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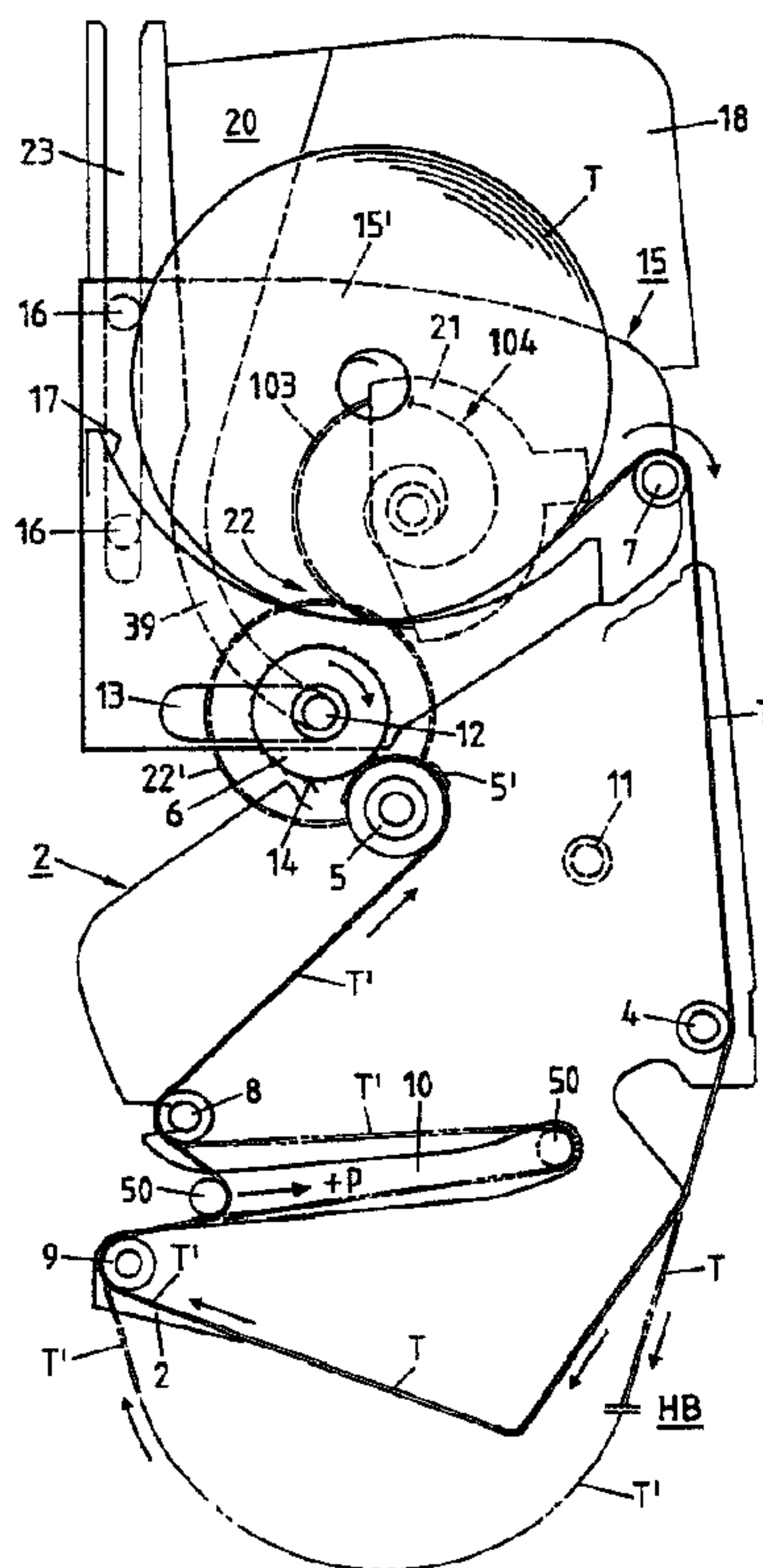
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(54) Title: TOWEL DISPENSER



(57) Abrégé/Abstract:

A hand towel dispenser is provided with a pivoting module (2), in which a winding roller (5) driven by a friction drive (6) is mounted in such a way that it is easily suspendible. An additional loop is formed in front of the winding roller (5) in the dispenser, this additional loop being tightened in direction +p by a compensator roller (50). When the clean towel (T) is extracted, a part of the used towel (T') serves to form the rear part of a towel loop (T, T') that is used in the front part (HB). The used towel (T') is easy to change and the dispenser easy to reload with clean towel (T') using the pivoting module (2), which is rotated. This process is carried out by opening and closing the top of the dispenser. A path and time-dependent control unit for discharging the hand towel is integrated into the dispenser.

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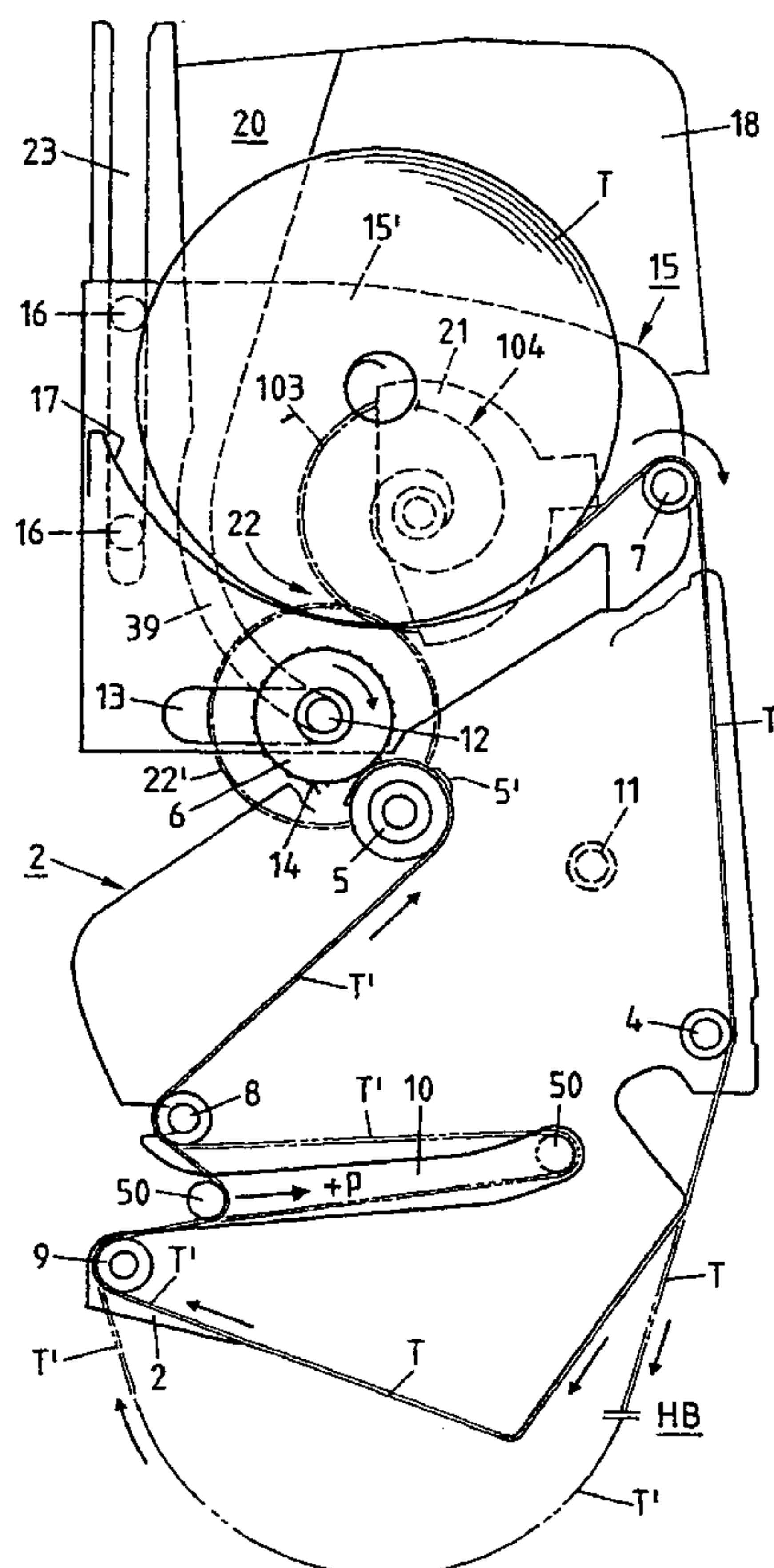
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(54) Title: **TOWEL DISPENSER**(54) Bezeichnung: **HANDTUCHSPENDER**

(57) **Abstract:** A hand towel dispenser is provided with a pivoting module (2), in which a winding roller (5) driven by a friction drive (6) is mounted in such a way that it is easily suspendible. An additional loop is formed in front of the winding roller (5) in the dispenser, this additional loop being tightened in direction +p by a compensator roller (50). When the clean towel (T) is extracted, a part of the used towel (T') serves to form the rear part of a towel loop (T, T') that is used in the front part (HB). The used towel (T') is easy to change and the dispenser easy to reload with clean towel (T') using the pivoting module (2), which is rotated. This process is carried out by opening and closing the top of the dispenser. A path and time-dependent control unit for discharging the hand towel is integrated into the dispenser.

(57) **Zusammenfassung:** Ein Handtuchspender ist mit einem Schwenkmodul (2) versehen, in das eine über einen Friktionsantrieb (6) getriebene Lickelwalze (5) leicht einhängbar gelagert ist. Vor der nickelwalze (5) wird im Spender eine zusätzliche Schlaufe gebildet, welche durch eine Pendelwalze (50) in Richtung +p gestrafft ist und beim Nachziehen von sauberem Handtuch (T) ein Teil benutztes Handtuch (T') zur Bildung des hinteren Teils einer im vorderen Teil (HB) verwendeten Tuschlaufe T;T') dient. Das Wechseln von benutztem Tuch (T') und Beladen mit sauberem Tuch (T') erfolgt über die Drehung des Schwenkmoduls (2), ist in einfachster Weise handhabbar und wird durch Öffnen bzw. Schliessen der Haube des Spenders vollzogen. Eine weg- und zeitabhängige Steuerung der Handtuchausgabe ist im Spender integriert.

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Zur Erklärung der Zweibuchstaben-Codes, und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

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Towel dispenser

The present invention relates to a towel dispenser.

Known hand towel dispensers (*inter alia* EP-A1-0 283 554) require the towel to be threaded in and additionally wound around a roller when being put into service. To prevent the end of a roll of hand towel from being usable several times, it is drawn in as soon as it would hang freely, that is to say, as soon as it has been unrolled from the clean hand towel roll. The force required to draw it in is stored in a spring motor; for that purpose, however, the energy for drawing in the relevant portion of soiled towel must first be accumulated and made available. Each time the roll of hand towel is changed, therefore, the delivery roller has towel wound around it manually in the correct towel direction, which alone gives rise to frequent problems. Once wrapping has been completed, for initial charging of the spring store a certain length of towel must consequently be drawn off unused so that the first portion used will be drawn in and no excessively long loop hanging out of the dispenser will be formed. In the event of malfunctions in the dispenser, the towel that has been drawn in cannot be removed; it must first be wound completely onto the soiled roll and is therefore lost.

Experience has shown that the conditions mentioned above for correct loading of a dispenser with towel are the cause of numerous malfunctions which are a consequence of poor understanding, ineptitude, misinterpretation and false alarms and which very often put a dispenser out of action merely for that reason. Since premature changing of the rolls results in the loss of the towel that has not yet been used and because of the inherent susceptibility of these dispensers to failure, it has been proposed that two hand towel units, in practice, however, two complete hand towel dispensers, be installed side by side and mechanically coupled to each other in order to increase the operating readiness of the system as a whole.

