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(54) Device for separating transferring and discharging containers

(57) A device for separating, transferring and discharging containers (101), picked from a first conveyor (4) and discharged to a second conveyor (8), includes:

- separating means (5) of at least a container (101);
- vertical transfer means (6) of the containers (101) picked by the separating means (5) and discharged to the second conveyor (8) through the cooperation of stop means (7).

The separating means (5) are fit to extract at least a single container (101) from the first conveyor (4) and to transfer this latter to said transfer means (6). These latter are alternatively moved from a picking and discharging condition (P) of each container (101) to a vertical moving condition (T) of this latter.

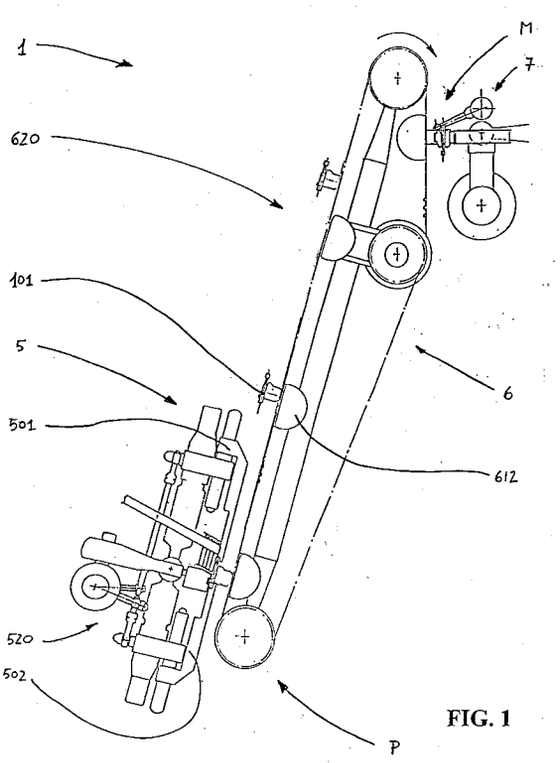

FIG. 1

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Description

[0001] The present invention relates to packaging machines, particularly the invention refers to a device for separating, transferring and discharging containers, principally flexible containers for pharmaceutical use, for instance strips of monodose containers or bag for parenteral solutions.

[0002] The known separating devices pick the single containers, for instance from a feeding store, by using mobile gripping means or pushers, by which the separating devices discharge said containers into following transferring devices.

[0003] In case of flexible containers, these transferring devices usually include support elements, the so-called "holders", with seats or shaped pits, in which the containers are housed.

[0004] The instability of these latter, in fact, makes necessary the use of said support elements, which are suitable to maintain the containers in the correct position and in the requested orientation, during their transfer.

[0005] Blocks of plastic material, for instance polyethylene or other synthetic resin, in which the seats for the containers are carried out, usually constitute the support elements.

[0006] Said support elements are fixedly or removably connected to conveyor, for instance belts or chains, which move with continuous or alternate motion.

[0007] Furthermore there are known transferring devices having mobile gripping means, for instance grippers with jaws or elements with opposed half shells, controlled by suitable actuators and usually connected to working carousels or rotating drums. Said kind of devices are used for transferring the containers to working planes at different heights or to change their orientation, for instance by rotating or turning upside-down said containers.

[0008] The known discharging devices are similar with the separating devices and have mobile gripping means or pusher means, fit to extract the containers from the related seats of the support elements and to transfer the container to following devices or operational stations.

[0009] The main drawback of the known devices for separating, transferring and discharging containers consists in the use of mobile gripping means of the containers that usually require a complex mechanics for the motion, with consequent high costs for the design and the manufacturing.

[0010] Other drawback consists in the configuration of the mobile gripping means, which do not allow an immediate accessibility to the containers, during the different phases of the operational process or in case of emergency stop of the device.

[0011] Further drawback of the known devices consists in that the support elements for the container transfer are usually bulky and heavy and cause a substantial increase of the machine inertia, with consequent reduction of the dynamic performances of the machine in terms of accelerations and achievable maximum speed; at the same time said support elements with their dimensions limit the movement of the container through the machine.

[0012] The main object of the present invention is to propose a device for separating, transferring and discharging containers having mobile gripping means very simple to carried out, light and having small dimensions.

[0013] Further object is to propose a device fit to utilize the container flexibility in the separating, transferring and discharging operations all along the operational stations of the machine. Other object is to propose a simple and economic device that does not require a machine mechanics complex and expensive. Further object is to propose a device whose gripping and transfer means allow an easy and immediate accessibility to the containers, in every motion phase.

[0014] The above-mentioned objects are achieved according to the content of the claims.

[0015] The characteristics of the present invention are underlined in the following with particular reference to attached drawings, in which:

- figure 1 shows a schematic front view of the device object of the present invention;
- figure 2 shows a enlarged and partial schematic front view of the figure 1 device;
- figures 3A-3E show partial front views of the figure 1 device respectively in correspondence of engagement, moving, gripping, removal and picking conditions of each container;
- figure 4 shows a partial side view of the figure 1 device;
- figures 5A and 5B show partial front views of the figure 1 device respectively in correspondence of a moving condition and a gripping and discharging condition of each container;
- figures 6A-6D show partial and schematic front view of the figure 1 device, respectively in correspondence of transferring, hooking, discharging and disengagement conditions of each container.

[0016] With reference to figure 1, numeral 1 indicates the separating, transferring and discharging device, which includes a frame 10, separating means 5, transfer means 6 and stop means 7 of flexible containers 101.

[0017] For instance, the device 1 is fit in a machine for moving, filling and packaging containers and therefore has a first conveyor 4 of the containers positioned upstream said device and a second conveyor 8 downstream the device 1.

[0018] The separating means 5, shown in figure 2, include pusher means, upper 501 and lower 502, slidably connected to related columns, upper 503 and lower 504, connected to the frame 10 by means of a support arm 508.

[0019] Each pusher mean has at the contact end with

the container a seat 515 fit to match the single container 101 or the couple of containers in case of two packaging lines, in such a way to allow the translation of these latter, stopping at the same time the remaining containers 101 laying in the first conveyor 4.

[0020] Shifting means 520 translate at the same time the pusher means, from an engagement condition A with a related container 101, to a shift condition B in which each container 101 is translated downwards to be grabbed by the transfer means 6, to a removal condition S in which said pusher means are parted to disengage the container and to allow its passage to the transfer means 6.

