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(54) **DEVICE TO CARRY OUT THE PROGRAMMING OF ROTARY DOBBIES IN WEAVING MACHINES**

VORRICHTUNG ZUM PROGRAMMIEREN VON ROTATIONSSCHAFTMASCHINEN FÜR WEBMASCHINEN

DISPOSITIF CONNU POUR EXECUTER LA PROGRAMMATION DE RATIERES ROTATIVES DE MACHINES A TISSER

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Description

[0001] The present invention relates to a selection device to carry out the programming of rotary dobbies to operate the heald frames in weaving machines.

[0002] It is known that the positioning of the heald frames in a weaving machine or loom, which affects the configuration of the weft of the finished fabric, must be programmed according to a predetermined sequence which defines the position which each frame must assume upon each rotation of the loom main shaft.

[0003] In order for the shed entrance, formed by the warp threads, to open and close alternately, allowing to insert the weft yarn, the heald frames must consequently assume a high and a low position, carrying with them in this movement the corresponding warp threads. In order to transform the rotary movement of the main shaft in an alternate translation movement of the frames, a weaving machine is used and, in particular, "dobbies" in which suitable eccentric rings operate the movement of their respective frames by means of leverages.

[0004] It must be possible to programme the upward and downward movement of the heald frames so that, at each half-turn of the main shaft, the individual frame can be maintained in a high position, in a low position, and moved from one position to the other. To do that, the corresponding eccentric ring must be idle with respect to the main shaft, in order to lock the corresponding frame, and must be alternately made integral with said shaft, to cause the frame itself to move: this is the task of a selection device capable of carrying out the desired programming.

[0005] The present invention relates to improvements to this device.

[0006] The dobby programming devices already known in the art for a very long time have more recently been improved through various and important technical features, intended to remove or reduce their many drawbacks, among which the need to stop the shaft at each half-turn in order to have the time to clear the previous selection and to set a new one for the following half-turn, and the high probability of errors in the carrying out of the selection in a "punctual" manner at the centreline of the movement diagram.

[0007] In particular, with the device subject of European Patent no. 768,402 in the name of the same Applicant, a selection of the position of heald frames was guaranteed without it being necessary to stop the rotation of the shaft at each half-turn, thus avoiding any possible jamming during such step, and achieving a selection independent from the frames, both in forward running mode and in backward running mode, with obvious advantages for the productivity of the weaving machine to which the dobby was associated, whereas with the device subject of the European Patent no. 882,821, again in the name of the same Applicant, the selection of the position of the heald frames occurred without it being necessary to prolong the step in which the rotating shaft was slowed down at each half-turn, so as to obtain a perfectly equivalent frame selection, both in forward and in backward running mode, without any risk of jamming of the selection mechanism and without having to resort to an actuator comprising two intervention steps.

[0008] To achieve their objects, the devices of the two above mentioned patents used an operating lever in which one and both the projecting end profiles, respectively, were manufactured as pivoted teeth housed in a recess with two diverging abutting walls, with one of which they were kept in contact by a spring.

[0009] The functions of said oscillating teeth in the devices of the two above mentioned patents, however, were different, as were the objects which they aimed to achieve.

[0010] Accordingly, in the case of EP 768,402 the single tooth provided at one only of the projecting end profiles of the operating lever was meant to produce a phase-displacement of the engagement of the operating lever itself with the selection lever between the modes of forward and backward running.

[0011] In turn, in the case of EP-882,821, the provision of two teeth, one for each of the projecting end profiles of the operating lever, guaranteed, with a similar phase-displacement, an equivalent engagement of the operating lever with the selection lever in the two modes of forward and backward running, eliminating the need to resort to - as had been unavoidable up until then - a selection that was of a different phase in either mode and, consequently, to the use of an actuator comprising two intervention steps.

[0012] In the case of the device according to the invention, instead, the function of the two teeth - which no longer need to have the two previous functions, since the problems they overcome were in the meantime solved by other means in the course of the evolution of the design and of the construction of dobbies - is more simply that of dampening the impacts, against the end profiles of the operating lever, of the opposite end to the toothed end of the selection lever, each time that - with the loom running forward in the usual mode at a steady speed - said profiles arrange themselves along the trajectory of said end of the selection lever.

