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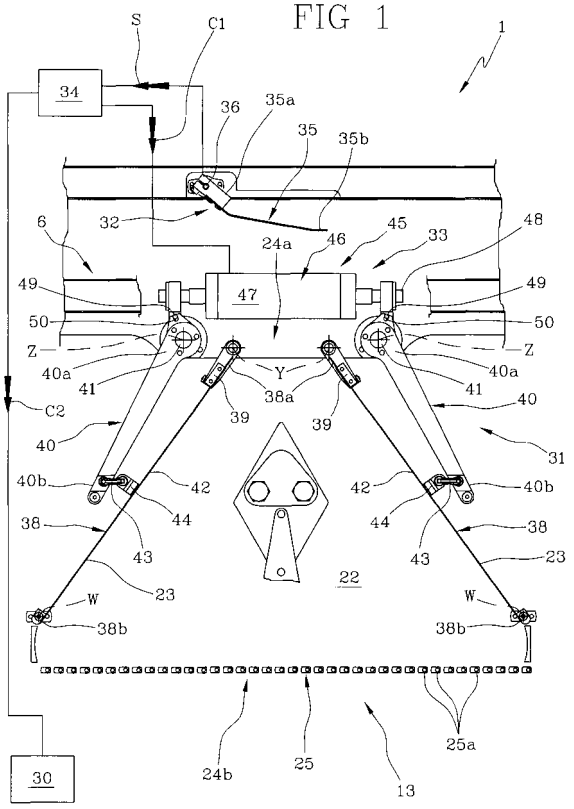
(54) A device and procedure for the batch transfer of tobacco products

(57) Cigarettes are transferred in batches adopting a procedure that includes the steps of feeding loose cigarettes (2) en masse into a hopper (13) with a back wall (22) and two side walls (23) delimiting a top inlet (24a) and a bottom outlet (24b), also a shutter (25) by which the bottom outlet (24b) is opened or closed, and actively varying the geometry of the side walls (23) so that the internal volume of the hopper (13) is adapted to accommodate the quantity of cigarettes (2) admitted through the inlet (24a), by means of an actuator mechanism (31) connected to the side walls (23). Thus, it becomes possible to monitor and control both the rate at which the cigarettes (2) flow into the hopper (13), and the pressure to which the single cigarettes (2) are subjected while occupying the hopper (13) and during the process of filling a tray (3).

FIG 1



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Description

[0001] The present invention relates to a device and to a procedure for the transfer of tobacco products in batches.

[0002] The invention finds application to advantage in complete manufacturing lines for tobacco products, such as cigars, cigarettes and filter tips, and in particular for cigarettes; one typical instance, by way of example, would be the operation of directing the tobacco products in question from a maker to a packer or other wrapping machine.

[0003] In accordance with one conventional method of this type, cigarettes emerging from the maker are ordered in containers, known as trays, which will be stored in readiness before being emptied at an infeed station of the packer.

[0004] The single trays are filled by means of a hopper presenting a vertical back wall, and two fixed side walls extending divergently from top to bottom.

[0005] The aforementioned walls combine to delimit a top inlet opening in communication with a conveyor, on which tobacco products advance in a continuous flow toward the hopper, and a bottom discharge opening closed off by a movable shutter.

[0006] The hopper is emptied cyclically, whilst the flow through the inlet opening is continuous. The hopper is filled by closing off the bottom discharge opening and allowing the cigarettes received from the conveyor to accumulate inside.

[0007] To fill a tray, the hopper bottom is opened for a duration sufficient to allow the cigarettes to pass into the tray beneath, the tray also being lowered by degrees as the cigarettes are taken up.

[0008] The trays have to be filled at relatively high speed in order to keep up with the fast production tempo of the cigarette maker, and at the same time with special care, so that the cigarettes will not lose their ordered arrangement and suffer damage.

[0009] Whilst the cigarettes flow substantially non-stop from the conveyor into the hopper, the flow is not uniformly constant. Consequently, it often happens that the rate of flow is too high, with the result that the cigarettes will be compressed excessively one against another or against the hopper walls and their integrity compromised, for example through tobacco being shed from the cut ends.

[0010] Conversely, if the rate of flow drops below an optimum level, then the massed cigarettes will lack compactness and lose their orderly arrangement, possibly assuming incorrect positions one relative to another, for example wrongly oriented, with axes no longer perpendicular to the back wall of the hopper but slightly askew, or even falling into a void and bending and breaking as a result.

[0011] The object of the present invention is to provide a device and a procedure for the batch transfer of tobacco products, such as will ensure that the products are handled with extreme care during the operation of filling the aforementioned trays.

[0012] In particular, the object of the invention is to design a device and a procedure that will allow of accurately monitoring and controlling both the rate at which the cigarettes flow into the hopper, and the pressure acting on the single cigarette while in the hopper and when transferred into a tray.

[0013] A further object of the invention is to provide a device and a procedure for the batch transfer of tobacco products that will be compatible with high speed operation and allow an ordered arrangement of cigarettes massed in large quantities for loading into trays.

[0014] The stated objects are realized in a device for the batch transfer of tobacco products, of which the features are recited in one or more of claims 1 to 12 appended, and in a procedure for the batch transfer of tobacco products, of which the features are recited in claims 13 to 18.

[0015] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a front elevation view of a device in accordance with the present invention, illustrated in a first operating configuration and with certain parts cut away better to reveal others;
- figure 2 shows the device of figure 1 in a second operating condition;
- figures 3, 4, 5 and 6 show the device of figures 1 and 2 in successive steps during the operation of filling a container.

[0016] Referring to figures 3, 4, 5 and 6, numeral 1 denotes a device, in its entirety, for transferring tobacco products 2 in batches, or lots, by means of containers 3 known commonly as trays, from a first processing unit 4 to a second processing unit 5, and in particular from a cigarette maker 4 to a cigarette packer 5. Both of the units 4 and 5 in question are of familiar embodiment and therefore illustrated only schematically.

[0017] The device 1 comprises a main conveyor 6 by which tobacco products, in this instance cigarettes 2, are carried from the cigarette maker 4 toward the packer 5 along a predetermined direction X; the conveyor 6 operates in conjunction with a unit for management of the containers 3, each of which is able to hold a plurality of cigarettes 2 arranged in ordered alignment.

[0018] The container management unit is neither shown nor described, but could be of the type disclosed in European patent application n° EP 06116470.3 or application n° EP 06116480.2, both filed in the name of the present applicant.