An at least partially automated threading-in of the hand towel is also known (WO-A1-96/32874). It has been found, however, that a dispenser of that kind either needs auxiliary

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energy and/or requires special measures at the end of the hand towel which have a detrimental effect in the laundering process.

It has furthermore been found to be disadvantageous that, in the case of the dispenser according to EP-A1-0 283 554, by pulling hard on the rear portion of the loop the roll of soiled towel can be unrolled, since the slip clutch required for returning used fabric - in order to form a temporary loop sufficient for drying purposes - cannot put up an adequately high resistance.

A hand towel dispenser is disclosed in US-A-5 244 263; that dispenser, however, preferably being driven by an electric motor. In order to utilise the space available in the appliance, the clean hand towel is accommodated in a flexible bag; beneath the latter, the used hand towel is rolled up in a module that can be pivoted outward for removal, the lower, soiled hand towel occupying the upper space with increasing use. The towel is dispensed in a large loop beneath the appliance.

Disadvantages in the case of that dispenser are the necessary threading-in of the web of hand towel between two rollers, the subsequently required manual winding of the beginning of the hand towel around the roller that winds up the soiled towel, and a perceptible imprecise guidance of the towel on that roller. The way in which the towel is dispensed requires a large loop or else there is a risk that a towel portion that has already been soiled will be re-used.

It is therefore the object of the invention to provide a compact hand towel dispenser that does not have the disadvantages mentioned above. In particular, with a minimum of necessary instruction to maintenance personnel, it is to afford the user a very high degree of operating reliability and hygiene. The dispenser is to make the roll of hand towel at its disposal available in optimum portions and prevent both intentional and unintentional multiple use of the hand towel. In particular, its roll of hand towel must be easily replaceable, that is to say, it must be easy to load the dispenser. In the event of any premature towel change, no rewinding of the towel is to be required.

The dispenser must furthermore be suitable for manufacture on a large scale and be economic in those terms; for reasons of space and cost, appliances arranged one beside another are undesirable.

The band material used as the hand towel should not as a rule require any measures or alterations to that in existing dispensers installed and used in numerous locations, since the existing infrastructure, such as washing machines, mangles and drying machines, as well as the existing logistics will continue to be used. The dispenser that is to be provided should not, however, be restricted to the use of textile band material; it is to be capable of adaptation to any environmentally friendly, durable material.

The invention therefore provides a hand towel dispenser for planar band material (T, T'), having a transport mechanism for simplified threading-in and for forming a loop of clean band material suitable for hand drying, wherein the transport mechanism has a pivoting module (2) which is rotatable outwards about a stationary shaft (11) and is supported in side panels (18, 19), and that transport mechanism is initiated by closing the dispenser with a housing cover (25) and rolls up the band material (T, T') in portions from a supply of clean material (T), by way of a dispensed loop, onto a replaceable roller (5) carrying used band material (T'), characterised in that the pivoting module (2) viewed in the operating state has, in its upper region, in two mutually opposing lateral flanges, bearing points (38) for the insertion of a removable winding roller (5), in which the winding roller (5) remains unchanged in position during operation, and a vertically displaceable body (15) guided in vertical slot guides (23) is arranged as the fabric receptacle for clean two (T) above the pivoting module (2), which body (15) carries on its underside a friction roller (6) which is connected to a spring motor gear mechanism (104, 22) and which charges the winding roller (5) with used towel (T') and drives it, and, for guiding the shaft of the friction roller (6), there is formed in both side panels (18, 19) a guide groove (20, 39) which has, from top to bottom, first a vertical portion (20) and then a circular arcuate portion (39), and mutually opposing horizontal guide grooves (13) being provided in the two lateral flanges (15') of the body (15) of the fabric receptacle so that, by the simultaneous action of both guide grooves (20, 39; 13), the shaft of the friction roller

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(6) and the gear mechanism (22) are positively guided both concentrically with a central wheel (103) of the gear mechanism of the spring motor (104) and in the upward direction, and there is provided in the lateral flanges of the pivoting module (2) a recess (10) in which a displaceable oscillating roller (50) can engage which forms an additional, variable loop of band material between the winding roller (5) and a guide (8, 9, 4) of the band material (T, T'), the loop serving as a reservoir for forming a temporarily returning band portion.

The additional loop is provided as a supplement to the loop issuing from the dispenser and intended for hand drying, downstream of the issuing loop in the winding direction and inside the dispenser. With each portion of hand towel dispensed, the hand towel already used which is present in the additional loop can therefore be utilised in a hygienically unobjectionable manner to form the loop intended for hand drying, without the winding roller laden with used, crumpled and damp hand towel being rotated first backward and then in the winding direction again. This results in a saving on hand towel consumption of almost 50%, without having to run the risk of malfunctions during the winding process etc.. The user is offered convenient and ergonomically advantageous access to the towel.

The specific term "recess" used herein is to be understood in the widest sense of "space" for guiding an additional loop; the formation of that loop can, however, also be accomplished by rotating the pivoting module. Owing to the given width of the towel and the confined spatial conditions, that loop will in each case be present in the pivoting module and upstream of its winding roller for used towel.

A hand towel dispenser according to the invention does not require any expenditure on training personnel; simple pictograms and/or directions on the dispenser are sufficient for perfect set-up and maintenance. No external energy is required, and the necessary forces for the control and operation are applied by the user without his being conscious of it. All of the operations proceed reproducibly and can be adapted and/or even set to local requirements by suitable measures.

Preferably, pulling taut the inner (additional) loop has the effect, in addition to the intended

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returning of the used towel to form the outer loop, of smoothing and partially drying the crumpled and damp towel portion.

Preferably, axially parallel guidance of the used towel ensures neat winding and thus prevents shifting with respect to the desired symmetrical path of the towel. - Advantageously, the guides required for this are fitted in the stationary side panels of the housing of the appliance.

Using cable pulls provided with springs, the oscillating roller can be controlled during its oscillating travel which begins with each delivery of towel, without the lateral space requirement in the dispenser being increased.

Preferably, a precise and slip-free guidance is achieved by means of the positive rolling action of the oscillating roller.

A preferred construction makes especially simple coupling of the movement of the oscillating roller possible in connection with the opening and closing of the cover of the dispenser.

Preferably, the clean towel is guided when the cover is closed and the delivery roller which extends into the towel path in the front lower portion of the cover. When the hand towel delivery is pulled, owing to that roller's large angle of contact and the rough surface which is adapted to the towel, it rotates simultaneously without slipping and transmits the movement of the towel to a control and drive device.

In a preferred form of construction there is allowed an especially simple and easily dismountable mounting of the pivoting module and its asymmetrical drive by way of the opening and closing movement of the cover.

The form and vertically adjustable mounting of the fabric receptacle preferably provides a particularly space-saving compact dispenser which performs the necessary movement sequences when the towel is changed, without parts of the appliance having to be moved manually. - Furthermore, the transmission of force by means of a friction roller resting on the

winding roller and arranged on the fabric receptacle makes use of the volume that becomes available as the clean towel unrolls for the roll of used towel which is simultaneously increasing in diameter.

The drive by way of the side panel preferably allows the necessary travel-dependent synchronism between the delivery roller and the winding roller to be controlled with time and monitored.

The configuration of the guide grooves preferably results in a compact construction and perfect transmission of force since the curved groove arranged concentrically with a central gearwheel ensures a constant engagement with the transmission and driving gearwheel of the winding roller.

Pins projecting on the fabric receptacle preferably are advantageous guides in one plane.

Preferably, the guidance of the fabric receptacle in a plane at right angles to the first plane is a further improvement.

Optimum parallel guidance of the fabric receptacle, and therewith of the friction drive, may be achieved by gearwheels connected to one another.

Preferably, there is disclosed a very effective possible method of raising the fabric receptacle, which is necessary in order to rotate the pivoting module forwards by about 180° and unload it or prepare it for re-use.

That position, pivoted out of the dispenser, also allows the pivoting module and optionally further parts of the hand towel dispenser to be cleaned and/or disinfected in a convenient manner.

Also disclosed is a preference to raise the fabric receptacle automatically upon opening.

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The lateral arrangement of the control and drive device provides a kinematically advantageous solution and results in a single functional unit that is easy to replace and that is advantageous in terms of production engineering.

The vertical position of the fabric receptacle is directly dependent upon the winding diameter of the roll of used towel - since the friction roller situated below the fabric receptacle rests on the roll - and therefore the preferred filling-state indicator is very simple and effective. In practice, before the supply of clean towel is used up, a vertical red line appears in an inspection window in the front side of the cover.

A preferred, illustrative embodiment of the invention is described with reference to drawings, in which:

Fig. 1 is a simplified view in perspective of a hand towel dispenser with its essential functional elements, without time-dependent control and without cover being shown;

Fig. 2 is a schematic diagram of the dispenser of Fig. 1, in plan view onto a narrow side, with a cover opened by 7°;

Fig. 3 shows the dispenser of Fig. 2 after the cover has been opened by 60°;

Fig. 4 shows the dispenser of Fig. 2 with the cover opened to its maximum extent and with a fabric receptacle held at the top;

Fig. 5 is a view analogous to Fig. 4, but with the pivoting module and the associated transmission elements being shown;

Fig. 6 is a simplified view of the functional elements in the positions shown in Fig. 4 and Fig. 5 during the loading operation;

Fig. 7 shows the dispenser according to Fig. 1 ready for operation after the loading operation, in plan view of a narrow side;

Fig. 8 shows the dispenser according to Fig. 7 after a prolonged period of operation;

Fig. 9 is a schematic diagram showing the mode of operation of the oscillating roller serving for economical dispensing of the hand towel;

Fig. 10 is a further view in perspective of the dispenser with essential slot guides and with the oscillating roller in its two end positions,

Fig. 11 is a view in perspective of the time- and travel-dependent control unit of the dispenser according to Figs. 1 to 10 with its gear mechanisms and switching members, and

Fig. 12 shows the passage of force between the gearwheels in Fig. 11, with the switching wheel disengaged.

A hand towel dispenser according to the invention is designated 1 in Fig. 1; the view in perspective shows it without cover (covering) and without a side panel on one face, during hand drying by a user B.

Two basic components, namely a pivoting module 2 with shell-shaped guiding and gripping cavities 3 and, situated compactly above the latter, a fabric receptacle 15 for a roll of clean towel T, are guided by side panels, only the right-hand side panel 18 being visible. The roll of towel rests in a freely movable manner on a shell-shaped trough 17 and does not have a winding spindle. Its band-shaped towel T is guided in the unrolling direction A over an upper deflecting roller 7 onto a lower deflecting roller 4, in the pivoting module 2, and forms a loop that is used at the point marked by parallel lines by the hands HB of the user B for drying in the usual manner. The towel T' that has been used in that way is guided in the direction W over further deflecting rollers 9 and 8 to a winding roller 5.

That winding roller 5 together with clamping spring 5' and bearing pin 5" serves to roll up the used towel T' in the winding direction W. It is described in all its details in Patent Application PCT/CH99/00197.

The bearing pins 5" are suspended in an insertion point 38, in the upper edge region of the pivoting module 2, where they wedge themselves in an end position in a rotatable manner. The winding roller 5 is driven by a friction roller 6 resting thereon and having a nubbed friction surface 14 which rests directly on the used towel T' and drives it in the direction W, with a time delay, after the hands have been dried. The friction roller 6 is movably guided by shaft pins 12 at its ends in a horizontal guide groove 13 in the lower portion of the fabric receptacle 15, and therefore can adapt to the increasing diameter of the rolled-up towel T'.

The fabric receptacle 15 is for its part movable in the lifting direction H, by means of guide pins 16 projecting outward from its lateral faces, in guide grooves 23 lying opposite each other on both sides, only the one guide groove 23 in the side panel 18 being visible. In addition, a depression 20 which widens towards the top can be seen in the side panel 18, which depression 20 serves to install the fabric receptacle 15 in the dispenser 1 with its projecting shaft pins 12 in a convenient manner.

