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(54) **A cutter device for tobacco products**

Schneidevorrichtung für Tabakprodukte

Dispositif de découpe pour produits du tabac

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Description

[0001] The present invention relates to a cutter device for tobacco products.

[0002] Manufacturing systems used in the tobacco industry (see e.g. WO 2005/089574) include machines by which continuous cigarette or filter rods are first formed and then cut transversely into discrete sticks of predetermined length.

[0003] In the case of cigarette makers, for example, the continuous cigarette rods are divided up by means of a cutter device into single cigarette sticks, each one of which is then associated with a filter tip to produce a filter cigarette.

[0004] Cutter devices of prior art design, positioned along the feed path followed by the continuous rod, comprise a cutter head mounted to a relative rotating shaft and equipped generally with two diametrally opposed blades, also a striker assembly or counterblade, with which the blades are caused to interact, consisting in a rotor linked mechanically to the cutter head and mounted to a shaft rotatable about an axis disposed transversely to the feed direction of the continuous rod.

[0005] The counterblade comprises a plurality of radial arms, referred to also as lobes, each projecting a given distance and equipped at the free end with a mechanism comprising a tubular element with a transverse slot. The slot affords a passage to the blade at the moment when the cut is made.

[0006] With the counterblade set in rotation, the tubular elements are positioned singly and in succession along the feed path followed by the continuous rod, each serving thus to support and guide the rod during a relative cutting stroke.

[0007] Given that the sticks must be cut in a plane at right angles to their predominating longitudinal dimension, and that the cut is made with the rod advancing continuously at a predetermined velocity along the feed path, the cutter head must be centred on an axis of rotation inclined at a certain angle relative to the aforementioned longitudinal dimension of the rod, in such a way that the angular velocity of the blade during the cutting stroke will include a component parallel to the feed direction followed by the rod and matching the linear velocity at which the rod advances.

[0008] In conventional cutter devices, the shaft of the cutter head is coupled to the counterblade shaft utilizing a transmission of a type that comprises a drive pulley, connected mechanically to the rotating shaft of the cutter head, a driven pulley coaxial with the counterblade shaft, and a drive belt looped around the two pulleys.

[0009] It has been found with cutter devices of this prior art type, however, that the transmission is not guaranteed to maintain the correct timing between each blade and a corresponding tubular element of the counterblade over an extended period. In effect, whilst the drive belt may be equipped with tensioners or idlers, it is still subject to slippage that must inevitably lead to a loss of timing between blade and counterblade.

[0010] In situations where a production run scheduled for one given brand of cigarette has been completed and there is a need to switch to a different brand, or in practice, to a cigarette of different length, the cigarette maker receives a command through its control system to adjust the feed rate of the continuous rod in such a way that single sticks can be cut to the requisite length while maintaining the same angular velocity of the cutter head.

[0011] More precisely, the velocity at which the rod advances will be faster or slower than the predetermined velocity aforementioned, depending on whether the new cigarette sticks need to be cut longer or shorter than the predetermined length of the previous run.

[0012] The inclination of the cutter head axis is also adjusted in such a way that the aforementioned component parallel to the feed direction followed by the advancing rod will match the new linear velocity of the selfsame rod.

[0013] Finally, the striker assembly or counterblade is replaced with a rotor presenting radial arms or lobes of which the radial dimensions are such that the tubular elements will assume a tangential velocity identical to the linear velocity of the advancing rod.

[0014] Clearly, the replacement of the striker assembly involves an adjustment to the rotational axis of the counterblade that must make allowance for the change in length of the respective arms, so as to ensure there will be neither interference nor loss of contact between blade and counterblade.

[0015] Lastly, the replacement involves a step of timing the action of the cutter device as a whole, and adjusting the tension of the drive belt.

[0016] It will be evident from the foregoing that the machine must be shut down in order to restore the timing between blade and counterblade, also to check and if necessary correct the tension of the drive belt; this results ultimately in loss of time and therefore a loss of hourly output from the cigarette or filter maker as a whole.

[0017] Accordingly, the object of the present invention is specifically to create a device for cutting continuous rods of tobacco products, such as will be unaffected by the drawbacks mentioned above.

[0018] In particular, the object of the present invention is to provide a cutter device for continuous rods of tobacco products that will favour high hourly output rates even when changing from one product to another, and typically when switching from one cigarette stick to another of different length.

[0019] A further object of the invention is to provide a cutter device for continuous rods of tobacco products, such as will ensure an accurate and repeatable cut of the rod.

[0020] The stated objects of the present invention are substantially realized in a cutter device for continuous rods of tobacco products, of which the characteristics are as recited in one or more of the appended claims.

[0021] The invention will now be described in detail,

by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a perspective view showing a cutter device for continuous rods of tobacco products, in accordance with the present invention;
- figure 2 is a perspective view showing a detail of the device in figure 1;
- figure 3 is a further perspective view showing the device of figure 1, with certain parts omitted better to reveal others;
- figure 4 is a section on IV-IV in figure 1.

[0022] With reference to the accompanying drawings, numeral 1 denotes a cutter device for tobacco products, in its entirety, according to the present invention.

[0023] The device 1 comprises a cutter drum 2 rotating in an anticlockwise direction, as seen in figure 1, about an axis T that is angled, or skew, relative to a feed direction B followed by at least one continuous tobacco or filter rod 3. In the preferred embodiment of the drawings, more exactly, two continuous rods 3 advance parallel one with another along the feed direction B toward the device 1, as illustrated in figures 1 and 2, at a predetermined and constant velocity denoted V1.

[0024] The cutter drum 2 comprises two peripheral and diametrally opposed blades 4 (one only of the two is visible in the accompanying drawings) by which the two continuous rods 3 are intercepted and, at a given angular velocity of the drum 2, divided into sticks 3a of predetermined length denoted L1.

[0025] The inclination of the drum axis T, hence of the cutting direction D, is adjusted in conventional manner so that the blade 4 will be displaced along the feed direction B during the cutting stroke at a velocity matching the linear velocity of the advancing rods 3; this ensures that each rod 3 is cut perpendicular to its longitudinal axis.

[0026] In other words, the component of the tangential velocity vector defining the rotational movement of the blade 4, considered along the feed direction B followed by the rods 3, is equal to the velocity vector defining the linear movement of the rod 3.

[0027] To allow a clean cut of the rods 3, the device 1 comprises a striker assembly or counterblade 5, located above the cutter drum 2 and comprising a rotating shaft denoted 5a, also a carrier element 6 mounted to and rotatable as one with the shaft 5a about an axis C orthogonal to the feed direction B, which turns in an anticlockwise direction as viewed in figure 1.