[0019] With reference in particular to figure 4, each container 3 presents a rectangular bottom 7, of which the shorter side is matched substantially to the length of a single cigarette 2 and the longer side compasses several tens of the cigarettes 2 disposed side by side, also a main

wall 8, likewise rectangular, set at right angles to the bottom 7 and joined along one longer side to a corresponding longer side of the bottom 7. The cigarettes 2 lie with one end offered in contact to the main wall 8, which presents a shorter side compassing several tens of cigarettes 2 disposed side by side; thus, the container 3 will hold several thousands of cigarettes, arranged quincuncially. The container 3 also presents two mutually opposed and parallel side walls 9 perpendicular to the bottom 7 and to the main wall 8, combining to delimit an opening 10 on the side opposite from the bottom 7, through which the container 3 can be filled and emptied, and an auxiliary opening 11 on the side opposite from the main wall 8.

[0020] In addition, the main conveyor 6 presents an opening 12 located intermediately along its length, directly above and communicating with a hopper denoted 13.

[0021] In the preferred embodiment illustrated, the main conveyor 6 comprises a first belt 14 looped around pulleys 15, extending between the cigarette maker 4 and the hopper 13 and presenting a top branch 16 on which cigarettes 2 emerging from the maker 4 are carried, lying side by side.

[0022] A second belt 17, looped over relative pulleys 18 and aligned in the same plane as that occupied by the first belt 14, extends from the hopper 13 to the cigarette packer 5 and presents a top branch 19 carrying cigarettes 2 about to enter the packer 5. The first belt 14 and the second belt 17 present respective ends 20 and 21 positioned facing one another and combining to delimit the intermediate opening 12 aforementioned.

[0023] The hopper 13 comprises a back wall 22 and two side walls 23 delimiting a top inlet opening 24a aligned with the opening 12 in the conveyor 6.

[0024] The side walls 23 are mutually divergent, extending from the ends 20 and 21 of the belts 14 and 17 and spreading to a distance marginally less than the width of one container 3.

[0025] Each side wall 23 is also of width approximately equal to the length of one cigarette 2, so that the hopper 13 presents a bottom discharge opening 24b substantially identical in terms of outline and dimensions to the bottom 7 of the container 3. This same opening 24b can be opened or closed by a shutter 25 of conventional embodiment, comprising a plurality of retaining bars 25a set perpendicular to the back wall 22 and arrayed side by side. The bars 25a are capable of movement between an open position (figures 1, 3, 4 and 6), in which the space between any two adjacent bars is sufficient to admit one cigarette 2, and a closed position (figures 2 and 5) in which the bars 25a are drawn into close order by pivoting on respective offset axes and the cigarettes 2 are unable to pass between them.

[0026] More exactly, with reference to figures 3 and 4, the intermediate opening 12 of the conveyor 6 and the top opening 24a of the hopper 13 are linked via a duct 26 delimited by a pair of mutually opposed vertical walls 27 mounted to a fixed frame 28 of the device 1.

[0027] Numeral 29 denotes a support element located next to the hopper 13 and driven by a relative motor 30, shown schematically, of which the function is to carry and position a single container 3 during the filling cycle (figures 4 to 6).

[0028] The support element 29 is traversable vertically between a first position (figure 4) of proximity to the bottom opening 24b of the hopper 13 and a second position (figure 6) distanced from the bottom opening 24b, thus allowing the container 3 to fill up gradually during its descent (figure 5), as will be explained in the course of the specification.

[0029] With the cigarette maker 4, the packer 5 and the device 1 in operation, cigarettes 2 emerging from the packer 4 and advancing along the conveyor 6 gravitate into the hopper 13, which is closed at the bottom by the shutter 25 and will therefore fill to the point where further cigarettes 2 begin rolling over the cigarettes 2 occupying the duct 26 and pass beyond, advancing toward the packer 5. In normal operation, accordingly, part of the total flow of cigarettes 2 will fill the hopper 13 and the trays 3, and part will find its way directly into the packer 5.

[0030] Empty containers 3 are brought to the hopper 13 one at a time by the aforementioned management unit (not illustrated) in readiness for filling. To this end, the container 3 is offered to the hopper 13 with the top opening 10 directed upwards, the auxiliary opening 11 facing the hopper 13, and the bottom 7 beneath the bottom discharge opening 24b, so that the hopper 13 is effectively positioned internally of the container 3 (figure 4).

[0031] Next, the hopper 13 is emptied by shifting the bars 25a of the shutter 25 to the open position so as to release the cigarettes 2, which drop through the bottom opening 24b onto the bottom 7 of the container 3; at the same time, the container 3 is lowered gradually to free more space (figure 5).

[0032] When the container 3 is full, the bars 25a of the shutter 25 return to the closed position (figure 6) and the container 3 is directed toward a storage location while the hopper 13, still full, continues to receive cigarettes 2 from the conveyor 6. Thus, the hopper 13 discharges cyclically whereas the incoming flow is continuous.

[0033] Also forming part of the device 1 is a motion-inducing mechanism 31 linked to the side walls 23 of the hopper 13, such as will actively vary the geometry of the selfsame side walls 23, and thus reproportion the internal volume of the hopper 13, according to the quantity of cigarettes 2 admitted.

[0034] As shown in figures 1 and 2, the motion-inducing mechanism 31 comprises at least one sensor 32 able to monitor a parameter indicating the quantity of tobacco products 2 admitted to the hopper 13, an actuator 33 connected to the side walls 23, which are deformable, and a control unit 34 to which both the sensor 32 and the actuator 33 are connected. The control unit 34 receives a signal S from the sensor 32 indicating the quantity of tobacco products 2 entering the hopper 13 and generates a signal C_1 by which the actuator 33 is piloted to vary the

geometry of the side walls 23.

[0035] The variation in internal volume of the hopper 13 must be proportioned so as to avoid compression and degradation of the cigarettes 2, while at the same time ensuring the flow remains suitably compact, so that the cigarettes 2 do not lose their ordered alignment.

[0036] As illustrated in figures 1, 5 and 6, to ensure balanced pressure and compactness in the flow of cigarettes 2 admitted to the hopper 13, the control unit 34 is also connected to the motor 30 of the support element 29 in such a way as to vary the rate of descent Vd of the selfsame element 29 (figure 5) in response to the signal S received from the sensor 32, by generating a respective control signal denoted C_2 (figure 1).

