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(54) **A power transmission device for feed wheels as used in automatic machines, and in through feed moulders for woodworking in particular.**

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(73) Proprietor : **SCM S.p.A.**
Via Emilia, 71
I-47037 Rimini (Forlî) (IT)

(72) Inventor : **Maioli, Fabio**
Via Carlo Alberto Dalla Chiesa,11
47038 Sant'Arcangello (Forli) (IT)

(74) Representative : **Lanzoni, Luciano**
c/o BUGNION S.p.A. Via dei Mille, 19
I-40121 Bologna (IT)

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Description

The present invention relates to a device by means of which to transmit power to through feed wheels as used in automatic machinery, and more especially in through feed moulders.

The art field of automatic woodworking machinery embraces a number of devices for transmitting drive to the friction wheels of through feed machines. Automatic machines of the type in question are equipped conventionally with a system by which the work is transferred from one machining station to the next, propelled along a horizontal bed by feeding wheels that are disposed transversely to the bed and variable for angle and height in relation to the horizontal surface to accommodate different thicknesses of work.

Each wheel is keyed onto a supporting shaft coupled to a drive system, and thus rotates together with the shaft. The coupling between the single shaft and the drive system is effected in most instances adopting one of two devices accommodated by a back rail disposed parallel with and to the rear of the horizontal bed. A first such device consists in a yoke associated coaxially with the support shaft and coupled at the end farthest from the wheel to a universal constant velocity joint that allows the variations in height of the feeding wheel above the horizontal bed and connects the supporting shaft to the low speed shaft of a speed reducer. The speed reducer will consist in a conventional train of cylindrical or worm gears, and is connected on the input side to a drive motor.

The speed reducer serves to adapt the high angular velocity at the output of the drive motor to the low speed requirement of the feed wheels. The yoke is also hinged to a vertically disposed pneumatic cylinder, through which pressure is applied to the supporting shaft in order to keep the feeding wheel permanently and firmly in contact with the work. The second device is similar in structure to the first, but dissimilar as regards the type of power transmission adopted. In this instance, drive is transmitted to the feeding wheels by a single chain positioned to the rear of the wheels, which extends parallel to the horizontal bed and is connected to the speed reducer of each feed wheel. The coupling in this system consists in two universal joints, synchronized one with the other and interconnected by a flexible element that permits the transmission of drive from the chain to the supporting shaft while allowing variations in angle to accommodate the passage of the work.

Whilst reflecting the feeding drive arrangements most widely adopted for through feeding moulders, devices of the type thus outlined betray certain drawbacks, from engineering and cost standpoints alike. The first device is encountered normally in automatic machines constructed to high output and efficiency specifications, as drive can be transmitted from the speed reducer to the supporting shaft without subjecting the feeding wheel to sudden acceleration (for example, due to the gear geometry of the speed reducer), any jerkiness being absorbed through the splined coupling of the constant velocity joint. Thus, one has a high efficiency power transmission, but also a high capital outlay and in consequence a restricted market.

The second device is certainly the more economic option, and may be found incorporated into machines of more modest specifications, given its relatively lower efficiency and shorter working life. A chain drive is the poorer option in engineering terms however, as a higher drive ratio is required to give the correct angular velocity at the support shaft, hence a greater number of speed reductions; moreover chain drive is not always acceptable to the users of such machinery.

The publication DE-B-1081210 discloses a feeding wheel power transmission device utilizing a transmission means comprising a first shaft disposed parallel to the axis of the feeding wheel and rotatably supporting a yoke; the end of such a first shaft is associated with a worm wheel which is meshed with a worm profile affording at one end of a second transmission vertical shaft mechanically coupled, at its top, to driving means. A third shaft is keyed to the feeding wheel, disposed parallel to the first shaft and supported by the yoke: in this solution the cinematic train between the two shafts (the first and the third ones) is realized by means of a couple of toothed-wheels which arises swinging of the yoke around the axis of the first shaft due to unexpected accelerations of the workpiece: this realizes a not-constant pressure value on the workpiece with consequent work defects.

The publication EP-A-203893 refers to a bearing structure with modular sections which can be fitted and separated at will; the transmission from the driving shaft to the driven wheel one is probably realized by means of a traditional couple of toothed-wheels as per the preceeding publication.

Accordingly, the object of the present invention is to overcome the drawbacks mentioned above through the adoption of a device that affords economy, and at the same time ensures high operating efficiency by virtue of the engineering expedient adopted in embodiment of the element that ultimately supports the feeding wheel, which ensures that no unnecessary torque is transmitted to the wheel.

The stated object is fully realized in a device as characterized in the appended claims.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- fig 1 illustrates a feeding station in a through feed moulder incorporating the device according to the invention, viewed in perspective from above with certain parts omitted better to reveal others;

- fig 2 is the section through II-II, fig 1;
- fig 3 is the section through III-III, fig 1;
- fig 4 is a frontal elevation showing a feeding wheel associated with the device of fig 1, with certain parts omitted better to reveal others and with the addition of a further constructional feature;
- fig 5 illustrates an alternative embodiment of the device according to the invention, shown in frontal elevation and with certain parts omitted better to reveal others;
- fig 6 shows the device of fig 5 in side elevation with certain parts omitted better to reveal others. Referring to the drawings, the power transmission device disclosed is designed for use in automatic machines such as are employed for woodworking, and in particular a through feed moulder (visible in part in fig 1), of the type comprising at least one station denoted 1 in its entirety, through which workpieces 2 are fed along a horizontal bed 3, thus passing from one machining station to another.

The feeding station 1 is flanked by a rail 4 extending parallel with and to the rear of the horizontal bed the purpose of which is to carry a set of wheels 5 serving to feed the work 2 horizontally along the bed 3; this same back rail 4 also carries the tools (conventional, and therefore not illustrated) by which the work 2 is machined at further stations of the moulder.

The feeding wheels 5 are disposed transversely with respect to the horizontal bed 3 and associated each with means, denoted 6 in their entirety, by which rotation originating at driving means 7 installed behind the rail 4 is transmitted to the wheels 5; such means 6 are accommodated for the most part within or beneath the back rail 4.

Transmission means 6 comprise a first cylindrical shaft 8 (fig 2), disposed parallel to the axis of the feeding wheel 5 and rotatably supporting a yoke 9 at two journal points, of which the end positioned farthest from the horizontal bed 3 carries a keyed worm wheel 10 accommodated internally of a support housing 11; to advantage, the housing will be of substantially arched embodiment (see figs 1 and 2) to the end of supporting the first shaft 8 with maximum rigidity.