[0028] The counterblade 5 and the drum 2 are supported by a bulkhead 7 forming a part of the frame 7a to which the device 1 is mounted.

[0029] The carrier element 6 is furnished with four radial arms or lobes 6a of predetermined length (figure 2), each of which furnished at the projecting end with a mechanism 8 capable, when operated by linkages of conventional type not illustrated in the drawings, of pivoting in relation to the relative lobe 6a on a respective secondary axis S (figure 2) parallel to the counterblade axis C.

[0030] The aforementioned mechanism 8 comprises a pair of hollow prismatic elements 9, each affording a cylindrical groove 10 internally of which a relative rod 3 is accommodated and guided during the cutting steps.

[0031] The hollow prismatic element 9 further comprises a slot 11, set transversely to the groove 10 and affording a passage to the blade 4.

[0032] With each mechanism 8 rendered thus pivotable about the secondary axis S and rotatable as one with the carrier element 6 about the counterblade axis C, its movement through the cutting area can be maintained straight and parallel to the feed direction B followed by the two continuous rods 3, and its tangential velocity during the cutting stroke matched to the velocity V1 of the advancing rods 3.

[0033] A block denoted 12 represents actuator means driving a shaft 13 centred on an axis 13a substantially transverse to the skew axis T and parallel to the counterblade axis C, from which motion is transmitted to the cutter drum 2 by way of mechanical means (not illustrated) located internally of a housing denoted 14.

[0034] Keyed to a free end of the shaft 13, projecting beyond the aforementioned bulkhead 7, is a toothed driving member, or gear 15, from which motion is transmitted by way of an auxiliary gear 16, mounted to a pivot 17 centred on an axis 17a parallel with the axis 13a of the aforementioned drive shaft 13, to a driven gear 18 keyed to the shaft 5a of the counterblade 5.

[0035] As illustrated in figures 1 and 2, the driven gear 18 combines with the counterblade 5 and the shaft 5a, which are set in rotation by the selfsame gear 18, to form an assembly carried by a slide 19 capable of movement in a vertical direction G along the ways 20 of respective slide means 21 fixed to the bulkhead 7.

[0036] The aforementioned pivot 17 is able, for reasons that will become clear in due course, to assume a plurality of positions relative to the bulkhead 7, each corresponding to a given elevation of the driven gear 18. On assuming each of the positions in question, the pivot 17 is locked to the bulkhead by means of familiar type (not illustrated). The three gears 15, 16 and 18 combine to establish transmission means denoted 22. The transmission means 22 in turn comprise mechanical interconnecting means 23 composed of a first connecting rod 24 by which the drive shaft 13 and its keyed driving gear 15 are linked to the pivot 17 of the auxiliary gear 16, and a second connecting rod 25 by which the pivot 17 is linked to the counterblade shaft 5a. Thus, the function of the rods 24 and 25 is to create two links, between the axis 13a of the driving gear 15 and the axis 17a of the auxiliary gear 16, and between the axis 17a of the auxiliary gear 16 and the axis C of the driven gear 18.

[0037] Numeral 26 denotes means by which to adjust the position of the slide 19 and, accordingly, of the shaft 5a, the driven gear 18 and the striker assembly or counterblade 5.

[0038] The positioning means 26 in question comprise

an actuator 27, mounted to the bulkhead 7 and driving a vertically disposed lead screw 28 coupled by way of a lead nut to the slide 19.

[0039] The slide 19 can therefore be moved up or down along the aforementioned vertical direction G by causing the lead screw 28 to rotate left or right, as appropriate, in such a way as to position the shaft 5a and the counterblade 5 closer to or farther from the cutter drum 2.

[0040] The two rods 24 and 25 of the aforementioned interconnecting means 23 are linked one to another by way of the pivot 17, which is movable relative to the bulkhead 7. For reasons that will become clear in due course, the rods 24 and 25 serve to accommodate a change in the distance H between the axes denoted C and 13a, hence between the relative shafts 5a and 13, when the counterblade axis C is displaced along the vertical direction G, without any loss of meshing contact between the gears 15, 16 and 18 and consequently without any loss of timing between the shafts 5a and 13.

[0041] Advantageously, the device 1 comprises clamp means 29 operating actively on the slide 19 in such a way as to lock the rotational axis C of the counterblade 5 in its correct position along the vertical direction G.

[0042] In particular, the slide 19 is of trapezoidal prismatic geometry and therefore presents at least two angled faces on opposite sides.

[0043] The clamp means 29 comprise a wedge element 30 that extends preferably along the entire length of the slide 19 and is located between the slide and the ways 20.

[0044] As illustrated in figure 4, the clamp means 29 comprise at least two bolts 31 passing through respective pairs of holes 32 in the slide 19 and in the bulkhead 7. The holes 32 of each pair are coaxial and allow the respective bolt 31 to pass through the bulkhead 7 to the side opposite from the slide 19.

[0045] Each bolt 31 presents a first end 31a fashioned with a head 33 designed to locate against the rim of the respective hole 32 in the wedge element 30, on the side opposite from the bulkhead 7.

[0046] In addition, the clamp means 29 comprise spring means 34 acting on second ends 31b of the bolts 31 remote from the first ends 33. Spring means 34 are shown in the preferred embodiment of the drawings as belleville discs 35, lodged between lugs 31c presented by the bolts 31, on the one hand, and the bulkhead 7 on the other.

[0047] In other words, the spring means 34 operate between the bolts 31 and the bulkhead 7 and are designed to urge the bolts 31 away from the bulkhead on the side remote from the wedge element 30. Accordingly, the wedge element 30 is forced by the heads 33 of the bolts 31 against the bulkhead 7 and against the ways 20 of the slide means 21 (see figure 4).

[0048] As illustrated in figures 3 and 4, the device 1 further comprises means 36 by which to release the wedge element 30 and allow freedom of movement to the slide 19.

[0049] Referring to figure 3, in particular, the release means 36 comprise an actuator 37, preferably hydraulic, of which an anchored first end 37a is attached hingedly to the bulkhead 7 on the side opposite from the wedge element 30, and an extendible second end 37b is attached hingedly to a crank arm 38.

[0050] Also associated with the crank arm 38 is a shaft denoted 39, keyed in such a way that it can be rotated by operating the actuator 37.

[0051] The shaft 39 is inserted rotatably in an appendage 40 attached rigidly and at right angles to the bulkhead 7.

[0052] In addition, the shaft 39 presents a cam 41, discernible in figure 4, inserted in a bracket 42 mounted slidably to the appendage 40 in a direction normal to the bulkhead 7.