[0021] The shifting means 520 are constituted by two rotating shafts inside the support arm 508 and are connected to the machine motor, said shafts move the pusher means, respectively lower 502 and upper 501, by means of crank arms 509 and 510 and connecting rods 506 and 507. The support arm 508 also supports the fixed horizontal abutment 505 of the container.

[0022] The shifting means 520 include disengagement elastic means, not shown, which disengage each pusher means, upper 501 and lower 502, from the motor in case the pusher mean by translating counters a resistant force higher than a predetermined value: for instance, in case of containers jamming or blocking in the separating means 5, so preserving the integrity of this latter.

[0023] With reference to figures 4, 5A and 5B, the transfer means 6 include a support frame 610 hinged to the machine and supporting belt transfer means 620, to which gripping means 608 of the containers 101 are connected.

[0024] The support frame 610 includes an middle swinging shaft 601 hinged to a horizontal support 604 connected to the frame 10 and rotated with a pendulum movement, between a picking and discharging condition P and a vertical moving condition T, as shown respectively in the figures 5B and 5A.

[0025] The transfer means 6 include motorized rotating shaft 602, parallel to the swinging shaft 601, which is rotated by transmission means 605 and which has toothed pulleys 606 fixed to his ends. At the lower portion of the frame there is idle rotating shaft 603, parallel to the swinging shaft 601 as well and having fixed to its ends toothed pulleys 606. The belt transfer means 620 are constituted, for instance, by the pulleys 606 and a related couple of belts 607, which are rigidly connected by equally spaced crosspieces 609. Sliding blocks 612 guarantee the correct alignment of the belts 607.

[0026] The gripping means 608 include elements connected to crosspieces 609, having rigid tine seats 611 for picking the containers 101 in correspondence of their flexible portions. In alternative, said tines 611 can be flexible for picking the containers 101 in correspondence of rigid portions of these latter.

[0027] With reference to figures from 6A to 6D, the stop means 7 are constituted by a stop 702 operated by driving means 700, constituted for instance by a hub 701, inside which there is fit a shaft 705, connected to a lever 704, linked to the device motor. The shaft 705 support the stop 702, constituted for instance by a transversal rod, through pivots 703 longitudinally sliding in respective housing of said shaft 705, for allowing the adjustment of the stop means according to the container dimensions.

[0028] The operation of the separating, transferring and discharging device provides that the separating means 5, in the engagement condition A, keep in position the container 101, not supported anymore by the bars 401 of the first conveyor 4, by the pusher means, upper 501 and lower 502, which fit the container into the corresponding seats 515.

[0029] The synchronous translation of the pusher means downwards cause the removal of a single container, or of a couple of containers, and its shifting in the underlying position, in the shifting condition B.

[0030] The container picking is made by virtue of the rotation, or swinging, of the transfer means 6 which moving from the vertical moving condition T to the picking and discharging condition P, guide the gripping means 608 to stop the containers, supported by the pusher means 501 and 502 and by the fixed horizontal abutment 505. More precisely said oscillation cause the insertion of a flexible container portion inside the seat defined by two tines 611 of the means 608. Said insertion is possible by using the container elasticity and the flexibility, as in the case of the monodose strips in which a single container is forced between the tines 611.

[0031] A variant provides that the gripping means 608 are flexible and elastic and therefore fit to grab the container rigid portion, for instance bag containers for medical products. After the picking of each container 101 by the gripping means 608, the pusher means, upper 501 and lower 502, are disengaged in a removal condition S by means of their mutual withdrawal, that is by translating respectively upwards and downwards, to allow the container transfer from the separating means 5 to the transfer means 6. The transfer is carried out through the rotation of the transfer means 6, which move from the picking and discharging condition P to the vertical moving condition T. After that, the pusher means move back in the engagement condition A, to receive the following containers 101.

[0032] The transfer means 6 in the vertical moving condition T, as shown in figure 5A, transfer the containers 101, connected to the gripping means 608 of the belt transfer means 620, from separating means 5 to the second conveyor 8. During the shifting of the containers 101 on the rising branch of the transfer means 6, the containers are turned over, in virtue of their discharge in correspondence of the descending branch of said transferring means.

[0033] With reference to figures from 6A to 6D, the discharge of the containers 101 to the second conveyor 8 from the transfer means 6, is carried out by the rotation

of these latter, which rotate in the picking and discharging condition P, in such a way to block a container 101 or a couple of containers 101, in picking means 80 of the second conveyor 8.

[0034] The intervention of the stop means 7, carried out by inserting the stop 702 in a hooking condition F, cause the container block on the picking means 80. When the transfer means 6 rotate, coming back in the vertical moving condition T, the containers 101 remain connected to the picking means 80. The disconnection of the stop 702 from the containers, in a disengagement condition M, allows these latter to be moved by the second conveyor 8.

[0035] The separating, transferring and discharging device 1 is completely controlled by electronic calculation and control means fit to check the phase coincidence between the functional elements, particularly the separating means 5, the transfer means 6 and the stop means 7.

[0036] The main advantage of the present invention is to provide a separating, transferring, discharging device having mobile picking means very simple to carried out, light and having small dimensions.

[0037] Further advantage is that to provide a device fit to use the container flexibility in the separating, transferring, discharging operations. Other advantage is that to provide a simple and economic device that does not require a complex and expensive mechanic.

[0038] Further advantage consists in providing a device whose picking and transfer means allow an easy and immediate accessibility to the containers, during their shifting.

Claims

1. Device for separating, transferring and discharging containers (101), picked from a first conveyor (4) and discharged to a second conveyor (8), **characterized in that** includes:

   - separating means (5) of at least a container (101);
   - vertical transfer means (6) of the containers (101) picked by the separating means (5) and discharged to the second conveyor (8) by means of the cooperation of stop means (7);

   said separating means (5) being fit to extract at least a single container (101) from the first conveyor (4) and to discharge this latter into said transfer means (6); the transfer means (6) being alternatively moved from a picking and discharging condition (P) of each container (101) to a vertical moving condition (T) of this latter.

2. Device according to claim 1 **characterized in that** the separating means (5) include pusher means, upper (501) and lower (502), transversally translated by moving means (520) from an engagement condition (A) with a related container (101) to a shifting condition (B), in which each container (101) is translated and then grabbed by the transfer means (6), to a removal condition (S), in which the pusher means (501, 502) are reciprocally parted to allow the transfer of the container (101) from the separating means (5) to the vertical transfer means (6).