[0037] In a preferred embodiment, the sensor 32 will be located near the conveyor 6 along the predetermined direction X followed by the cigarettes 2, above the top opening 24a of the hopper 13, so as to measure the rate of the flow.

[0038] In particular, the sensor 32 is a feeler placed to measure the depth Sp of the flow of cigarettes 2 advancing along the conveyor 6 (figure 3).

[0039] The feeler 32 comprises a finger 35 of which a first end 35a is coupled to the spindle 36 of a potentiometer such as will pick up any angular movement of a floating second end 35b.

[0040] The second end 35b appears substantially flat when seen in cross section, and is thus able to ride on the cigarettes 2 without damaging them.

[0041] The potentiometer is mounted above the conveyor 6 and over a zone 37 occupied by the advancing flow of cigarettes 2, with the spindle 36 set at right angles to the back wall 22 of the hopper 13. The finger 35 is capable of movement between a first position, in which the second end 35b encroaches on the zone 37 occupied by the cigarettes 2, and a second position in which it is caused by a rise in level of the flow of cigarettes 2 to rotate through an angle α (figure 3) determined by the depth Sp of the cigarettes 2 present on the conveyor 6 at the intermediate opening 12.

[0042] In the preferred embodiment illustrated in the accompanying drawings, each of the side walls 23 of the hopper 13 comprises a flexible leaf 38. A first end 38a of the leaf 38 is inserted slidably in a terminal portion 39 associated pivotably with the fixed frame 28 of the device 1 by way of an axis Y of rotation located near the top inlet opening 24a. The leaf 38 also presents a second end 38b associated pivotably with the fixed frame 28 of the device 1 by way of a further axis W located near the bottom discharge opening 24b.

[0043] The actuator 33 comprises a pair of levers 40 flanking the hopper 13, each with a first end 40a hinged to the frame 28 and a second end 40b linked to a corresponding flexible leaf 38.

[0044] The first end 40a of each lever 40 is coupled to a pivot 41 turning on an axis Z located alongside the axis Y of rotation of the terminal portion 39 aforementioned. The second end 40b of the lever 40 is linked to a middle area 42 of the respective leaf 38 by way of a connecting rod 43 coupled pivotably to the lever 40 and attached hingedly to a lug 44 associated rigidly with the leaf 38.

[0045] Each of the levers 40 is connected to a motor 45 and rendered capable thus of angular movement on the pivot 41 at its first end 40a.

[0046] The motor 45 will consist preferably in a double acting pneumatic or fluid power cylinder 46 mounted horizontally near to the inlet opening 24a of the hopper 13 (figures 1 and 2). The cylinder 46 has a central body 47 slidably accommodating two mutually opposed rods 48 capable of movement in respective horizontal directions.

[0047] Each rod 48 carries a pin 49 engaging a socket 50 afforded by the first end 40a of the corresponding lever 40 and distanced from the rotational axis Z of the pivot 41. Thus, a linear displacement of the rod 48 produces an angular movement of the lever 40 which, by way of the connecting rod 43, will either push or pull on the leaf 38 at the middle area 42 and cause it to arch.

[0048] More exactly, with the two rods 48 in a partially extended position, the leaves 38 remain undeformed and straight (figure 1). Retracting the two rods 48 from the aforementioned partially extended position back into the central body 47, the levers 40 will swing in opposite directions and spread the two second ends 40b apart, thus arching the leaves 38 outward and increasing the volume of the space enclosed by the hopper 13 (figure 2). Conversely, extending the rods 48 beyond the partially extended position will have the effect of drawing the second ends 40b together, causing the leaves 38 to arch inward and reducing the volume of the space enclosed by the hopper 13 (a configuration not illustrated in the drawings).

[0049] There now follows a description of a preferred through not exclusive transfer procedure employing the device 1 disclosed.

[0050] In operation, with the hopper 13 filling up, the control unit 34 is programmed to position the two side walls 23 according to a prescribed law of deformation "Ld" that corresponds to a reference flow rate "Pr" of the cigarettes 2 advancing on the conveyor 6. At the same time, the control unit 34 also monitors the effective flow rate "Pe" by way of the sensor 32, comparing this value with the reference value "Pr" and, should the effective rate "Pe" differ from the reference rate "Pr", responds by adjusting the law of deformation "Ld".

[0051] More exactly, from the moment when the bottom of the hopper 13 is closed off by the shutter 25, the cigarettes 2 begin to accumulate, rising ultimately to the level of the intermediate opening 12. During this stage, the control unit 34 is programmed to pilot the operation of the actuator 33 in such a way that the volume internally of the hopper 13 will be increased in accordance with the prescribed law of deformation "Ld" which, for example, induces a linear variation in the deflection Fr (figure 2) of the flexible leaves 38 with a time component expressed as "Ld: Fr=at+b", where "t" is time and "a" and "b" are constants, the deflection in this instance being characterized by a constant rate of deformation equal to "V_{Fr}=a".

[0052] The law "Ld" governing the increase in volume is precomputed so that the reference flow rate "Pr" of the advancing cigarettes 2 will be sensed by the feeler 32 as constant, or rather, the flow passing beneath the feeler 32 will present a constant reference depth "Sp_r".

[0053] If the effective rate of flow "Pe" sensed by the feeler 32, or the effective depth "Sp_e", is not at variance with the reference value "Pr", the control unit 34 will apply no correction to the law "Ld" governing the increase in volume.

[0054] If the effective rate of flow "Pe" sensed by the feeler is greater than the reference rate "Pr", or the effective depth "Sp_e" is greater than the reference depth "Sp_r," the control unit 34 will alter the law "Ld" governing the increase in volume in such a way, for example, as to speed up the rate at which the side walls 23 are deformed.

[0055] If the effective rate of flow "Pe" sensed by the feeler is less than the reference rate "Pr", or the effective depth "Sp_e" is less than the reference depth "Sp_r,", the control unit 34 will alter the law "Ld" governing the increase in volume in such a way as to slow the rate at which the side walls 23 are deformed, for example, or to leave the walls 23 undeformed, or indeed to reduce the volume of the hopper 13 by causing the walls 23 to flex inwards.

[0056] The control unit 34 also governs the rate "Vd" at which the support element 29 descends during the step of emptying the hopper 13 and filling the container 3. The container 3 is lowered according to a prescribed law of motion "Lm" that corresponds to the reference flow rate "Pr" of the cigarettes 2 advancing on the conveyor 6. At the same time, the control unit 34 senses the effective flow rate "Pe" by way of the sensor 32, comparing this value with the reference value "Pr", and should the effective rate "Pe" differ from the reference rate "Pr", responds by adjusting the law of motion "Lm".