[0053] The bracket 42 is placed in contact with the second ends 31b of the bolts 31.

[0054] Operating the actuator 37, the shaft 39 is rotated by the crank 38, with the result that the bracket 42 will be displaced by the cam 41 and forced against the second ends 31b of the bolts 31.

[0055] The force exerted by the bracket 42 is therefore directed against the force of the spring means 34. In particular, the force exerted by the bracket 42, in terms of modulus, is greater than the force exerted by the spring means 34. Thus, with the bracket 42 impinging on the second ends 31b of the bolts, the heads 33 of the bolts are forced away from the rims of the holes 32 in the wedge element 30, freeing the selfsame element from the locked position of the slide 19.

[0056] At this point, the slide 19 can be moved so as to alter the distance between the drive shaft 13 and the shaft 5a of the counterblade 5. With the adjustment made, the actuator 37 causes the cam 41 to rotate in the opposite direction, removing the force exerted by the bracket 42 on the second ends 31b of the bolts 31, whereupon the wedge element 30 is forced by the spring means 34 to resume the position in which the slide 19 is locked.

[0057] In operation, the cigarette maker turns out sticks 3a of which the length L1, at a given angular velocity of the cutter drum 2 and the counterblade 5 about their relative axes of rotation T and C, is determined by the linear velocity V1 of the advancing continuous rods 3.

[0058] Conventionally, to reiterate, the cutter drum 2 is set at a given angle to the feed direction B followed by the continuous rods 3, so that the relative velocity measurable during the cutting stroke between the blades 4 and the rods 3, advancing along the selfsame feed direction B at linear velocity V1, will be zero.

[0059] In order to ensure that cuts are made correctly, the tangential velocity of the mechanisms 8 by which the rods 3 are retained during the cutting stroke must also coincide with the velocity of the blades 4, measured along the feed direction B; accordingly, the carrier element 6 of the counterblade 5, which is connected mechanically to the cutter drum 2, will be equipped with arms or lobes 6a of length d1 equivalent to a value of tangential velocity

matching the linear velocity V1 of the advancing rods 3.

[0060] Once a scheduled quantity or batch of tobacco products has been completed, it may be necessary to switch to another brand or size of product assembled with sticks presenting a different axial dimension, for example of length L2 (not illustrated) shorter than L1.

[0061] Maintaining the same angular velocity of the cutter drum 2, this new length L2 will dictate that the continuous rods 3 advance at a linear velocity V2 (not illustrated) slower than V1.

[0062] Accordingly, before starting up the machine at the new velocity V2, or rate of feed, the operator will need to make a number of changes.

[0063] The angle of the cutter drum 2 must be adjusted so that the linear velocity of the blades 4 during the cutting stroke, measured along the feed direction B followed by the rods 3, will assume the new value of V2.

[0064] Having set the counterblade shaft 5a at the maximum distance from the drive shaft 13 by operating the actuator 27 to turn the lead screw 28 against the slide 19, that is, having separated the counterblade 5 from the cutter drum 2, the carrier element 6 is removed from the shaft 5a and replaced with another element 6 (not illustrated) of shorter radial dimensions, in this instance a replacement with radial arms or lobes 6a of which the length d2 is shorter than the previous length d1, and such that the tangential velocity of the selfsame lobes will match the new linear velocity V2.

[0065] The new carrier element 6 is mounted to the shaft 5a in the same angular position as the previous element 6, with the aid of reference systems not illustrated in the drawings.

[0066] Finally, the actuator 27 is operated to set the distance between the counterblade shaft 5a and the drive shaft 13, in such a way as will ensure that with each cutting stroke, a hollow prismatic element 9 is positioned correctly to engage and guide the continuous rod 3 relative to a corresponding blade 4.

[0067] At this point, a signal is given to start the cigarette or filter maker with the feed system operating at the new linear velocity V2, so as to turn out sticks 3a of length L2.

[0068] In the case opposite to that described above, that is to say when changing over to a product requiring sticks of length L3 greater than L1, the operator needs to carry out substantially the same procedures as described above, before restarting the machine at a new linear velocity V3 (not illustrated) faster than the previous velocity V1.

[0069] More exactly, the angle of the cutter drum 2 must be adjusted so that the linear velocity of the blades 4 during the cutting stroke, measured along the feed direction B followed by the rods 3, will assume the new value of V3, and the carrier element 6 will be replaced with another of increased radial dimensions, that is, with radial arms or lobes 6a of length d3 (not illustrated) greater than the previous length d1, so that their tangential velocity will match the new linear velocity V3.

[0070] Whether during normal operation or in the course of a brand or size changeover, it will be evident that a cigarette or filter maker equipped with the cutter device 1 according to the present invention remains unaffected by the drawbacks associated with devices of conventional type, since transmission means 22 utilizing gears 15, 16 and 18 are not subject to the problems typical of conventional belt type transmission means.

[0071] Moreover, during the operation of adjusting and setting the distance between the rotational axis C of the counterblade 5 and the path of the rods 3, the transmission means 22 disclosed, linked by connecting rods 24 and 25, can be displaced without any loss of meshing contact and thus function as timing means by which to maintain synchronous operation of the shaft 13 driving the cutter drum 2 and the shaft 5a carrying the counterblade 5.

[0072] Clearly, in altering the distance between the counterblade axis C and the rods 3, the distance H between this same axis C and the drive axis 13a is also altered. With the device 1 disclosed, however, the operation of the aforementioned timing means synchronizing the drive shaft 13 of the drum 2 and the shaft 5a of the counterblade 5 is unaffected by any variation in the distance H between the respective axes 13a and C of the two shafts.

Claims

1. A cutter device for tobacco products comprising:

- a cutter drum (2) by which at least one continuous rod (3) is divided into discrete sticks (3a), equipped with at least one blade (4) and rotating about an axis (T) angled relative to a feed direction (B) followed by the continuous rod (3);
- a counterblade (5) rotating about an axis (C) orthogonal to the feed direction (B) and separated from the rod (3) by a distance dependent on the length of the sticks (3a), equipped peripherally with at least one mechanism (8) by which the continuous rod (3) is supported and guided during the cutting stroke;
- means (22) by which motion is transmitted between the cutter drum (2) and the counterblade (5),

characterized

in that transmission means (22) function as timing means by which to synchronize the operation of the cutter drum (2) and the counterblade (5); and,

in that such timing means comprise a train of gears (15,16,18) maintainable in constant meshing contact during a step of adjusting the distance between the axis of rotation (C) of the counterblade (5) and the continuous rod (3).

2. A device as in claim 1, wherein at least one of the gears (15,16,18) is capable of movement between a plurality of operating positions in which motion is transmitted, each such position related to a predetermined length of the sticks (3a).