[0013] In essence, the invention relates to a device to carry out the programming of rotary dobbies for the actuation of the heald frames in weaving machines, of the type in which the control rods of the heald frames are operated by connecting rods mounted each onto an eccentric ring rotating with respect to the main shaft of the dobby, which further comprises a disc caused to rotate by said shaft and a selection lever pivoted on said eccentric ring and capable of making it integral with the connecting rod, when it engages the diametrically opposite pins thereof and, respectively, with said disc, when it engages with one of its end teeth diametrically opposite recesses thereof through the action of a spring, said device comprising an operating lever rotating about a fixed fulcrum upon the action of thrust means and in contrast

with return-spring means, so that projecting end profiles of the same operating lever alternately arrange themselves along or outside the trajectory of the end opposite to the toothed end of the selection lever to cause it to engage or to prevent it from engaging with the rotating disc, the rotation of the operating lever occurring during the rotation of the main shaft, characterised in that the projecting end profiles of said operating lever are manufactured each as a tooth pivoted on the corresponding end of said lever in a recess having two diverging abutting walls and kept in contact with one of them by spring means, so as to be able to oscillate up to contacting the other, with said spring means dampening the impact against the profiles themselves of the shaped end opposite to the toothed end of the selection lever every time that - during the usual forward running mode of the loom at a steady speed - said profiles arrange themselves along the trajectory of said end of the selection lever.

[0014] Preferably, said teeth have an upright wall onto which said spring means rest, and a wall with a slanting portion to receive the impact from said shaped end of the selection lever.

[0015] Furthermore, the spring means that act onto said teeth of the projecting profiles of the operating lever perform an action which is weaker than that performed by the spring acting on the selection lever.

[0016] It must also be noted that the pins of the connecting rod with which the selection lever is capable of engaging are provided symmetrically opposite on the diameter perpendicular to the longitudinal axis of the connecting rod itself.

[0017] The invention will now be described in detail, by way of example only, with reference to a preferred embodiment thereof, schematically illustrated in the accompanying drawing.

[0018] As shown in the drawing, the device according to the invention is part of a dobby comprising a rotating shaft 1 onto which a connecting rod element 2 is keyed on, shaped so as to have a projection 2A pivotally hinged at 3A onto the operating rod 3 of the corresponding heald frame QL and a substantially circular ring 2B which carries two pins 2C at opposite positions of its diameter perpendicular to the longitudinal axis of the connecting rod element 2.

[0019] Halfway through the connecting rod 2 a bearing 4 is inserted, on the inner element of which is mounted an eccentric ring 5, which is able to rotate with respect to the shaft 1, as can be seen further on.

[0020] On the eccentric ring 5 is mounted capable of oscillating, by means of a rivet 6 or similar element, a rocker lever 7 (or start lever, or selection lever) having a shaped end 8, a slot 9 of which receives a pivot 10 projecting from the eccentric ring 5, and a fork-shaped end 11, 12, of which one branch 11 carries a tooth 13 and the other branch 12 is provided with a recess for the engagement of the pins 2C.

[0021] A spring 14, located between the eccentric ring 5 and the end 11 of the lever 7, performs a return action onto the lever 7 itself and thus tends to make it rotate, so as to draw the tooth 13 closer to the rotation axis of the shaft 1.

[0022] Finally, onto said shaft 1 is keyed on, coaxially with it, a disc 15 at the periphery of which two grooves 15A and 15B are obtained, arranged diametrically opposite with respect to the rotation centre of the disc 15 itself.

[0023] With the disc 15 the inner element of a bearing is integral, on the outer element of which the eccentric ring 5 is keyed on, to rotate thus around the shaft 1.

[0024] The disc 15 lies in the same position as the lever 7, so that the tooth 13 thereof is able to engage with one of the two grooves 15A or 15B and disengage therefrom.