The pivoting module 2 conceals a gear mechanism for a friction drive and therefore the gear mechanism is shown by broken lines. The gear mechanism 22 is driven by a central gearwheel 103 which projects out of a housing 21.

The pivoting module 2 is rotatable about its two likewise projecting shaft pins 11, that is to say, as described in detail below it can be pivoted outward about those shaft pins so that the roll of used towel T' can be taken out from the front, as viewed from the user B. - The winding roller 5, which remains with the dispenser 1, is withdrawn axially from the roll T' and a new, clean end of a towel T is drawn under the clamping spring 5', the winding roller 5 is re-positioned in the insertion point 38 and the module 2 is pivoted back into the position shown.

In order that the module 2 can be pivoted out, the fabric receptacle 15 has to be moved upward. That is done by means of a pivoting lever 47 which is connected to the cover of the dispenser, see Fig. 5.

In addition, a recess 10 for an oscillating roller is provided in Fig. 1, which oscillating roller has been omitted here for the sake of clarity and only the oscillation directions p thereof have been shown.

The oscillating roller is described in detail in the following Fig. 7 to Fig. 10, but its action can already be explained at this point.

When fresh towel T is pulled down by the hands HB, the oscillating roller, which is in its forward position, is pulled back in the direction -p, with the result that a piece or portion of used towel T' is also released. That piece corresponds to 50% of the overall length of the towel loop consisting of T + T'. As a result, the loop becomes larger for convenient drying of the hands, without an unnecessarily large amount of clean towel T being required.

In Fig. 2, the dispenser 1, mounted by its mounting face M on a vertical wall, is shown in a first arrestable tilting position with the cover 25 inclined at 7° to the vertical V. - That is the first position obtained at the dispenser 1 when the cover 25 is opened.

The cover 25 for its part has on each side a bearing pin 24 which is supported in the respective side panels 18 and 19 indicated. When the cover 25 is tilted as illustrated - after opening of a fastening, not shown - a slide cam 26 presses on a vertically arranged slide 27 provided with sliding faces 29. The slide 27 has guide strips 28 at its sides, which prevent it from tilting, so that the lifting movement H is transmitted *via* its lifting cam 31 to a projection 32 on the fabric receptacle 15 and lifts the latter also.

The slide 27 has on the side thereof facing the appliance a further ramp-shaped sliding face, which has not been shown for reasons of clarity and on which a driving pin 59 of a gripper-rocker 55, Fig. 9, rests so that the latter is moved together with the slide 27.

In addition, attached to the slide 27 on the inside thereof is a catch-like cam 30 which is engaged by a shoulder 35 of a locking catch 33, which is rotatable on a bearing pin 34, when the slide 27 has been raised sufficiently. To ensure that that takes place, it is drawn in the direction of engagement by a restoring spring 36.

In addition, a delivery roller 37 likewise provided with nubs can be seen at the front in the cover 25.

Figure 3 shows a snapshot at an opening angle of the cover of 60° to the vertical V; the slide cam 26 has already travelled along the lowest portion of the sliding face 29 and is now moving on the upwardly leading portion of the sliding face 29. The cam 30 is just about to engage with the projecting shoulder 35.

In Fig. 4, the cam 30 can be seen in its engaged position on the shoulder 35; the fabric receptacle 15 has been raised to the maximum height H and can be loaded with a roll of clean towel T.

For reasons of clarity, the movement and the transmission of force from the cover 25 to the pivoting module 2 were omitted in Figs. 3 and 4. For the same considerations the fabric receptacle 15 has not been shown in Fig. 5. When the cover 25 is open to its maximum extent, in the position identical to that shown in Fig. 4, the pivoting module 2 is turned outward, so that it adopts the position shown in Fig. 5. It will be apparent from this how, during the opening movement of the cover 25, the pivoting module is pivoted about its shaft pin 11 by a pivoting lever 47, which is rotatably mounted on the cover on a connecting pin 70, by means of its pin 48 which projects into a straight slot guide 71 in the pivoting module 2. That pivoting movement is controlled by the other end of the shaft stub, which is constructed in the form of a double pin 48, in accordance with the curve of the further slot guide 49 which is provided in the side panel 19, cf. Fig. 10.

As shown in Fig. 5, it is easy to lift the winding roller 5 out of its bearings, the mutually opposing insertion points 38, and, with it, a full roll of soiled towel T'.

The winding roller 5 can be recovered for its next use by simply withdrawing it axially.

For loading, a roll of clean towel T is placed in the fabric receptacle 15 situated in the position shown in Fig. 4, in such a way that the free end of the roll rests on the trough 17. The winding roller 5 is then inserted into the free end of the towel T from the side, at an angle of 90° to the unrolling direction A, the towel T being clamped in a non-slipping manner between the actual roller 5 and a clamping spring 5' attached thereto.

The actual loading operation is shown in Fig. 6:

The clean towel T is made to hang down from its roll over the forward deflecting roller 9, and the winding roller 5 is pushed into the leading end part of the towel T as described.

For reasons of clarity the cover 25 has been omitted here also, and therefore the delivery roller 37, which is supported laterally therein and is driven by means of a gearwheel, cf. Fig. 2 to Fig. 5, below the deflecting roller 4, Fig. 1, is likewise absent, as also in the Figures that follow.

The winding roller 5 is then, as shown, suspended in the insertion point 38 in the direction of the arrow, whereupon the manual loading as such is completed; the cover 25 is then merely closed. In the process, a kinematic reversal of the procedures already described with reference to Fig. 2 to Fig. 5 takes place; finally, the appliance appears as shown in Fig. 7.

In that Figure, it is also possible to see the oscillating roller 50 which pulls the towel T' taut since it is rolled in the direction +p by a gripper-rocker 55, Fig. 9. The towel T takes the path marked by a double line at the lower portion of the pivoting module 2. After pulling vertically downward with both hands HB at the point marked, the oscillating roller 50 adopts its forward end position, as a result of which, at the next hand drying operation, owing to the retraction of the oscillating roller 50 in the direction -p, approximately double the length of fabric delivered over the deflecting rollers 7 and 4 is available.

In all the Figures, the same consistent lettering is applied to the designation of the towel in the dispenser ready for operation: clean towel = T; used towel or towel behind the point marked in Fig. 1 (hands HB) = T'.

Whereas in Fig. 7 a fresh roll of towel T is illustrated, in Fig. 8 a major part is already situated as used towel T' on the winding shaft 5. As a consequence, the friction roller 6 resting on the roll T' has shifted to the left in the guide groove 13 and at the same time has been raised, concentrically with a central gearwheel 103, along the path of the curve 39.

Owing to the illustrated path guidance of the friction roller 6, its transmission gear-wheel 22' is in engagement with the central gearwheel 103 irrespective of the current diameter of the winding roller 5 around which the used (soiled) towel T' is being wound, and therefore a slip-free transmission of force is ensured.

The friction between the used towel T' and the friction roller 6 driven in that manner is good, but, in the case of a fresh roll of towel T, almost its entire weight rests by way of the friction surface 14 on the winding roller 5 and the cloth T'. When, during routine operation, the two roll diameters first match each other and then change in the opposite direction, the moments acting on the contact surfaces between the friction roller 5 and the towel T' also remain almost constant.

The practical form of the oscillating roller 50 can be seen in Fig. 9; it has a texture with notches 51 and is provided at the sides with flange-like lateral guides 53 and respective gearwheels 52 used for the parallel guidance. On the left-hand side of the oscillating roller 50, a gripper-rocker 55 engages by its recess 56 over the shaft thereof. The gripper-rocker 55 is arranged on a bearing pin 64 so as to be pivotable in the direction p and has, on an upper side, a tension spring fastening 57 to which a tension spring 58, arranged substantially vertically, is attached. The driving pin 59 is used for the enforced actuation of the oscillating roller 50 by the slide 27, Figs. 2 to 4, in dependence upon the position of a cover not shown here.

Inserted rotatably on the right-hand side of the oscillating roller 50 is a bearing pin 54 to which a traction cable 60 is attached which is guided over a pulley 60' to a winding coil 61 and is wound up and held taut by the latter's integrated spiral spring 63. A bore 62 in the winding coil 61 is likewise arranged rotatably in a portioning wheel, not shown, for dispensing the towel.

The oscillating roller 50 is shown in Fig. 9 in its rearward position, analogously to Fig. 10, where it has been stopped against travel-limiting elements 50'. It is possible to see here its parallel guide 45 with a parallel set of teeth 46 at the top which guides it in an axially parallel manner into the forward position shown by broken lines. The oscillation path is again designated p.

Figure 10 shows the dispenser 1 partly dismantled. It is possible to see here the rear wall 40 of the appliance housing, which is attached to a vertical wall by its mounting face M in the usual manner.

It is easy to see here that opening of the cover 25 - by means of the slide 27 not visible here - guides both the oscillating roller 50 and the fabric receptacle 15 out of the region of rotation of the pivoting module 2 and pivots the latter into the position shown in Fig. 6 in the manner previously described.

Projecting at a right angle to the rear wall 40 is a side panel 18 which carries a guiding and bearing point 41 for a shaft pin 11 of a pivoting module, not visible. Behind it, there is a curved slot guide 49 which also guides the pivoting module 2. In the upper region of the side panel 18 a recess can be seen, which is used for the pin guide 42 of a filling indicator for the towel T. Arranged beside it is the above-mentioned tension spring 58 which is attached in the tension spring fastening 57 to the gripper-rocker 55.

In addition, it is possible to see the guide groove 39 which runs concentrically with the central gearwheel, not visible here, and which serves to guide a friction drive intended for winding up the used towel T'; a guide groove 20 that is widened at the top serves to facilitate the installation of that drive.

Other elements, such as a guide groove 23 and a vertical groove 43 that leads into a linear set of teeth 44, are intended for the parallel guidance of a fabric receptacle, likewise not shown here, in which the roll of clean towel T is supported in a vertically displaceable manner.

It can easily be seen from Fig. 10 that the oscillating roller 50, as shown in its rearward position, jams the used towel T' against the travel-limiting elements 50' and, in conjunction with the deflecting roller 9 supported in the pivoting module 2, prevents it from being pulled out. A so-called return lock is thereby obtained.

It is also possible to see here the parallel guide 45 with a parallel set of teeth 46 lying at the top which guide the oscillating roller 50 in an axially parallel manner into the forward position shown by broken lines. The oscillation path is designated p in this case also. A

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bearing pin 54 which projects from the front end face of the oscillating roller 50 and to which the traction cable 60 is attached, Fig. 9 and Fig. 11, can also be seen.

For the sake of completeness, a portion of a cover 25 with its bearing pin 24 for initiating further operations is also indicated here.

In Fig. 11, a simplified illustration of a control device is designated 100, the appropriate coverings and protective covers and also any non-functional gearing parts having been removed.

The control and drive device 100 consists substantially of two units, a release and switching rocker 106 and a pivoting gear mechanism 112. The release and switching rocker 106 is mounted on a rotation shaft 107 and is arranged around two wheels 102 and 103. The front wheel 102 is a transmission gearwheel, whereas the rear, concealed, wheel 103 is the central gearwheel already described. Arranged in the interior of the transmission gearwheel 102 is a spiral spring 104 which acts on the common shaft of the two wheels 102, 103 and is tensioned in the anti-clockwise direction.

The spiral spring 104 is situated in a housing, and its state of tension can be monitored through two inspection windows 104'.

Located on the release and switching rocker 106 is the rotation shaft 119, see Fig. 12, of an ellipsoidal gearwheel 105 which, on its major axis, engages by its teeth Z in the gearwheel 102. The rocker 106 is constructed in the form of a two-armed lever; the upper lever is designated 106a and the lower lever 106b. Located at the end of the upper lever 106a is a time function element 108; 109 which acts on an abutment 111 and which, according to Fig. 11, is in its closed state c.

