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(54) **Electromechanical device to control terry loop formation in terry looms**

Elektromechanische Vorrichtung zur Kontrolle der Plüschhenkelbildung in Frottierwebmaschinen

Dispositif électro-mécanique pour contrôler la formation des boucles dans un métier à tricoter

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Description

The present invention concerns a device to control the movements allowing to form the loop in terry looms, wherein said loop is formed thanks to rotary oscillations of the take-up roller or to alternate displacements of the cloth deviating bar (also known as "cloth shackler"), in coordination with alternate translatory movements of the warp beam.

More precisely, the present invention concerns an electromechanical device apt to control in such looms - with possibility of wide and easy adjustments - the rotary oscillating movements of the take-up roller or the alternate displacements of the cloth shackler, and the coordinate alternate translatory movements of the warp beam, which form the terry loop.

It is known that modern looms need to be promptly and easily adapted to the most different requirements, even within a specific type of weaving operation. In the particular case concerned, of terry cloth weaving, it is for example of utmost interest to be able to quickly and easily change both the frequency in forming the terry loop in the cloth (typically, one loop every three or four beatings up of the loom: hereinafter simply referred to as "3/1 loop" or, respectively, "4/1 loop") and the height of said loop in respect of the base cloth. It is required in particular - especially in the case of high-quality terry cloths - to be able to vary the height of the loop along the length of the cloth and, thus, during the weaving operation.

The arrangements known so far to accomplish the above requirements - generally comprise devices having an inlet shaft, caused to continuously rotate by the general movement of the loom, and an outlet lever which cyclically imparts, through suitable leverages, said rotary oscillating movements to said roller or said alternate displacements to said cloth shackler, and said alternate translatory movements to said beam, such movements overlapping the ordinary movements of said roller and beam - are by no means satisfactory. These devices in fact - apart from having internal mechanisms complicated and scarcely functional - require very difficult and lengthy interventions of the operator, which are no longer compatible with the present industrial requirements. Furthermore, they considerably limit the maximum allowable speed of the mechanical parts of the loom.

The present invention proposes instead a single control device apt to perfectly satisfy the above requirements.

The object of the invention is in fact reached through an electromechanical device, of the general type above described, apt to control, with possibility of wide and easy adjustments, the rotary oscillating movements of the take-up roller or the alternate displacements of the cloth shackler, and the coordinate alternate translatory movements of the warp beam, allowing to form the loops in terry looms, characterized in that, the motion from said inlet shaft to said outlet lever is transmitted through

first mechanical members allowing to determine the law of said cyclic movements, and through second mechanical members allowing to select the amplitude of said movements between at least two set values - one of them being adjustable - and a nought value, said second members being controlled by electromagnetic means.

Preferably, said first mechanical members comprise a cam with two conjugate tracks - or a single track with return spring on the respective cam follower - caused to rotate by said inlet shaft, and a rocking lever having cam followers which engage with the tracks of said cam and comprising a control bracket which projects towards said second members. Said cam can be promptly replaced, by easy manual operations, so as to vary the law by which said cyclic movements follow one another.

Moreover, said second mechanical members comprise a pair of pawls each having a first end which is pivoted to the free end of a lever and a second end which is hook-shaped, said lever operating said outer lever through a shaft to which it is fixedly connected and each of said pawls being controlled so as to engage, with its hook-shaped end, a corresponding pin of said control bracket of the rocking lever. One of the pins of said control bracket is fixed, while the other pin is manually adjustable along a suitable slot. Said pawls are each controlled, so as to engage said pins, by a rocking leverage operated by electromagnets, said electromagnets being electronically controlled according to the working programme of the loom on which the device is mounted.

The invention is now described in further detail, by mere way of example, with reference to the accompanying drawings, which illustrate a preferred embodiment thereof and in which:

Fig. 1 is a lateral view of the control device according to the invention housed in its case, shown open; and

fig. 2 is a plan view - with some parts removed, for the sake of clearness - of the device shown in fig. 1.

