problem of its lifting and of the consequent machine stops does not occur. However, the chain accumulating around the reel causes the weight to increase progressively, whereby the traction is not kept constant. The considerable variations of the tension of the chain, and also the harsh pull transmitted to the chain each time the actuator operates, gives rise to distortions and damages of the product. Moreover, as the chain accumulates, the reel progressively reaches a weight and a size which are incompatible with an efficient operation of the machine, whereby in any case it has to be stopped for replacement of the loaded reel with an unloaded one. Therefore, even this solution, though not requiring the presence of an operator in the manufacturing process, is not fully satisfactory.

[0008] The object of the present invention is to provide a traction device for use in the manufacturing process of sock chains, which permits the exertion of a constant and continuous traction on the chain, without requiring either any machine stops or the attendance to the machine itself by an operator.

[0009] The above object is achieved by the device for exerting a traction of a sock chain getting out of the machine by which it is manufactured according to the present invention. The device is fit to be connected to the chain to keep it in traction with its own weight, and comprises: a frame; a drive roller rotatably supported by the frame; motor means connected to the frame, for controlling the rotation of the drive roller; feeding means of the motor means; a pushing roller rotatably and movably supported by the frame with an axis parallel to that of the drive roller; elastic means for keeping the pushing roller pushed against the drive roller with the interposition of the chain, whereby, as a consequence of the friction between the chain and the rollers, the device is steady with respect to the chain when the rotation of the drive roller is blocked by the motor means, whereas it slides up with respect to the chain when the drive roller is rotated by the motor means; and sensor means associated to the motor means, for controlling the rotation of the drive roller as a function of the level of the device.

[0010] The features and advantages of the traction device for use in the manufacturing process of a sock chain according to the present invention will be made clearer thanks to the following description of exemplifying and not limiting embodiments thereof, with reference to the following drawings wherein:

- Figure 1 is a schematic front view of the device according to the invention;
- Figure 2 is a schematic front view, analogous to that of figure 1, of a different embodiment of the device according to the invention;

[0011] With reference to figure 1, the device according to the invention can be associated to a sock chain, indicated at 2, getting out of the machine by which it is formed, so as to exert on the chain itself, with its own weight, the traction necessary to ensure a correct accomplishment of the manufacturing process.

[0012] The device comprises a frame 1, which in the depicted embodiment has a substantially flat shape, generally quadrilateral, with a lightening central through opening 1b. As will made clearer hereinafter, frame 1 is fit to be placed so that chain 2 drops in a substantially intermediate position along one of its faces 1a. On face 1a a drive roller 3 is rotatably supported, with its rotation axis orthogonal to face 1a itself. Drive roller 3 is placed in a position permitting the engagement of its profile with chain 2 and is operated, through a conventional transmission, not shown, by an electric motor 5, also supported by frame 1. Motor 5 can be seen only in part in the figure, since it is hidden by frame 1.

[0013] Electric cables 10 for feeding motor 5 are connected to a sleeve 7, supported by frame 1 upstream from drive roller 3, substantially coaxial to chain 2. In further detail, sleeve 7 comprises an internal cylinder 7a, integral to frame 1 and electrically connected to motor 5, and an external cylinder 7b, to which cables 10 are jointed, turnably mounted around internal cylinder 7a with wiping electric contacts, or equivalent ones, arranged in between. In this way, in spite of the fact that the chain getting out of the machine, as a consequence of the process to which it is subjected, turns around its own axis and frame 1 turns with it as will be explained hereinafter, external cylinder 7b can stay substantially still, and the winding of cables 10 around the device is avoided.

[0014] Face 1a of frame 1 pivotally supports also a movable arm 6 at the side opposite to drive roller 3 with respect to chain 2. Movable arm 6 is hinged at an intermediate point, so that one of its ends 6a is placed close to roller drive 3. In correspondence to end 6a, arm 6 turnably supports an idle pushing roller 4, having a rotation axis parallel to that of drive roller 3. The opposite end 6b of arm 6 is articulated to frame 1 through a crank 8. A spiral spring 9 is mounted coaxially to crank 8, for elastically hindering the rotation of arm 6 in the direction implying the movement of pushing roller 4 away from drive roller 3.