[0057] In detail, to fill a container 3, the shutter 25 opens and the cigarettes 2 begin to drop into the container 3. During this step, the control unit 34 is programmed to pilot the speed of the motor 30 driving the support element 29 so that the element will descend subject to the predetermined law of motion "Lm" which, for example, induces a downward movement of the container 3 according to a law expressed as "Lm: S=ct+d", where "t" is time and "c" and "d" are constants, which results in a rate of descent equal to "Vd=c".

[0058] The law "Lm" governing the rate of descent is precomputed so that the reference flow rate "Pr" of the advancing cigarettes 2 will be sensed by the feeler 32 as constant, or rather, the flow passing beneath the feeler 32 will present a constant reference depth "Sp_r".

[0059] If the effective rate of flow "Pe" sensed by the feeler 32, or the effective depth "Sp_e", is not at variance with the reference value "Pr", the control unit 34 will apply no correction to the law "Lm" governing the rate of descent.

[0060] If the effective rate of flow "Pe" sensed by the feeler is greater than the reference rate "Pr", or the effective depth "Sp_e" is greater than the reference depth "Sp_r," the control unit 34 will alter the law of motion "Lm" in such a way as to increase the rate Vd at which the container 3 descends.

[0061] If the effective rate of flow "Pe" sensed by the feeler is less than the reference rate "Pr", or the effective depth "Sp_e" is less than the reference depth "Sp_r,", the control unit 34 will alter the law of motion "Lm" in such a way as to reduce the rate Vd at which the container 3 descends.

[0062] The function of monitoring the rate of descent Vd can also be performed simultaneously with that of monitoring the deformation of the side walls 23, applying a control logic that is more complex and not described here.

[0063] In any event, all of the monitoring and control operations are intended primarily to ensure that the pressure exerted on each cigarette 2 by the other cigarettes and by the walls of the hopper 13 remains constant, so that the cigarettes will not be crushed and damaged.

[0064] Moreover, these same operations ensure that the cigarettes 2 can be kept in their proper orderly alignment, and prevented from assuming positions with axes no longer perpendicular to the back wall of the hopper, but slightly askew and at risk of bending or breaking.

Claims

1. A device for the batch transfer of tobacco products, comprising a hopper (13) furnished with a back wall (22) and two side walls (23) combining to delimit a top inlet opening (24a) through which tobacco products (2) are admitted, and a bottom opening (24b) from which the tobacco products (2) are discharged, also a shutter (25) by which the bottom opening (24b) is opened or closed,
   characterized
   in that it further comprises a motion-inducing mechanism (31) connected to the side walls (23), such as will actively vary the geometry of the side walls (23) so as to adapt the internal volume of the hopper (13) to the quantity of tobacco products (2) admitted through the top opening (24a)

2. A device as in claim 1, wherein the motion-inducing mechanism (31) comprises at least one sensor (32) able to monitor a parameter indicating the quantity of tobacco products admitted to the hopper (13), an actuator (33) connected to the side walls (23), and a control unit (34) connected to the at least one sensor (32) and to the actuator (33) in such a way that it can receive a signal (S) from the sensor (32) representative of the parameter indicating the quantity of tobacco products (2) admitted to the hopper (13) and generate a signal (C) by which the actuator (33) is piloted to vary the geometry of the side walls (23).

3. A device as in claim 2, further comprising a support element (29) carrying a container (3) to be filled with tobacco products (2), and a motor (30) by which the support element (29) is set in motion vertically between a first position of proximity to the bottom opening (24b) of the hopper (13) and a second position distanced from the selfsame bottom opening (24b), in such a way that the container (3) can be filled during the movement of the support element (29) from the first position toward the second position.

4. A device as in claim 3, wherein the motor (30) is connected to the control unit (34) in such a way that the rate of descent (Vd) of the support element (29) can be varied in response to the signal received from the sensor (32) representative of the parameter indicating the quantity of tobacco products (2) admitted to the hopper (13).

5. A device as in claim 1, 2, 3 or 4, wherein each of the side walls (23) of the hopper (13) comprises a flexible leaf (38).

6. A device as in claim 5, wherein each of the side walls (23) comprises a terminal portion (39) associated pivotably with a fixed frame (28) near the top inlet opening (24a), and the leaf (38) presents a first end (38a) inserted slidably in the terminal portion (39) and a second end (38b) associated pivotably with the fixed frame (28) near the bottom discharge opening (24b).

7. A device as in claim 5 or 6, wherein the actuator (33) comprises a pair of levers (40), each presenting a first end (40a) hinged to the fixed frame (28) and a second end (40b) linked to one respective side wall (23), and at least one motor (45) by which each lever (40) is caused to rotate about the relative first end (40a).

8. A device as in claim 7, wherein the at least one motor (45) of the actuator (33) comprises a double acting pneumatic or fluid power cylinder (46).

9. A device as in claim 1, further comprising a conveyor (6) extending along a predetermined direction (X) between a first unit (4) and a second unit (5) by which the tobacco products (2) are processed, and presenting an intermediate opening (12) positioned facing the top inlet opening (24a) of the hopper (13), by way of which the tobacco products (2) are caused to drop into the hopper (13).

10. A device as in claim 9, wherein the at least one sensor (32) is located near the conveyor (6) at a point along the predetermined direction (X).

11. A device as in claim 10, wherein the at least one sensor (32) is located above the inlet opening (24a) of the hopper (13).

12. A device as in claim 10 or 11, wherein the at least one sensor (32) comprises a feeler able to sense the depth (Sp) of the flow of tobacco products (2) advancing on the conveyor (6) in the predetermined direction (X).

13. A procedure for the batch transfer of tobacco products, comprising the step of feeding a flow of tobacco products (2) into a hopper (13) furnished with a back wall (22) and two side walls (23) combining to delimit a top inlet opening (24a), and a bottom opening (24b) from which the tobacco products (2) are discharged, also a shutter (25) by which the bottom opening (24b) is opened or closed,
characterized
in that it comprises the further step of actively varying the geometry of the side walls (23) and the internal volume of the hopper (13), according to the quantity of tobacco products (2) admitted to the hopper (13), by means of a motion-inducing mechanism (31) linked to the side walls (23).