3. A device as in claim 1, wherein the transmission ratio of the train of gears is fixed.

4. A device as in claim 2 or 3, wherein transmission means (22) comprise a driving gear (15) associated operationally with the rotational axis (T) of the cutter drum (2) or with the rotational axis (C) of the counterblade (5), a driven gear (18) associated operationally with the rotational axis (C) of the counterblade (5) or with the rotational axis (T) of the cutter drum (2), and at least one auxiliary gear (16) by which motion is transmitted from the driving gear (15) to the driven gear (18), the auxiliary gear (16) being capable of movement between a plurality of operating positions in which motion is transmitted.

5. A device as in claim 4, wherein the driving gear (15) is keyed to a drive shaft (13) coupled mechanically to the cutter drum (2) and disposed substantially transverse to the rotational axis (T) of the drum (2), the driven gear (18) is keyed to a driven shaft (5a) coupled mechanically to the counterblade (5) and centred on the rotational axis (C) of the selfsame counterblade (5), and the auxiliary gear (16) is keyed to a pivot (17) and freely revolving.

6. A device as in claims 1 to 3, wherein transmission means (22) comprise mechanical interconnecting means (23) operating actively between pairs of gears (15,16;16,18).

7. A device as in claims 5 and 6, wherein mechanical interconnecting means (23) comprise a first connecting rod (24) attached rotatably to the drive shaft (13) and to the pivot (17) of the auxiliary gear (16), and a second connecting rod (25) attached rotatably to the pivot (17) of the auxiliary gear (16) and to the driven shaft (5a), in such a way that the auxiliary gear (16) can be moved between the plurality of operating positions in which motion is transmitted, and the rotational axis (C) of the counterblade (5) and the rotational axis (T) of the drum (2) can be repositioned selectively farther apart or closer together.

8. A device as in claim 7, comprising means (26) by which to adjust the position of the shaft (5a) and the rotational axis (C) of the counterblade (5), operating actively on the selfsame driven shaft (5a) to which the driven gear (18) is keyed.

9. A device as in claim 8, wherein positioning means (26) comprise slide means (21) operating actively on the driven shaft (5a) in such a way as to traverse the counterblade (5) along an axis (G) perpendicular to the rotational axis (C) of the selfsame counterblade (5).

10. A device as in claim 9, wherein positioning means (26) comprise an actuator (27) driving a vertically disposed lead screw (28) coupled by way of a lead nut to a sliding element (19) of the slide means (21), the slide means (21) in turn engaging the shaft (5a) by which the counterblade (5) is driven in rotation.

11. A device as in claim 10, comprising clamp means (29) operating actively on the slide means (21) in such a way as to lock the rotational axis (C) of the counterblade (5) in the selected position.

12. A device as in claim 11, wherein clamp means (29) comprise a wedge element (30) such as will interfere mechanically with an angled face of the sliding element (19) to the end of locking the selfsame element in the selected position.

13. A device as in claim 12, comprises release means (36) operating actively on the wedge element (30) in such a way as to free the selfsame element from the slide means (21).

14. A device as in preceding claims, wherein the counterblade (5) comprises a plurality of mechanisms (8) equipped with two prismatic elements (9), each presenting a respective groove (10), functioning as elements by which to guide the motion of two respective continuous rods (3) advancing parallel one with another.

15. A device as in claim 14, wherein each groove (10) comprises a respective transverse slot (11) affording a passage to the blade (4) when cutting the continuous rod (3).

Patentansprüche

1. Schneidvorrichtung für Tabakprodukte, Folgendes enthaltend:

- eine Schneidtrommel (2) zum Zerteilen zumindest einer Endlosstange (3) in einzelne Stäbe (3a), die mit zumindest einem Messer (4) ausgerüstet ist und sich um eine Achse (T) dreht, die relativ zu der von der Endlosstange (3) verfolgten Vorschubrichtung (B) angewinkelt ist;
- ein Gegenmesser (5), das sich um eine Achse (C) dreht, die orthogonal zu der Vorschubrichtung (B) verläuft und von der Stange (3) durch einen Abstand getrennt ist, der von der Länge der Stäbe (3a) abhängig ist, und das an seinem

Außenumfang mit zumindest einem Mechanismus (8) ausgestattet ist, der zum Tragen und Führen der Endlosstange (3) während des Schneidhubes dient;
- Mittel (22) zur Übertragung der Bewegung zwischen der Schneidtrommel (2) und dem Gegenmesser (5);

dadurch gekennzeichnet,
dass die Übertragungsmittel (22) als Taktungseinrichtungen dienen, um den Betrieb der Schneidtrommel (2) mit dem Gegenmesser (5) zu synchronisieren; und,
dass diese Taktungseinrichtungen einen Getriebezug (15, 16, 18) von Zahnrädern beinhalten, der während eines Schrittes zur Einstellung des Abstandes zwischen der Drehachse (C) des Gegenmessers (5) und der Endlosstange (3) in ständigem Eingriff gehalten werden kann.

2. Vorrichtung nach Anspruch 1, worin zumindest eines der Zahnräder (15, 16, 18) eine Bewegung ausführen kann zwischen mehreren Arbeitsstellungen, in denen die Bewegung übertragen wird, wobei jede dieser Stellungen auf eine vorbestimmte Länge der Stäbe (3a) bezogen ist.

3. Vorrichtung nach Anspruch 1, worin das Übertragungsverhältnis des Getriebezuges fest ist.

4. Vorrichtung nach Anspruch 2 oder 3, worin die Übertragungsmittel (22) Folgendes beinhalten: ein antreibendes Zahnrad (15), das mit der Drehachse (T) der Schneidtrommel (2) oder mit der Drehachse (C) des Gegenmessers (5) wirkverbunden ist, ein angetriebenes Zahnrad (18), das mit der Drehachse (C) des Gegenmessers (5) oder mit der Drehachse (T) der Schneidtrommel (2) wirkverbunden ist, und zumindest ein Hilfszahnrad (16), durch das die Bewegung von dem antreibenden Zahnrad (15) auf das angetriebene Zahnrad (18) übertragen wird, wobei das Hilfszahnrad (16) eine Bewegung zwischen mehreren Arbeitsstellungen, in denen die Bewegung übertragen wird, ausführen kann.