[0015] Two sensors are associated to the device, for detecting its position between the machine outlet and the chain collection plate and for controlling motor 5 as a function of said position. Namely, a lower sensor, placed near the collection plate of the chain, and a higher one, as close as possible to the point from which the chain gets out of the machine, are provided respectively for turning on and off the motor 5 when detecting the presence of the device at the corresponding heights. The features of the sensors and their arrangement are neither shown nor described in further detail, being obvious to an expert in the field.

[0016] The device according to the invention operates in the following way. Chain 2, passing through sleeve 7, is engaged between pushing roller 4 and drive roller 3 by manually moving arm 6 so as to overcome the elastic hindrance provided by spring 9 and then releasing it, the rotation of drive roller 3 being blocked by motor 5. Pushing roller 4 then, thanks to the response of spring 9, keeps chain 2 pushed against drive roller 3, thus generating a static friction, between the circumferential edges of the two rollers and the chain itself, sufficient to ensure the support of the whole device.

[0017] During the manufacturing process the chain moves downward, kept in traction by the weight of the device, steady with respect thereto since the rotation of drive roller 3 is blocked. When the device gets close to the collection plate the lower sensor operates, through motor 5, the drive roller 3 which, rotating in a counter clockwise direction according to the view of the figure, in cooperation with pushing roller 4 and thanks to the consequent friction on the chain, causes the device to slide up along the chain. When the device reaches the height of the higher sensor, its climbing along the chain is stopped by turning off motor 5 and consequently blocking drive roller 3. During this process no machine stops are required.

[0018] Preferably both drive roller 3 and pushing roller 4 have external linings respectively 3a and 4a, in suitable material, e. g. rubber, for increasing the friction on the chain but preventing the pressure from deforming and damaging it. To the same purpose, circumferential grooves of suitable width and depth can advantageously be formed in the side surface of the rollers.

[0019] When an excessive pressure on the chain has to be absolutely avoided, the embodiment shown in figure 2 can be adopted. In said figure equal or corresponding parts to those of the first embodiment are indicated with the same reference numerals and are not described in detail. According to this embodiment, frame 1 rotatably supports a wind-up wheel 11, upstream from pushing roller 4 and drive roller 3, on which chain 2 winds up with a single coil. The rotation of wheel 11 is controlled by motor 5 during the going up of the device. In this way, pressure on chain 2 can be decreased, by suitably adjusting spring 9, because the winding up of the chain around wheel 11 remarkably contributes to the support of the device and a lower pressure is enough to ensure the friction which prevents the rollers from sliding along the chain itself.

[0020] More precisely in the device of figure 2 motor 5 is placed on the same side of pushing roller 4 and through a worm screw transmission 12 operates a worm gear wheel 13, supported by frame 1 upstream from pressure roller 4 and drive roller 3 and in a substantially symmetrical position to wind-up wheel 11 with respect to chain 2. Wind-up wheel 11 is driven by a cog belt 14, extending between gear wheel 13 and wind-up wheel 11 itself. From wheel 11 the motion is finally transmitted to drive roller 3 by means of a second cog belt 15. To keep the chain in traction between wind-up wheel 11 and drive roller 3, it is preferable that the transmission via the cog belt 15 is such that the peripheral speed of drive roller 3 during the going up of the device is higher, e. g. of about 10%, than that of wheel 11.

[0021] The above described arrangement has the ad-

vantage of being substantially symmetrical with respect to the axis of chain 2, whereby the barycenter of the whole device is placed in correspondence to the axis itself. This is a very important condition to be complied with for a correct operation of the device. In fact, thanks to it, chain 2 is kept vertical and this results in a substantially balanced traction.