As specified heretofore, the control device according to the invention is for use in terry cloth looms, wherein the loop is formed thanks to rotary oscillating movements of the take-up roller or to alternate displacements of the cloth shackler, in coordination with alternate translatory movements of the warp beam, said movements overlapping - as supplementary cyclic movements - the ordinary movements imparted to said roller and beam in the conventional weaving operation. (As known, there are other methods to form the terry cloth, as shifting the sley in the beating zone, but the present invention does not apply thereto).

The control device according to the invention - the inlet shaft A of which (fig. 2) is caused to continuously rotate by a pulley B, moved by the general movement of the loom through a belt C - imparts at cyclic intervals the required supplementary movements to said roller or

cloth shackler and to said beam, through an outlet lever D (the length of which is adjustable by acting on the junction E between two elements thereof) connected in known manner, through conventional leverages, to said roller and beam.

Premising the above, the control device according to the invention, housed into a sealed lubricated case 1, comprises (fig. 1) first mechanical members 2, to determine the law by which said supplementary cyclic movements follow one another, and second mechanical members 3, to select the amplitude of said movements. Such members can be operated - partly by an electric and/or electronic control and partly by simple manual adjustments - to perform operations of selection and/or adjustment, allowing to vary the frequency and, respectively, the height of the loop being formed on the terry cloth, and also - if required - to stop loop formation (thus leading to the formation of ordinary fabric).

The mechanical members 2 comprise a cam 4 with two conjugate tracks 5 (or conjugate cam) and a rocking lever 6 cooperating with said cam 4. The cam 4 is keyed onto a shaft 7 and can be very easily and promptly replaced by cams of different shape or type (for instance, single-track cams with return spring on the respective cam follower), by simply removing the cover 8 of the case 1 (fig. 2) which carries one of the two bearings 9 for the shaft 7. On said shaft 7 there is also keyed a gear 10 meshing with a gear 11 of the inlet shaft A in order to cause the rotation of the cam 4. The rocking lever 6 (fig. 1) is pivoted to the case 1 in 6a and carries two cam followers 12 engaging with the tracks 5 of the cam 4. Said rocking lever 6 extends moreover into a long control bracket 13, from which project a fixed end pin 14 and a more rearward pin 15 the position of which is adjustable along a slot 16 of said bracket 13.

The mechanical members 3 in turn comprise a pair of pawls 17 and 18, both pivoted at one end into a pin 19, onto which is also pivoted the end of a lever 20 keyed onto an outlet shaft 21 of the device; onto said shaft 21 there is also keyed - externally to the case 1 (fig. 2) - the outlet lever D. The pawls 17 and 18 are controlled so as to engage - when oscillating in 19 - with their free hook-shaped end, the pin 14 and, respectively, the pin 15 of the bracket 13 of the rocking lever 6. Said engagement is controlled by rocking leverages 22, 23, one for each pawl, each leverage being operated by a corresponding electromagnet 24 mounted externally to the case 1.

The magnets 24 can be operated either manually, by the operator, or automatically, by electronic control means, according to the working programme of the loom on which the device according to the invention is mounted.

The device according to the invention is preset by choosing a particular type of cam 4, and adjusting the position of the pin 15 and the length of the outlet lever D. Said device works as follows: when the loom is working, the cam 4 rotates and causes the oscillation of the rocking lever 6 with a law apt to form the chosen type of

terry cloth (3/1 loop, or 4/1 loop); when the pawls 17 and 18 are disengaged from the pins 14 and 15, they transmit no motion to the shaft 21 and the outlet lever D of the device remains therefore at rest. This means that no supplementary movement overlaps the ordinary movements of the take-up roller and of the warp beam: the loom hence weaves ordinary fabric and not terry cloth. If one now operates the electromagnet 24 which controls the pawl 17, this latter engages the fixed pin 14 positioned at the end of the bracket 13: the oscillations of the rocking lever 6 are then transmitted, with the widest amplitude, to the shaft 21 and to the lever D; this will allow to obtain the maximum height of the loop, which will be woven at the frequency determined by the shape of the cam 4. If one instead operates the electromagnet 24 which controls the pawl 18, this latter engages the pin 15: the oscillations of the rocking lever 6 are still transmitted to the lever D, but with a smaller amplitude than in the previous case (in fact the pin 15 is closer to the pivoting axis 6a of the bracket 13), whereby the loop being woven will be of smaller height.

