

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 444 726 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
17.04.1996 Bulletin 1996/16

(51) Int Cl.®: **D03C 1/00**

(21) Application number: **91200157.5**

(22) Date of filing: **26.01.1991**

(54) **Positive device for governing and controlling a rotary dobbie in looms**

Vorrichtung zum zwangsläufigen Steuern einer Rotationsschaffmaschine für Webmaschinen

Dispositif positif de commande d'une ratière rotative pour métier à tisser

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(72) Inventor: **Beretta, Giovanni**
Imola, (Bologna) (IT)

(30) Priority: **05.02.1990 IT 1926290**

(74) Representative:
Raimondi, Alfredo, Dott. Ing. Prof. et al
Dott. Ing. Prof. RAIMONDI ALFREDO S.r.l.
Piazzale Cadorna 15
I-20123 Milano (IT)

(43) Date of publication of application:
04.09.1991 Bulletin 1991/36

(73) Proprietor: **BREVTEX SA**
CH-6534 San Vittore/GR (CH)

(56) References cited:
EP-A- 0 050 160 **EP-A- 0 068 139**
EP-A- 0 078 752 **EP-A- 0 185 780**
EP-A- 0 212 273 **FR-A- 2 596 074**

EP 0 444 726 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

The subject of the present invention is a device for governing and controlling a rotary dobbie for actuating heddle frames of looms.

5 It is known that the positioning of the frames of the heddles of a loom, determining the weft of the finished fabric, must be programmed in accordance with a predetermined sequence which predicts the raised or lowered position which each frame must adopt at every rotation of the main shaft, to which are firmly attached the oscillating devices which actuate said frames for the purpose of achieving the movement into one of the two desired positions, high or low.

10 Because the main shaft is actuated in accordance with an intermittent cycle with a stop at each half-revolution of 180°, the governing and control device must, in correspondence with each stop of the main shaft, be capable of making the rotary shaft locked to, or disengaged from, said eccentric which actuates the movement lever mechanisms for the frames, thereby determining for them, in one case, the raising or lowering and, in the other case, the maintenance of the preceding position.

15 Solutions are known in the art which provide the use of eccentrics, coaxially mounted on the rotary shaft, which eccentrics must be brought into a rotationally locked position with an element which converts the rotary motion into an alternating rectilinear motion so as to cause the displacement of the frame, or must be kept idling relative to the shaft but in a fixed position, thus causing the frame to be held in the fixed position.

20 In particular, there is known from the Patent Application FR-81 20502, a device which provides an eccentric, rotating with the main shaft, which can be firmly locked to, or kept neutral from, an oscillating element actuating the lever mechanisms governing the movement of the frames, by means of two fixed levers, positioned outside the rotary elements and governed by a programmer for actuating an internal engagement and disengagement mechanism; said device, however, possesses the serious disadvantage that said governing levers and said engagement and disengagement mechanism operate correctly only dependently upon a reaction on an indirect return element composed of a spring which, only if it is perfectly calibrated and in perfect operating conditions, assures the functioning of said control device.

25 Another example of device for controlling a rotary dobbie according to the prior art is disclosed into EP- 0 185 780.

30 The technical problem therefore arises of creating a device for governing and controlling a rotary dobbie for actuating the positioning levers for the frames of the heddles of a loom, the device being equipped with controls and gear, blocking and positive safety means which assure the correct positioning and mutual engagement of the movable parts, both during the rotation with the shaft that determines the variation in the position of the frame and in the neutral or idling position with maintenance of the position adopted by the frame in the preceding revolution.

Said safety means must, furthermore, contribute to the blocking of the rotation, when each final position corresponding to the half-revolution through 180° is reached.

35 Said device, which must revolve at high speed, must furthermore be of very small size and mass, must make possible rapid programming, actuating the desired command during the very short stopping time of the main shaft; and it must be easy and economical to assemble and maintain, thus enabling the repair times to be reduced to a minimum.