3. Device according to claim 2 **characterized in that** the moving means (520) include disengagement elastic means which provide to disengage each pusher means, upper (501) and lower (502), if the pusher means, during the translation, counter a resistant force higher than a predetermined value.

4. Device according to claim 2 **characterized in that** each pusher means, upper (501) and lower (502), has at the contact end with the containers (101) a seat (515) fit to mate the containers (101) and to allow the translation by stopping at the same time the containers (101) of the first conveyor (4).

5. Device according to claim 1 **characterized in that** the transfer means (6) are constituted by a support frame (610) hinged to the frame (10) and support belt transfer means (620) to which are connected gripping means (608) of the containers (101); said transfer means (6) being fit to swing with alternated motion by a picking and discharging condition (P), in which the belt transfer means (620) are stopped and the gripping means (608) at the same time grip at least a container (101) from the separating means (5) and discharge at least a container to the second conveyor (8), to a moving condition (T) in which the belt means (607) transfer the containers (101) from the separating means (5) to the second conveyor (8).

6. Device according to claim 5 **characterized in that** each gripping mean (608) includes at least a rigid tines seat (611) for picking the containers (101) in correspondence of flexible portions of these latter.

7. Device according to claim 5 **characterized in that** each gripping mean (608) includes a flexible tines seat (611) for picking the containers (101) in correspondence of rigid portions of these latter.

8. Device according to claim 5 **characterized in that** each container (101) blocked by the first gripping mean (608) is turned upside-down during the transfer from the separating means (5) to the second conveyor (8).

9. Device according to claim 1 **characterized in that** the stopping means (7) include a stop (702) moved

by driving means (700) from a hooking condition (F), in which the stop (702) counters at least a container (101) keeping this latter connected to the second conveyor (8), to a disengagement condition (M) in which the stop (702) disengages at least a container (101).

10. Device according to claim 1 **characterized in that** is completely controlled by electronic calculation and control means fit to control the phase coincidence between at least the separating means (5), the transfer means (6) and the stopping means (7).

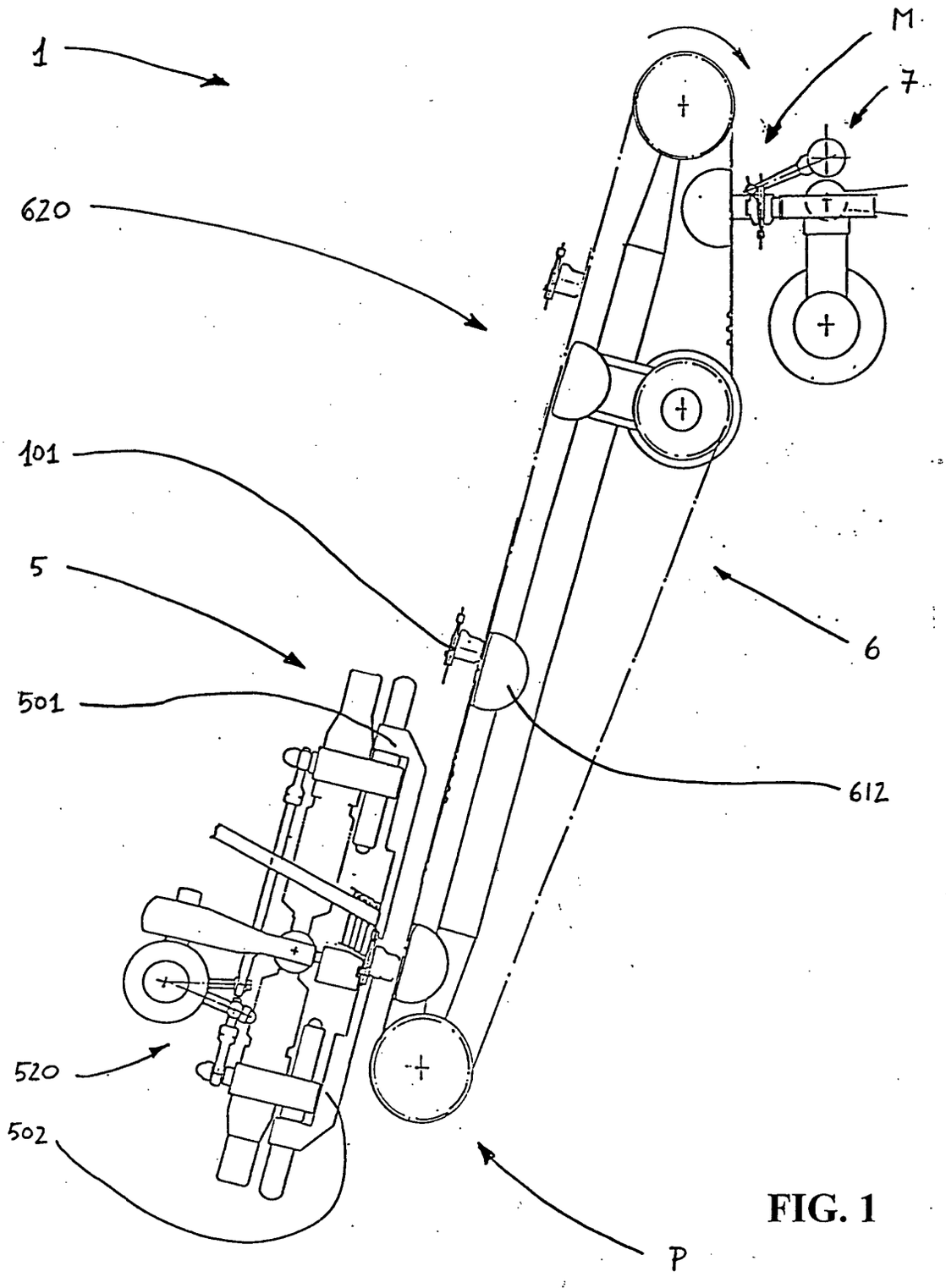
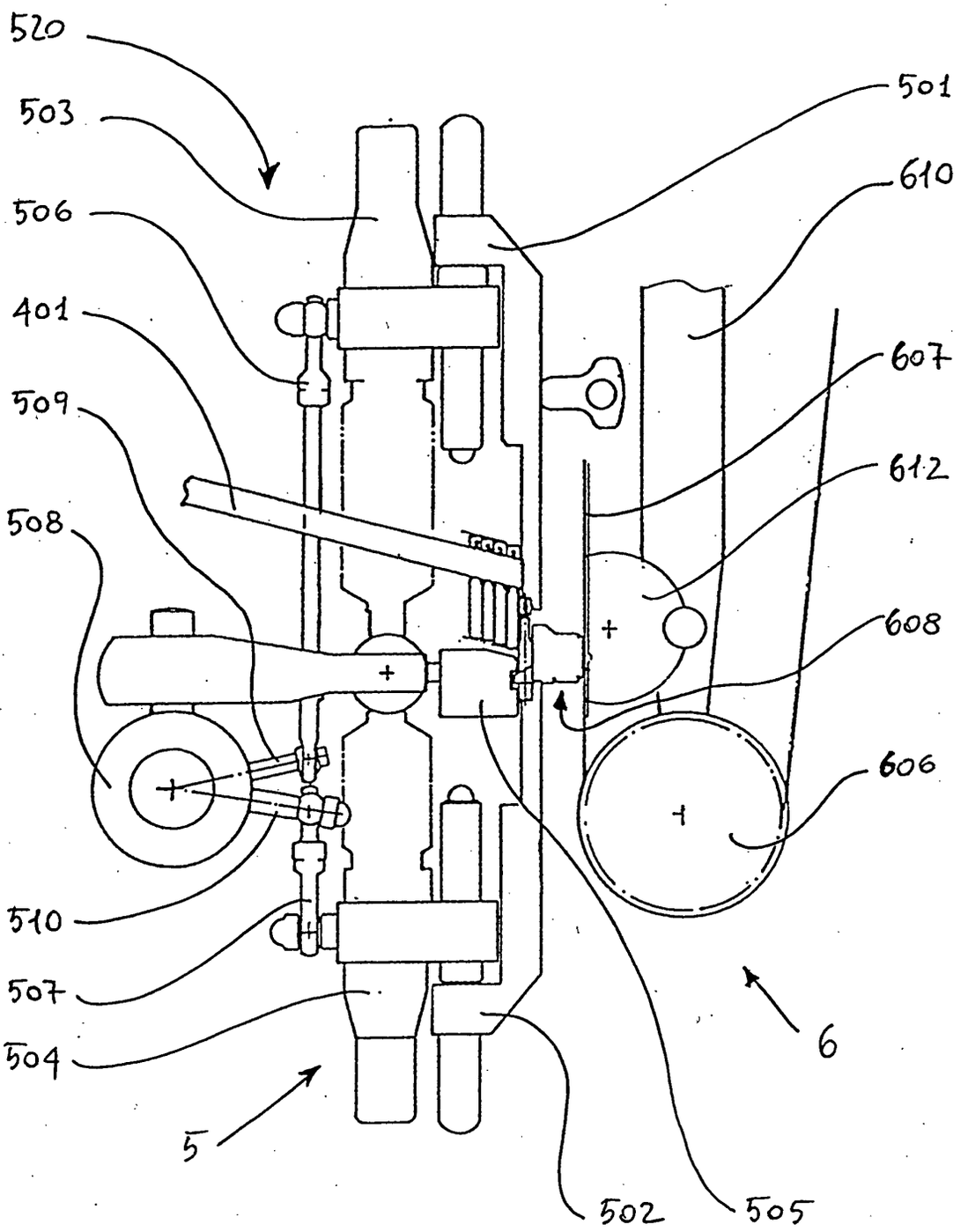