14. A procedure as in claim 13, further comprising the steps of positioning a container (3) in alignment with the bottom discharge opening (24b) of the hopper (13), operating the shutter (25) to open the bottom opening (24b), lowering the container (3) to allow the passage of the tobacco products (2) from the hopper (13) into the container (3) and controlling the rate of descent (Vd) of the container (3) on the basis of a parameter indicating the quantity of tobacco products (2) entering the hopper (13).

15. A procedure as in claim 14, wherein the step of feeding a flow of tobacco products (2) into the hopper (13) includes the step of directing the products along a predetermined direction (X) on a conveyor (6) that extends between a first unit (4) and a second unit (5) by which the tobacco products (2) are processed, and presents an intermediate opening (12) positioned facing the top inlet opening (24a) of the hopper (13), by way of which the tobacco products (2) are caused to drop into the hopper (13).

16. A procedure as in claim 15, wherein the parameter indicating the quantity of tobacco products (2) admitted to the hopper (13) is given by the rate of flow of the tobacco products (2) advancing on the conveyor (6).

17. A procedure as in claim 16, wherein the step of actively varying the geometry of the side walls includes the steps of deforming the side walls (23) according to a prescribed law of deformation (Ld) corresponding to a reference flow rate (Pr) of the tobacco prod-

ucts (2) advancing on the conveyor (6), sensing the effective flow rate (Pe) of the tobacco products (2) advancing on the conveyor (6), comparing the effective flow rate (Pe) with the reference flow rate (Pr), and varying the law of deformation (Ld) in the event that the effective rate (Pe) differs from the reference rate (Pr).

18. A procedure as in claim 17, wherein the step of controlling the rate of descent of the container includes the steps of lowering the container (3) according to a prescribed law of motion (Lm) corresponding to a reference flow rate (Pr) of the tobacco products (2) advancing on the conveyor (6), sensing the effective flow rate (Pe) of the tobacco products (2) advancing on the conveyor (6), comparing the effective flow rate (Pe) with the reference flow rate (Pr), and varying the law of motion (Lm) in the event that the effective rate (Pe) differs from the reference rate (Pr).

FIG 1

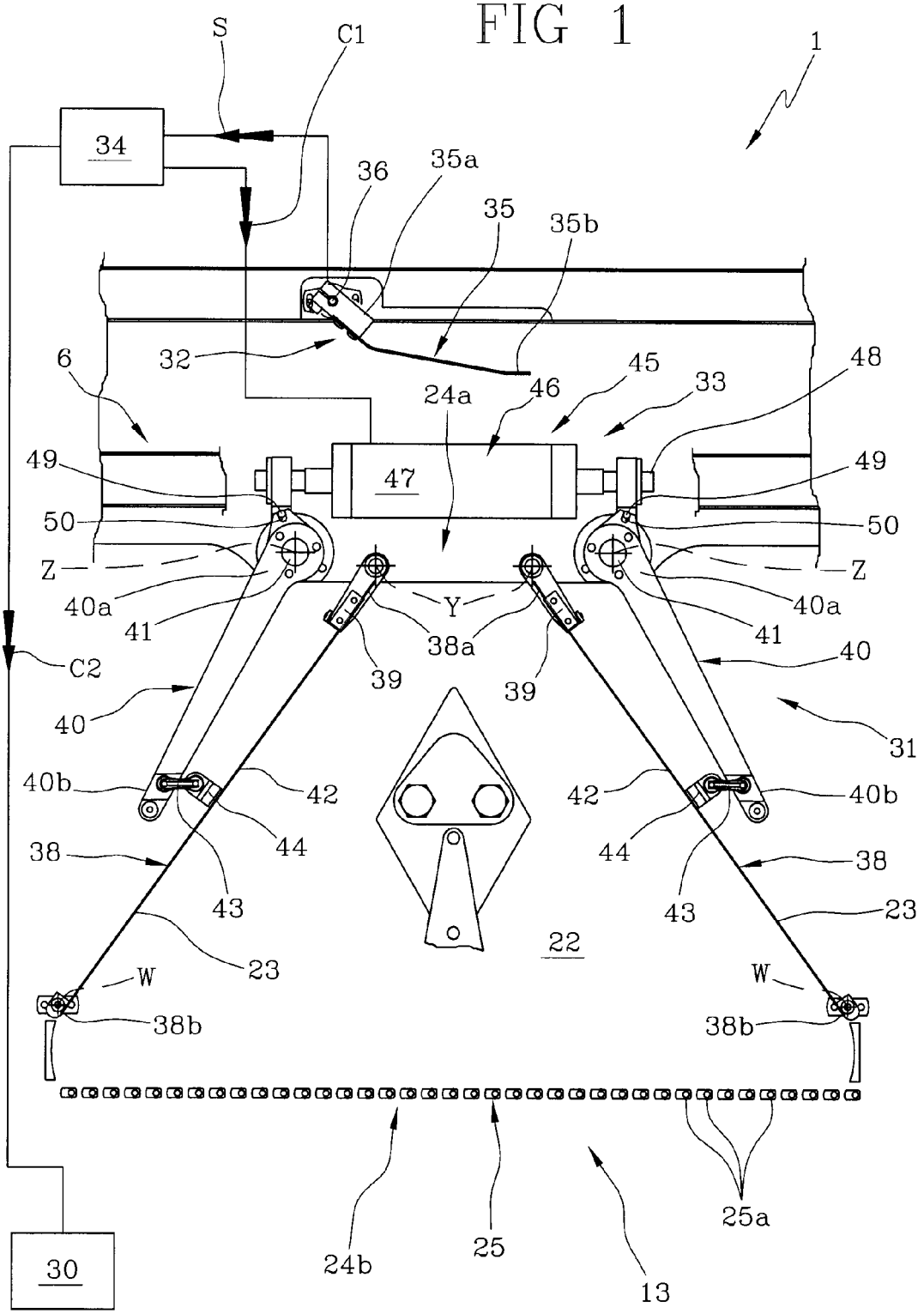
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FIG 2