After further turning of the gearwheel 102, the ellipsoidal gearwheel 105 tilts through 90°; the release and switching rocker 106 remains in the engaged position until the interval specified by the time function element 108; 109 has elapsed.

A pivoting gear mechanism 112, likewise constructed in the form of a two-armed lever, engages over the release and switching rocker 106 and is pivotally arranged on a further rotation shaft 123 and, with its upper lever portion, engages in the rear wheel, the central gearwheel 103, by way of a spring piece 115 and a gearwheel locking arrangement 116. The pivoting movement accordingly required is effected by a switching cam 110 attached to the lower lever 106b.

The pivoting gear mechanism 112 is returned by a spring 118. Meshing gearwheels are located on shafts 122, 113 and the rotation shaft 123.

It is also possible to see that the ellipsoidal gearwheel 105 has, in addition to complete teeth Z, also flattened teeth Z' and two tooth gaps L. That is expedient in order to enable clean tilting by 90° in the direction of rotation of the gearwheel 105. When the time function element 108; 109 has reached the intended time, the upper lever 106a moves in the direction o, this being assisted by a further spring 117, a conventional helical spring.

Fig. 11 shows the gearing parts and levers that are expedient for complete operation of the device 100 in the hand towel dispenser 1. What is not shown are the necessary coverings and the guide elements that are not essential for operation.

All the parts, including supports, brackets and engagement points 99 for coverings etc., are integrally arranged on a mounting plate 98. Beside the transmission gearwheel 102 there is a reverse stop 130 which engages in or slides over the gearwheel 102 in the manner of a ratchet.

At the front, a feeler 133 can be seen, which, tensioned by a spring 134, is pressed out of the front face of the mounting plate 98 and detects the presence of a closed cover, not shown. When the cover has been pivoted out or removed, the lever guided on a pivot shaft 131, which is likewise a two-armed lever, moves forward with its feeler 133 and, with a switching projection 132, presses the pivoting gear mechanism 112 into its engaged position. In that position, it stops the central gearwheel 103 by way of the

spring 115 and the gearwheel locking arrangement 116, with the result that the entire hand towel dispenser is locked.

The practical form of the ellipsoidal gearwheel 105 shows how the two leaf springs 121 in the position illustrated only rest on the end faces of the flat portion 120, so that even a slight torque will tilt the gearwheel 105.

The engagement of the switching cam 110 on the pivoting gear mechanism 112 can also be seen clearly, as can the support 99 at the front, which prevents unintentional springing of the cam 110.

In addition, it is possible to see a transmission gearwheel 124 which is present at the end of the delivery roller 37 and which engages in a small intermediate wheel 126 concealed by a large intermediate wheel 127, and also a coupling wheel 128, a tensioning wheel 129 and, lying partly behind the latter, a portioning wheel 137 on which the winding coil 61 with the spiral spring 63 inside it is arranged. The winding coil 61 uses the same shaft 141 as the portioning wheel 137; the inner coil of the spiral spring 63 acts against the latter and turns the winding coil 61 clockwise against a sprung pin projecting out of the portioning wheel 137.

From the winding coil 61 spring-loaded in that manner a traction cable 60, which remains taut in every position, leads to the oscillating roller, not visible here, behind a covering 135.

Situated in the rear lower portion of the mounting plate 98 is a further lever 139 which is engaged by a catch, not visible, which serves to unlock the oscillating roller 50, cf. Fig. 9, so that it can be drawn back by means of the spring-loaded traction cable 60.

Figure 12 shows all the gearwheels - with the exception of the central gearwheel 103 situated behind the transmission gearwheel 102 and having the same diameter - in engagement or in their possibilities of engagement.

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The lowermost transmission gearwheel 124 is driven by the delivery roller 37 which rolls as the fabric is pulled out and which is supported in the pivotable cover, not shown, and from which a torque is transmitted *via* the gearwheel 124 to an intermediate wheel 126. Arranged in front of that small intermediate wheel
5 126 and connected to the same shaft 123 is a large intermediate wheel 127. The latter drives a coupling wheel 128 which in turn engages in a tensioning wheel 129, on the shaft 122 of which a switching wheel 144 rotates concurrently.

After the gear mechanism 112 has been pivoted, by displacement of the
10 switching cam 110, Fig. 11, in the switching direction S marked by an arrow, the switching wheel 144, Fig. 12, engages in the portioning wheel 137 and drives it as far as is permitted by an annular towel length limiter TL. The towel length limiter TL is constructed in the form of a raised groove with a central angle of 330°, and the travel is limited by a stop pin 145 having an O-ring, not shown in
15 detail, which serves to damp the stop.

The tensioning wheel 129 is continuously in engagement with the transmission gearwheel 102, since the pivoting gear mechanism 112 undergoes only a slight displacement and since, in addition, the rotation shaft 123 thereof is at a
20 relatively large distance from the gearwheel 102, cf. Fig. 11.

The shaft 113 of the coupling wheel 128 is likewise situated on the pivoting gear mechanism 112, so that the coupling wheel 128 rotates concurrently and changes the direction of rotation at the gearwheel 129.

25 Accordingly, every hand towel delivery causes the delivery roller 37 to rotate in the clockwise direction, as a result of which the spiral spring 104, cf. Fig. 11, is ultimately tensioned by an amount until, after about six deliveries of hand towel, it enters into a rigid coupling, in its clockwise direction of rotation, with the central
30 gearwheel 103 which is likewise fixed to the shaft 101, Fig. 11.

The spring motor charged in that manner serves to draw in the end of the hand towel completely when the entire roll of towel has been used; it thereby prevents unhygienic multiple use of the hand towel.

With every rotation of the delivery roller 37, therefore, movement of the ellipsoidal gearwheel 105 also takes place, so that, after a quarter rotation, the ellipsoidal gearwheel 105 causes the maximum displacement of the release and switching rocker 106 in the direction c shown in Fig. 11 and produces a vacuum in the resilient hollow body 108 (expansion bellows).

Owing to the torque transmitted by the gearwheel 102, the ellipsoidal gearwheel 105 then receives an impulse, as a result of which it tilts through 90° owing to the leaf springs 121, cf. Fig. 11, and re-adopts the position shown in Fig. 12 but is not yet in engagement with the gearwheel 102 as shown there.

After air has entered the hollow body 108 by way of the throttle 109, the hollow body 108 separates from its abutment 111; the lever 106a moves in the direction o; the ellipsoidal gearwheel 105 engages by its flattened teeth Z' in the gearwheel 102, thereby producing the starting position again.

The foregoing description explains the simple and reproducing initiation of the time function element and the fundamental movement sequences of the control device.

The intermediate wheel 126, which has been drawn concealed, furthermore contains an annular slip clutch 146 known *per se* (also called a screen clutch) having cams, not shown in detail, which prevents damage in the dispenser or to the hand towel in the event of excessive pulling on the hand towel.

The portioning wheel 137 has a so-called spring-in point 143, that is to say, a resilient piece in the gear rim, which allows the tensioning wheel 129 to engage even if the teeth of the two gearwheels 144 and 137 happen to be opposite one another. The engagement

always takes place at the same region of the portioning wheel 137, and therefore that measure also serves to reduce wear.

If the portioning wheel 137, Fig. 12, is considered in greater detail, the portioning, that is to say, the dispensing of a maximum portion of towel, can be explained:

The travel limiter TL allows rotation of the portioning wheel 137 only by the distance set; consequently, when the switching wheel 144 is in engagement, the resulting rotational movement is restricted to that amount.

At the same time, however, the unrolling distance of the towel is also restricted at the delivery roller 37, since the stopping of the portioning wheel 137 against the stop pin 145 acts on that roller also.

It is easy to see that, by inserting intermediate pieces in the towel length limiter TL or by a second or displaceable stop analogous to the pin 145, the maximum delivery of clean towel can be adjusted from the current 32 cm, that is to say, can be shortened.

The winding coil 61, which serves to draw in the traction cable 60 illustrated in Fig. 9, is also seated on the portioning wheel; a spiral spring, designated 63, which acts on the traction cable 60 can also be seen here.

In addition, it is possible to see a further locking lever 138 which is shifted into engagement by the closed cover 25 and which extends into the pivoting module 2 situated behind the mounting plate 98 and fixes it in the operating position or releases it when the cover 25 is opened.

If hand towel is then dispensed - and hence actuation of the control device occurs -, the blocking lever 139 at the bottom of Fig. 11 is raised by the rear end of the lever on the pivoting gear mechanism 112. As a result, the oscillating roller 50 situated behind the covering 135, together with the already used towel guided around it, is unlocked; it is activated by the traction cable 60 and travels in the direction -p, Fig. 2; that allows the

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formation of a loop for drying the hands in a convenient and hygienic manner, without relatively large quantities of unused towel being expended.

5 The time function element 108; 109 can also be "programmed" by selecting the porosity of the throttle 109 in accordance with the desired falling time of the hollow body 108 and/or optimising it. A hollow body 108 consisting of expansion bellows produces an adequate retaining force by virtue of its springing-in behaviour, permits long switching distances and, owing to its relatively large volume of air, can be returned in a precise and reproducible manner from the
10 temporary vacuum to atmospheric pressure by way of the throttle 109.

The subject matter of the invention in its entirety solves the problem set. Individual functional elements can, of course, also be used for the improvement of other constructions that are already in use.

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Patent Claims

1. Hand towel dispenser for planar band material (T, T'), having a transport mechanism for simplified threading-in and for forming a loop of clean band material suitable for hand drying, wherein the transport mechanism has a pivoting module (2) which is rotatable outwards about a stationary shaft (11) and is supported in side panels (18, 19), and that transport mechanism is initiated by closing the dispenser with a housing cover (25) and rolls up the band material (T, T') in portions from a supply of clean material (T), by way of a dispensed loop, onto a replaceable roller (5) carrying used band material (T'), characterised in that the pivoting module (2) viewed in the operating state has, in its upper region, in two mutually opposing lateral flanges, bearing points (38) for the insertion of a removable winding roller (5), in which the winding roller (5) remains unchanged in position during operation, and a vertically displaceable body (15) guided in vertical slot guides (23) is arranged as the fabric receptacle for clean towel (T) above the pivoting module (2), which body (15) carries on its underside a friction roller (6) which is connected to a spring motor gear mechanism (104, 22) and which charges the winding roller (5) with used towel (T') and drives it, and, for guiding the shaft of the friction roller (6), there is formed in both side panels (18, 19) a guide groove (20, 39) which has, from top to bottom, first a vertical portion (20) and then a circular arcuate portion (39), and mutually opposing horizontal guide grooves (13) being provided in the two lateral flanges (15') of the body (15) of the fabric receptacle so that, by the simultaneous action of both guide grooves (20, 39; 13), the shaft of the friction roller (6) and the gear mechanism (22) are positively guided both concentrically with a central wheel (103) of the gear mechanism of the spring motor (104) and in the upward direction, and there is provided in the lateral flanges of the pivoting module (2) a recess (10) in which a displaceable oscillating roller (50) can engage which forms an additional, variable loop of band material between the winding roller (5) and a guide (8, 9, 4) of the band material (T, T'), the loop serving as a reservoir for forming a temporarily returning band portion.