5. Vorrichtung nach Anspruch 4, worin das antreibende Zahnrad (15) auf eine Antriebswelle (13) gekeilt ist, die mechanisch mit der Schneidtrommel (2) gekoppelt ist und im Wesentlichen in Querrichtung zu der Drehachse (T) der Trommel (2) angeordnet ist, während das angetriebene Zahnrad (18) auf eine Abtriebswelle (5a) gekeilt ist, die mechanisch mit dem Gegenmesser (5) gekoppelt ist und mittig auf der Drehachse (C) des Gegenmessers (5) angeordnet ist, und das Hilfszahnrad (16) auf einen Drehzapfen (17) gekeilt und frei drehend ist.

6. Vorrichtung nach den Ansprüchen 1 bis 3, worin die Übertragungsmittel (22) mechanische Verbindungseinrichtungen (23) beinhalten, die aktiv zwischen Paaren von Zahnrädern (15, 16; 16, 18) wirken.

7. Vorrichtung nach den Ansprüchen 5 und 6, worin die mechanischen Verbindungseinrichtungen (23) Folgendes beinhalten: eine erste Verbindungsstange (24), die drehbar an der Antriebswelle (13) und an dem Drehzapfen (17) des Hilfszahnrades (16) befestigt ist, und eine zweite Verbindungsstange (25), die drehbar an dem Drehzapfen (17) des Hilfszahnrades (16) und an der Abtriebswelle (5a) befestigt ist, derart, dass das Hilfszahnrad (16) eine Bewegung zwischen mehreren Arbeitsstellungen, in denen die Bewegung übertragen wird, ausführen kann, und dass die Drehachse (C) des Gegenmessers (5) und die Drehachse (T) der Trommel (2) wahlweise in größerer oder geringerer Entfernung zueinander neu positioniert werden können.

8. Vorrichtung nach Anspruch 7, die Einrichtungen (26) zur Positionierung der Welle (5a) und der Drehachse (C) des Gegenmessers (5) beinhaltet, die aktiv auf die Abtriebswelle (5a) wirken, auf die das angetriebene Zahnrad (18) gekeilt ist.

9. Vorrichtung nach Anspruch 8, worin die Positioniereinrichtungen (26) Gleiteinrichtungen (21) beinhalten, die aktiv auf die Abtriebswelle (5a) wirken, um das Gegenmesser (5) entlang einer Achse (G) zu verfahren, die perpendikular zur Drehachse (C) des Gegenmessers (5) ausgerichtet ist.

10. Vorrichtung nach Anspruch 9, worin die Positioniereinrichtungen (26) einen Stellantrieb (27) beinhalten, der eine vertikal angeordnete Leitspindel (28) antreibt, die über eine Leitmutter mit einem Gleitelement (19) der Gleiteinrichtungen (21) gekoppelt ist, wobei die Gleiteinrichtungen (21) wiederum in Eingriff mit der Welle (5a) stehen, durch die das Gegenmesser (5) drehend angetrieben wird.

11. Vorrichtung nach Anspruch 10, Klemmeinrichtungen (29) beinhaltend, die aktiv auf die Gleiteinrichtungen (21) wirken, um die Drehachse (C) des Gegenmessers (5) in der gewählten Stellung zu arretieren.

12. Vorrichtung nach Anspruch 11, worin die Klemmeinrichtungen (29) ein Keilelement (30) beinhalten, das mechanisch mit einer angewinkelten Fläche des Gleitelementes (19) interagiert, um das Element in der gewählten Stellung zu arretieren.

13. Vorrichtung nach Anspruch 12, Auslöseeinrichtungen (36) beinhaltend, die aktiv auf das Keilelement (30) wirken, um das Element von den Gleiteinrichtungen (21) freizugeben.

14. Vorrichtung nach den vorhergehenden Ansprüchen, worin das Gegenmesser (5) mehrere Mechanismen (8) beinhaltet, die mit zwei prismatischen Elementen (9) ausgestattet sind, die jeweils eine entsprechende Rille (10) aufweisen, die als Elemente zur Führung der Bewegung von zwei entsprechenden Endlosstangen (3) dienen, die parallel zueinander vorgeschoben werden.

15. Vorrichtung nach Anspruch 14, worin jede Rille (10) einen entsprechenden quer verlaufenden Schlitz (11) beinhaltet, der einen Durchgang für das Messer (4) beim Schneiden der Endlosstange (3) bereitstellt.

Revendications

1. Un dispositif de découpe pour produits du tabac, comprenant :

- un tambour de découpe (2) servant à diviser au moins un boudin continu (3) en bâtonnets (3a) discrets, équipé d'au moins une lame (4) et tournant autour d'un axe (T) qui est incliné par rapport à une direction d'avance (B) suivie par le boudin continu (3) ;
- une contre-lame (5) tournant autour d'un axe (C) orthogonal à la direction d'avance (B) et séparé du boudin (3) d'une distance qui dépend de la longueur des bâtonnets (3a), dotée périphériquement d'au moins un mécanisme (8) servant à supporter et à guider le boudin continu (3) pendant la course de découpe ;
- des moyens (22) servant à transmettre le mouvement entre le tambour de découpe (2) et la contre-lame (5), ledit dispositif étant **caractérisé**

en ce que les moyens de transmission (22) définissent des moyens de synchronisation servant à synchroniser le fonctionnement du tambour de découpe (2) et de la contre-lame (5) ; et,
en ce que lesdits moyens de synchronisation comprennent un train d'engrenages (15, 16, 18) pouvant être maintenus en prise constante pendant une phase de réglage de la distance entre l'axe de rotation (C) de la contre-lame (5) et le boudin continu (3).

2. Le dispositif selon la revendication 1, **caractérisé en ce qu'**au moins un des engrenages (15, 16, 18) peut se déplacer entre une pluralité de positions opérationnelles de transmission du mouvement, chaque position étant fonction d'une longueur prédéfinie des bâtonnets (3a).

3. Le dispositif selon la revendication 1, **caractérisé en ce que** le rapport de transmission du train d'engrenages est fixe.

4. Le dispositif selon la revendication 2 ou 3, **caractérisé en ce que** les moyens de transmission (22) comprennent un engrenage menant (15) opérationnellement associé à l'axe de rotation (T) du tambour de découpe (2) ou à l'axe de rotation (C) de la contre-lame (5), un engrenage mené (18) opérationnellement associé à l'axe de rotation (C) de la contre-lame (5) ou à l'axe de rotation (T) du tambour de découpe (2), et au moins un engrenage auxiliaire (16) servant à transmettre le mouvement de l'engrenage menant (15) à l'engrenage mené (18), l'engrenage auxiliaire (16) pouvant se déplacer entre une pluralité de positions opérationnelles de transmission du mouvement.