Said results are achieved by the present invention, which provides a device for governing and controlling a rotary dobbie for the actuation of heddle frames in looms, according to the characterizing part of claim 1

Further details may be understood from the following description, with reference to the attached drawings, in which there are shown:

40 in Figure 1: a partial schematic section through the device of this invention in a position with the eccentric engaged;

45 in Figure 2: a section through the device on the plane of II-II in Figure 1;

In Figure 3: the device of Figure 1 at the end of a rotation through 180° ready to be programmed;

50 In Figures 4a/b/c: the sequence of release, rotation with levers engaged with the eccentric, blocking and disengagement of the levers, respectively.

As shown in Figure 1, the device according to this invention is composed of a rotary shaft 1, on which is keyed a disc 2, rotating integrally with the shaft and equipped with two diametrically opposite notches 2a and 2b; on said disc there is concentrically mounted a sleeve 3, on which an eccentric ring 4 can revolve, bounded in its circumferential external surface by a further sleeve 5, which allows it to rotate relative to the oscillating external body 4a of the eccentric 4 connected to an extension 4b pivoted on the actuating bar 6 for the frame of the loom, not illustrated in the Figure.

55 A ring 7 is also fixed to the oscillating body 4a by rivets 7c, this ring possessing two notches 7a of substantially trapezoidal shape, diametrically opposite each other, on its internal surface, and two basically semicircular notches 7b on its external surface, diametrically opposite each other and on an axis perpendicular to the axis of the internal notches 7a.

The device of this invention comprises, furthermore, a first pair of levers 9 and 10, connected to the eccentric 4 at the pivots 9a and 10a respectively, and a second pair of levers 13 and 14, these being attached to the eccentric ring 4 at the respective end pivots 13a and 14a. Each lever of said first pair has one of its two ends free, facing inwards and respectively equipped with a radially orientated tooth 9b and 10b, and also a set of cylindrical gear teeth 9c and 10c respectively, orientated tangentially; said sets of teeth are adapted for engaging each other, in this way forming one single radial tooth 17, having twice the width of the two teeth 9b and 10b, and adapted for engaging with the notch 2a or 2b of the disc 2.

Said tooth 17 has, moreover, sides suitably shaped for obtaining optimum positioning and engagement with the notch 2a and 2b.

The other free end of each lever is, in contrast, equipped with a roller 9d and 10d, and is adapted for receiving a thrust command from a programmer element 13 and for rotating freely on the front annular surface of the oscillating body 4a in the case in which the levers 9 and 10 are engaged with the disc 2, or for engaging with the semicircular notch 7b in the ring 7 under the thrust action from the programmer 13, which itself produces said thrust by small pistons equipped with permanent magnet heads, themselves known, and indicated schematically in the Figure by two arrows A and B, which engage with said rollers 9d and 10d.

The levers 13 and 14 of said second pair have, in turn, a free end shaped as a set of cylindrical gear teeth 13c and 14c, orientated substantially tangentially and adapted for engaging with each other; said end possesses, in addition, an upper tooth 13b and 14b, adapted for engaging radially into the notch 7a of the ring 7.

In this way, the rotational action imparted to one of the two levers of each pair compels a corresponding rotation in the opposite direction of the other lever.

In the preferred example of embodiment illustrated in the Figures, both the pairs of levers 9, 10, 13, 14 have an auxiliary spring or the like 11 and 15, respectively, disposed horizontally; the ends of each spring are attached to the levers of the same pair; said springs exert a restoring action which promotes rotation in the radial centripetal direction of the levers of the first pair and centrifugal radial rotation of the levers of the second pair. The functioning of the device will now be described, starting from the configuration of Fig. 1, in which the programmer 13 is not exerting any thrust action on the free end 9d of the lever opposite; in this condition, the restoring action of the spring 11 causes the levers 9 and 10 of the first pair of levers to rotate towards the centre, thus keeping the tooth 17 engaged into the notch 2a, and therefore when the shaft 1 starts to rotate it entrains with it the disc 2 and the eccentric ring 4, with which the levers 9 and 10 and also the levers 13 and 14 integrally move; the latter levers (Fig. 4a), as a result of the inclined shape of the flanks of the teeth 13b and 14b, disengage themselves from the notch 7a, and move downwards, and exert a direct pressure action on the levers 9 and 10, keeping them blocked in a position of engagement with the notch 2a.