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2. Hand towel dispenser according to claim 1, characterised in that an oscillating roller (50) which is spring-loaded by a traction cable (60; 61) temporarily returns the band portion.
3. Hand towel dispenser according to claim 1 or 2, characterised in that there are provided in lateral guides (45) of the oscillating roller (50) sets of teeth (46) in which gearwheels (52) arranged at both ends engage.
4. Hand towel dispenser according to claim 3, characterised in that a gripper-rocker (55) which is loaded by a spring (58) engages by its recess (56) over one end side of the oscillating roller (50), and the rocker (55) is in operative connection with a cover (25) by way of a stop pin (59).
5. Hand towel dispenser according to claim 1, characterised in that the pivoting module (2) has at least one shell-shaped guiding and gripping cavity (3), and at least one freely rotatable roller (4), arranged on the pivoting module (2), projects at the front above that cavity (3).
6. Hand towel dispenser according to claim 1, characterised in that vertical guide grooves (23) are formed in the side panels (18, 19), into which vertical guide grooves (23) guide pins (16) protruding in pairs from the lateral flanges of the fabric receptacle (15) project.
7. Hand towel dispenser according to claim 6, characterised in that grooves (43) and linear sets of teeth (44) in which guides on the rear side of the fabric receptacle (15) engage are formed in the rear wall (40) of the dispenser (1).
8. Hand towel dispenser according to claim 7, characterised in that the guides on the rear side of the fabric receptacle (15) are gearwheels projecting from the fabric receptacle (15) which are freely rotatable and coupled to each other.

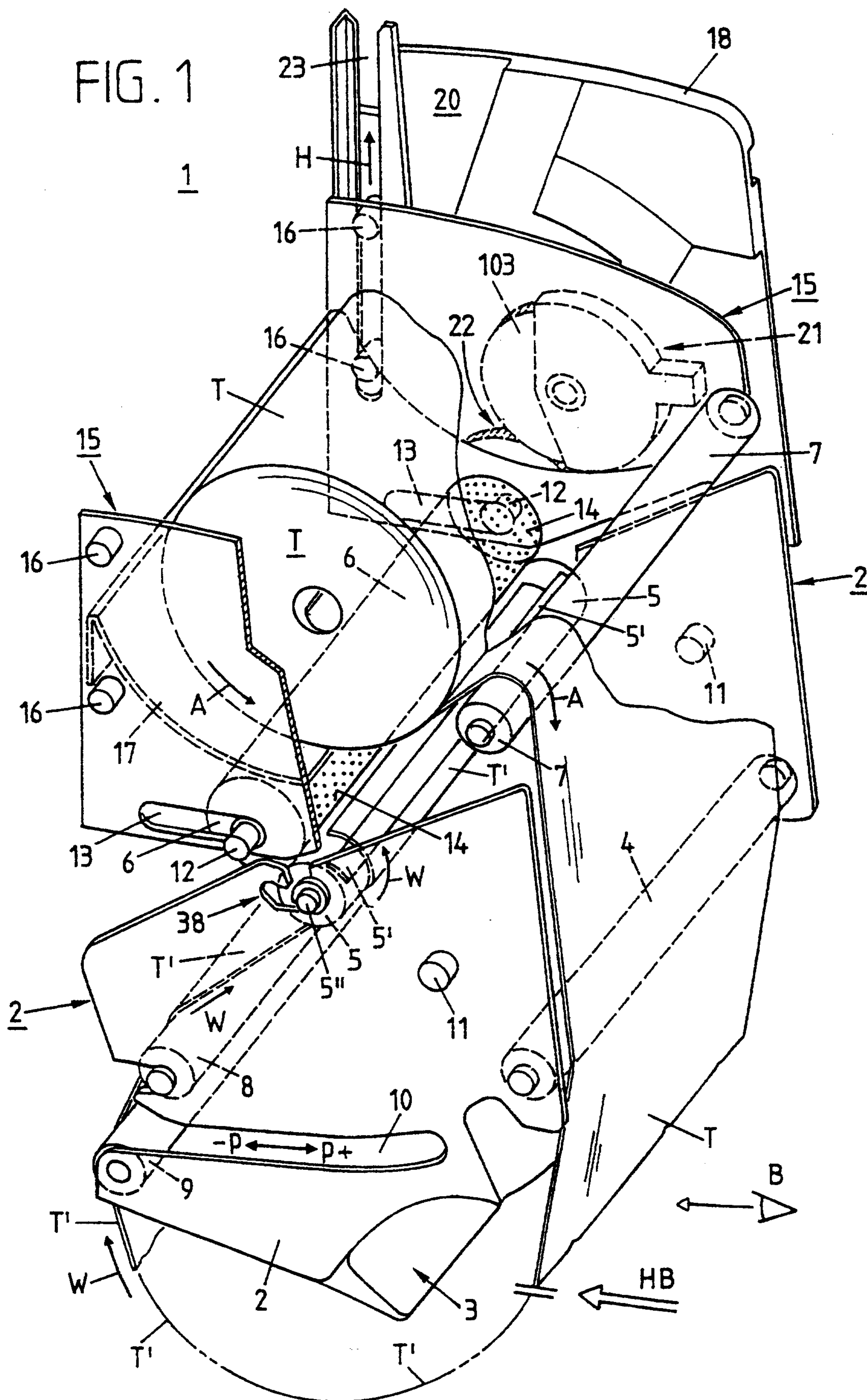
10. Hand towel dispenser according to claim 9, characterised in that the slide (27) has a base arranged at an oblique angle and having a sliding face (29) which comes into engagement owing to a slide cam which projects from the inside of a cover (25) of the dispenser (1).

12. Hand towel dispenser according to at least one of claims 6 to 11, characterised in that, on one side panel (18), a bearing (42') is attached and a pin guide (42) for the pivoting lever of a filling state indicator for the supply of towel (T) is formed, which ascertains and displays the height of the fabric receptacle (15).

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FIG. 1



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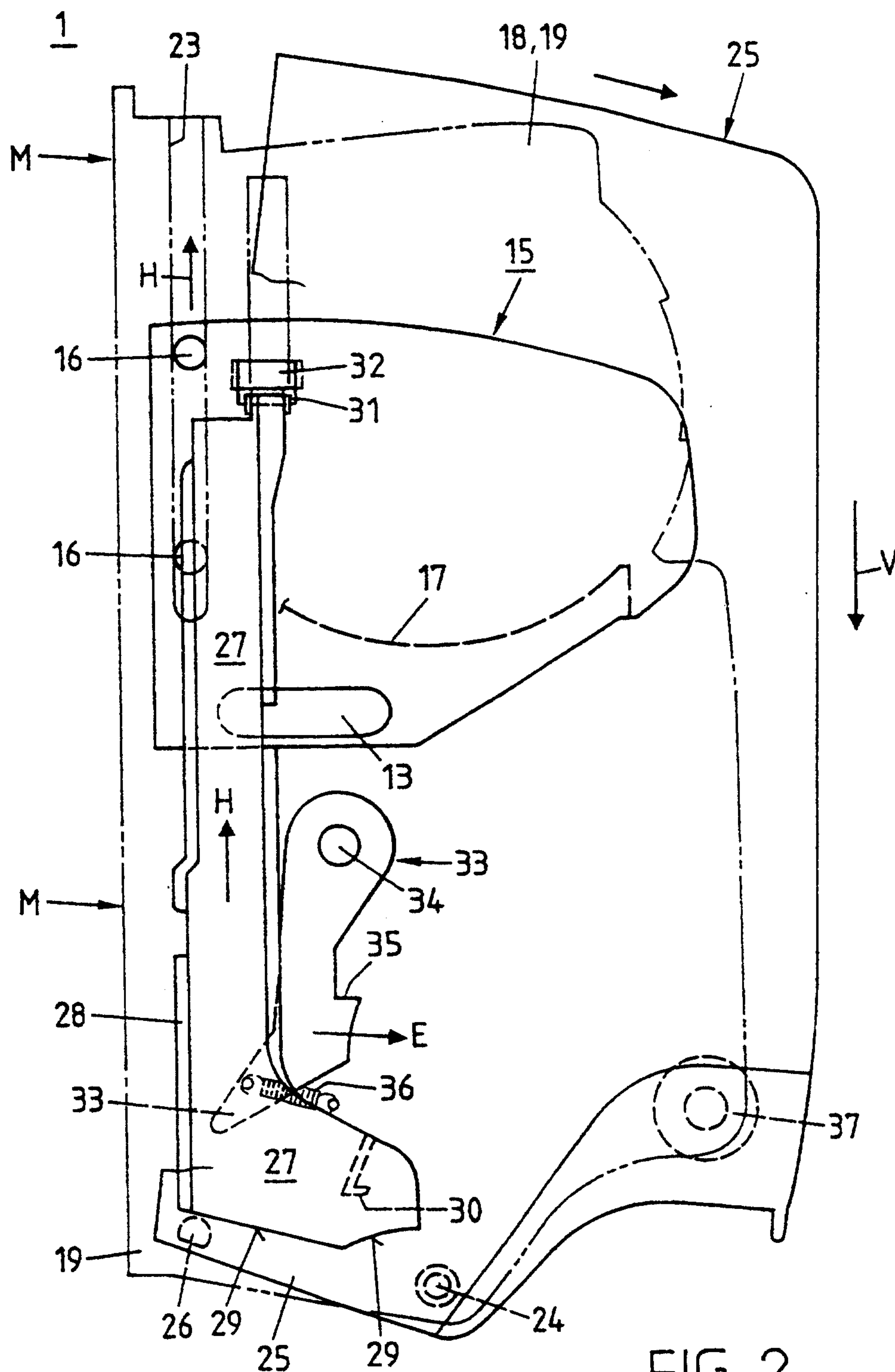
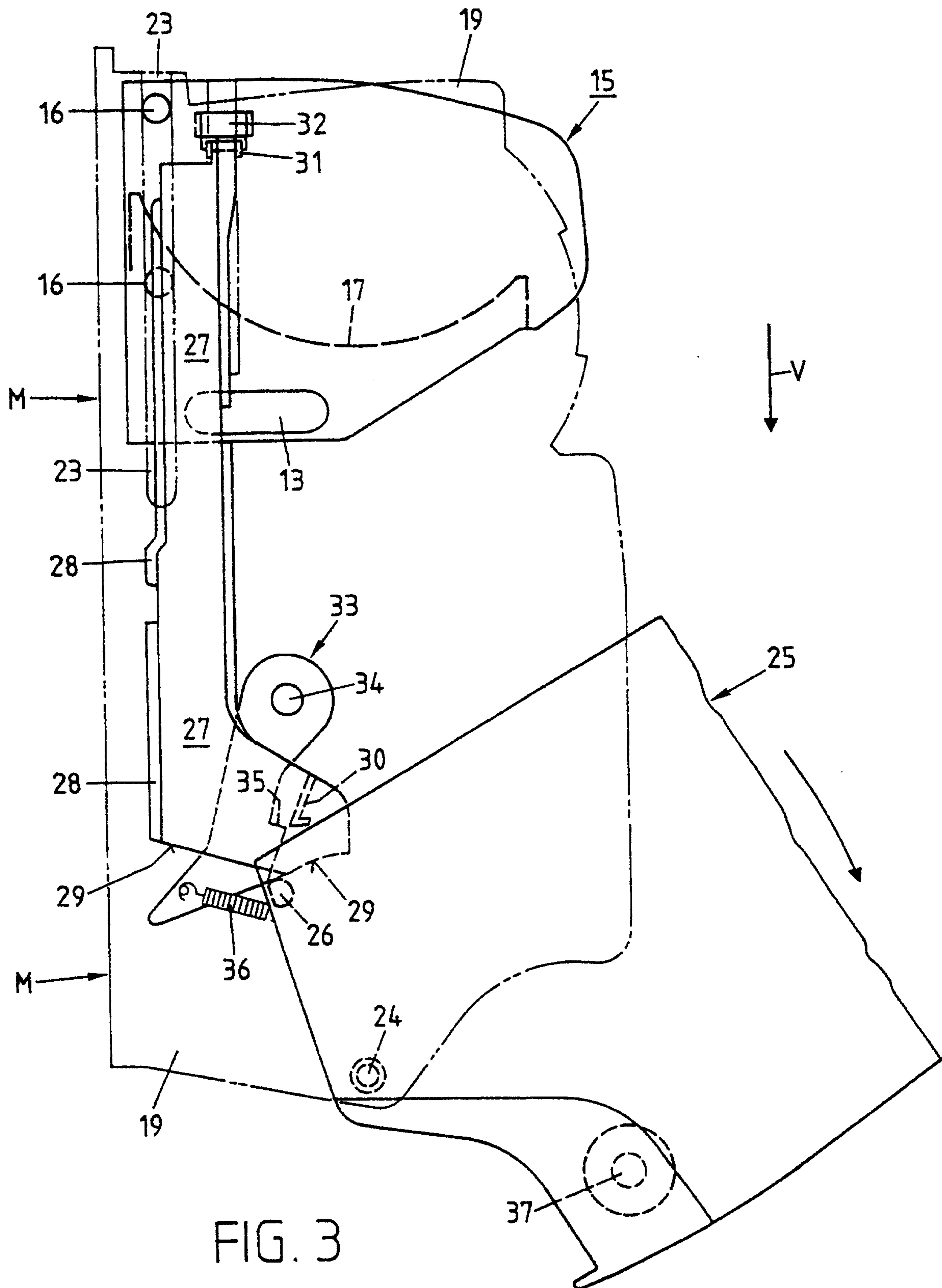
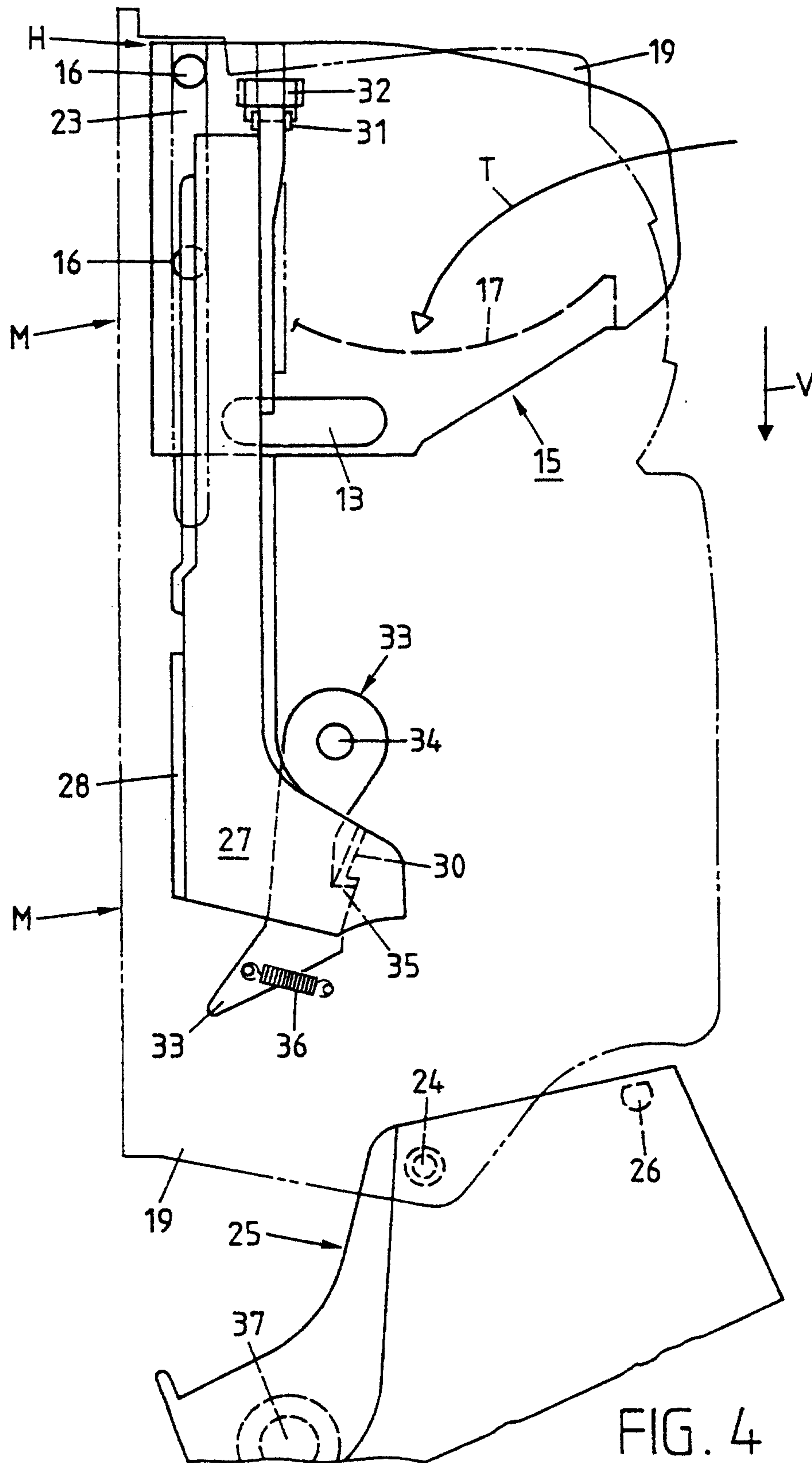