It is evident that the device according to the invention allows to vary the height of the loop - between the two considered values - also with the loom and device in working conditions - and thus on the actual cloth being woven - by simply changing the electromagnet to be operated; as seen, this can also be done automatically. To vary even further the height of the loop, it is instead necessary to perform a manual operation - with the loom and device at rest - by shifting the pin 15 along the slot 16; the minimum height of the loop is obtained when the pin 15 is positioned against the end of the slot 16 closest to the pivoting axis 6a of the bracket 13.

To change the characteristics of the terry loop being woven, it is necessary to replace the cam 4 by a cam of different shape, which - as seen - can be done very easily and quickly, even if manually and with the loom and device at rest.

As can be easily understood from the previous description, the device according to the invention - very simple and compact from the structural point of view, free from slacks and requiring no maintenance - perfectly answers the requirements pointed out in the introductory part of the description: it in fact allows to rapidly and easily vary - even during weaving (by suitably operating the electromagnets 24 and, possibly, by manually adjusting the position of the pin 15) - both the type of terry loop being formed in the cloth (typically, changing over from a terry cloth with 3/1 loop to a terry cloth with 4/1 loop, and viceversa, by simply replacing the cam 4), and the height of the terry loop along the length of the cloth itself.

This kinematic system allows to realize a compact assembly of the control and selection members, free from slacks and fully housed into a sealed lubricated case. One thus obtains the advantages of combining an easy working with a high mechanical reliability, of reaching high performances and of requiring no maintenance

for the members (which, in the conventional structures, are exposed to dust and receive no permanent lubrication).

Claims

1. Electromechanical device to control, with possibility of wide and easy adjustments, the rotary oscillating movements of the take-up roller or the alternate displacements of the cloth shackler, and the coordinate alternate translatory movements of the warp beam, allowing to form the loop in terry looms - said device being of the type comprising an inlet shaft (A), caused to continuously rotate by the general movement of the loom, and an outlet lever (D) which cyclically imparts, through leverages, said rotary oscillating movements to said roller or said alternate displacements to said cloth shackler, and said alternate translatory movements to said beam, such movements overlapping the ordinary movements of said roller and beam - characterized in that, the motion from said inlet shaft (A) to said outlet lever (D) is transmitted through first mechanical members (2) allowing to determine the law of said cyclic movements, and through second mechanical members (3) allowing to select the amplitude of said movements between at least two set values - one of them being adjustable - and a naught value, said second members (3) being controlled by electromagnetic means (24).
2. Device as in claim 1), wherein said first mechanical members (2) comprise a cam (4) with two conjugate tracks (5), caused to rotate by said inlet shaft (A), and a rocking lever (6) having cam followers (12) which engage with the tracks (5) of said cam (4), and comprising a control bracket (13) which projects towards said second members (3).
3. Device as in claim 2), wherein said cam (4) has a single track with return spring on the respective cam follower.
4. Device as in claim 2) or 3), wherein said cam (4) can be promptly replaced, by manual operations, to vary the cyclic movements law.
5. Device as in Claims 2) or 3), wherein said second mechanical members (3) comprise a pair of pawls (17, 18) each having a first end which is pivoted (in 19) to the free end of a lever (20) and a second end which is hook-shaped, said lever (20) operating said outer lever (D) through a shaft (21) to which it is fixedly connected and each of said pawls (17, 18) being controlled so as to engage, with its hook-shaped end, a corresponding pin (14, 15) of said control bracket (13) of the rocking lever (6).