With continuing rotation, the teeth 13b and 14b slide in contact with the internal surface of the ring 7, keeping the levers 9 and 10 blocked at all times until, when the rotation has completed 180°, by bringing the oscillating body (4a) of the eccentric 4 into the raised position, the teeth meet the diametrically opposite notch 7a, into which they engage by the effect of the simultaneous stopping of the shaft and the restoring action of the spring 15 (Fig. 4b), in this way releasing the levers 9 and 10, which can now be reprogrammed.

In Fig. 4c there is shown a programming example contrary to that just described. In this case, after the first rotation through 180°, the programmer 13 exerts a thrust action on the end 10d of the lever 10, as a consequence of which both the end 10d with a roller of the lever 10 and also the end 9d of the lever 9, caused to rotate by the sets of teeth 9c, 10c, engage into the corresponding notches 7b, thus locking onto the ring 7, in this way overcoming the restoring action of the spring 11 and forcing the two teeth 9b and 10b to disengage from the notch 2a, by rising until they bear against the levers 13 and 14, on which they exert a thrust force which promotes blocking of the oscillating body 4.

In these conditions, the rotation of the shaft 1 causes rotation of the disc 2 only, while the rotation remains neutral with respect to the eccentric ring 4, which keeps its own position, keeping the oscillating body 4a also in its preceding position and consequently also the frame of the loom.

By a succeeding programming, which is intended for causing new engagement of the levers 9 and 10 with the disc 2, said small piston with magnetic head A or B returns into the at-rest position, and the piston by magnetic attraction will move with it the end 9d or 10d of the opposite lever, causing radial, centripetal rotation of the two levers 9 and 10 in accordance with the restoring action of the auxiliary spring 11.

It is apparent from the foregoing description how the reciprocal action of the two pairs of levers, in addition to causing governing and control of the operation of the heddle frames, constitutes also a positive safety blocking, both in the case of rotation of the eccentric and in the case where this eccentric is in the idling position, thereby guaranteeing maximum accuracy and reliability of the device, which is capable of operating correctly, even in the case of simultaneous breakage of both restoring springs; in the first case on account of the rotation of the eccentric ring 4 it entrains with it the two pairs of levers, thereby assuring engagement of said tooth 17 with the disc 2, whereas in the second case the thrust action of the programmer 13, which causes disengagement of the tooth 17 from the notch 2a, with consequent bringing of the oscillating body 4a into the neutral condition, is directly promoted by the absence of the restoring action exerted by the spring 11.

Finally, in the case also where the levers are raised and it is necessary to programme the next engagement, the command is positive, being created by the retraction of the magnetic piston, which takes with it the free end of the lever.