FIG. 2

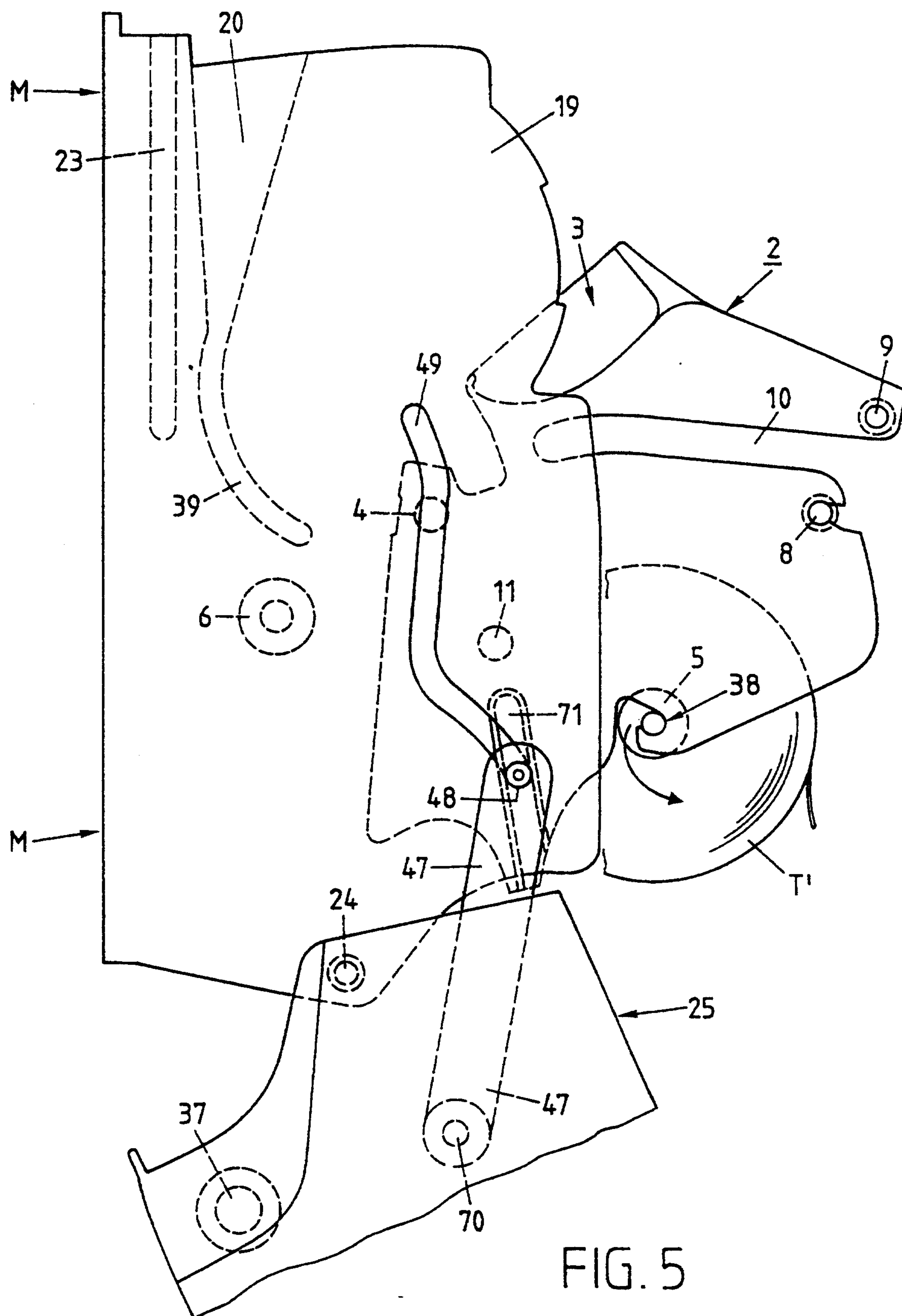
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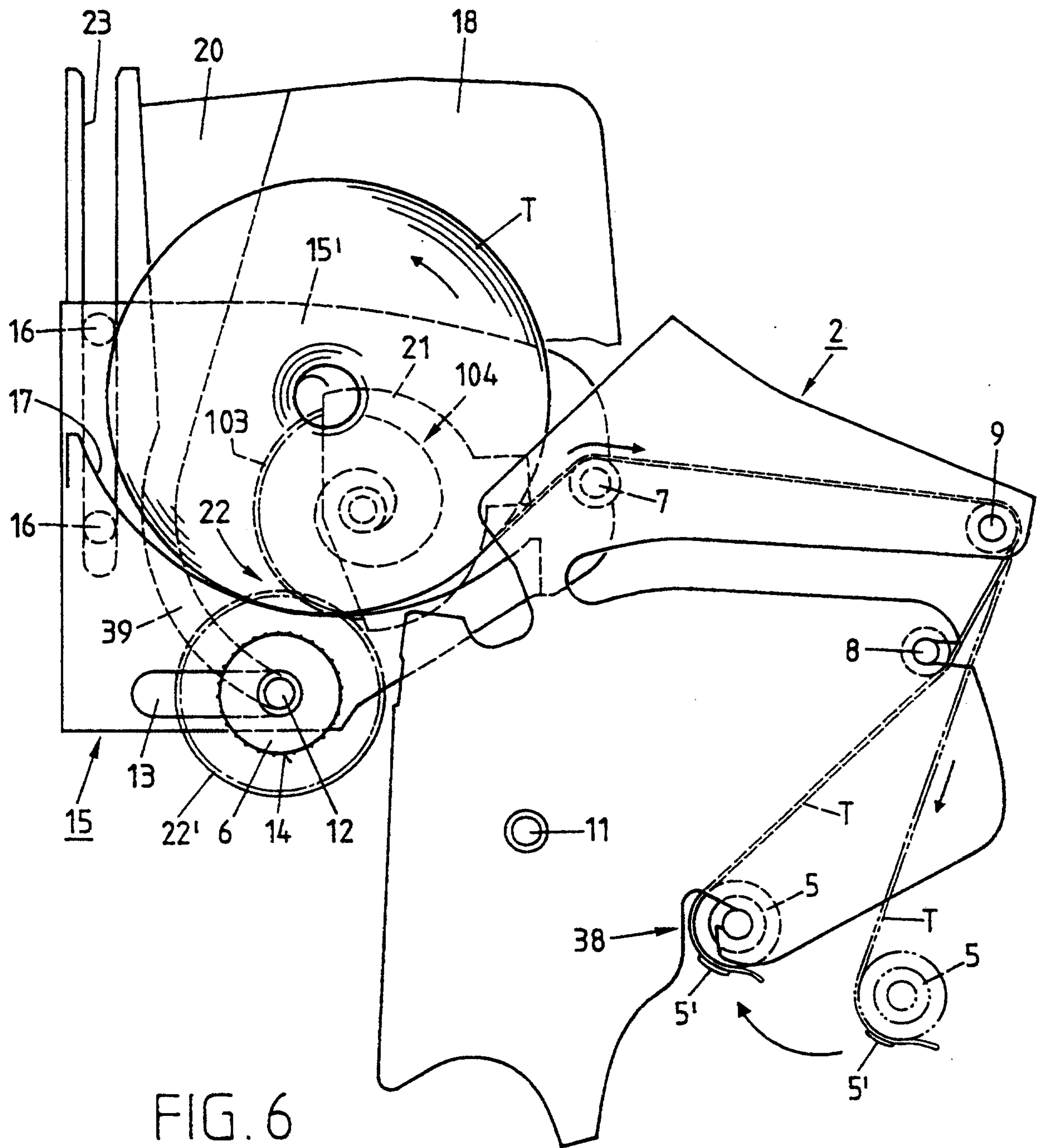
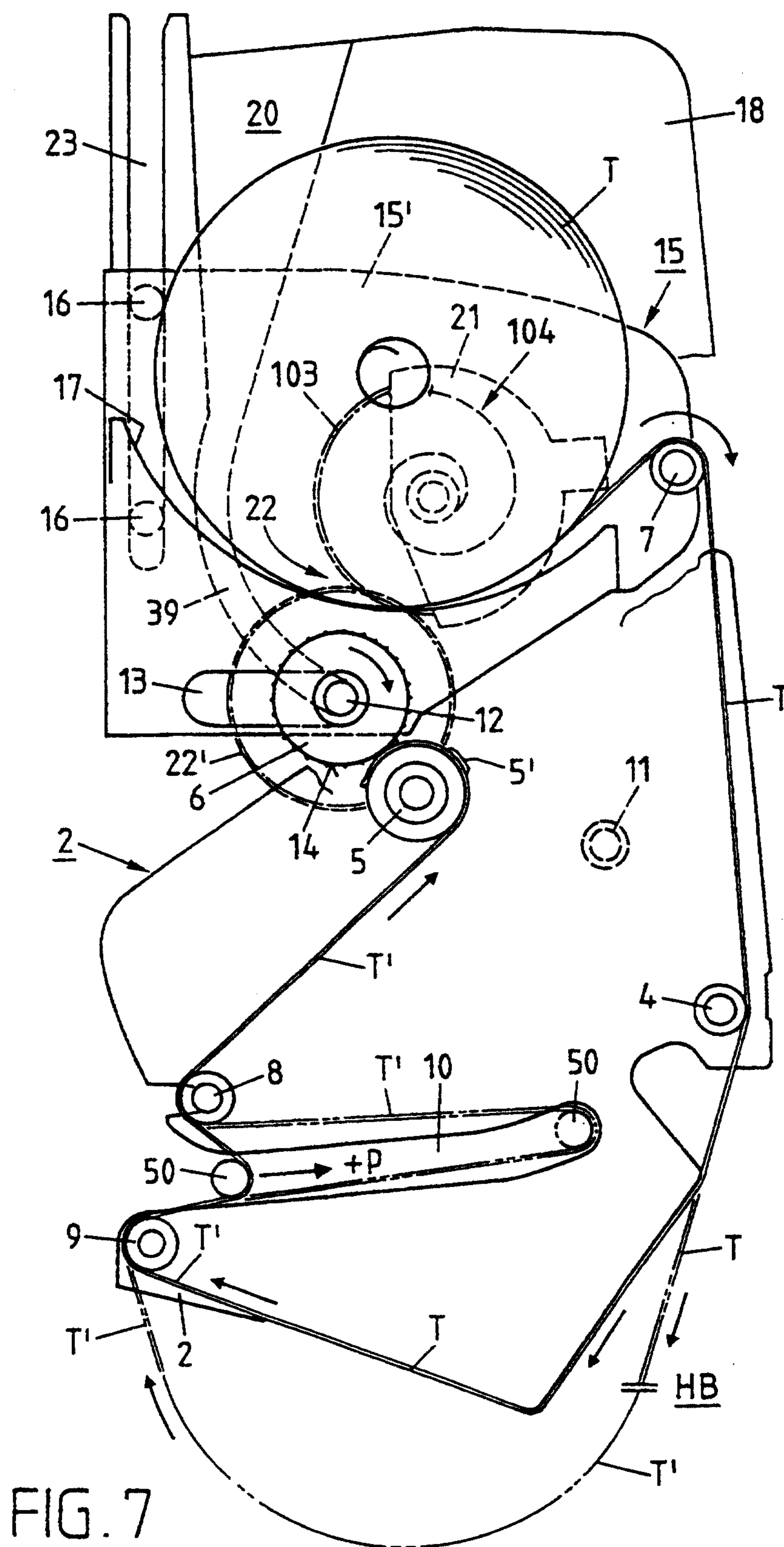
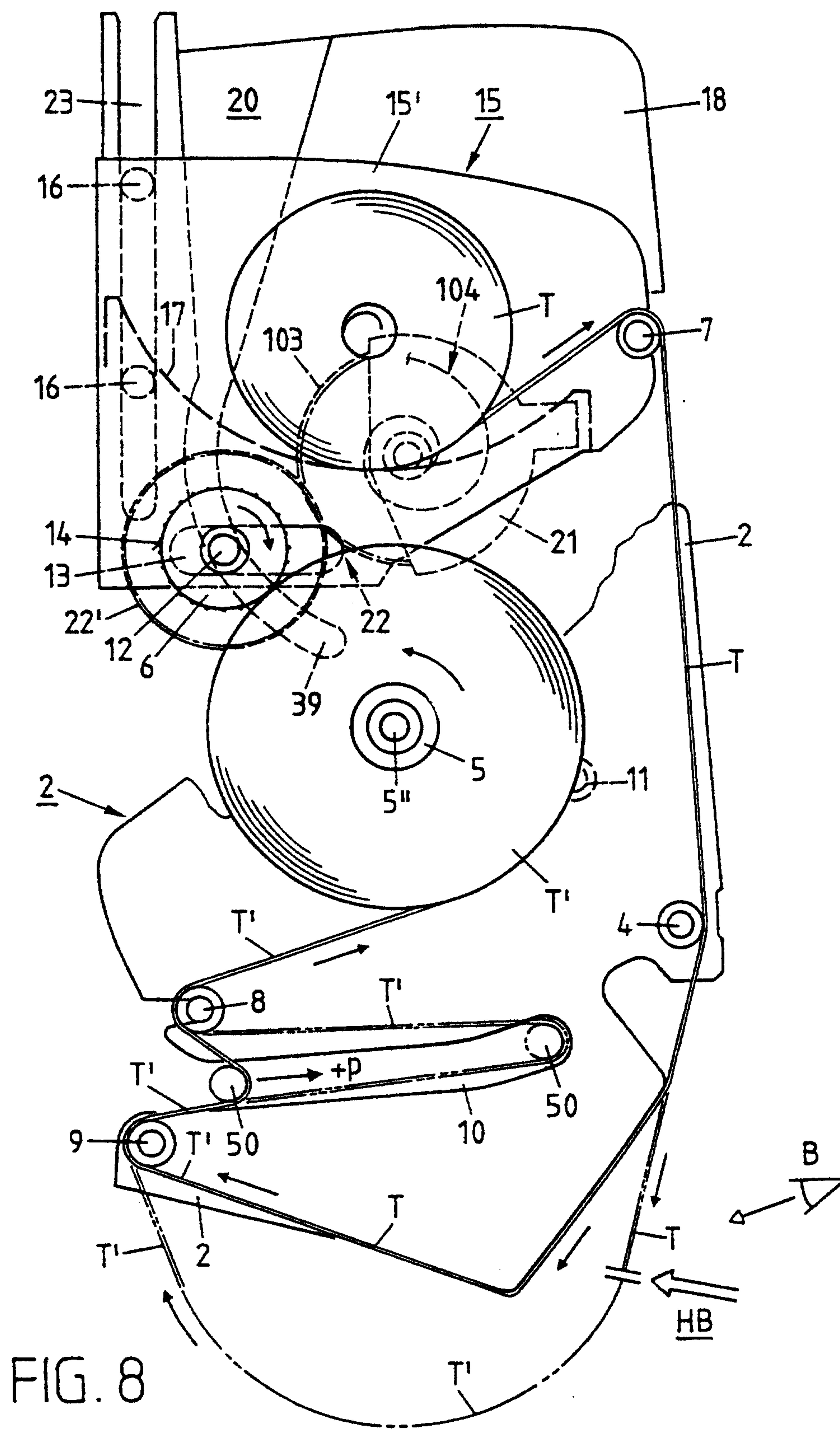