FIG. 1


520
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506
401
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508
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507
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5
501
610
607
612
608
606
6
502
505

FIG. 2

FIG. 3A

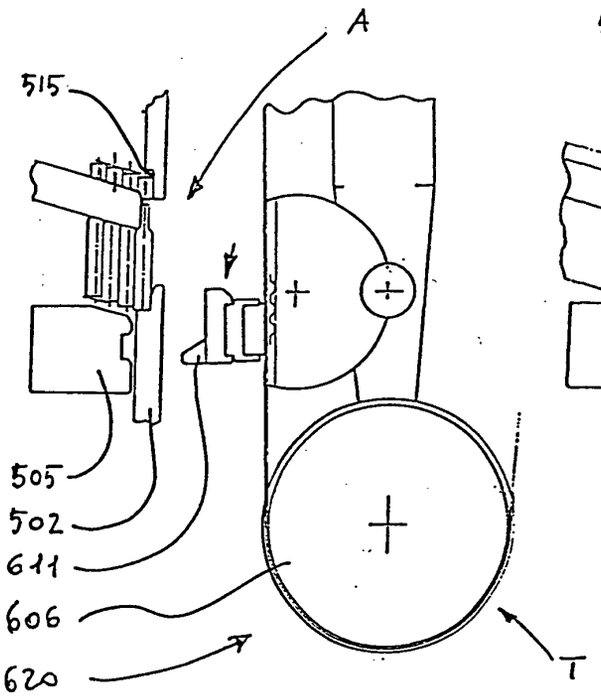
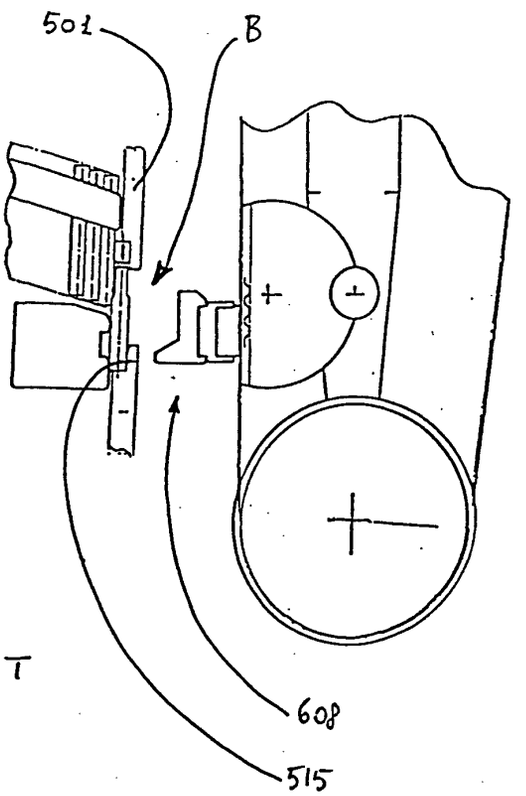