12 denotes a second transmission shaft accommodated partly by the support housing 11 (figs 2 and 3), which incorporates a worm profile in mesh with the worm wheel 10 of the first transmission shaft 8; in the example of figs 2 and 3, the worm shaft 12 is disposed vertically with one end (the topmost end) projecting from the support housing 11 and carrying two coaxial keyed pulleys 13a and 13b.

14a and 14b denote two belt loops passed around the respective pulleys 13a and 13b, of which the first also passes around an expanding pulley 20 keyed to the driving means 7 behind the back rail 4 and the second around the corresponding pulley of a further second shaft constituting part of the transmission means 6 for a successive feeding wheel; in this way, drive is relayed to all the wheels 5 constituting the feeding station 1 (as discernible from fig 1).

The feeding wheel 5 is keyed to and rotatable about the axis of a third shaft 15, carried by the yoke 9 in a position parallel to the first shaft 8 (see fig 2), which is coupled to and driven from the first shaft 8 by way of an idle gear 16 supported rotatably by the yoke 9 in a substantially central position, between the two shafts 8 and 15; meshing contact occurs by way of gears 8a and 15a keyed to the respective shafts in alignment with the idle gear 16. With this arrangement, the first and third shafts 8 and 15 are caused to rotate in the same direction, and the resulting mechanical linkage is capable of eliminating unwanted rotational forces transmitted through the assembly 6.

As shown in fig 4, the device further comprises means denoted 17 in their entirety, by which to select a degree of rocking movement allowed to the yoke 9 about the axis of the first shaft 8 (see arrow F) during passage of the work 2 beneath the feed wheel 5. More exactly, such means 17 comprise a bifurcated pin projecting toward the back rail 4 and associated with the part of the yoke 9 occupied by the first shaft 8, which serves to establish the lower limit of the arc of rotation allowed to the yoke 9, and a second pin 21, located alongside the bifurcated pin 17 and nearer to the outermost end of the first shaft 8, extending likewise toward the rail 4, which is set at angle and height different to those of the bifurcated pin 17 (in relation to the horizontal bed 3), and positioned to enter into contact with the bottom face of the back rail 4, thereby establishing the upper limit of the arc of rotation allowed to the yoke 9.

18 denotes means fixed to the support housing 11, by which to adjust the travel limit of the yoke 9; in the example of fig 4, such means 18 appear as a fixed horizontal screw 22 of which the projecting thread end is freely accommodated by the bifurcated pin 17. The screw 22 carries a threaded collar 23 that permits of selecting an exact setting for the lower limit of the rotation allowed to the yoke 9. In practice therefore, the bifurcated pin 17 serves to determine a maximum descent angle of the yoke 9 in relation to the horizontal bed 3, by striking against the stop collar 23, while the second pin 21 establishes a maximum ascent angle by striking against the rail 4.

Still in fig 4 of the drawings, 19 denotes a small, vertically disposed hydraulic cylinder rigidly associated with the support housing 11, of which the reciprocating end impinges on the part of the yoke 9 occupied by the third shaft 15 (a trunnion type connection might also be used if appropriate). The cylinder 19 is adjustable, and serves to keep the wheel 5 steadily in contact with the work 2 during its passage, avoiding any possible slippage (due, for example, to irreg-

ularities in the surface of the workpiece).

As discernible from the foregoing description, the operation of a device according to the invention will occur substantially in this manner: power is supplied to the driving means 7 (depicted in fig 1 as a motor mounted to the back rail 4, and keyed to its spindle, the expanding pulley 20 which permits of varying the input speed), whereupon rotation is transmitted by the belt 14a to the pulley 13a of the first worm shaft 12 (or indeed to any one of the linked worm shafts), and relayed by way of the individual linked pulleys 13a and belt loops 14b to all remaining worm shafts 12; drive is transmitted by each worm shaft 12 to the corresponding worm wheel 10 and the keyed first shaft 8, thence by way of the idle gear 16 to the third shaft 15. The feed wheel 5 is thus set in rotation, and, engaging each workpiece 2 fed forward by the wheels of preceding stations, adapts to the thickness of the wood by virtue of the angle of the yoke 9 while remaining firmly in contact with the work 2 as the result of pressure applied through the yoke by the hydraulic cylinder 19.

Sliding movement of the work 2 along the horizontal bed 3 can be optimized further by elongating the worm shaft 12 down beyond the support housing 11 and below the horizontal bed 3 to permit of meshing with a second worm wheel 10'. Thus, it becomes possible to provide a structure below the bed 3 similar to that above (as illustrated schematically by the phantom lines of fig 4), comprising yoke 9', transmission shafts 8' and 15', housing 11' and feed wheel 5', all driven synchronously by the one shaft 12. Naturally enough, the bottom yoke 9' will be subject to respective travel limiting means 17' and 21' allowing the wheel 5' a degree of rocking movement such as will ensure continuous contact with the work 2 above. Sandwiched thus between two wheels 5 and 5' in this manner, the work 2 can be effectively pinch driven along the bed 3, ensuring a steady and accurate rate of feed that can also be governed to suit subsequent machining operations. It will be observed from the foregoing description that a device structured according to the invention affords advantages of economy, together with higher performance; the adoption of a belt drive signifies the elimination of chains, and of costly and bulky gear trains, whilst the inclusion of an idle member has the effect of absorbing any sudden acceleration attributable to the operating characteristic of the high ratio worm gear pair.

In an alternative embodiment of the device shown in figs 5 and 6, the second transmission shaft or worm shaft, denoted 112, is horizontally disposed above the first shaft 8, parallel with the bed 3 and in mesh with a worm wheel 110 occupying the vertical plane directly beneath. In this instance, the worm wheel 110 is keyed coaxially to an intermediate gear 31 of smaller diameter located between and in mesh with a pair of gears denoted 110a, each keyed in turn to a relative first shaft 8; to advantage, the entire train comprising worm shaft 112, worm wheel 110, intermediate gear 31 and driven gears 110a will be accommodated internally of a removable support housing 111 carrying two first shafts 8 and two feed wheels 5.

The worm shaft 112 is fitted at its opposite ends with respective flexible couplings 32a and 32b emerging from the housing 111, which permit of connecting the shaft permanently in rotation both to the power shaft 33 of driving means 7 (e.g. a geared motor not illustrated in the drawings), and to the worm shafts 112 of successive and preceding housings 111.