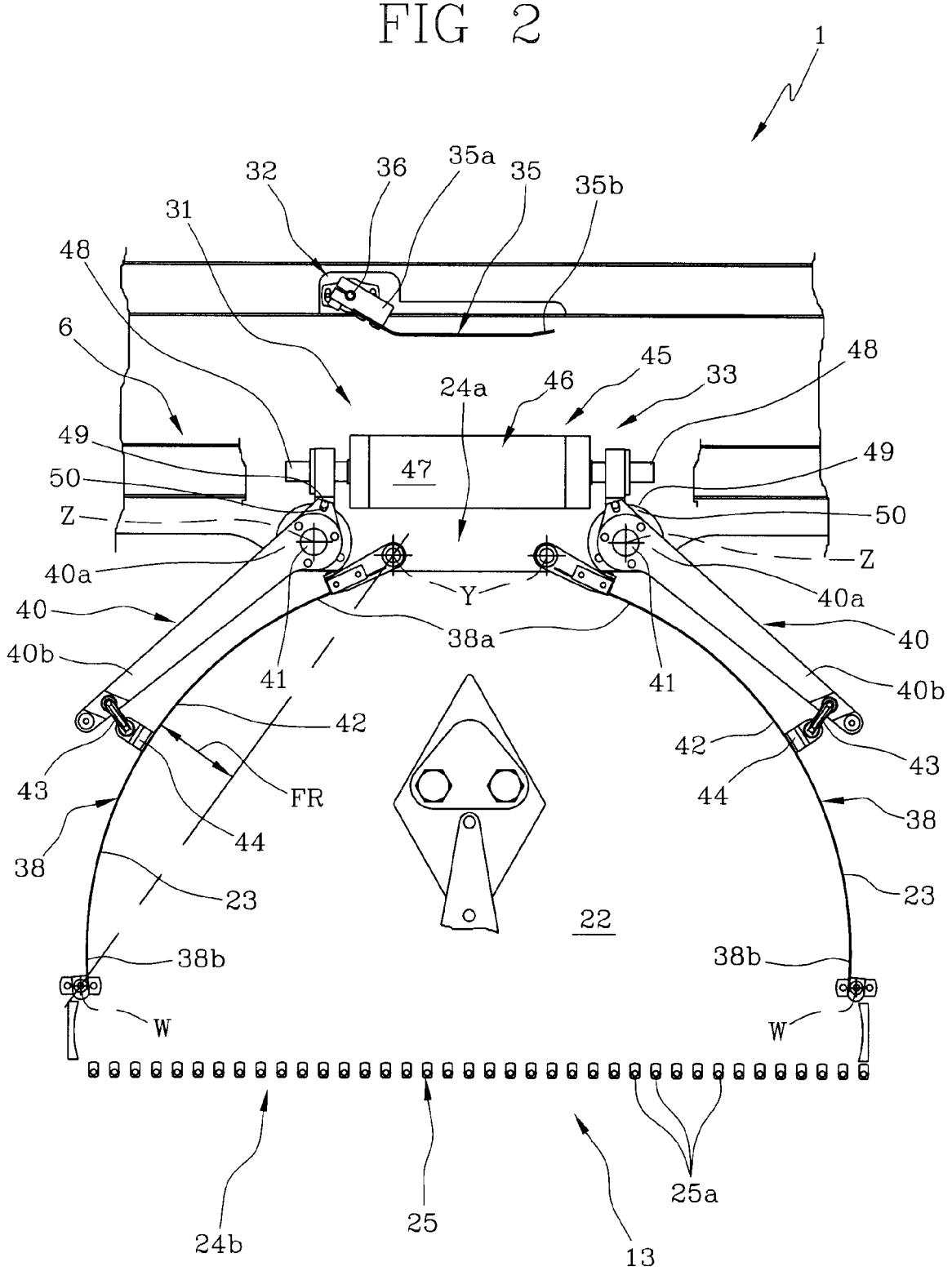
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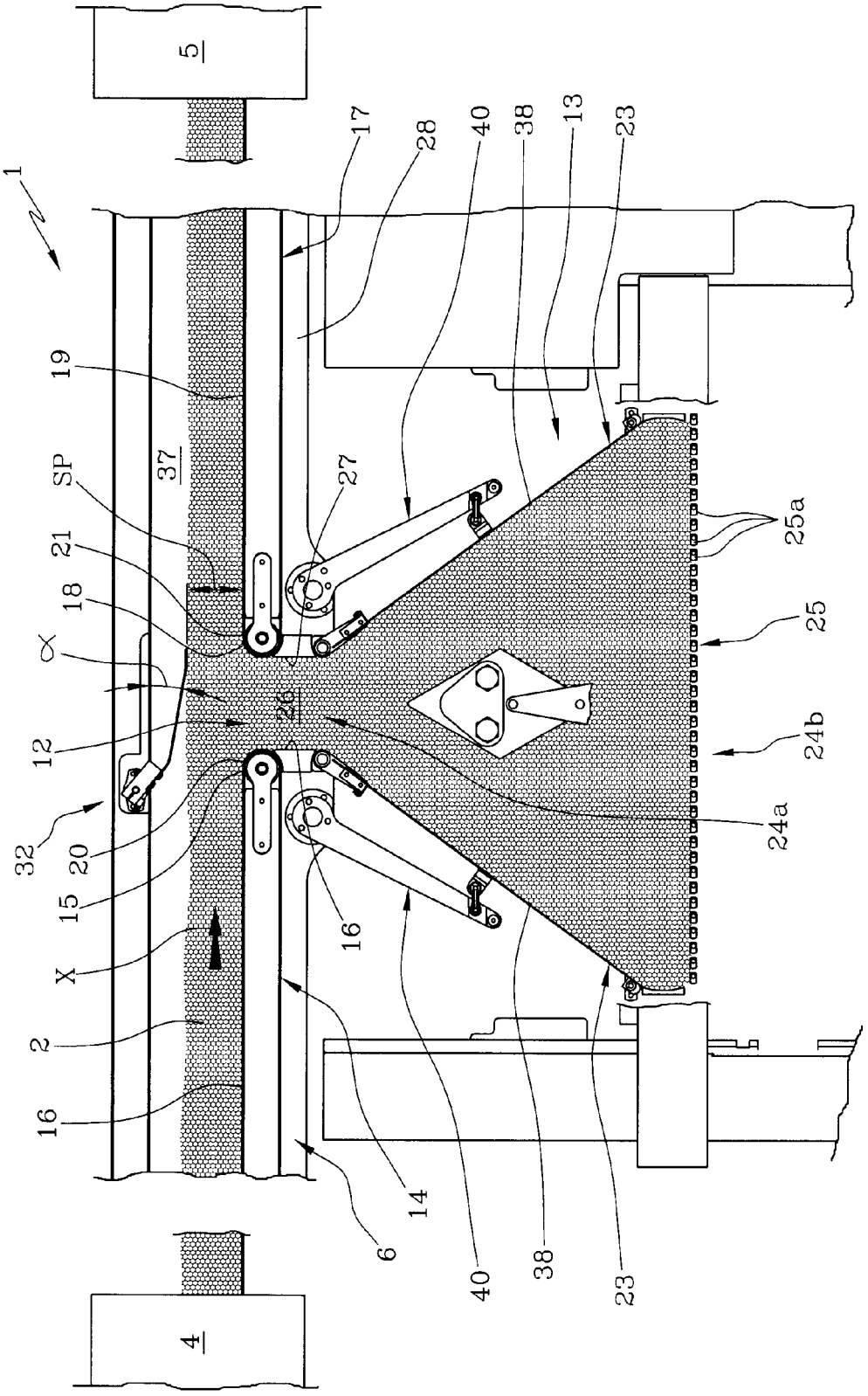