[0025] The dobby is completed by a C-shaped operating lever 16, the ends of which, according to the invention, are equipped with respective mobile, tooth-shaped projecting profiles 17 and 18, oscillating between the abutting walls 17A, 17B, and 18A, 18B respectively and maintained in position against the first thereof by springs 19 and 20. The action performed by the springs 19 and 20 is weaker than that performed by the spring 14 onto lever 7, so that the phase displacement of teeth 17, 18 occurs before the opening movement of the lever 7.

[0026] The operating lever 16 oscillates - upon the action of the thrust means 21 - about a fulcrum 22, between a first position, determined by the traction of a spring 23 and of a reference element 24, and a second position, determined by the thrust performed by the means 21 under the control of an actuator of the programming.

[0027] The operation of the dobby occurs according to the most up-to-date known art, with the start lever or selection lever 7 making the eccentric ring 5 integral with the disc 15 when the tooth 13 thereof engages one of the recesses 15A or 15B or instead leaving the eccentric ring 5 idle with respect to the disc 15, when the tooth 13, due to the engagement of the toothed profiles 17 or 18 with the shaped end 8 of the lever 7, is totally removed from said recesses. In the former case a change is produced, in the latter case the position of the heald frame controlled by the rod 3 is maintained.

[0028] Please note that, when the tooth 13 does not engage the recesses 15A, 15B, the end 12 of the selection lever 7 engages one or the other of the pins 2C of the connecting rod 2. Due to its symmetrical position with respect to the longitudinal axis of the connecting rod 2 of the pins 2C, which describe identical elliptical trajectories, this engagement occurs, in the described device, in a particularly safe and effective manner.

[0029] According to the invention, the engagement of the projecting end profiles of the operating lever 16 with the shaped end 8 opposite to the toothed end of the selection lever 7 , which engagement always occurs as an impact at high speed, is dampened due to the fact that such profiles are both manufactured as an oscillating tooth against the action of spring means. As a matter of fact, it has already been mentioned that the ends of the C-shaped operating lever 16 are equipped with tooth-shaped, mobile projecting profiles 17 and 18 which os-

cillate between abutting walls 17A, 17B, and 18A and 18B maintained in position against the first of them by the springs 19 and 20. It should be said now that the teeth 17 and 18 comprise portions of slanted wall 17C and 18C to receive the impact and the engagement of the shaped end 8 of the lever 7 when, rotating in the direction of the arrow F, such end finds tooth 17 and tooth 18 on its trajectory. The impact occurring when lever 7 touches the teeth 17, 18 is dampened by the springs 19 and 20, which offer a certain resistance to the short oscillation allowed to teeth 17 and 18, which are therefore slowed down to a certain extent until they touch the walls 17B and 18B. Since this effect is achieved every time the engagement occurs of at least one of the ends of the operating lever 16 with the shaped end of the selection lever 7, i.e. very frequently during the usual forward running movement of the loom, as well as in other operating conditions of the machine, it is easy to understand the importance of the extremely positive consequences which, in terms of a smoother and safer operation and of the reduction of stresses, noise and power consumption, can be achieved with the arrangement according to the invention.

[0030] It is understood that other embodiments - different from the one described and illustrated merely by way of example - of the selection device are possible that are fully within the scope of the claims.

Claims

1. Device for the carrying out of the programming of rotary dobbies for the operation of the heald frames in weaving machines, of the type in which the operating rods (3) of the heald frames (QL) are operated by connecting rods (2) mounted each on an eccentric ring (5) rotating with respect to the main shaft (1) of the dobby, which further comprises a disc (15) caused to rotate by said shaft (1) and a selection lever (7) pivoted on said eccentric ring (5) and capable of making it integral with the connecting rod (2), when it engages the diametrically opposite pins (2C) thereof and, respectively, with said disc (15), when it engages with one of its end teeth (13) diametrically opposite recesses (15A, 15B) thereof through the action of a spring (14), said device comprising an operating lever (16) rotating about a fixed fulcrum (22) upon the action of thrust means (21) and in contrast with return-spring means (23), so that projecting end profiles (17, 18) of the same operating lever (16) arrange themselves alternately along or outside the trajectory of the end (8) opposite to the toothed end (13) of the selection lever (7) to cause it to engage or to prevent it from engaging with the rotating disc (15), the rotation of the operating lever (16) occurring during the rotation of the main shaft, **characterised in that** the projecting end profiles of said operating lever (16) are manufactured each as a tooth (17, 18) pivoted on the corresponding end of said lever (16) in a recess having two diverging abutting walls (17A, 17B, 18A, 18B) and kept in contact with one of them (17A, 18A) by spring means (19, 20), so as to be able to oscillate up to contacting the other (17B, 18B), with said spring means dampening the impact against the profiles themselves of the shaped end (8) opposite to the toothed end of the selection lever (7) every time that - during the usual forward running mode of the loom at steady speed - said profiles (17, 18) arrange themselves along the trajectory of said end (8) of the selection lever (7).