6. Device as in claim 5), wherein one of said pins (14) of the control bracket (13) is fixed, while the other pin (15) is manually adjustable along a suitable slot (16).
7. Device as in claim 5), wherein said pawls (17, 18) are each controlled, so as to engage said pins (14, 15), by a rocking leverage (22, 23) operated by electromagnets (24).
8. Device as in claim 7), wherein said electromagnets (24) are electronically controlled according to the working programme of the loom on which the device is mounted.

Patentansprüche

1. Elektromechanische Vorrichtung zur Steuerung der pendelnden Drehbewegungen der Aufnahmewalze oder der alternierenden Verlagerungen der Warenfessel und der entsprechenden alternierenden translatorischen Bewegungen des Kettbaums mit der Möglichkeit weitgehender und einfacher Einstellungen zur Bewirkung der Bildung von Schlaufen bei Frottierwebmaschinen - wobei die Vorrichtung von der Art mit einer Einlaßwelle (A) ist, die dazu veranlaßt wird, durch den Hauptantrieb der Webmaschine kontinuierlich gedreht zu werden, und einem Auslaßhebel (D), der über ein Gestänge die pendelnden Drehbewegungen zyklisch auf die Walze oder die alternierenden Verlagerungen auf die Warenfessel und die alternierenden translatorischen Bewegungen auf den Baum aufbringt, wobei die Bewegungen die gewöhnlichen Bewegungen der Walze und des Baums überlagern - dadurch gekennzeichnet, daß der Antrieb von der Einlaßwelle (A) auf den Auslaßhebel (B) über erste mechanische Elemente (2), die es erlauben, den Ablauf der zyklischen Bewegungen zu bestimmen, und über zweite mechanische Elemente (3), die es erlauben, die Amplitude der Bewegungen zwischen wenigstens zwei vorbestimmten Werten - von denen der eine einstellbar ist - und einem Grenzwert zu wählen, übertragen werden, wobei die zweiten Elemente (3) durch elektromagnetische Mittel gesteuert werden.
2. Vorrichtung nach Anspruch 1, wobei die ersten mechanischen Elemente (2) einen Nocken (4) mit zwei paarweisen Bahnen (5), die von der Einlaßwelle (A) zur Rotation veranlaßt werden, und einen Kipphebel (6) mit Nockenfolgern (12), die mit den Bahnen (5) des Nockens (4) in Eingriff sind, und einen Steuerarm (13), der sich in Richtung auf die zweiten Elemente (3) erstreckt, aufweisen.
3. Vorrichtung nach Anspruch 2, wobei der Nocken (4)

eine einzige Bahn mit einer Rückstellfeder auf dem jeweiligen Nockenfolger hat.

4. Vorrichtung nach Anspruch 2 oder 3, wobei der Nocken (4) zum Ändern des zyklischen Bewegungsablauf schnell durch einen manuellen Eingriff ausgetauscht werden kann.
5. Vorrichtung nach Anspruch 2 oder 3, wobei die zweiten mechanischen Elemente (3) ein Paar von Sperrklinken (17, 18) haben, deren einen Enden (bei 19) an dem freien Ende eines Hebels (20) angelenkt sind und deren andere Enden hakenförmig sind, wobei der Hebel (20) den äußeren Hebel (D) über eine Welle (21) betätigt, mit der er fest verbunden ist, und jede der Sperrklinken (17, 18) derart gesteuert ist, daß sie mit ihrem hakenförmigen Ende einen entsprechenden Stift (14, 15) des Steuerarms (13) des Kipphebels (6) ergreift.
6. Vorrichtung nach Anspruch 5, wobei einer der Stifte (14) des Steuerarms (13) entlang eines geeigneten Schlitzes (16) manuell einstellbar ist.
7. Vorrichtung nach Anspruch 5, wobei die beiden Sperrklinken (17, 18) derart gesteuert werden, daß sie die Stifte (14, 15) über ein durch Elektromagneten (24) betriebenes Schwenkgestänge (22, 23) ergreifen.
8. Vorrichtung nach Anspruch 7, wobei die Elektromagneten (24) elektronisch dem Arbeitsprogramm der Webmaschine, auf der die Vorrichtung montiert ist, entsprechend gesteuert werden.