FIG 3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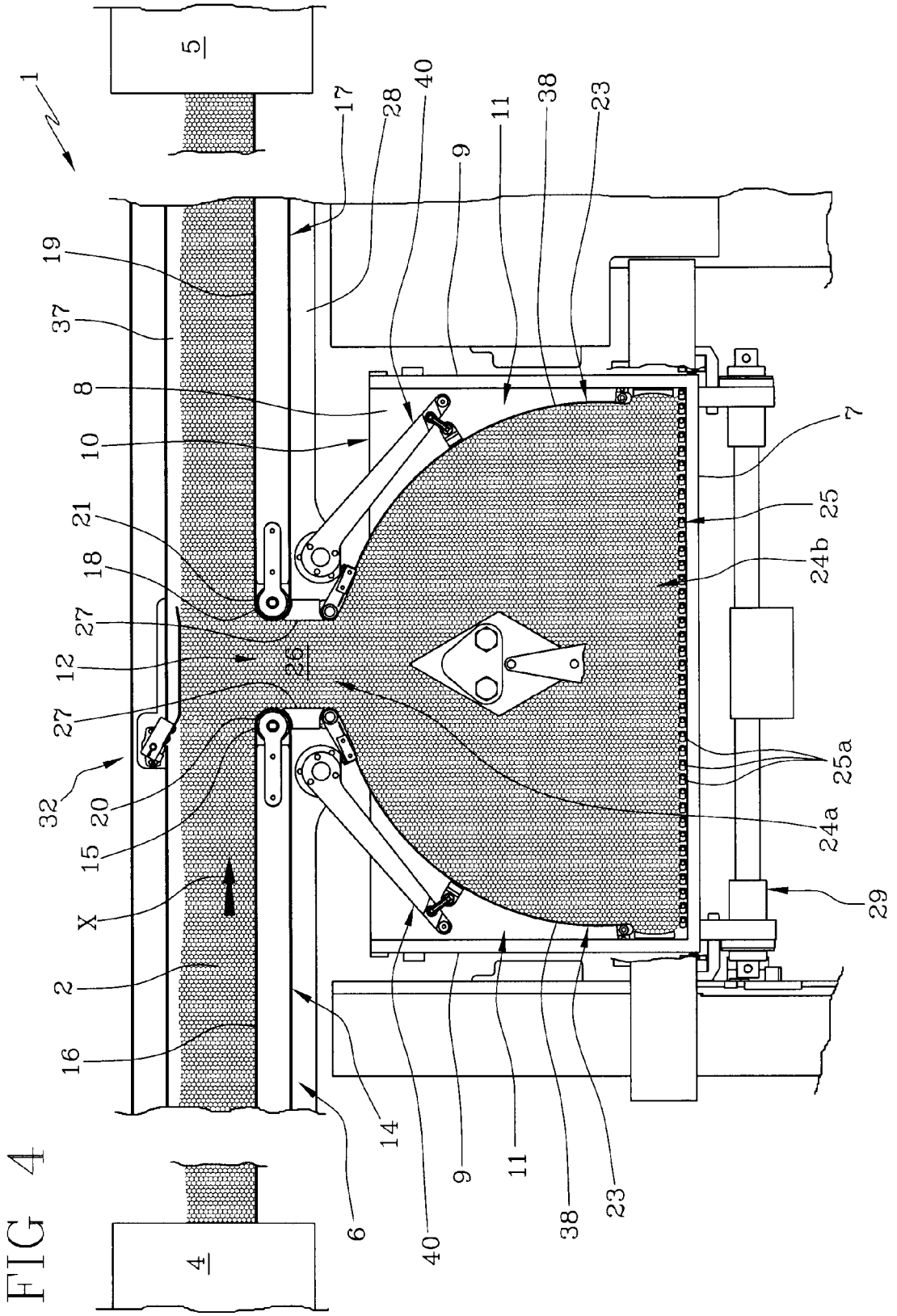
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FIG 4