The alternative embodiment thus described affords distinct mechanical advantages, in that with two ratios established by the first reduction stage (worm gear pair) and the second (intermediate gear and driven gears), one obtains high torque at the feeding wheels deriving from a nonetheless relatively limited torque value at the worm gear pair, this by reason of the high input speed. Advantage is gained also from the constructional standpoint in that each housing 111, easily replaceable if need be, carries two drive shafts with two corresponding feeding wheels as a modular assembly.

Claims

1. A power transmission device for feeding wheels as used in automatic machinery, in particular a woodworking machine of the through feed moulder type comprising at least one feeding station (1) by which work (2) is propelled along a horizontal bed (3), flanked by a back rail (4) extending parallel to the bed and supporting a plurality of feeding wheels (5) revolving about axes disposed transversely to the bed, each of said feeding wheels (5) being connected, by way of transmission means (6) associated within the back rail, to driving means (7) positioned to the rear of the back rail, each of such transmission means (6) comprising:
   - a support housing (11, 111) accomodating a first shaft (8), disposed parallel to the axis of the feeding wheel (5) and rotatably supporting a yoke (9), the end of the first shaft located farthest from the horizontal bed (3) and directed toward the back rail (4) being associated with a worm wheel (10);
   - a second transmission shaft (12, 112) affording at one end a worm profile in mesh with the worm wheel (10, 110), accomodated within the support housing (11, 111) and mechanically coupled at the other end, to the driving means (7) in such a way as to transmit rotation from the driving means (7) to the first shaft (8) at a high speed reduc-

tion ratio;
- a third shaft (15), keyed to the feeding wheel (5), disposed parallel to the first shaft (8) and supported by the yoke (9); characterized in that it comprises:
- an idle gear (16), supported in a central position by the yoke (9), located between and in mesh with gears (8a, 15a) keyed respectively to the first and third shafts (8, 15) in such a way as to permit of transmitting rotation from the first shaft (8) to the third shaft (15) by way of a train capable of cancelling out angularly generated vector forces acting on the two shafts.

2. A device as in claim 1, characterized in that the second shaft or worm shaft (12), in mesh with the worm wheel (10), is disposed vertically and orthogonal to the first shaft (8) with the topmost end extending upward to support at least one coaxially keyed pulley (13a) about which to loop belt means (14a) connected with the driving means (7), in such a way as to permit of transmitting rotation from the driving means to the first shaft (8) at a high ratio of speed reduction, and a second coaxial keyed pulley (13b) about which to loop further belt means (14b) connecting with the worm shaft (12) of a successive or preceding feeding wheel (5).

3. A device as in claim 1, characterized in that the yoke (9) is able to oscillate about the axis of the first shaft (8) in relation to the horizontal bed (3) within a given arc of rotation restricted by controlling means comprising a bifurcated pin (17), associated externally with the part of the yoke occupied by the first shaft (8) and projecting toward the back rail (4) in such a manner as to interact with adjustable travel limiting means (18) associated with the support housing (11), positioned in alignment with the bifurcated pin (17) for establishing the lower limit of the arc of rotation allowed to the yoke (9).

4. A device as in claim 1, characterized in that it comprises a vertically disposed hydraulic cylinder (19) mounted to the back rail (4) and impinging on the end of the yoke (9) farthest from the first shaft (8), of which the purpose is to maintain the feeding wheel (5) in uninterrupted contact with the work (2).

5. A device as in claim 2, comprising a lower first shaft (8'), a lower third shaft (15') and a lower yoke (9'), defining a lower transmission means identical to the transmission means (6) located above the horizontal bed (3), characterized in that the second shaft or worm shaft (12) extends externally of and beyond the support housing (11) and below the horizontal bed (3) in such a way as to mesh with a lower worm wheel (10') constituting a part of said lower transmission means.

6. A device as in claim 3, characterized in that said controlling means further comprise a second pin (21) associated with the yoke, positioned alongside the bifurcated pin (17) and extending toward the back rail (4), which is of length such as to establish the upper limit of the arc of rotation allowed to the yoke by locating against the bottom face of the back rail (4).

Patentansprüche

1. Getriebevorrichtung für Vorschubrollen, geeignet für automatisch arbeitende Maschinen, insbeondere für Holzkehlmaschinen, enthaltend wenigstens eine Vorschubstation (1), durch welche das Werkstück (2) entlang eines horizontalen Bettes (3) vorgeschoben wird, flankiert von einem Querbalken (4), der sich parallel zu dem Bett erstreckt und eine Anzahl von Vorschubrollen (5) trägt, die sich um Achsen drehen, welche quer zu dem Bett angeordnet sind, wobei jede der genannten Vorschubrollen (5) durch Übertragungsmittel (6) des Querbalkens, die in dem Querbalken angeordnet sind, an Antriebsmittel (7) angeschlossen ist, die sich im rückwärtigen Teil des Querbalkens befinden, wobei jedes der Übertragungsmittel (6) wie folgt enthält:
- ein Trägergehäuse (11, 111), das eine erste Welle (8) aufnimmt, angeordnet parallel zu der Achse der Vorschubrolle (5) und drehbar ein Joch (9) tragend, wobei das Ende der ersten Welle, das sich am weitesten von dem horizontalen Bett (3) entfernt befindet und dem Querbalken (4) zugewandt ist, mit einem Schneckenrad (10) verbunden ist;
- eine zweite Übertragungswelle (12, 112), die an einem Ende ein Schneckenprofil aufweist, das in das Schneckenrad (10, 110) greift, angeordnet in dem Trägergehäuse (11, 111) und mit dem anderen Ende mechanisch an die Antriebsmittel (7) angeschlossen, und zwar auf solche Weise, dass die Umdrehung von den Antriebsmitteln (7) auf die erste Welle (8) mit einem hohen Geschwindigkeits-Reduzierverhältnis übertragen wird;
- eine dritte Welle (15), aufgekeilt auf die Vorschubrolle (5), angeordnet parallel zu der ersten Welle (8) und getragen durch das Joch (9);
dadurch gekennzeichnet, dass sie wie

folgt enthält:

- ein in einer mittleren Position von dem Joch (9) getragenes Leerrad (16), das zwischen den Zahnrädern (8a, 15a), die jeweils auf die erste und die dritte Welle (8, 15) aufgekeilt sind, angeordnet ist und sich mit diesen im Eingriff befindet, und zwar auf solche Weise, dass die Übertragung der Umdrehung von der ersten Welle (8) auf die dritte Welle (15) über eine kinematische Kette erlaubt wird, welche in der Lage ist, die winkelmässig erzeugten Vektorkräfte zu annullieren, die auf die beiden Wellen wirken.

2. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet,** dass die zweite Welle oder Schneckenwelle (12), im Eingriff mit dem Schneckenrad (10), vertikal und rechtwinklig zu der ersten Welle (8) angeordnet ist, sich mit dem oberen Ende nach oben hin erstreckend, um wenigstens eine koaxial aufgekeilte Riemenscheibe (13a) zu tragen, um welche Riemenmittel (14a) laufen, die mit den Antriebsmitteln (7) verbunden sind, und zwar auf solche Weise, dass die Übertragung der Umdrehung von den Antriebsmitteln auf die erste Welle (8) mit einem hohen Geschwindigkeits-Reduzierverhältnis möglich ist, sowie eine zweite koaxial aufgekeilte Riemenscheibe (13b), um welche weitere Riemenmittel (14b) laufen, die mit der Schneckenwelle (12) einer anschliessenden oder vorhergehenden Vorschubrolle (5) verbunden sind.

3. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet,** dass das Joch (9) in der Lage ist, im Verhältnis zu dem horizontalen Bett (3) um die Achse der ersten Welle (8) zu schwingen, und zwar innerhalb eines bestimmten Umdrehungsbogens, der durch Steuermittel begrenzt wird, welche einen Gabelzapfen (17) enthalten, der aussen dem Teil des Joches zugeordnet ist, der durch die erste Welle (8) belegt wird und sich zu dem Querbalken (4) hin auf solche Weise erstreckt, dass er mit einstellbaren Hubbegrenzern (18) zusammenwirkt, die dem Trägergehäuse (11) zugeordnet und ausgerichtet zu dem Gabelzapfen (17) angeordnet sind, um die untere Grenze des erlaubten Umdrehungsbogens für das Joch (9) festzulegen.

4. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet,** dass sie einen vertikal angeordneten Hydraulikzylinder (19) enthält, der auf dem Querbalken (4) montiert ist und auf das Ende des Joches (9) wirkt, das am weitesten von der ersten Welle (8) entfernt ist, und dessen Zweck es ist, die Vorschubrolle (5) in ununterbrochenem Kontakt mit dem Werkstück (2) zu halten.

5. Vorrichtung nach Patentanspruch 2, enthaltend eine untere erste Welle (8'), eine untere dritte Welle (15') und ein unteres Joch (9'), welche untere Übertragungsmittel gleich den Übertragungsmitteln (6) beschreiben, die oberhalb des horizontalen Bettes (3) angeordnet sind, **dadurch gekennzeichnet,** dass die zweite Welle oder Schneckenwelle (12) sich ausserhalb auf und über das Trägergehäuse (11) erstreckt und unter dem horizontalen Bett (3), und zwar auf solche Weise, dass sie in das untere Schneckenrad (10') greift, welches einen Teil der genannten unteren Übertragungsmittel bildet.

6. Vorrichtung nach Patentanspruch 3, **dadurch gekennzeichnet,** dass die genannten Steuermittel weiter einen zweiten Zapfen (21) enthalten, der dem Joch zugeordnet und längs des Gabelzapfens (17) positioniert ist und sich zu dem Querbalken (4) hin erstreckt, und der von einer solchen Länge ist, dass die obere Grenze des erlaubten Umdrehungsbogens des Joches festgelegt wird, wenn er an der unteren Fläche des Querbalkens (4) anschlägt.

Revendications

1. Dispositif de transmission de puissance pour des rouleaux d'avancement utilisés dans des machines automatiques, de préférence machines à moulurer le bois comprenant au moins un poste de transport (1) où les pièces sont faites avancer le long d'un banc horizontal (3), ledit poste étant pourvu d'une traverse (4) s'étendant parallèlement au banc et supportant une pluralité de roues (5) d'entraînement tournant autour d'axes disposés transversalement au banc, chacune desdites roues d'entraînement (5) étant reliée, par des moyens de transmission (6) associés dans ladite traverse, à des moyens de commande (7) positionnés à la partie arrière de la traverse, chacun desdits moyens de transmission (6) comprenant:
   - une boîte de support (11, 111) logeant un premier arbre (8) disposé parallèle à l'axe de la roue d'entraînement (5) et supportant à rotation un joug (9), l'extrémité du premier arbre située le plus loin du banc horizontal (3) et orientée vers ladite traverse (4) étant associée à une roue à vis sans fin (10);
   - un second arbre de transmission (12, 112) présentant à l'une de ses extrémités un profil à vis sans fin engrenant dans la roue à vis sans fin (10, 110), cet arbre étant logé dans la boîte de support (11, 111) et à son autre extrémité étant couplé mécaniquement aux

moyens de commande (7) , de manière à transmettre la rotation des moyens de commande (7) au premier arbre (8), à un rapport de réduction élevé:

- un troisième arbre (15) emboîté sur la roue d'entraînement (5), disposé parallèle au premier arbre (8) et support par le joug (9); caractérisé en ce qu'il comporte:
- un engrenage intermédiaire (16) support à une position centrale par le joug (9), situé entre des engrenages (8a, 15a) avec lesquels il est en engrènement, ces derniers engranages étant respectivement emboîtés sur les premier et troisième arbres (8, 15) de manière à permettre la transmission de la rotation du premier arbre (8) au troisième arbre (15) par un mécanisme cinématique capable d'annuler les forces vectorielles engendrées en angle lesquelles agissent sur lesdits premier et troisième arbres.

2. Dispositif selon la revendication 1, caractérisé en ce que le deuxième arbre ou arbre à vis sans fin (12) engrenant avec la roue à vis sans fin (10) disposé verticalement et perpendiculaire au premier arbre (8) avec son extrémité supérieure s'étendant vers le haut de manière à supporter au moins une poulie (13a) emboîtée coaxialement, autour de laquelle sont enroulés des moyens à courroie (14a) reliés aux moyens de commande (7), de telle sorte qu'ils permettent la transmission de la rotation des moyens de commande au premier arbre (8) à un rapport de réduction élevé, et une deuxième poulie (13b) emboîtée coaxiale avec la première et autour de laquelle sont enroulés d 'autres moyens à courroie (14b) qui sont reliés à l'arbre à vis sans fin (12) d'une roue d'entraînement (5) suivante ou précédente.