[0022] The device according to the invention can be constructed so as to be, on the whole, not heavier than about 700g, and this permits the manufacturing of very fine chains. When a stronger traction is required, as a function of the size of the chain and of the type of material used, weighing elements, not shown, can be applied to the device, through hook or container means. Besides, the device can be made available in different sizes, so that the diameter and the width of rollers 3 and 4 and of wheel 11, and consequently the width and the depth of the circumferential grooves thereof, can be adapted to the specific size of the chain to be manufactured.

[0023] It will be easily appreciated from the above that the device according to the invention fully achieves the stated object, exerting a constant traction on the sock chain without requiring any machine stops. The production of the chain is then continuous, with all the advantages brought about by it, and does not need the attendance of an operator to the machine, except for the initial step when the device is set up. Afterwards the device operates in a completely automatic way.

[0024] Other variations and/or modifications can be brought to the traction device for the manufacturing of ornamental chains according to the present invention, without departing from the scope of the invention itself as defined in the appended claims. In particular the above described arrangements of the supporting structure of pushing roller 4, and of the means for transmitting the motion to drive roller 3, and if present to wind-up wheel 11, can be replaced by equivalent arrangements.

Claims

1. A device for exerting a traction on a sock chain (2) getting out of a munufacturing machine, fit to be connected to said chain (2) to keep it in traction with its own weight, characterised in that it comprises: a frame (1); a drive roller (3) rotatably supported by said frame (1); motor means (5) connected to said frame (1), for controlling the rotation of said drive roller (3); feeding means (10) of said motor means (5); a pushing roller (4) rotatably and movably supported by said frame (1) with an axis parallel to that of said drive roller (3); elastic means (9) for keeping said pushing roller (4) pushed against said drive roller (3) with the interposition of said chain (2), whereby as a consequence of the friction between said chain (2) and said rollers (3, 4), the device is steady with respect to said chain (2) when the rotation of said drive roller (3) is blocked by said motor means (5), whereas it slides up with respect to said chain (2) when said drive roller (3) is rotated by said motor means (5); and sensor means associated to said motor means (5), for controlling the rotation of said drive roller (3) as a function of the level of the device.

2. The device according to claim 1, wherein said frame (1) pivotally supports a movable arm (6), hinged at a substantially intermediate point, one end (6a) of said arm (6) rotatably supporting said pushing roller (4), the opposite end (6b) being articulated to said frame (1) in association with said elastic means (9), whereby the rotation of said arm (6) in the direction implying the movement of said pushing roller (4) away from said drive roller (3) is elastically hindered.

3. The device according to any of the previous claims, wherein said frame (1) rotatably supports, upstream from said pushing and drive rollers (4, 3), a wind-up wheel (11) around which said chain (2) winds with a single coil, the rotation of said wheel (11) being controlled by said motor means (5).

4. The device according to claim 3, wherein said wind-up wheel (11) is placed at the same side of said drive roller (3) with respect to the axis of said chain (2), said motor means (5) being adjacent to said pushing roller (4), transmission means (12, 13, 14, 15) being provided for transmitting the motion from said motor means (5) to said wind-up wheel (11) and to said drive roller (3).

5. The device according to claim 3 or 4, wherein during the sliding of the device along said chain (2) the peripheral speed of said drive roller (3) is higher than that of said wind-up wheel (11).

6. The device according to claim 4 or 5, wherein said transmission means comprise a worm screw (12) and worm gear wheel (13) transmission associated to said motor means (5) and a cog belt (14) extending between said gear wheel (13) and said wind-up wheel (11).

7. The device according to any of the previous claims, wherein said feeding means (10) of said motor means (5) comprise an electric connection (7) with a wiping contact, supported by said frame (1) upstream from said drive and pushing rollers (3, 4) coaxially to said chain (2) so as to permit the passage thereof at its inside.

8. The device according to any of the previous claims, wherein said pushing and drive rollers (4, 3) have elastic linings, for increasing the friction between

said chain (2) and said rollers (3, 4) and preventing damages of chain (2).