5 Claims

1. Device for governing and controlling a rotary dobby for actuating heidle frames of looms, the device comprising a control shaft (1), a disc (2) rotationally locked with said shaft and an eccentric, composed of an eccentric ring (4) keyed onto the shaft (1), with which it can rotate relative to a traversing external body (4a) attached to the actuating bar for the frames, the device comprising a first (9, 10) and a second (13, 14) pair of levers, firmly pivoted on the rotating eccentric ring (4) and adapted for cooperating radially with one another, one free end of said first and said second pair of levers, respectively, being adapted for engaging with said rotating disc (2) and with the traversing body (4a), the other free end (9d, 10d) of the levers of the first pair being, moreover, adapted for receiving any control action from an external programmer device (13), characterized by the fact that the levers (9, 10) of said first pair have one of the ends formed with a tooth (9b, 10b) orientated substantially radially towards the centre of the eccentric (4) and with a set of cylindrical gear teeth (9c, 10c), orientated substantially tangentially and adapted for making possible reciprocal engagement of the two levers with each other in such a way that the rotation effected by one of the two levers causes an identical rotation of the other lever in the opposite sense, and by the fact that the rotation of the two levers (9, 10) towards the centre of the control shaft (1) by means of said set of gear teeth brings the two teeth (9b, 10b) firmly together to form a single tooth (17) having a width twice that of each of said two teeth.
2. Device for governing and controlling a rotary dobby according to Claim 1, characterized by the fact that the programmer incorporates actuating means equipped with permanent magnets, which exert a thrust action or restoring action on the free ends of the levers of the first pair, causing rotation of said levers in a centrifugal or centripetal sense.
3. Device for governing and controlling a rotary dobby according to the preceding Claims, characterized by the fact that auxiliary restoring means (11, 15) are applied between the levers of each of said pairs of levers, for the purpose of promoting the rotation in the radial direction of the first and second pairs of levers, respectively, in a centripetal sense and in a centrifugal sense.
4. Device for governing and controlling a rotary dobby according to Claim 1, characterized by the fact that the other free end of the levers (9, 10) of said first pair has a sliding element pivoted onto it in the axial direction.
5. Device for governing and controlling a rotary dobby according to Claim 1, characterized by the fact that said disc (2) has two notches (2a, 2b), diametrically opposite each other with respect to the centre of rotation of the shaft (1) and adapted for receiving said double tooth (17).
6. Device for governing and controlling a rotary dobby according to Claim 1, characterized by the fact that said notches (2a, 2b) and said tooth (17) have flanks and walls respectively shaped to curved or inclined profiles for promoting engagement without play of the tooth in the notch.
7. Device for governing and controlling a rotary dobby according to Claim 1, characterized by the fact that said traversing body (4a) has an internal ring (7) equipped with two notches (7a) disposed diametrically opposite each other on the internal surface, and two notches (7b) or the like disposed on its external surface, diametrically opposite each other and on an axis perpendicular to the axis of the internal notches (7a), which are adapted for engaging with the teeth (13b, 14b) of the levers of said second pair, said external notches, in turn, being adapted for engaging with the sliding element (9d, 10d) fitted to the end of the levers (9, 10) of said first pair.

50 Patentansprüche

1. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine für das Betätigen von Kettfädenrahmen einer Webmaschine mit einer Steuerwelle (1), einer Scheibe (2), die drehend mit der Welle verbunden ist und einem Exzenter, der aus einem Exzentering (4) besteht, der auf der Welle (1) befestigt ist, mit der er sich relativ zu einem querliegenden äußeren Körper (4a) drehen kann, der an der Betätigungsstange für die Rahmen befestigt ist, wobei die Vorrichtung ein erstes (9, 10) und ein zweites (13, 14) Paar von Hebeln aufweist, die fest angelenkt sind an dem rotierenden Exzentering (4) und so ausgestaltet sind, daß sie radial miteinander zusammenarbeiten, wobei ein

freies Ende des ersten beziehungsweise zweiten Paares von Hebeln so ausgestaltet ist, daß es die rotierende Scheibe (2) und den Querkörper (4a) eingreift, wobei das andere freie Ende (9d, 10d) der Hebel des ersten Paares darüberhinaus so ausgestaltet ist, daß es eine beliebige Steuerbetätigung von einer externen Programmier-
 5 vorrichtung (13) aufnimmt, **gekennzeichnet durch** die Tatsache, daß die Hebel (9, 10) des ersten Paares an einem ihrer beiden Enden mit einem Zahn (9b, 10b), der im wesentlichen radial gegen das Zentrum des Exzenters (4) ausgerichtet ist, und mit einem Satz zylindrischer Getriebezähne (9c, 10c) versehen sind, die im wesentlichen tangential ausgerichtet und so ausgebildet sind, daß sie einen hin- und hergehenden Eingriff der zwei Hebel miteinander derart ermöglichen, daß die Rotation, die von einem der beiden Hebel ausgeführt wird, eine identische Rotation des anderen Hebels im entgegengesetzten Sinn bewirkt, und durch die Tatsache, daß die Rotation der beiden Hebel (9, 10)
 10 hin zum Zentrum der Steuerwelle (1) durch den Satz der Getriebezähne, die beiden Zähne (9b, 10b) fest zusammenbringt, um einen einzigen Zahn (17) zu bilden, der eine Breite hat, die dem Doppelten der Breite jedes der beiden Zähne entspricht.

2. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach Anspruch 1, gekennzeichnet durch die
 15 Tatsache, daß der Programmierer eine Betätigungsvorrichtung einbaut, die mit Permanentmagneten ausgerüstet ist, die eine Schiebebewegung oder eine Rückstellbewegung auf die freien Enden der Hebel des ersten Paares ausüben und eine Rotation dieser Hebel in einem zentrifugalen oder zentripetalen Sinn erreichen.

3. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach den vorhergehenden Ansprüchen,
 20 gekennzeichnet durch die Tatsache, daß eine Hilfsrückführvorrichtung (11, 15) zwischen den Hebeln jedes Hebel-
 paares angebracht ist, um die Rotation des ersten beziehungsweise zweiten Hebelpaares in radialer Richtung in einem zentripetalen und einem zentrifugalen Sinn zu unterstützen.

4. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach Anspruch 1, gekennzeichnet durch die
 25 Tatsache, daß das andere freie Ende der Hebel (9, 10) des ersten Paares ein Schiebeelement aufweist, das in axialer Richtung beweglich auf ihm angelenkt ist.

5. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach Anspruch 1, gekennzeichnet durch die
 30 Tatsache, daß die Scheibe (2) zwei Kerben (2a, 2b) hat, die einander diametral bezüglich des Zentrums der Rotation der Welle (1) gegenüber stehen und ausgebildet sind, um den doppelten Zahn (17) aufzunehmen.

6. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach Anspruch 1, gekennzeichnet durch die
 35 Tatsache, daß die Kerben (2a, 2b) und der Zahn (17) Flanken beziehungsweise Wände besitzen, die gebogene oder geneigte Profile besitzen, um den Eingriff zu unterstützen, ohne daß ein Spiel des Zahns in der Kerbe auftritt.

7. Vorrichtung zum Regeln und Steuern einer Rotationsschaftmaschine nach Anspruch 1, gekennzeichnet durch die
 40 Tatsache, daß der Querkörper (4a) einen inneren Ring (7) aufweist, mit zwei Kerben (7a), die einander diametral auf der inneren Oberfläche angeordnet sind, und zwei Kerben (7b) oder dergleichen, die auf seiner äußeren Oberfläche diametral einander gegenüberstehend und auf einer Achse rechtwinklig zur Achse der inneren Kerben (7a) angeordnet sind, welche so ausgebildet sind, daß sie mit den Zähnen (13b, 14b) der Hebel des zweiten Paares in Eingriff treten, wobei die äußeren Kerben wiederum so ausgeformt sind, daß sie das Schiebeelement (9d, 10d),
 45 das am Ende der Hebel (9, 10) des ersten Paares befestigt ist, eingreifen.