2. Device as claimed in claim 1) in which said teeth have an upright wall onto which rest said spring means (19, 20) and a wall with a slanting portion (17C, 18C) to receive the impact of said shaped end (8) from the selection lever (7).

3. Device as claimed in claims 1) and 2) in which the spring means (19, 20) acting onto said teeth (17, 18) of the projecting profiles of the operating lever (16) perform a weaker action than that performed by the spring (14) acting on the selection lever (7).

4. Device as claimed in claims 1) to 3) in which the pins (2C) of the connecting rod (2) with which the selection lever (7) is capable of engaging are provided symmetrically opposite on the perpendicular diameter to the longitudinal axis of the connecting rod (2) itself.

Patentansprüche

1. Vorrichtung zum Programmieren von Rotationsschaftmaschinen fiir den Betrieb der Litzenrahmen von Webmaschinen, von der Art, bei der die Betätigungsstangen (3) der Litzenrahmen (QL) durch Verbindungsstangen (2), die jeweils an einem exzentrischen Ring (5), der bezüglich der Hauptwelle (1) der Schaftmaschine rotiert, montiert sind, und weiter mit einer Scheibe (15), die von der Hauptwelle (1) zur Rotation veranlasst wird, und einem Wahlhebel (7), der an dem exzentrischen Ring (5) angelenkt ist und mit der Verbindungsstange (2) einstükkig gemacht werden kann, wenn er mit dessen diametral gegenüber liegenden Stiften (2C) in Eingriff ist, beziehungsweise mit der Scheibe (15), wenn er aufgrund der Wirkung einer Feder (14) mit einem seiner Zähne (13) mit deren einander diametral gegenüber liegende Kerben (15A, 15B) in Eingriff ist, wobei die Vorrichtung einen Betätigungshebel (16) aufweist, der aufgrund der Wirkung eines Druckmittels und gegen eine Rückstellfeder (23) um einen festen Drehpunkt (22) rotiert, so dass vorragende Endprofile (17, 18) dieses Betätigungshebels (16) sich selbst alternierend entlang oder außerhalb der Bahn des dem gezahnten Ende (13) des Wahlhebels gegenüberlie-

genden Endes anordnen, um diesen zu veranlassen, mit der Drehscheibe (15) in Eingriff zu kommen bzw. daran zu hindern, mit der Drehscheibe (15) in Eingriff zu kommen, wobei die Rotation des Betätigungshebels (16) während der Rotation der Hauptwelle stattfindet, **dadurch gekennzeichnet, dass** die vorragenden Endprofile des Betätigungshebels (16) jeweils als ein Zahn hergestellt sind, der an dem entsprechenden Ende des Hebels (16) in einer Kerbe mit zwei divergierenden Anlageflächen (17A, 17B, 17A, 18B) angelenkt ist und durch Federmittel (19, 20) derart mit einer der Flächen (17A, 18A) in Berührung gehalten wird, dass er verschwenkend mit der anderen Fläche (17B, 18B) in Berührung kommen kann, wobei die Federmittel den Stoß gegen die Profile selbst der dem gezahnten Ende des Wahlhebels (7) gegenüber liegenden geformten Enden jedes Mal, wenn - während des gewöhnlichen Vorwärtslaufs der Webmaschine mit gleich bleibender Geschwindigkeit - die Profile sich selbst entlang der Bahn des Endes (8) des Wahlhebels (7) anordnen, dämpfen.