5. Le dispositif selon la revendication 4, **caractérisé en ce que** l'engrenage menant (15) est calé sur un arbre d'entraînement (13) accouplé mécaniquement avec le tambour de découpe (2) et disposé essentiellement transversalement à l'axe de rotation (T) dudit tambour (2), l'engrenage mené (18) est calé sur un arbre entraîné (5a) accouplé mécaniquement avec la contre-lame (5) et centré sur l'axe de rotation (C) de cette même contre-lame (5), et l'engrenage auxiliaire (16) est calé sur un pivot (17) et peut tourner librement.

6. Le dispositif selon les revendications de 1 à 3, **caractérisé en ce que** les moyens de transmission (22) comprennent des moyens d'interconnexion mécanique (23) opérationnellement actifs entre des paires d'engrenages (15, 16; 16, 18).

7. Le dispositif selon les revendications 5 et 6, **caractérisé en ce que** les moyens d'interconnexion mécanique (23) comprennent une première bielle (24) associée de façon pivotante à l'arbre d'entraînement (13) et au pivot (17) de l'engrenage auxiliaire (16), et une deuxième bielle (25) associée de façon pivotante au pivot (17) de l'engrenage auxiliaire (16) et à l'arbre entraîné (5a), de manière à ce que l'engrenage auxiliaire (16) puisse être déplacé entre ladite pluralité de positions opérationnelles de transmission du mouvement, et à ce que l'axe de rotation (C) de la contre-lame (5) et l'axe de rotation (T) du tambour (2) puissent être repositionnés sélectivement en éloignement ou rapprochement réciproque.

8. Le dispositif selon la revendication 7, **caractérisé en ce qu'**il comprend des moyens (26) servant à régler la position de l'arbre (5a) et de l'axe de rotation (C) de la contre-lame (5), opérationnellement actifs sur l'arbre entraîné (5a) lui-même sur lequel est calé l'engrenage mené (18).

9. Le dispositif selon la revendication 8, **caractérisé en ce que** les moyens de positionnement (26) comprennent des moyens à chariot (21) opérationnellement actifs sur l'arbre mené (5a) de manière à déplacer la contre-lame (5) le long d'un axe (G) perpendiculaire à l'axe de rotation (C) de la contre-lame (5) elle-même.

10. Le dispositif selon la revendication 9, **caractérisé en ce que** les moyens de positionnement (26) comprennent un actionneur (27) entraînant une vis-mère (28) disposée à la verticale et accouplée, par l'intermédiaire d'un écrou de vis-mère, à élément coulissant (19) des moyens à chariot (21), lesdits moyens à chariot (21) venant en prise avec l'arbre (5a) qui met en rotation la contre-lame (5) .

11. Le dispositif selon la revendication 10, **caractérisé en ce qu'**il comprend des moyens de blocage (29) opérationnellement actifs sur les moyens à chariot (21) de manière à bloquer l'axe de rotation (C) de la contre-lame (5) dans la position sélectionnée.

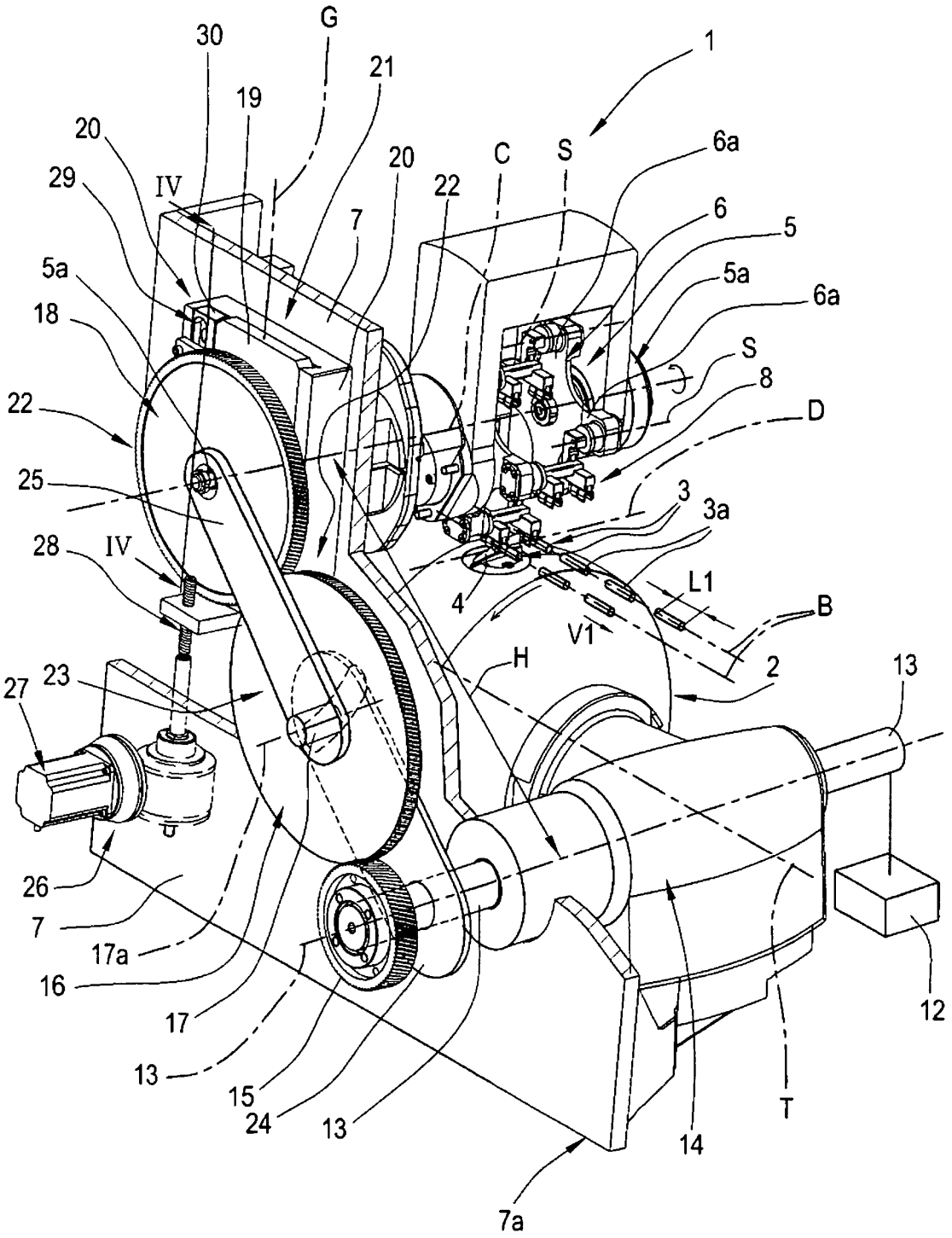
12. Le dispositif selon la revendication 11, **caractérisé en ce que** les moyens de blocage (29) comprennent un élément cunéiforme (30) destiné à interférer mécaniquement avec une face inclinée de l'élément coulissant (19) de manière à bloquer ce même élément dans la position sélectionnée.