45 **Revendications**

1. Dispositif pour commander et contrôler une ratière rotative afin d'actionner les cadres des lices de métiers à tisser, le dispositif comprenant un arbre de commande (1), un disque (2) verrouillé en rotation avec ledit arbre et un excentrique, composé d'une bague excentrique (4) calée sur l'arbre (1), avec lequel elle peut tourner par rapport à un
 50 corps externe traversant (4a) fixé à la barre d'actionnement pour les bâtis, le dispositif comprenant une première (9, 10) et une seconde (13, 14) paires de leviers, montées fermement à pivotement sur la bague excentrique rotative (4) et prévues pour coopérer radialement l'une avec l'autre, une extrémité libre de ladite première et de ladite seconde paires de leviers étant respectivement prévue pour venir en prise avec ledit disque rotatif (2) et avec le corps traversant (4a), l'autre extrémité libre (9d, 10d) des leviers de la première paire étant en outre prévue pour recevoir une quelconque action de commande d'un organe de programmation externe (13), caractérisé par le fait que les leviers (9, 10) de ladite première paire présentent une de leurs deux extrémités munie d'une dent (9b, 10b) orientée de manière sensiblement radiale vers le centre de l'excentrique (4) et un jeu de dents d'engrenage cylindriques (9c, 10c), orientées de manière pratiquement tangentielle et prévues pour rendre possible une mise en
 55

EP 0 444 726 B1

prise réciproque des deux leviers l'un avec l'autre de telle manière que la rotation effectuée par l'un des deux leviers amène une rotation identique de l'autre levier dans le sens opposé, et par le fait que la rotation des deux leviers (9, 10) vers le centre de l'arbre de commande (1), au moyen dudit jeu de dents d'engrenage, amène les deux dents (9b et 10b) fermement ensemble pour former une dent unique (17) présentant une largeur double de celle de chacune desdites deux dents.

- 5
2. Dispositif pour commander et contrôler une ratière rotative selon la revendication 1, caractérisé par le fait que l'organe de programmation incorpore des moyens d'actionnement équipés d'aimants permanents, qui exercent une action de poussée ou une action de rappel sur les extrémités libres des leviers de la première paire, en provoquant une rotation desdits leviers dans un sens centrifuge ou centripète.
- 10
3. Dispositif pour commander et contrôler une ratière rotative selon les revendications précédentes, caractérisé par le fait que des moyens de rappel auxiliaires (11, 15) sont appliqués entre les leviers de chacune desdites paires de leviers, dans le but de favoriser la rotation dans la direction radiale des première et seconde paires de leviers, respectivement, dans un sens centripète et dans un sens centrifuge.
- 15
4. Dispositif pour commander et contrôler une ratière rotative selon la revendication 1, caractérisé par le fait que l'autre extrémité libre des leviers (9, 10) de ladite première paire présente un élément coulissant monté à pivotement dans la direction radiale.
- 20
5. Dispositif pour commander et contrôler une ratière rotative selon la revendication 1, caractérisé par le fait que ledit disque (2) présente deux encoches (2a, 2b), opposées diamétralement l'une à l'autre par rapport au centre de rotation de l'arbre (1), et prévues pour recevoir ladite double dent (17).
- 25
6. Dispositif pour commander et contrôler une ratière rotative selon la revendication 1, caractérisé par le fait que lesdites encoches (2a, 2b) et ladite dent (17) présentent des flans et des parois conformées respectivement pour courber ou incliner des profils permettant de favoriser une mise en prise sans jeu de la dent dans l'encoche.
- 30
7. Dispositif pour commander et contrôler une ratière rotative selon la revendication 1, caractérisé par le fait que ledit corps traversant (4a) présente une bague interne (7) équipée de deux encoches (7a) disposées de manière diamétralement opposées l'une à l'autre sur la surface interne, et deux encoches (7b) ou analogue disposées sur sa surface externe, diamétralement opposées l'une à l'autre et sur un axe perpendiculaire à l'axe des encoches internes (7a), qui sont prévues pour venir en prise avec les dents (13b, 14b) des leviers de ladite seconde paire, lesdites encoches externes, à leur tour, étant adaptées pour venir en prise avec l'élément coulissant (9d, 10d) monté à l'extrémité des leviers (9, 10) de ladite première paire.
- 35