FIG. 6

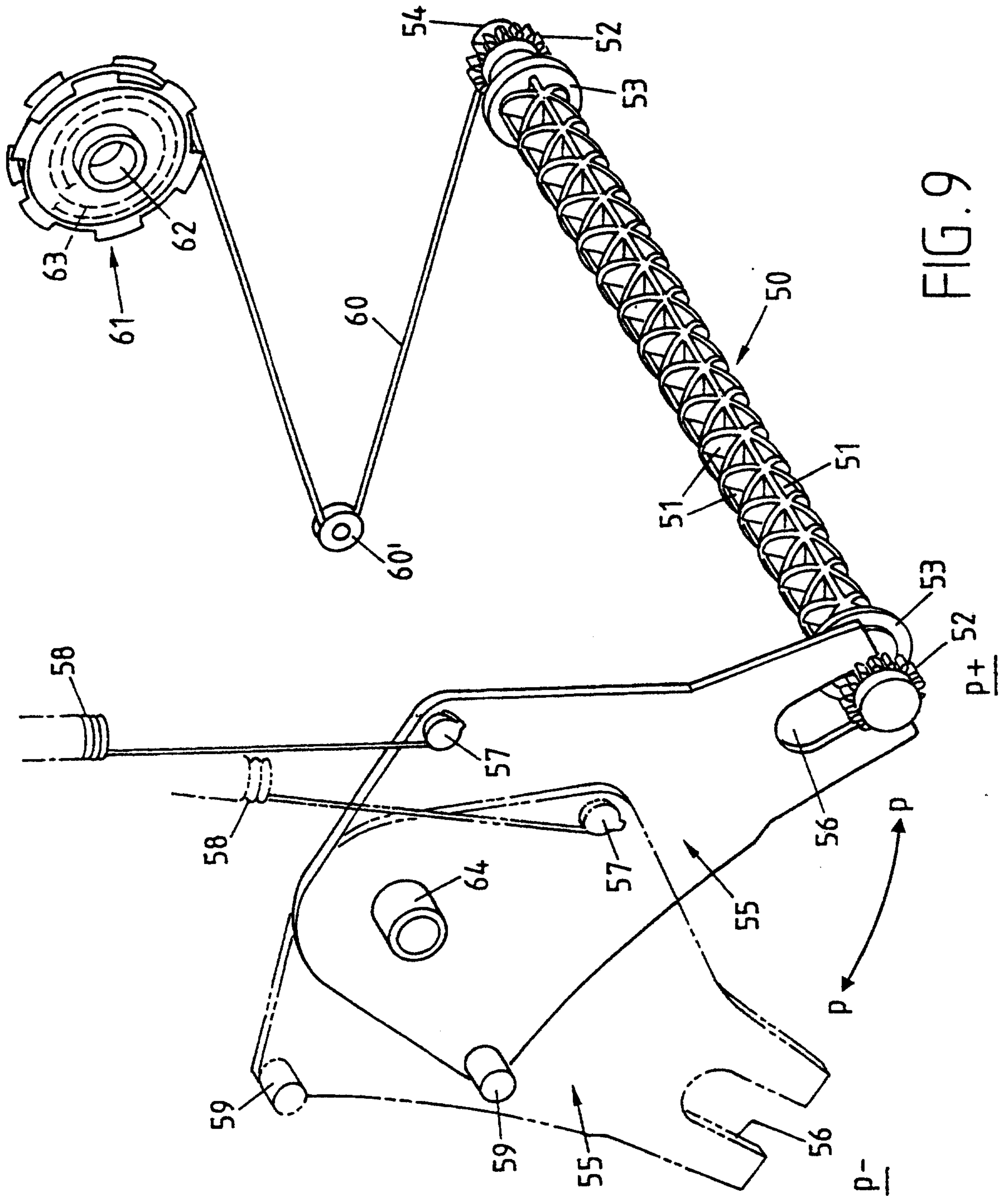
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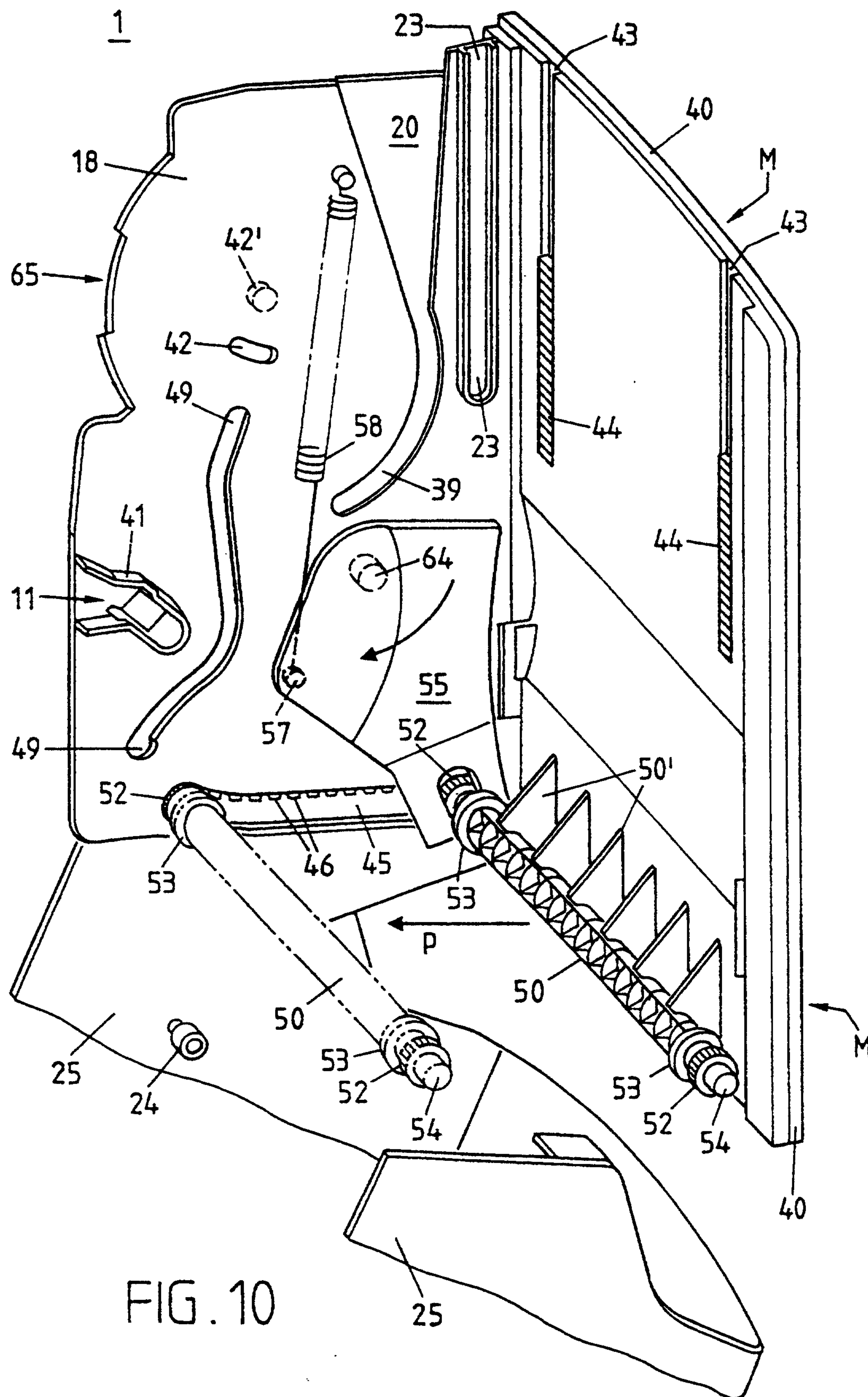
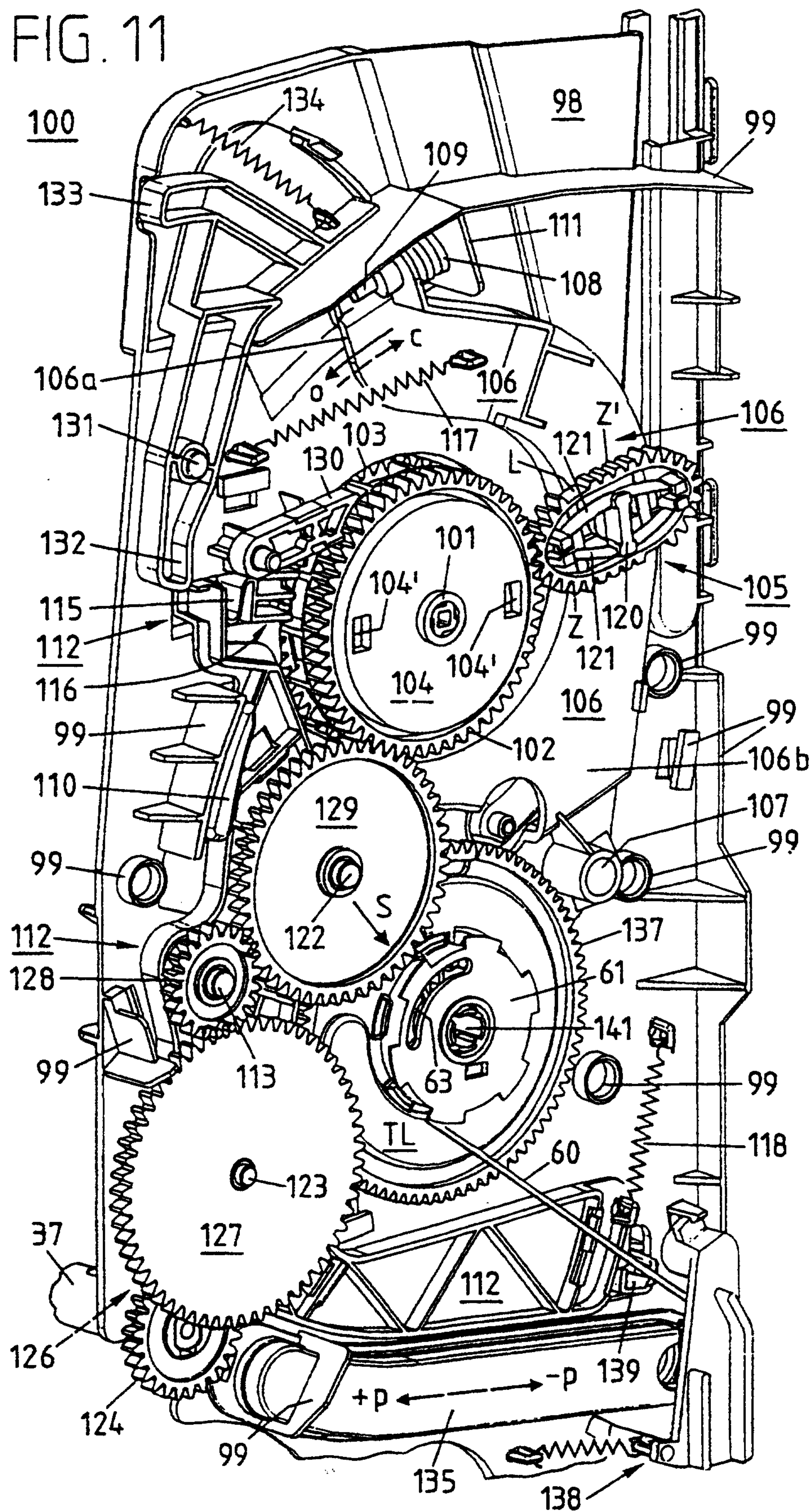


FIG. 11



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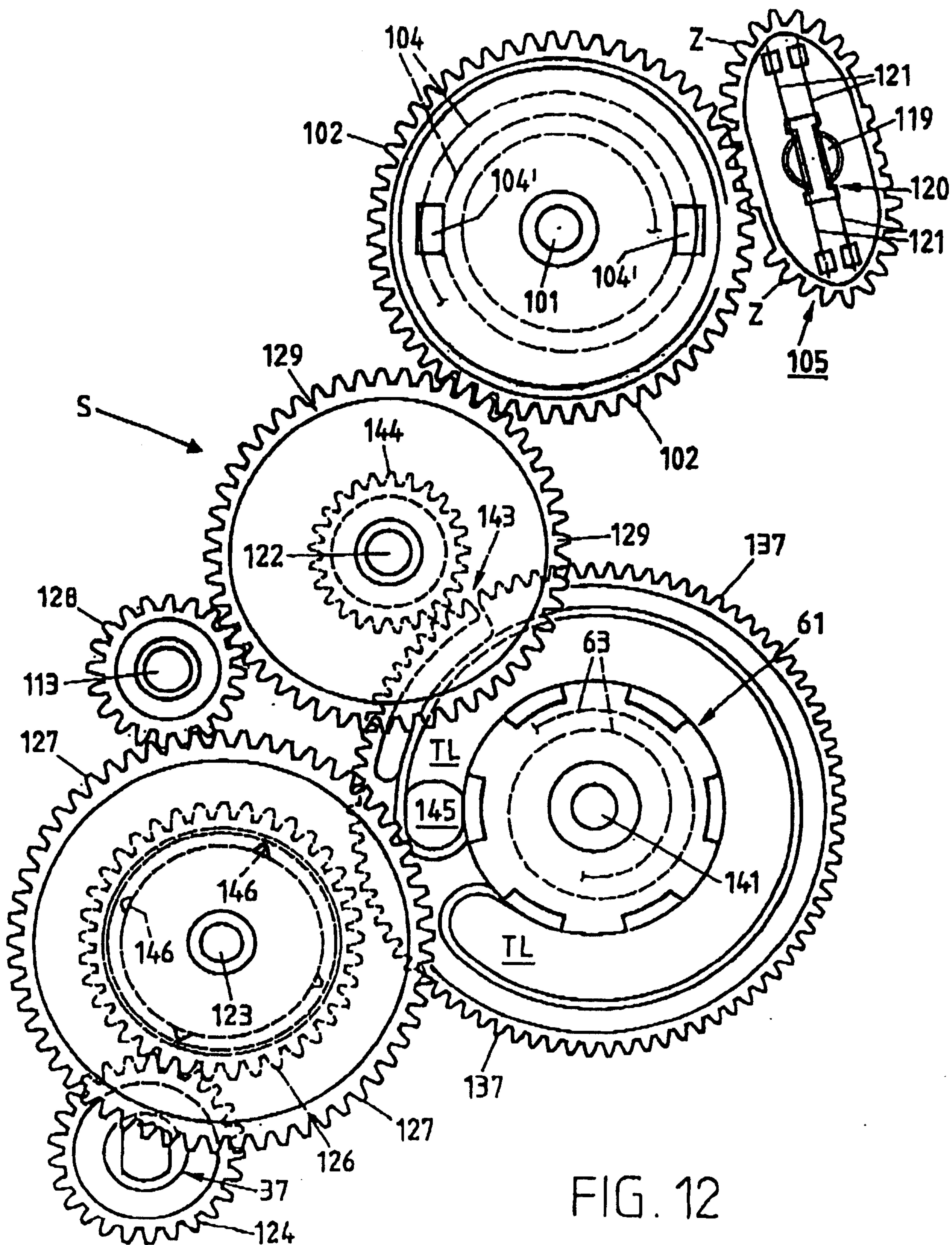


FIG. 12