Revendications

1. Dispositif électromécanique pour commander, avec possibilité de réglages amples et aisés, les mouvements oscillatoires rotatifs du rouleau de prélèvement ou les déplacements en va-et-vient de l'étrier de déviation de tissu, et les mouvements de translation en va-et-vient coordonnés de l'ensouple de la chaîne, permettant de former la boucle dans les métiers à tisser des tissus à boucles - ledit dispositif étant du type comprenant un arbre d'entrée (A), amené à tourner en continu par le mouvement général du métier, et un levier de sortie (D) qui impose de manière cyclique, via des leviers, lesdits mouvements oscillatoires rotatifs audit rouleau ou lesdits déplacements en va-et-vient audit étrier de déviation de tissu, et lesdits mouvements de translation en va-et-vient à ladite ensouple, ces mouvements recouvrant les mouvements ordinaires dudit rouleau et de ladite ensouple - caractérisé en ce que, le mouvement dudit arbre d'entrée (A) audit levier de sortie (D) est transmis via des premiers organes

mécaniques (2) permettant de déterminer la loi desdits mouvements cycliques, et via des seconds organes mécaniques (3) permettant de sélectionner l'amplitude desdits mouvements entre au moins deux valeurs prédéfinies - l'une d'elles étant ajustable - et une valeur zéro, lesdits seconds organes (3) étant commandés par des moyens électromécaniques (24).

2. Dispositif selon la revendication 1, dans lequel lesdits premiers organes mécaniques (2) comprennent une came (4) avec deux pistes conjuguées (5), amenée à tourner par ledit arbre d'entrée (A), et un levier oscillant (6) comportant des suiveurs de came (12) qui s'engagent avec les pistes (5) de ladite came (4), et comprenant une console de commande (13) qui se projette vers lesdits seconds organes (3).
3. Dispositif selon la revendication 2, dans lequel ladite came (4) comporte une seule piste avec un ressort de rappel sur le suiveur de came respectif.
4. Dispositif selon la revendication 2 ou la revendication 3, dans lequel ladite came (4) peut être remplacée rapidement, par des opérations manuelles, pour modifier la loi des mouvements cycliques.
5. Dispositif selon la revendication 2 ou la revendication 3, dans lequel lesdits seconds organes mécaniques (3) comprennent une paire de cliquets (17, 18) comportant chacun une première extrémité qui pivote (en 19) sur l'extrémité libre d'un levier (20) et une seconde extrémité en forme de crochet, ledit levier (20) actionnant ledit levier de sortie (D) via un arbre (21) auquel il est fixement relié et chacun desdits cliquets (17, 18) étant commandé de manière à engager, avec son extrémité en forme de crochet, une tige correspondante (14, 15) de ladite console de commande (13) du levier oscillant (6).
6. Dispositif selon la revendication 5, dans lequel l'une (14) desdites tiges de la console de commande (13) est fixe, tandis que l'autre tige (15) est réglable manuellement le long d'une fente appropriée (16).
7. Dispositif selon la revendication 5, dans lequel lesdits cliquets (17, 18) sont commandés chacun, de manière à engager lesdites tiges (14, 15), par une articulation oscillante (22, 23) actionnée par des électro-aimants (24).
8. Dispositif selon la revendication 7, dans lequel lesdits électro-aimants (24) sont commandés électriquement selon le programme de fonctionnement du métier sur lequel le dispositif est monté.