40

45

50

55

Fig.1

Fig.2

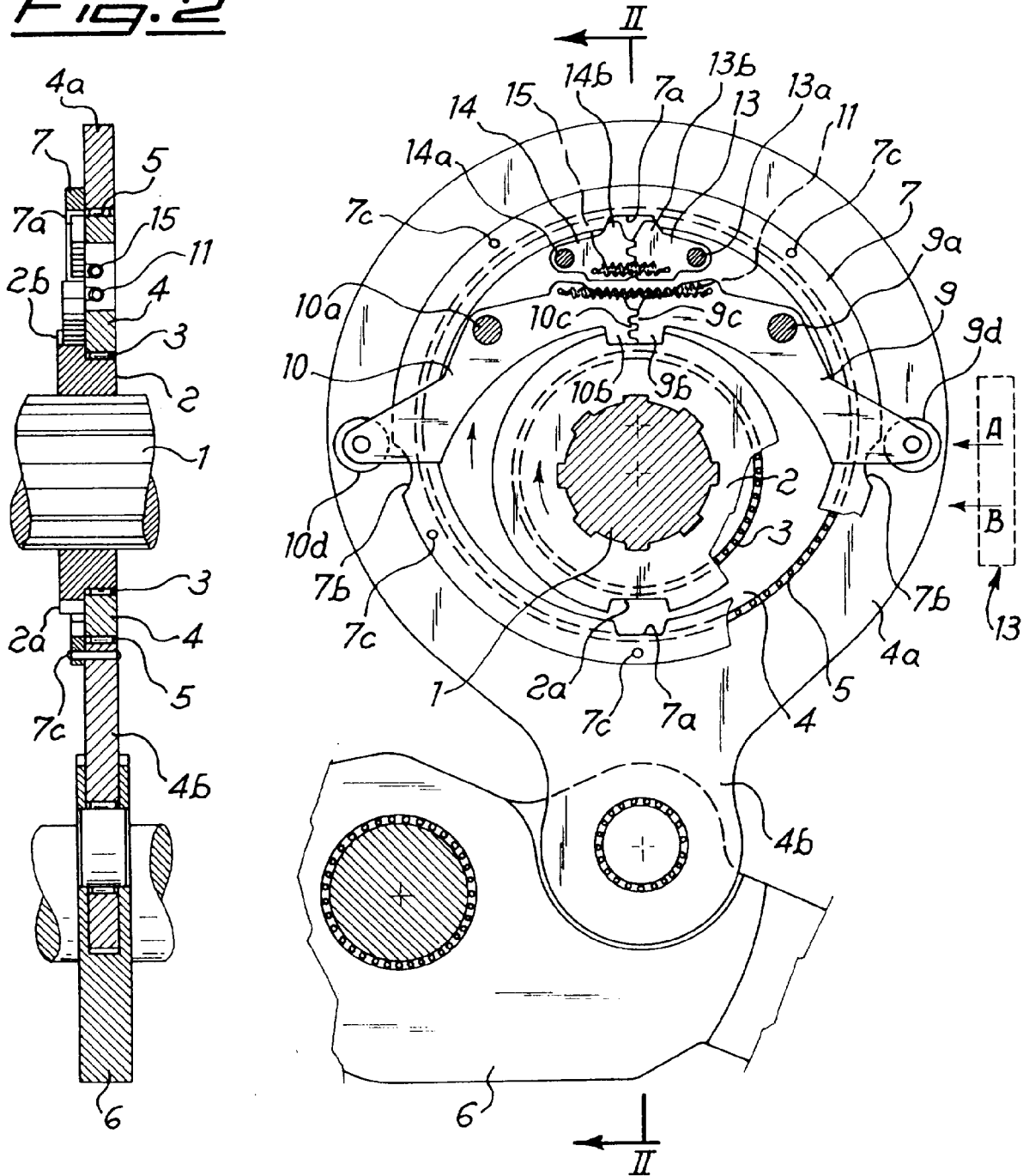


Fig. 3