2. Vorrichtung nach Anspruch 1, bei der jeder Zahn auf aufrechte Wand, auf der das Federmittel (19, 20) ruht, und eine Wand mit einem geneigten Abschnitt (17C, 18C) zur Aufnahme des Stoßes des geformten Endes (8) des Wahlhebels (7).

3. Vorrichtung nach einem der Ansprüche 1) oder 2), bei der die auf die Zähne (17, 18) der vor ragenden Profile des Betätigungsmittels wirkenden Federmittel (19, 20) eine Wirkung ausüben, die schwächer ist als die Wirkung, die von dem Federmittel, das auf den Wahlhebel (7) wirkt, ausgeübt wird.

4. Vorrichtung nach einem der Ansprüche 1) bis 3), bei der die Stifte (2C) der Verbindungsstange (2), mit denen der Wahlhebel (7) in Eingriff gelangen kann, symmetrisch auf dem senkrechten Durchmesser zu der Längsachse der Verbindungsstange (2) selbst vorgesehen sind.

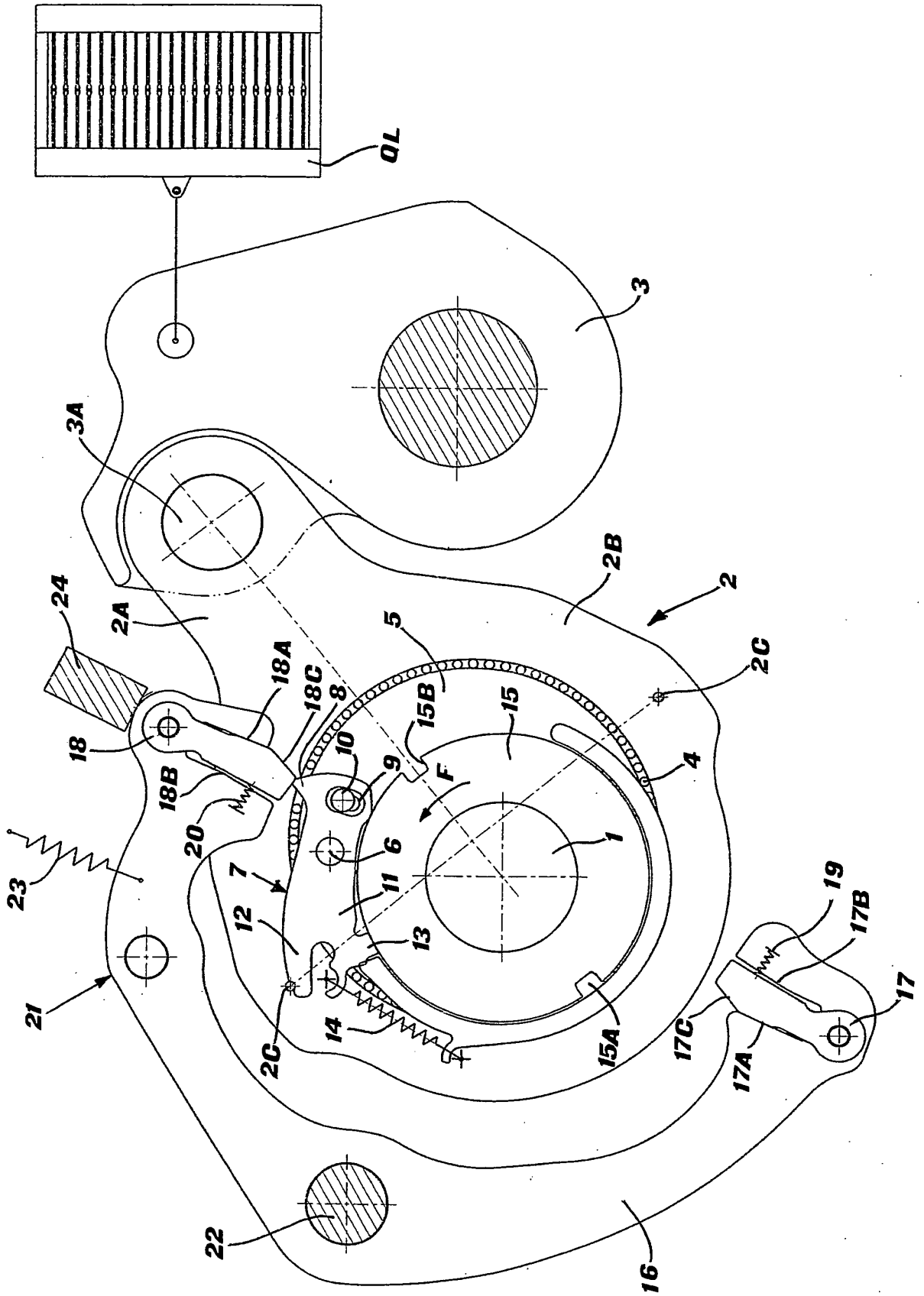
Revendications

1. Dispositif destiné à exécuter la programmation de ratières rotatives pour la mise en oeuvre de cadres à lisses dans des machines à tisser, du type dans lequel les tiges de commande (3) des cadres à lisses (QL) sont mises en oeuvre par des barres de liaison (2) montées chacune sur un anneau de centrage (5) qui effectue une rotation par rapport à l'arbre principal (1) de la ratière, qui comprend en outre un disque (15) amené à effectuer une rotation par ledit arbre (1) et un levier de sélection (7) pivoté sur ledit anneau de centrage (5) et pouvant le rendre solidaire de la barre de liaison (2), lorsqu'il s'engage avec les broches diamétralement opposées (2C) de celle-ci, et, respectivement, dudit disque (15), lorsqu'il s'engage avec l'une de ses dents d'extrémité (13) diamétralement opposées à des évidements (15A, 15B) de celui-ci par le biais de l'action d'un ressort (14), ledit dispositif comprenant un levier de commande (16) qui effectue une rotation autour d'un axe de pivotement fixe (22) sous l'action d'un moyen de poussée (21) et de façon opposée à un moyen de ressort de rappel (23), de sorte que des profils d'extrémité saillants (17, 18) du même levier de commande (16) s'agencent eux-mêmes par alternance