3. Dispositif selon la revendication 1, caractérisé en ce que le joug (9) est susceptible d'oscillation autour de l'axe du premier arbre (8) par rapport au banc horizontal (3) dans un arc de rotation donné limité par des moyens de contrôle comprenant un pivot bifurqué (17), associé à l'extérieur à la partie du joug occupée par le premier arbre (8) et faisant saillie vers la traverse (4) de manière à interagir avec des moyens (18) de limitation de course réglables, associés à la boîte de support (11), disposés en alignement avec le pivot bifurqué (17) en vue d'établir la position inférieure de l'arc de rotation dudit joug (9).

4. Dispositif selon la revendication 1, caractérisé en ce qu'il comporte un cylindre hydraulique disposé verticalement (19) et support par ladite traverse (4) lequel agit sur l'extrémité du joug (9) la plus éloignée du premier arbre (8), dans le but de maintenir la roue d'entraînement (5) constamment en contact avec ladite pièce (2).

5. Dispositif selon la revendication 2, comprenant un premier arbre inférieur (8'), un troisième arbre inférieur (15') et un joug inférieur (9') définissant des moyens de transmission inférieurs égaux aux moyens de transmission (6) disposés au-dessus du banc horizontal (3), caractérisé en ce que le deuxième arbre ou arbre à vis sans fin (12) s'étend à l 'extérieur et au-delà de la boîte de support (11) et au-dessous du banc horizontal (3) de manière à engrener avec une roue à vis sans fin inférieure (10') faisant partie desdits moyens de transmission inférieurs.

6. Dispositif selon la revendication 3, caractérisé en ce que lesdits moyens de contrôle comportent en outre un deuxième pivot (21) associé au joug, positionné le long du pivot bifurqué (17) et s'étendant vers la traverse (4), dont la longueur permet d'établir la limite supérieure de l'arc de rotation du joug, par son postionnement contre la face inférieure de la traverse (4).

FIG 1

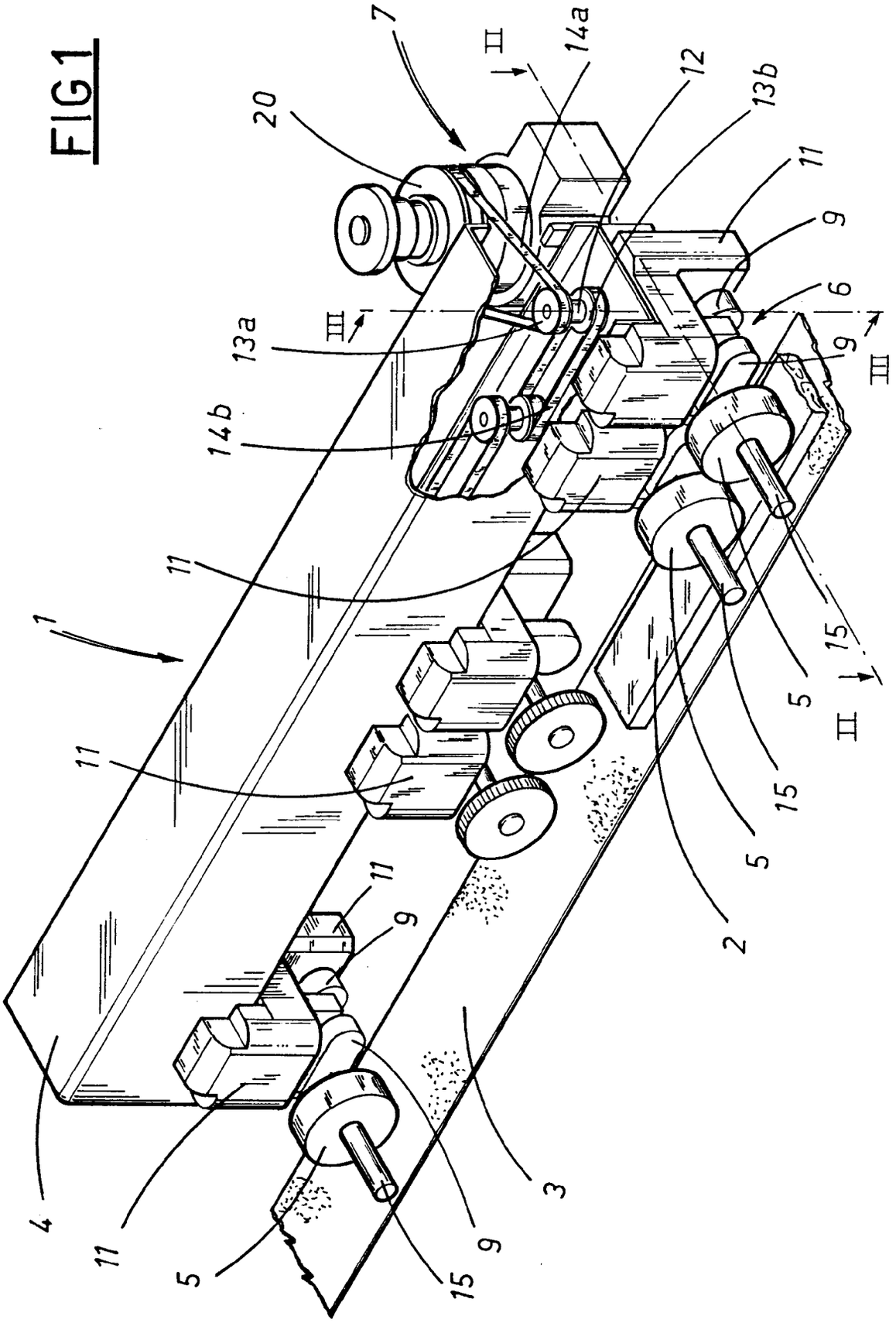
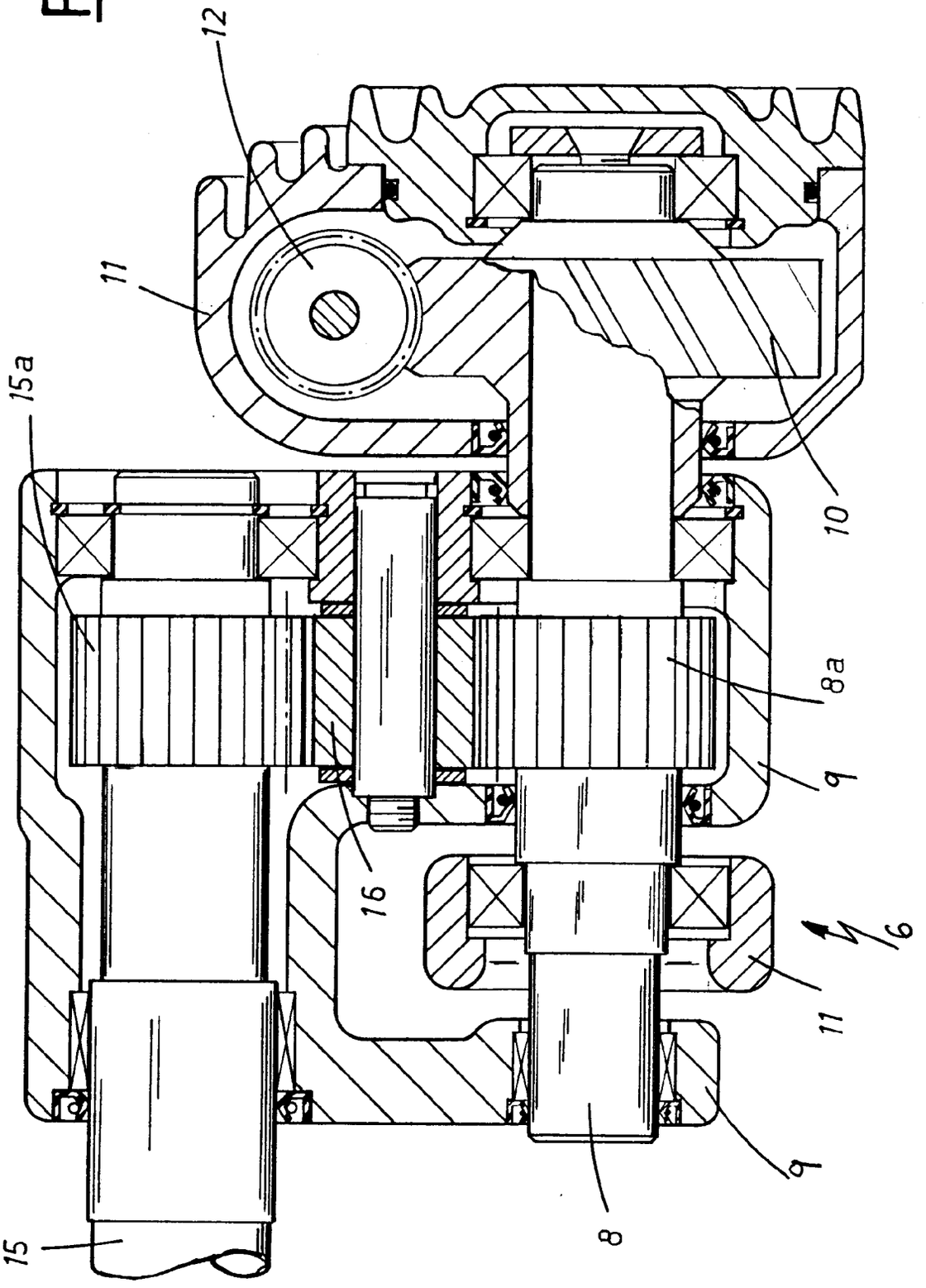