9. The device according to any of the previous claims, comprising hook or container means for supporting weighing elements of the device.

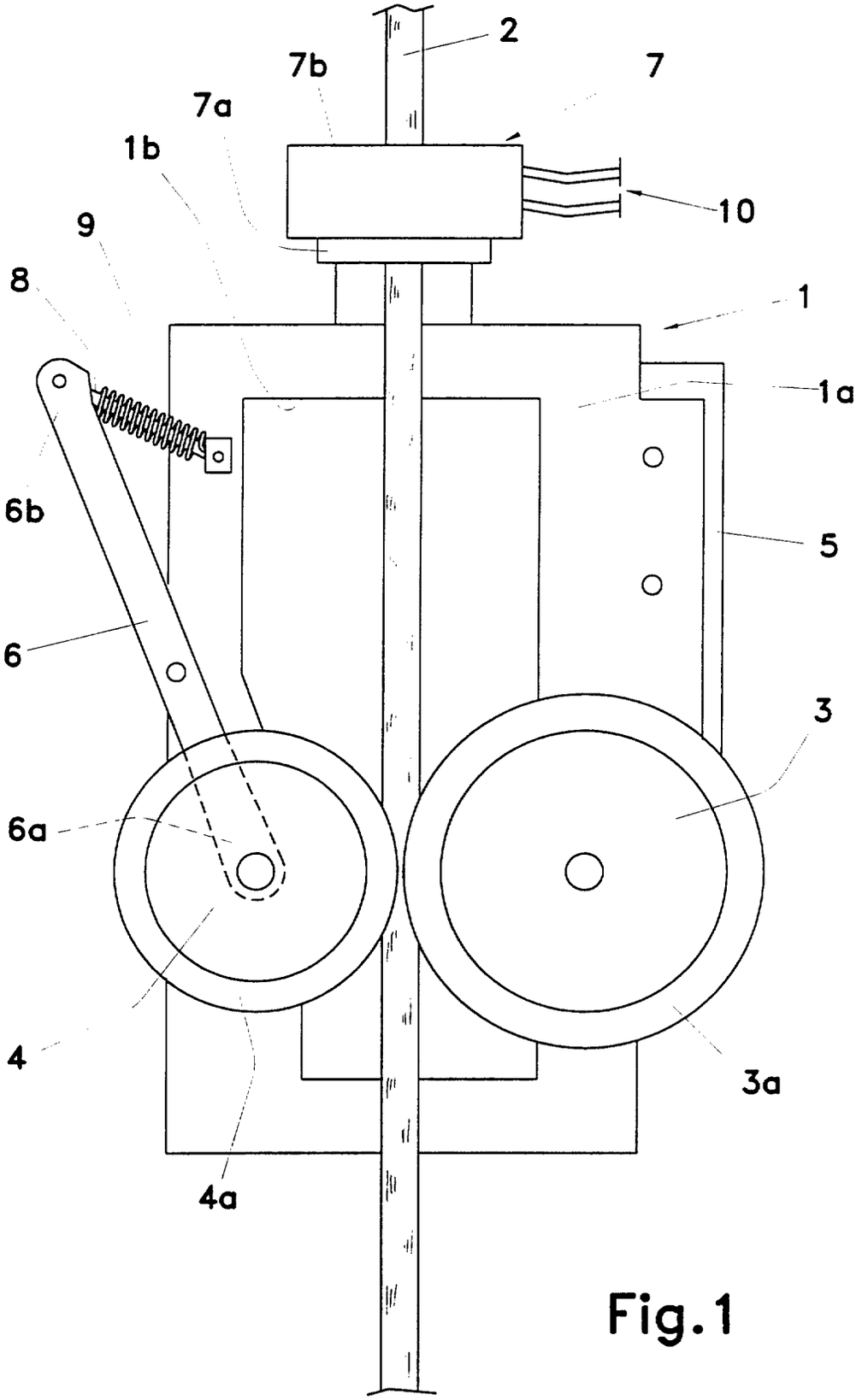

Fig.1

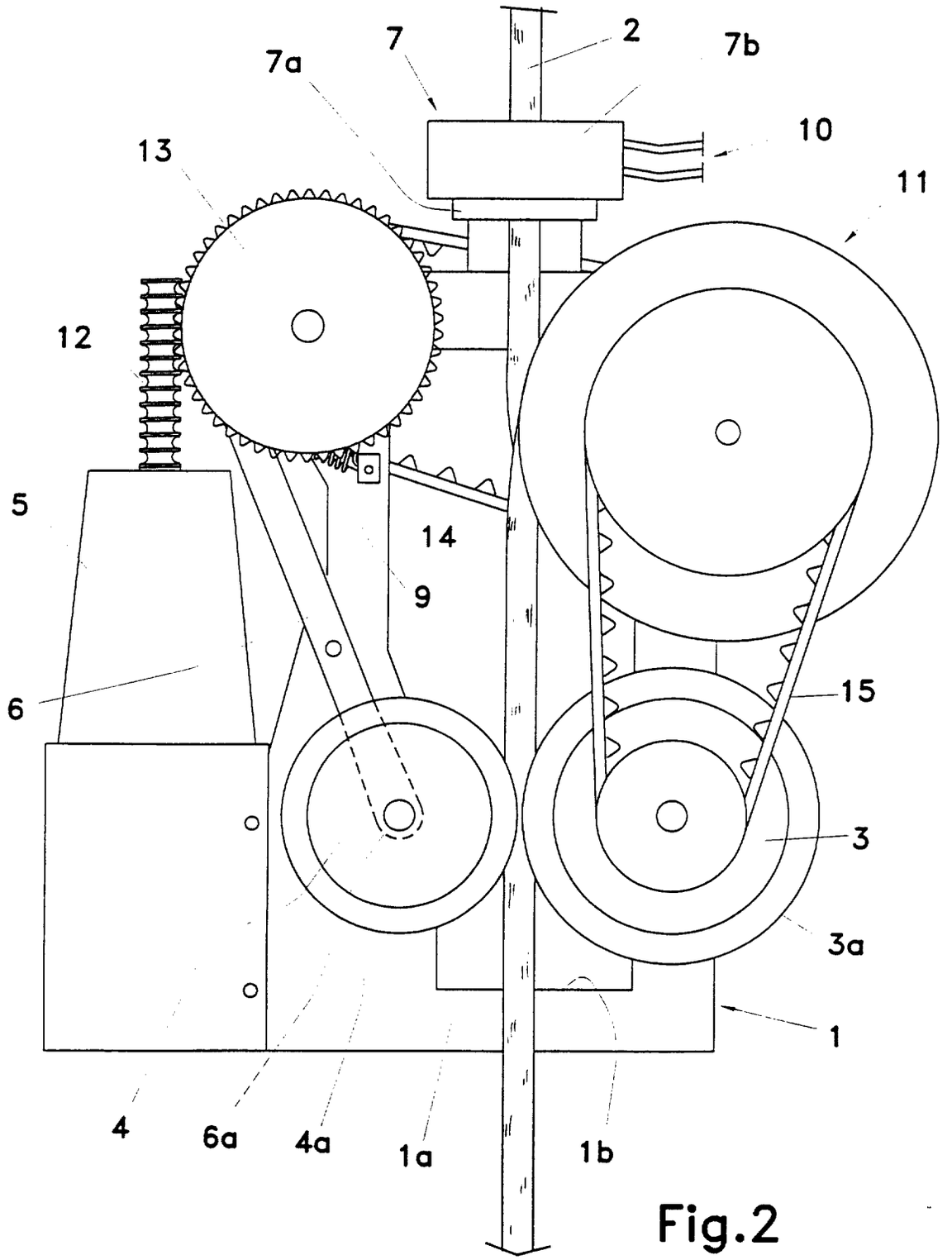

Fig.2