le long ou à l'extérieur de la trajectoire de l'extrémité (8) opposée à l'extrémité à dents (13) du levier de sélection (7) afin de l'amener à s'engager ou bien de l'empêcher de s'engager avec le disque rotatif (15), la rotation du levier de commande (16) se produisant pendant la rotation de l'arbre principal, **caractérisé en ce que** les profils d'extrémité saillants dudit levier de commande (16) sont chacun fabriqués sous la forme d'une dent (17, 18) pivotée sur l'extrémité correspondante dudit levier (16) dans un évidement comportant deux parois en butée écartées (17A, 17B, 18A, 18B) et maintenue en contact avec l'une d'elles (17A, 18A) par un moyen de ressort (19, 20), de façon à pouvoir osciller jusqu'à venir en contact avec l'autre (17B, 18B), ledit moyen de ressort amortissant l'impact contre les profils eux-mêmes de l'extrémité mise en forme (8) opposée à l'extrémité à dents du levier de sélection (7) à chaque fois que, pendant le mode de fonctionnement vers l'avant habituel du métier à une vitesse régulière, lesdits profils (17, 18) se placent d'eux-mêmes le long de la trajectoire de ladite extrémité (8) du levier de sélection (7).

2. Dispositif selon la revendication 1, dans lequel lesdites dents comprennent une paroi dressée sur laquelle repose ledit moyen de ressort (19,20) et une paroi avec une partie inclinée (17C, 18C) destinée à recevoir l'impact de ladite extrémité mise en forme (8) depuis le levier de sélection (7).

3. Dispositif selon les revendications 1 et 2, dans lequel le moyen de ressort (19,20) agissant sur lesdites dents (17,18) des profils saillants du levier de commande (16) exécute une action plus faible que celle réalisée par le ressort (14) agissant sur le levier de sélection (7).

4. Dispositif selon les revendications 1 à 3, dans lequel les broches (2C) de la barre de liaison (2), avec laquelle le levier de sélection (7) peut s'engager, sont prévues de façon symétriquement opposée sur le diamètre perpendiculaire à l'axe longitudinal de la barre de liaison (2) elle-même.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