7
II
14a
12
13b
20
11
9
6
III
13a
III
9
14b
11
1
15
II
5
11
15
5
2
11
9
4
3
11
9
5
15

FIG2



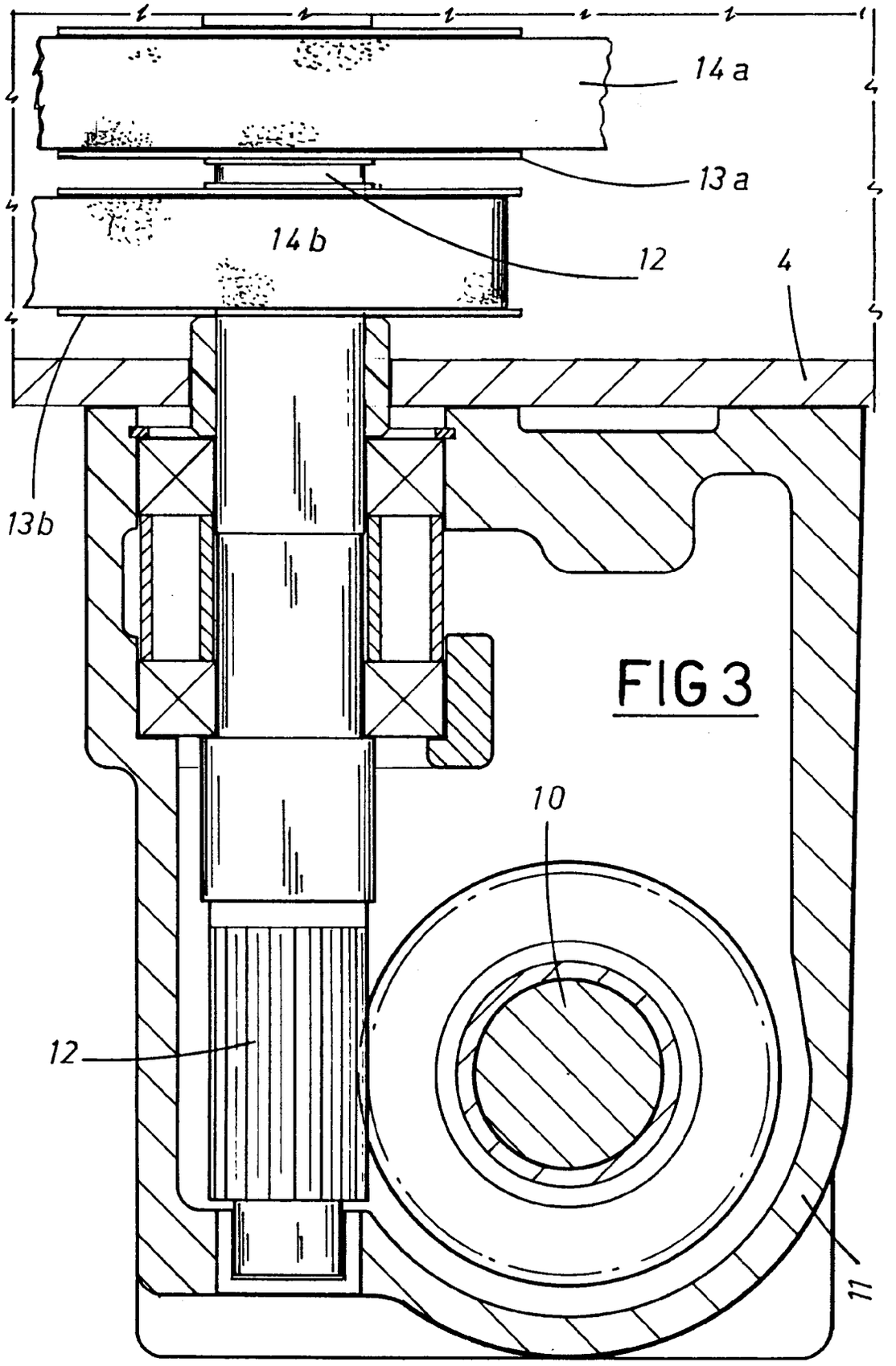
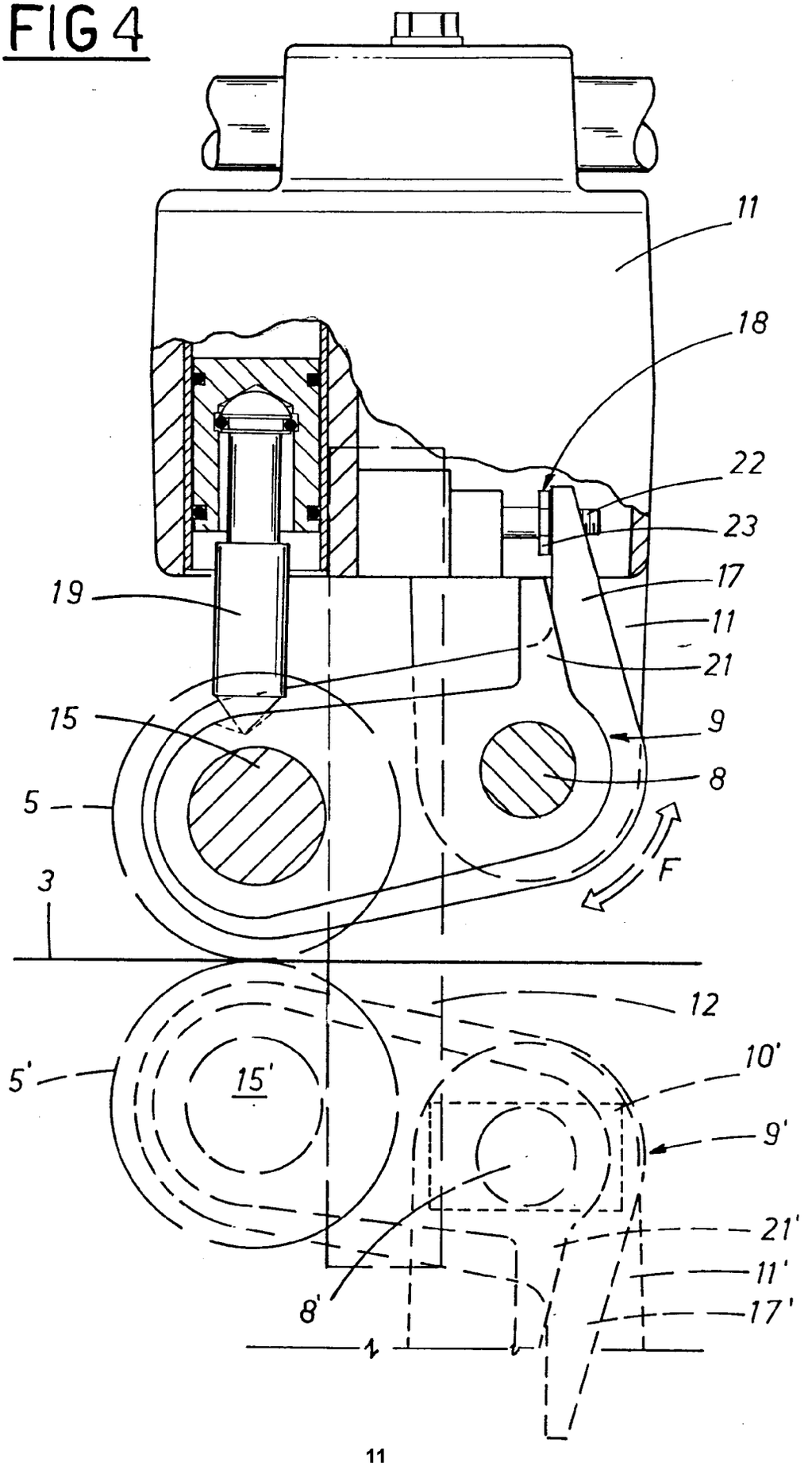