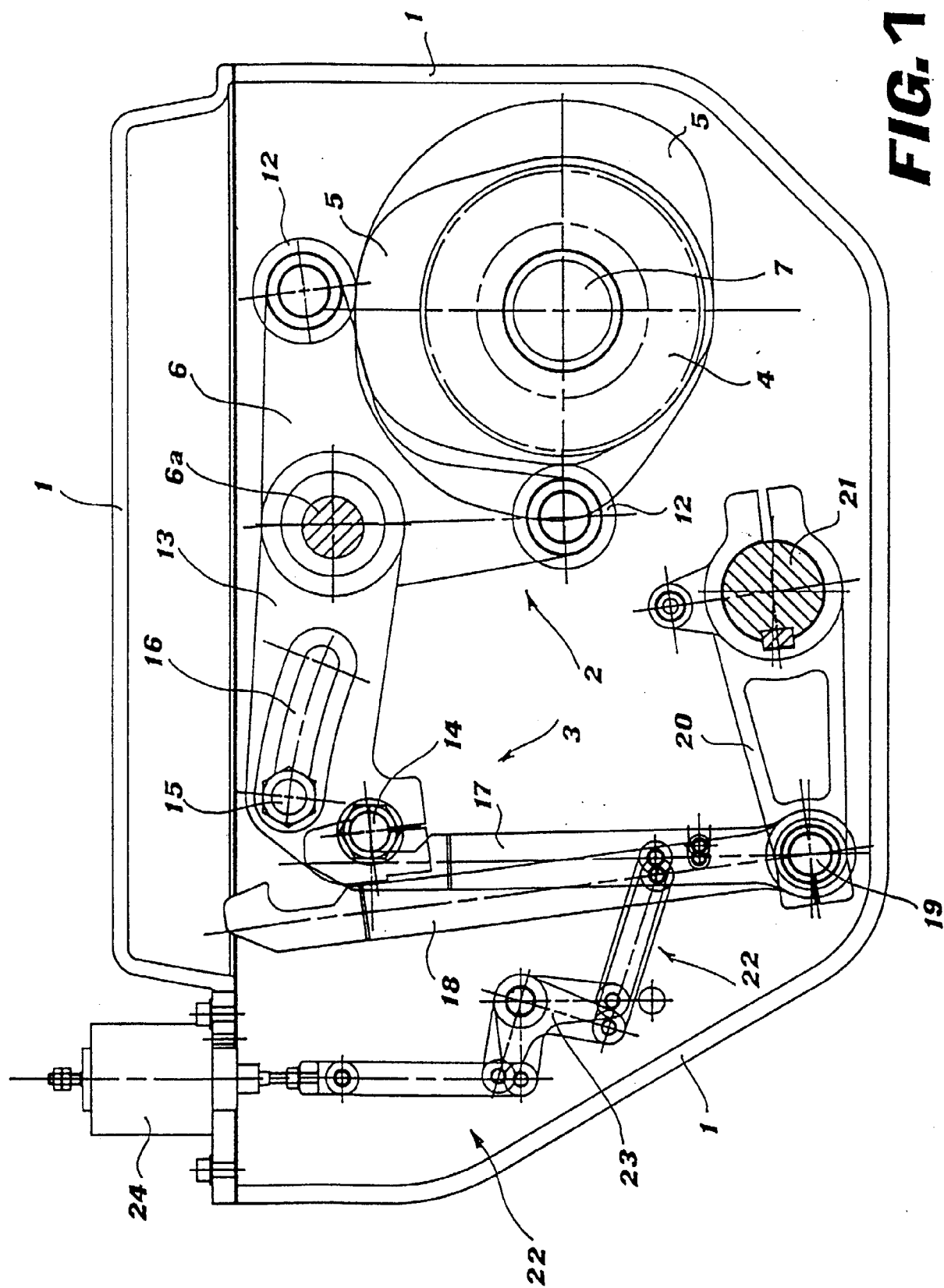


FIG. 1