FIG. 3B



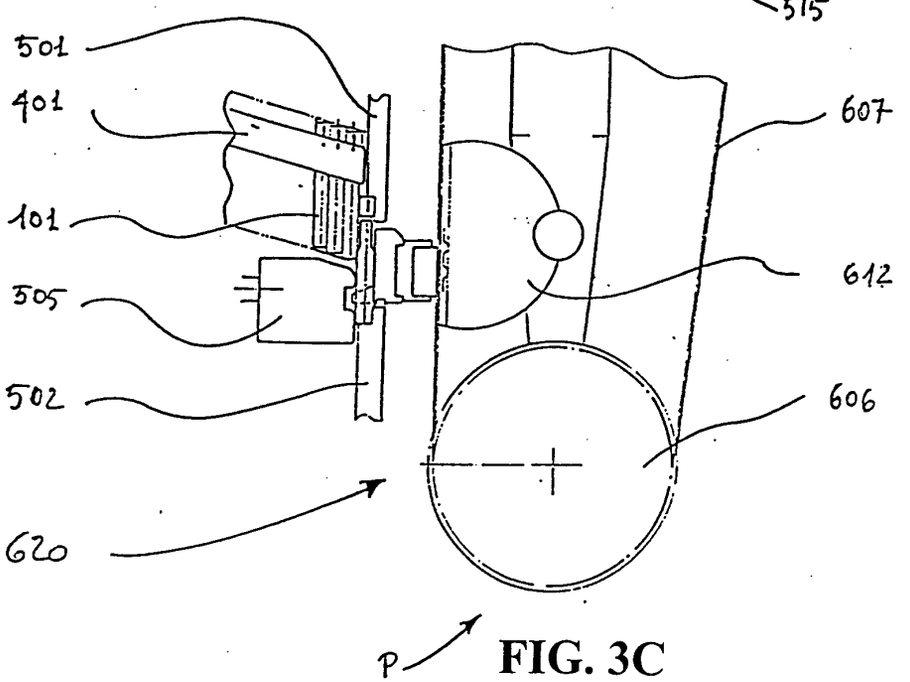


FIG. 3C

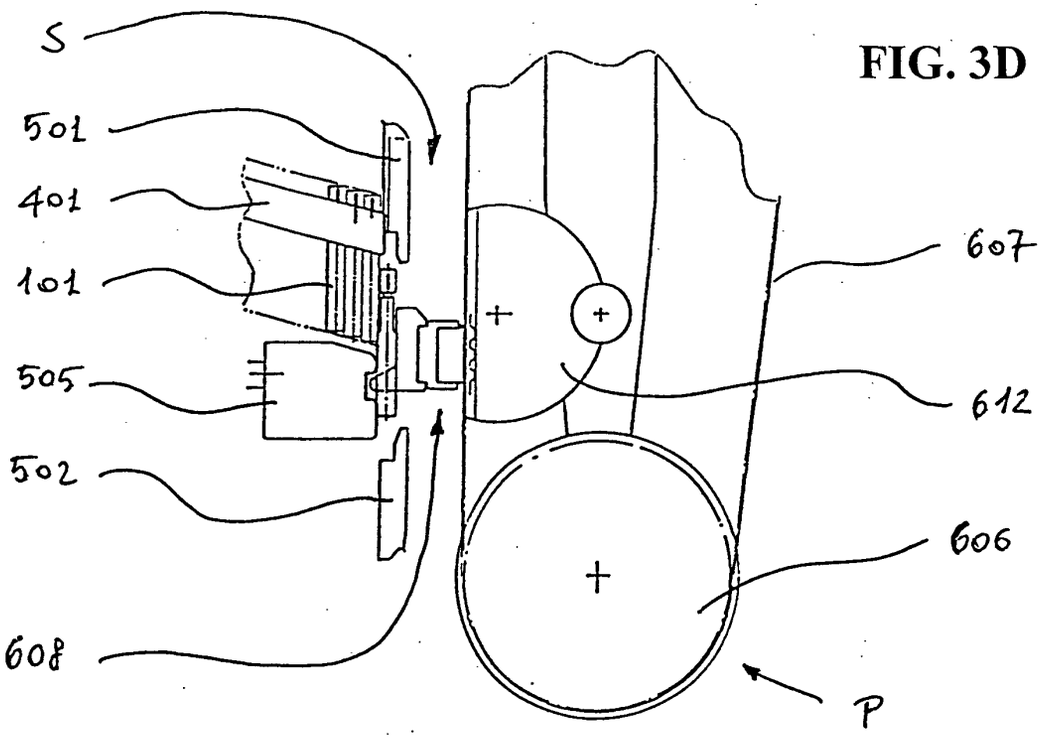

S
501
401
101
505
502
608
607
612
606
P

FIG. 3D

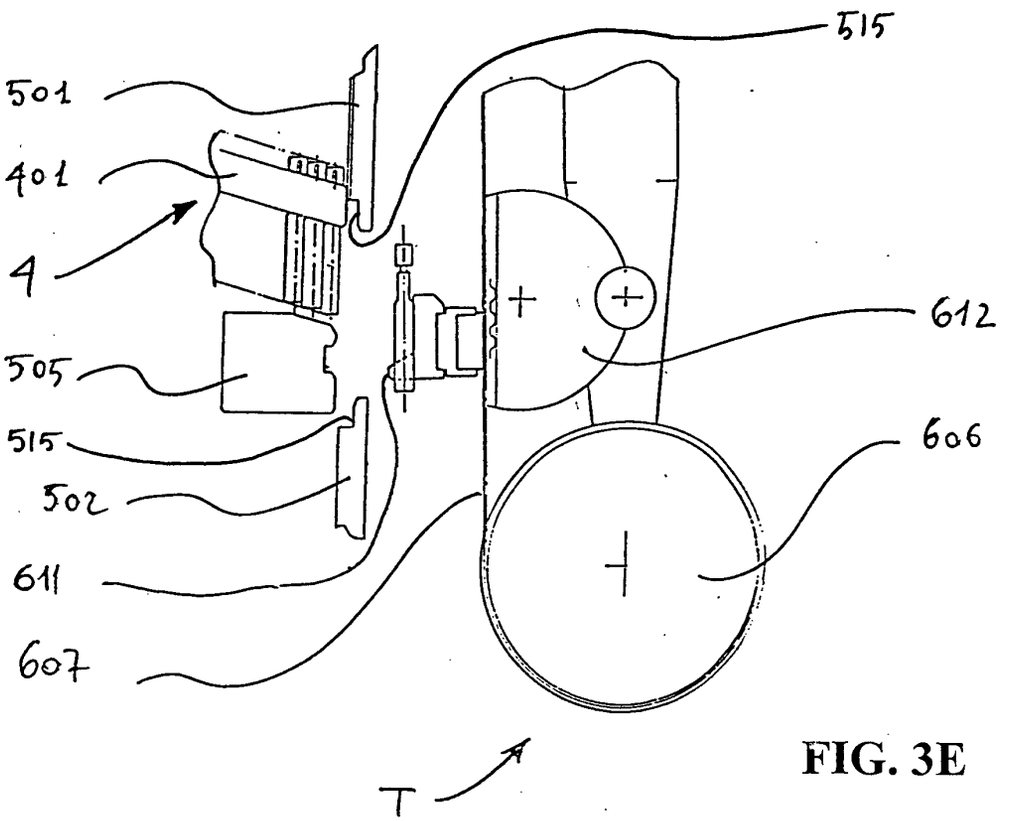

515
501
401
4
505
515
502
611
607
612
606
T

FIG. 3E

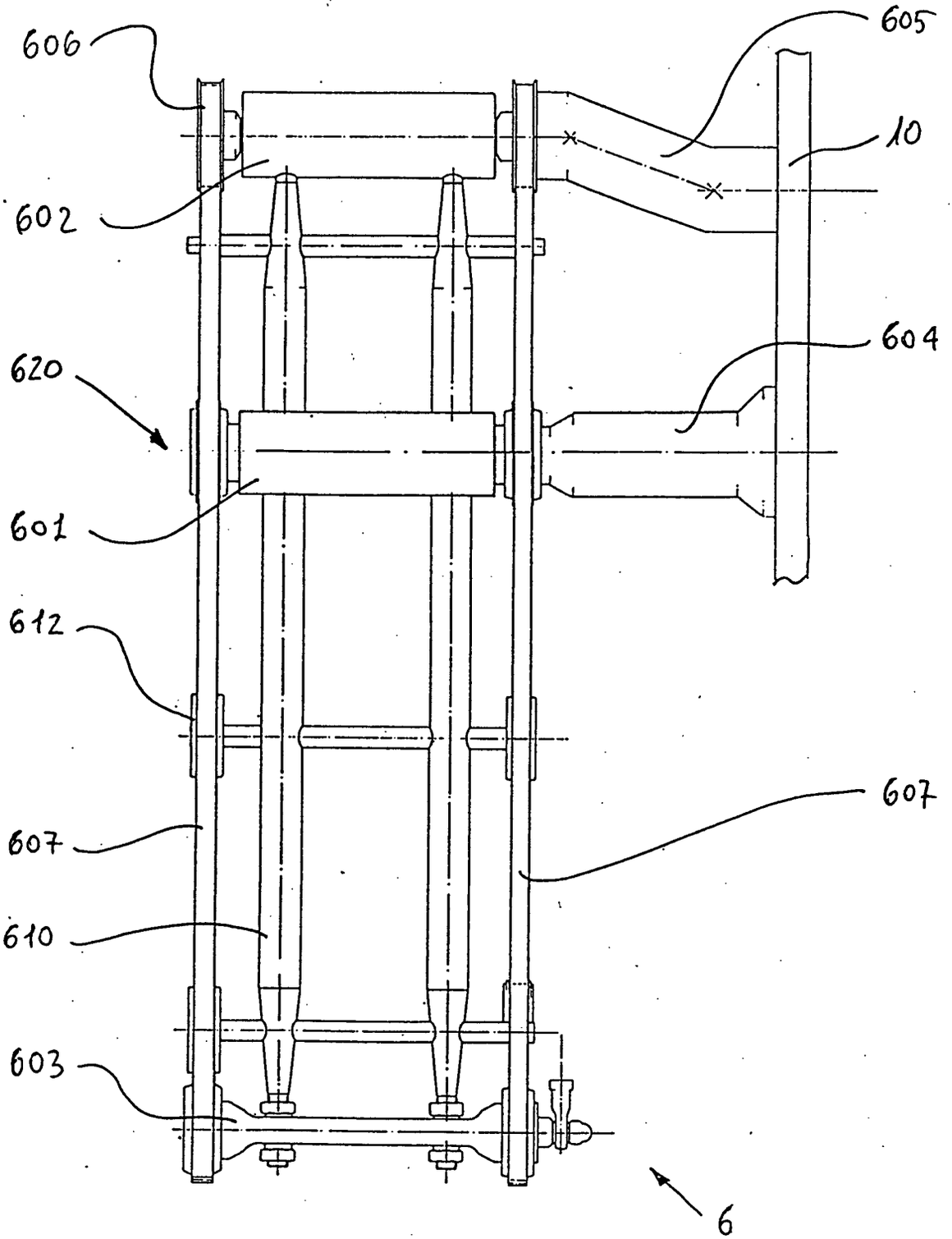