FIG 3

FIG 4



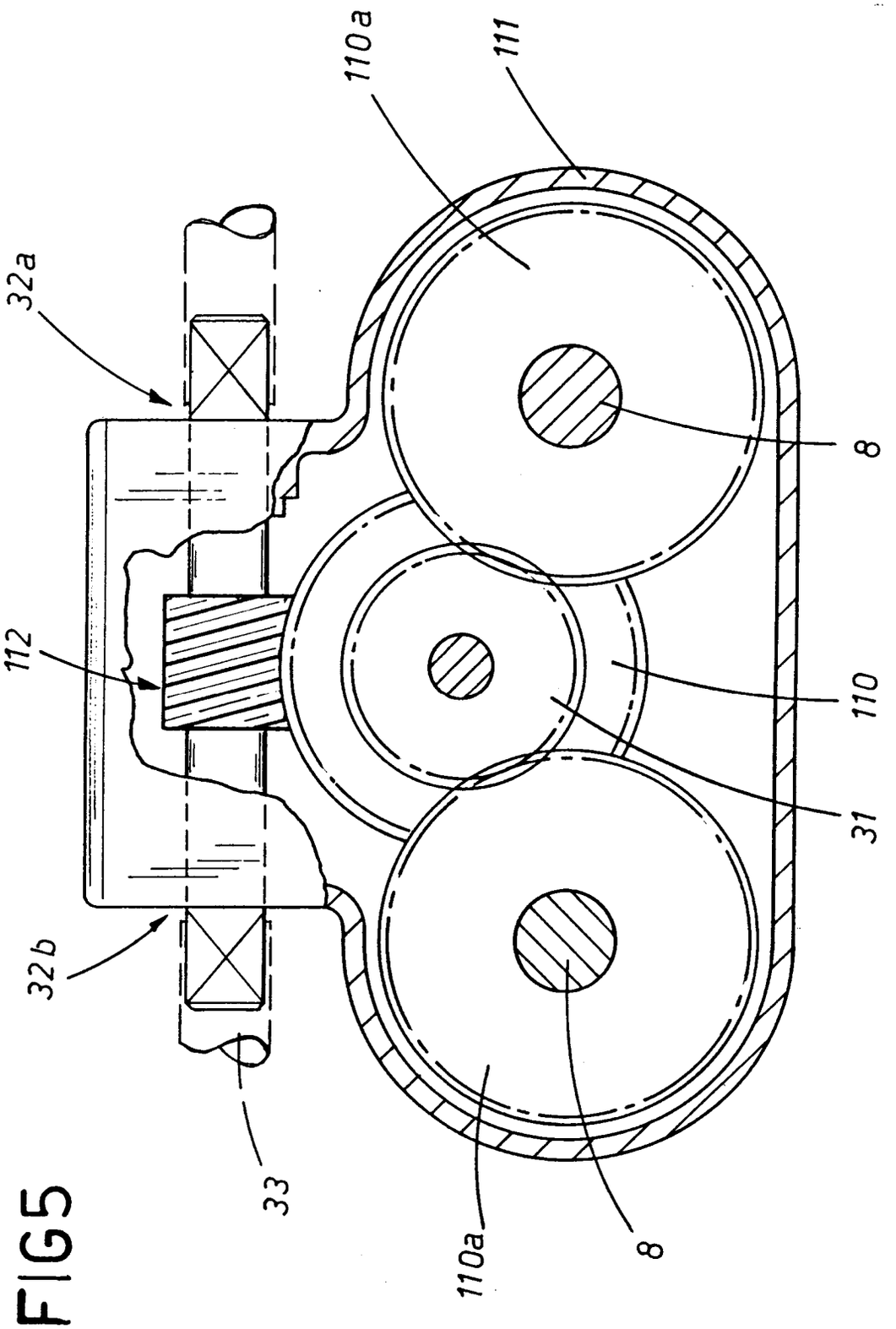


FIG5

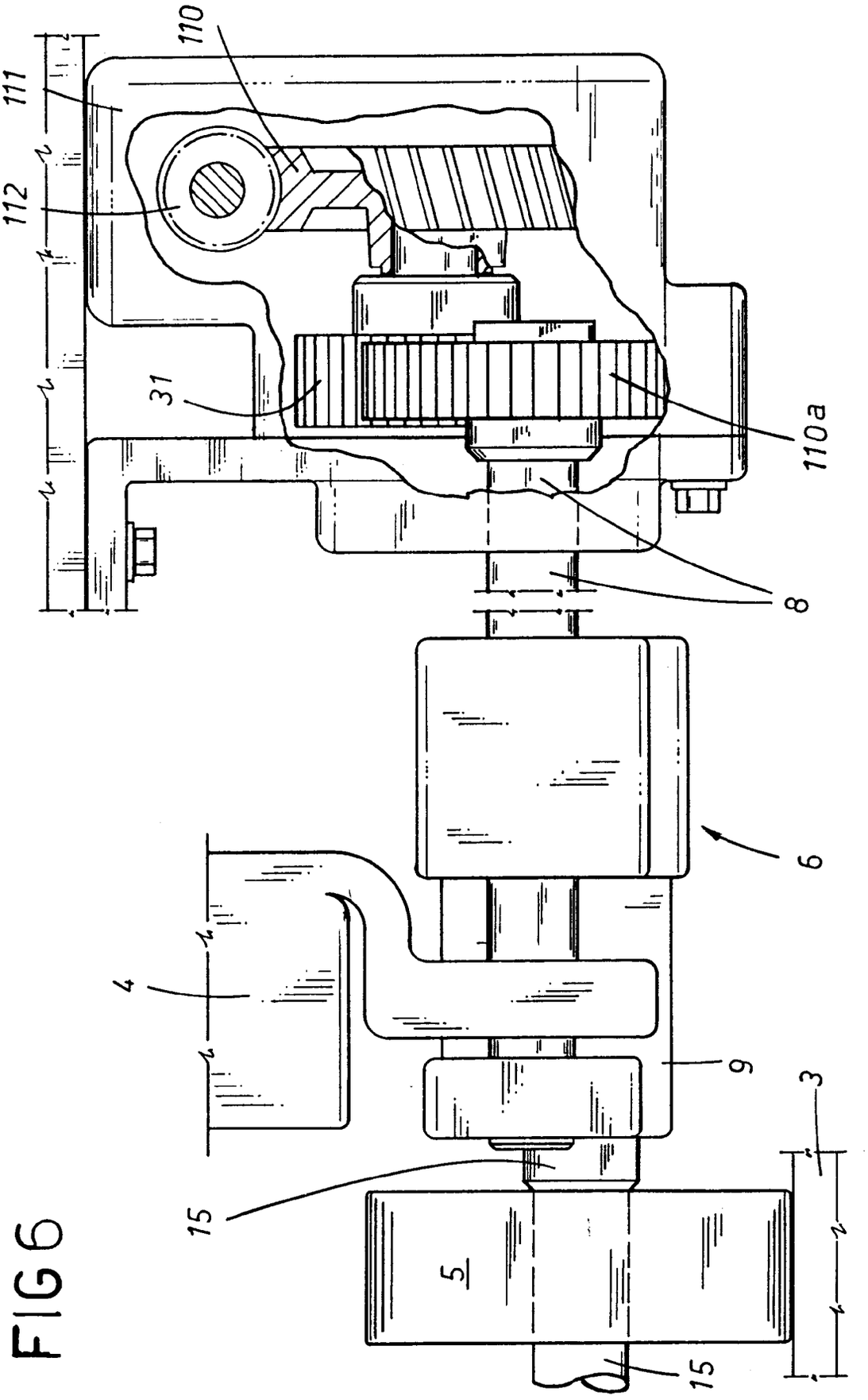


FIG 6