FIG 5

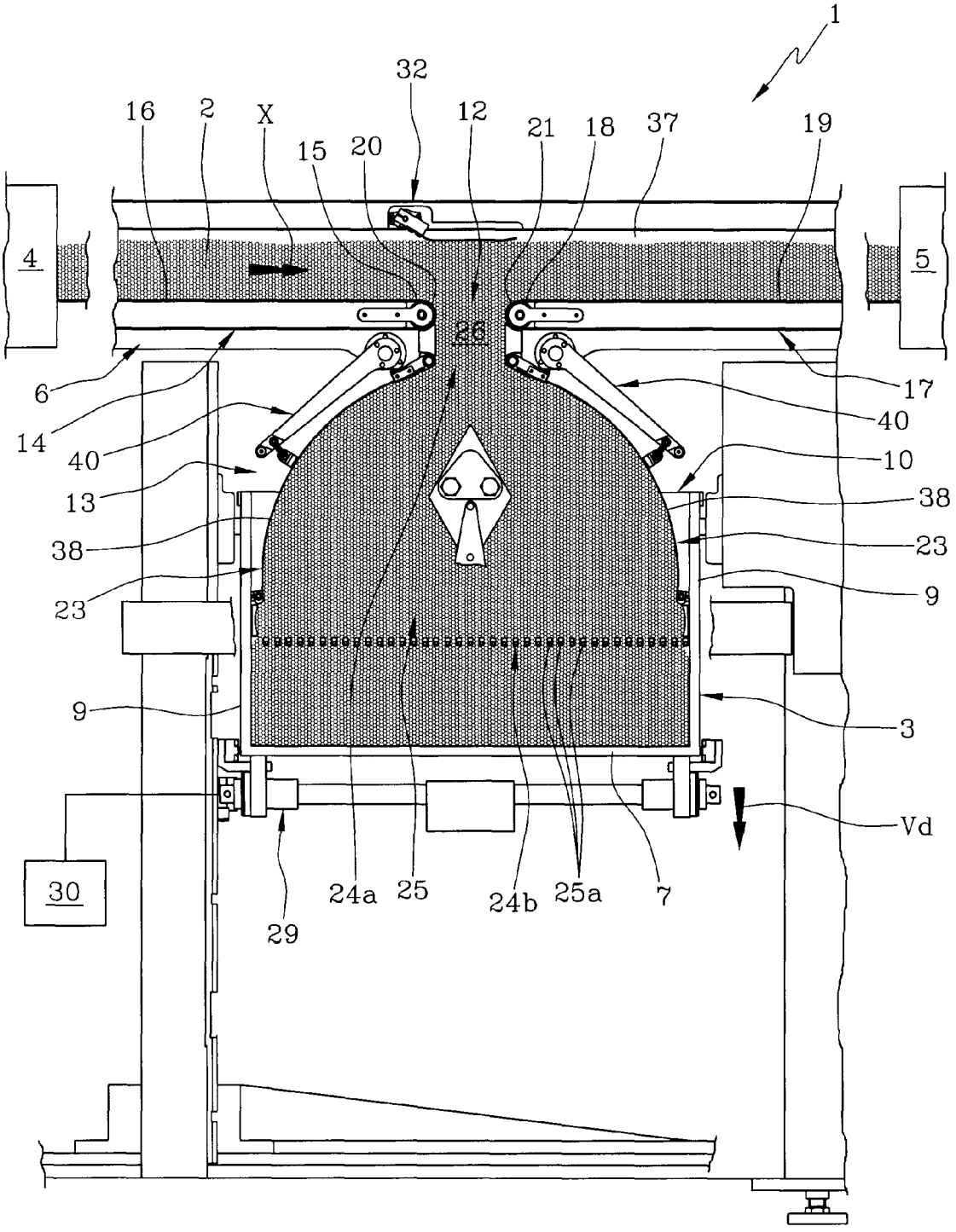
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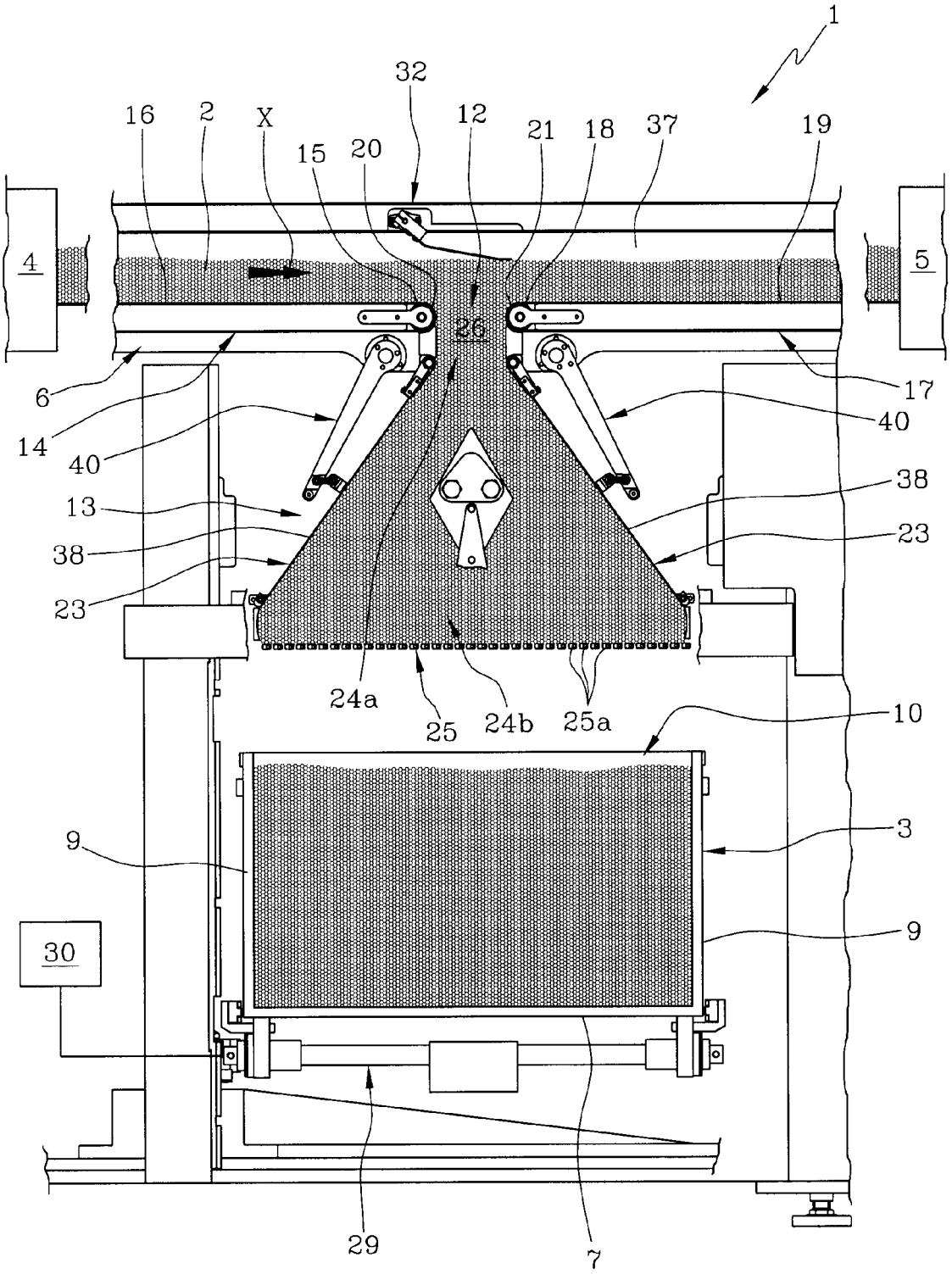
FIG 6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Place of search	Date of completion of the search	Examiner
Munich	30 March 2007	MARZANO MONTEROSSO

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