FIG. 4

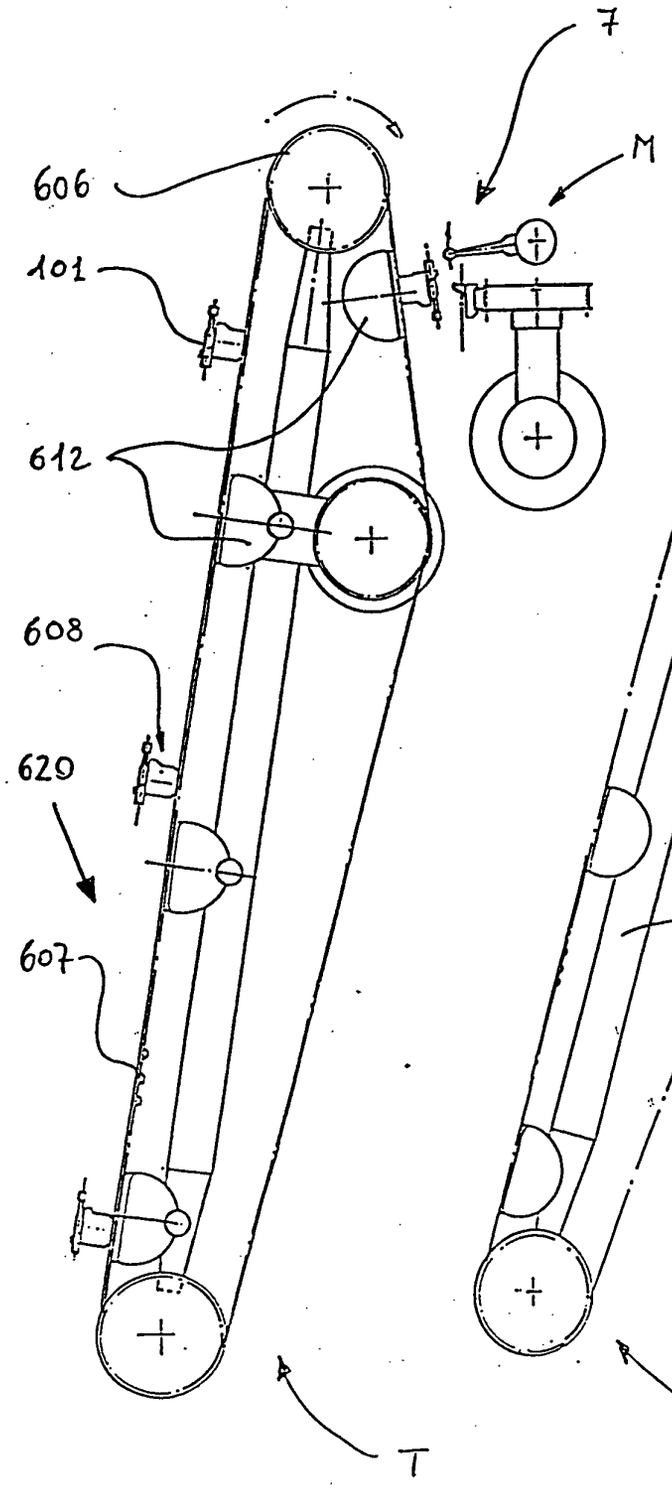


FIG. 5A

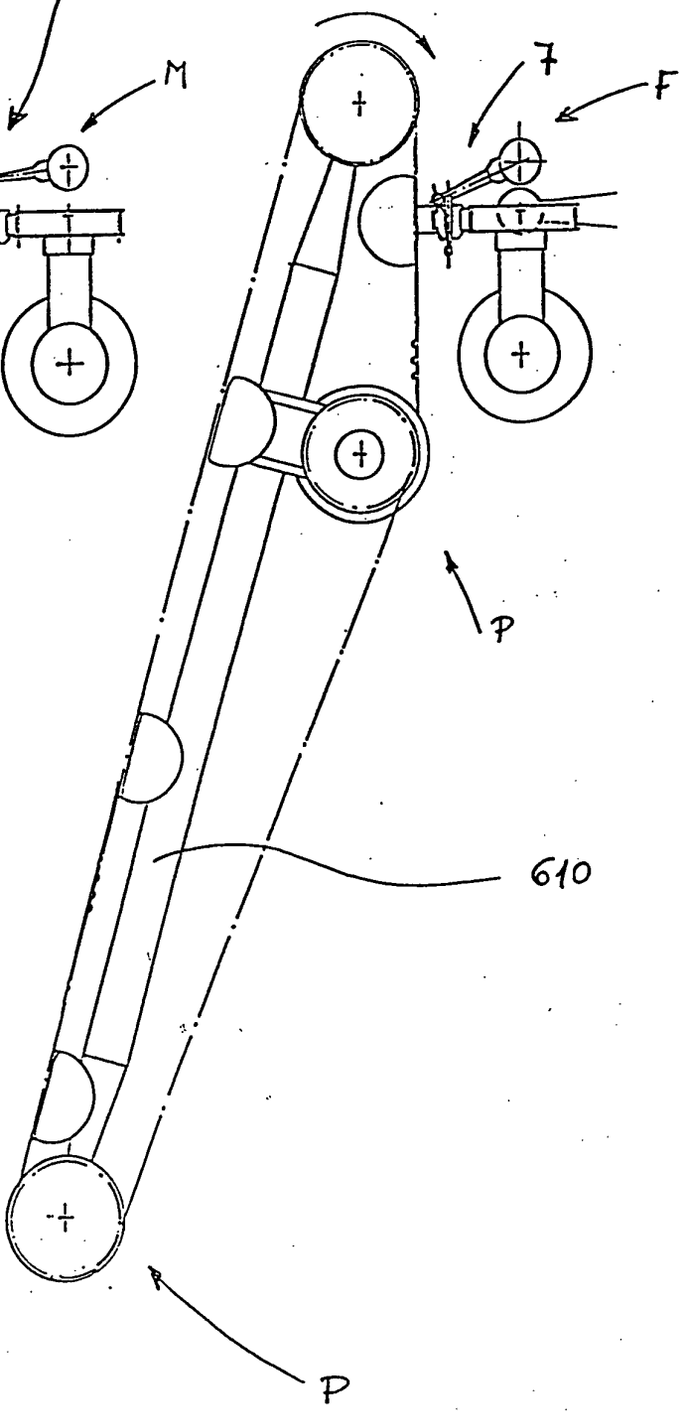


FIG. 5B

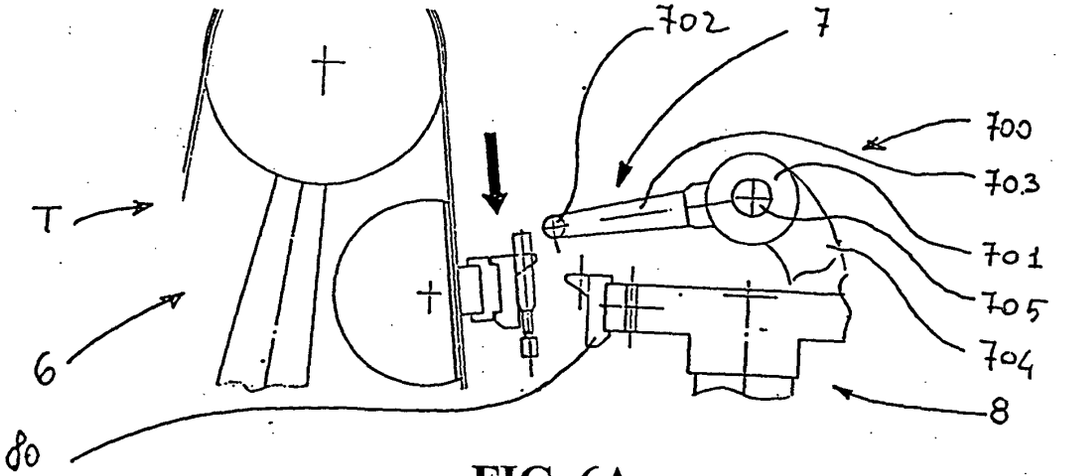


FIG. 6A

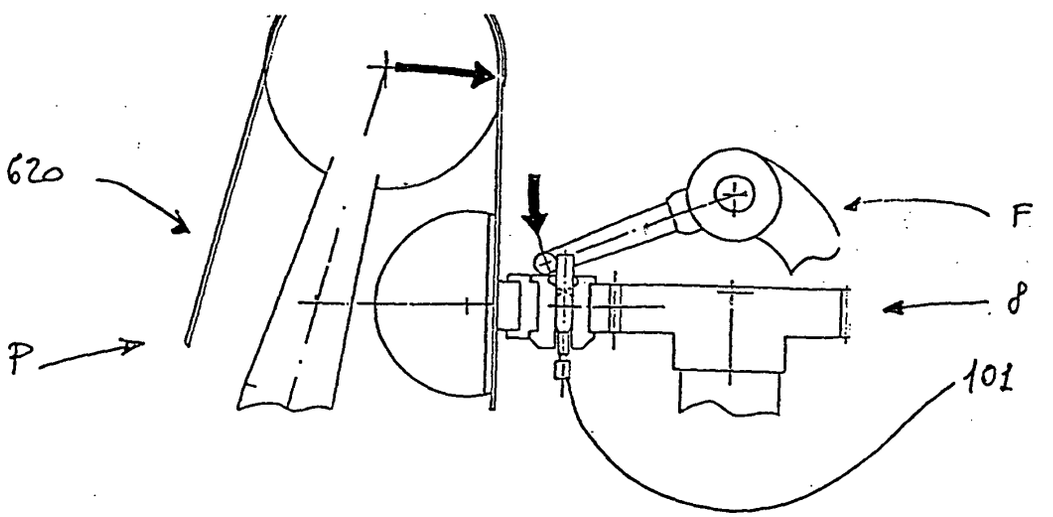


FIG. 6B

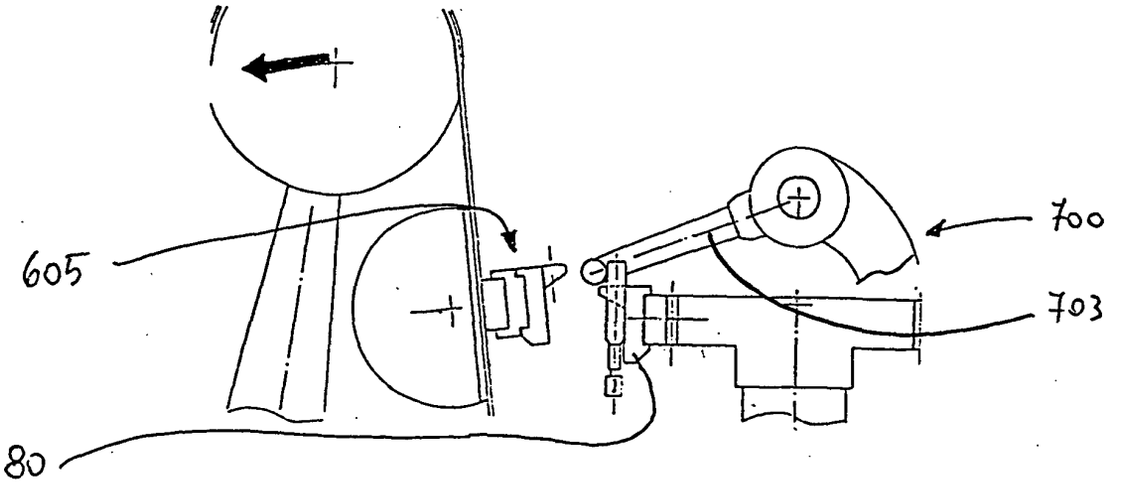