13. Le dispositif selon la revendication 12, **caractérisé en ce qu'**il comprend des moyens de déblocage (36) opérationnellement actifs sur l'élément cunéiforme (30) de manière à libérer ce même élément des moyens à chariot (21).

14. Le dispositif selon les revendications précédentes, **caractérisé en ce que** la contre-lame (5) comprend une pluralité de mécanismes (8) équipés de deux éléments prismatiques (9) présentant, chacun, une rainure (10) respective et constituant des éléments destinés à guider le mouvement des deux boudins continus (3) respectifs qui avancent parallèlement l'un par rapport à l'autre.

15. Le dispositif selon la revendication 14, **caractérisé en ce que** chaque rainure (10) comprend une fente transversale (11) respective offrant un passage à la lame (4) lors de la découpe du boudin continu (3).

FIG.1


G
30
21
19
1
20
20
C
S
6a
29
IV
22
6
5
7
5a
5a
6a
18
S
8
22
D
25
3
3a
28
IV
4
L1
B
V1
H
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27
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17a
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15
24
13
14
T
12
7a

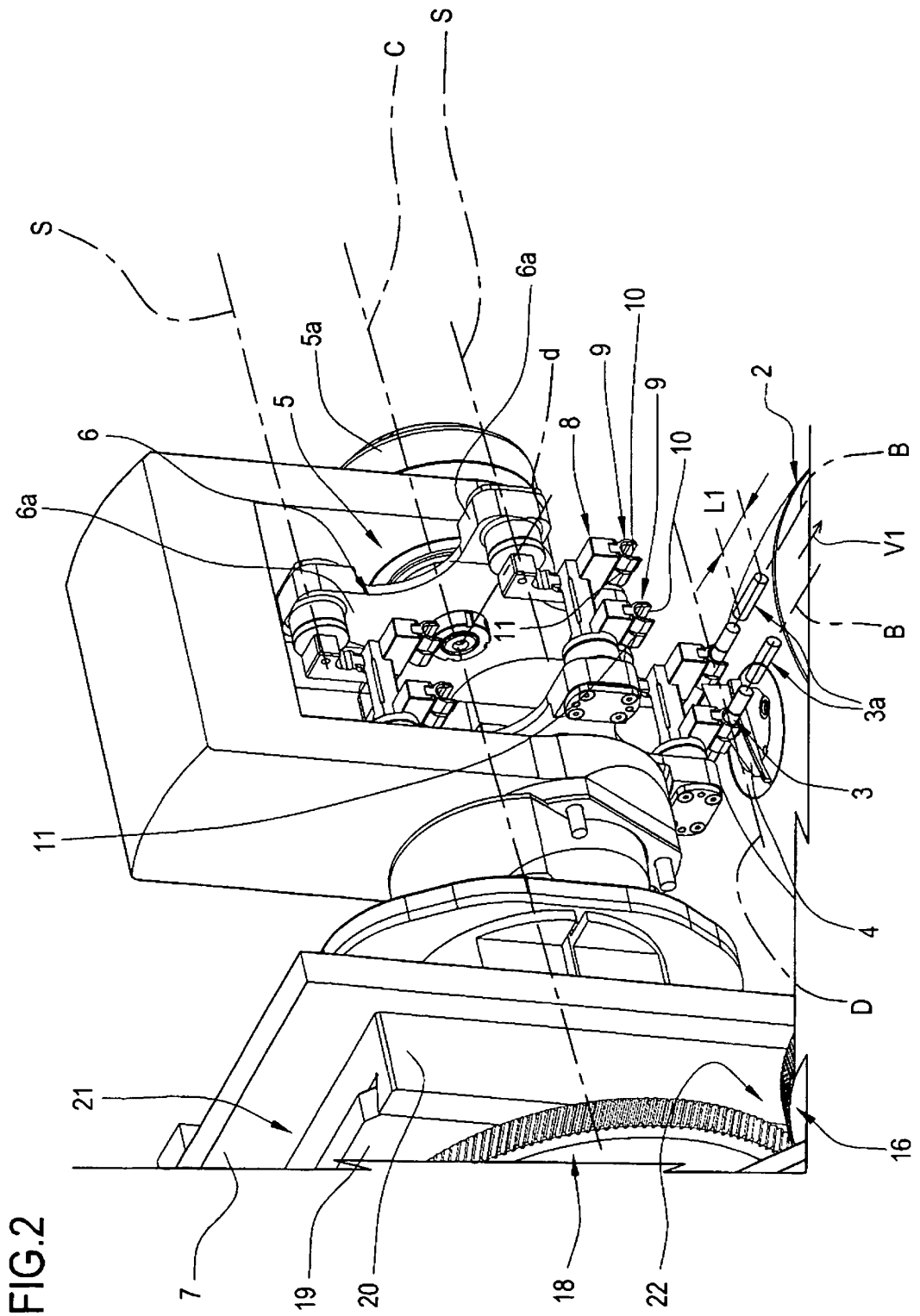


FIG.2

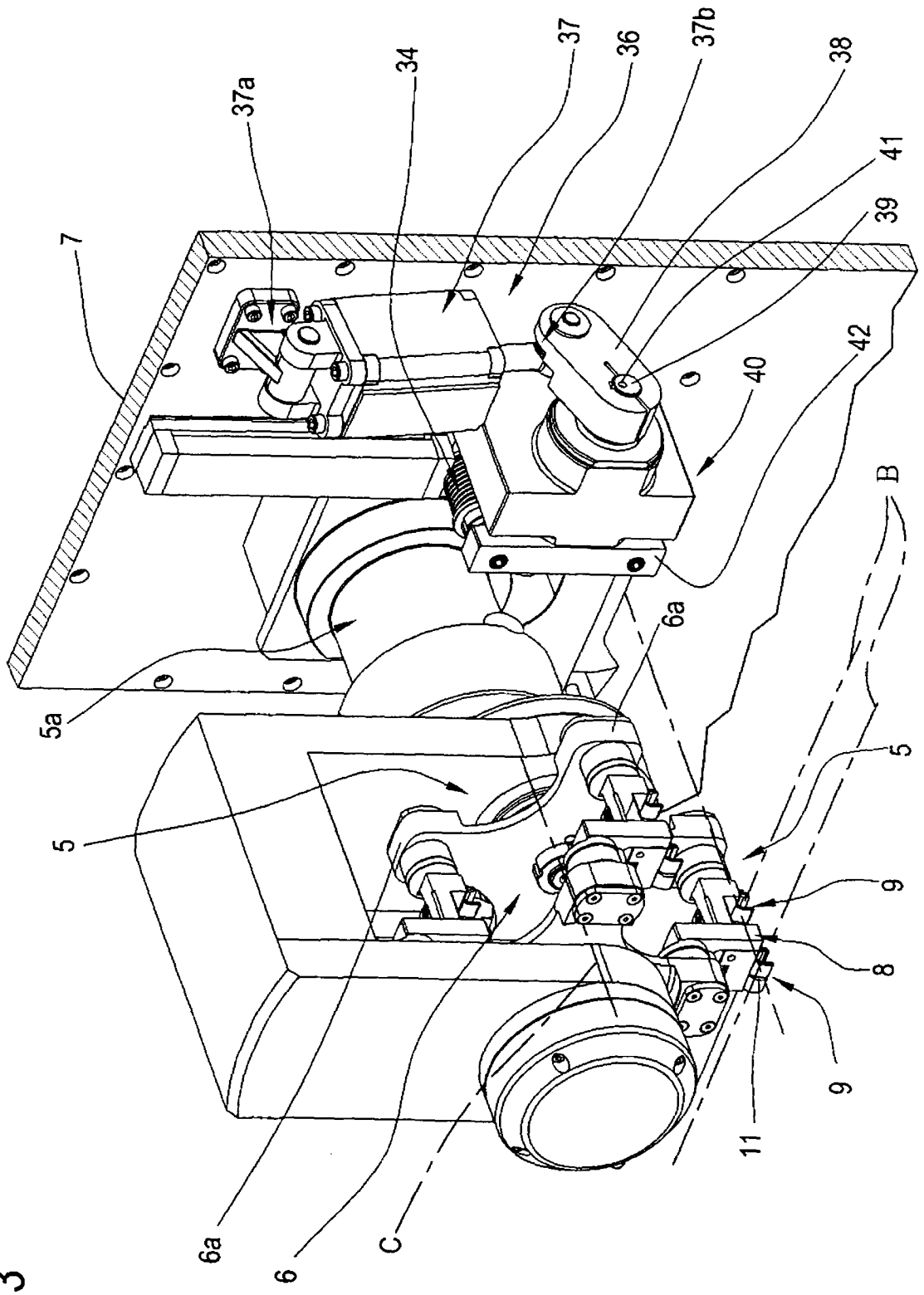


FIG.3

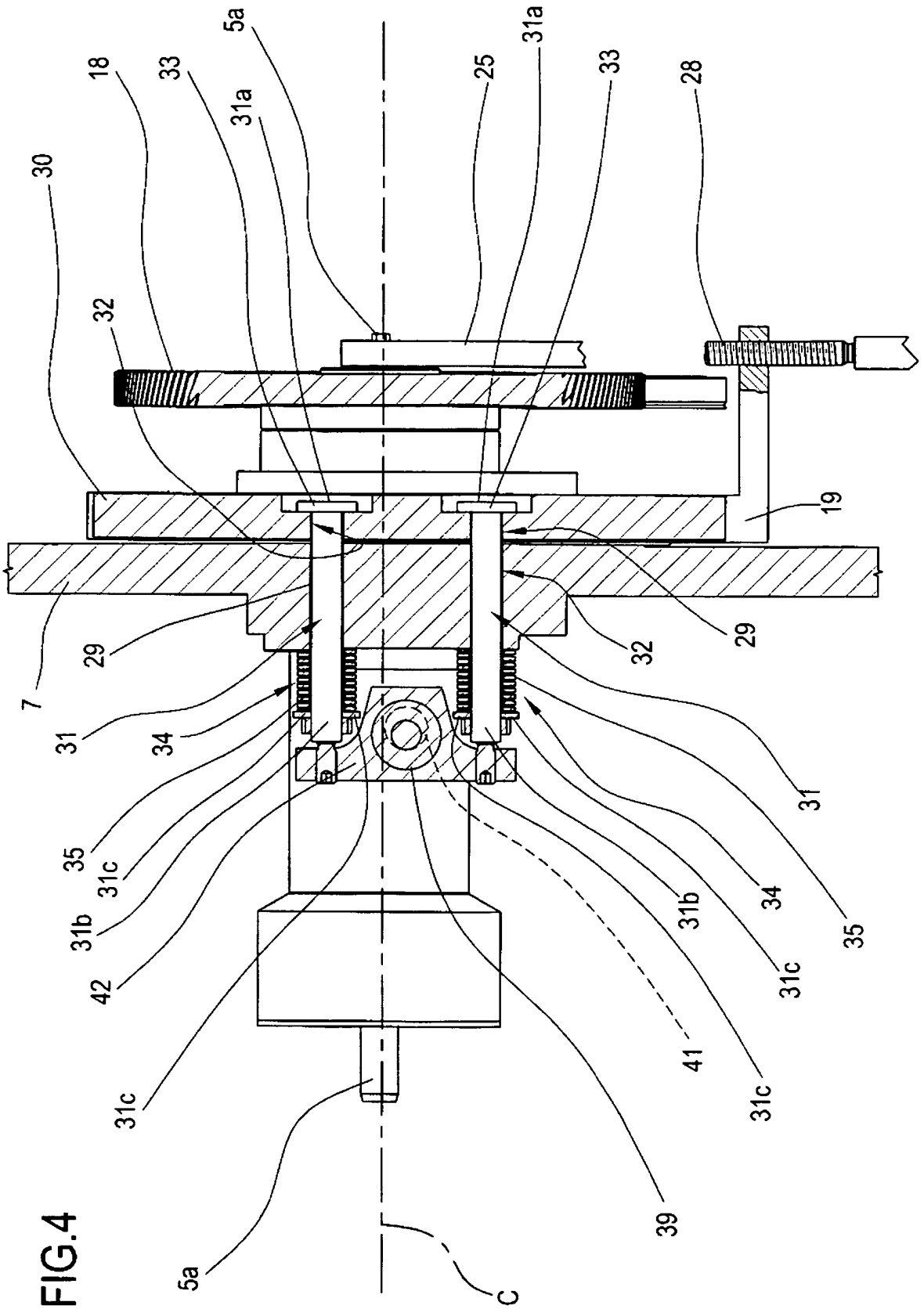

5a
31a
18
33
25
33
28
30
32
19
29
29
32
7
31
34
35
31c
31b
42
31
34
31b
31c
35
31c
41
31c
39
5a
C

FIG.4

REFERENCES CITED IN THE DESCRIPTION

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