FIG. 6C

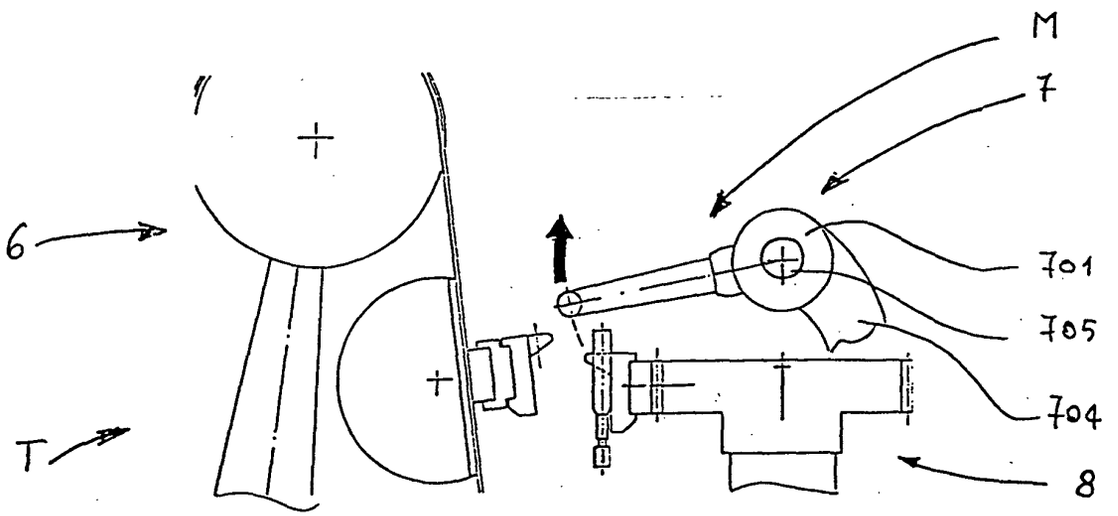


FIG. 6D

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 6460

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	GB 832 346 A (ROSE) 6 April 1960 (1960-04-06) * the whole document *	1	B65B43/52

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 June 2002	Claeys, H

CATEGORY OF CITED DOCUMENTS

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21-06-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 832346 A	06-04-1960	NONE	

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