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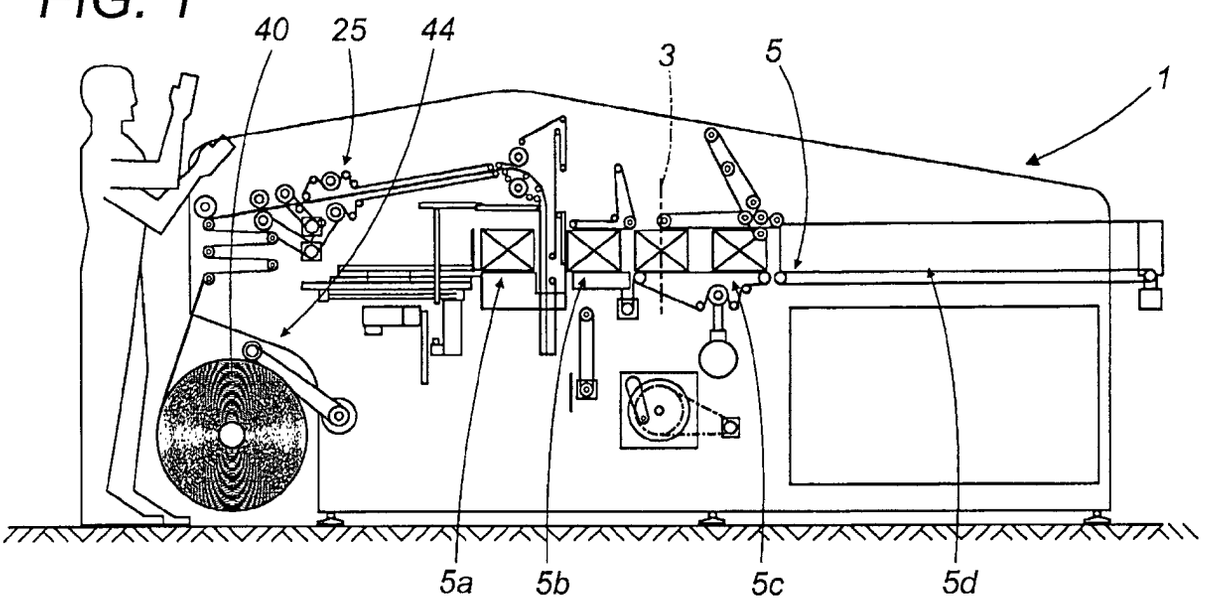
(54) Machine for packaging layered products made of soft material

(57) A machine for packaging sets (2) of layered products, within containers formed by a sheet (6) of packing material, comprises operative stations (4a, 4b, 4c) in which the sets (2) translate in succession along a discontinuous plane of advance (5) and in which the packing sheet (6), by transportation and retention means (10; 21), is carried across the plane of advance (5) to be: intercepted by a corresponding set (2) of product translating with continuous motion, dragged, folded back, closed and sealed. The means for transporting the sheet (6) comprise a funicular apparatus (10), motorised continuously; and aspirating means (21) associated thereto, operated in appropriate phase coordination with the funicular apparatus (10).

FIG. 1



EP 1 219 538 A1

Description

[0001] The present invention relates to the packaging of layered products, made of soft material, mutually stacked, by winding sets in containers made of plastic film formed directly on the products.

[0002] In particular, the invention relates to an automatic packaging machine, usable, advantageously but not merely, to envelop smooth, rough, fluffy paper napkins, assembled in packs of various geometric formats, and wound in containers constituted with packaging materials of various kinds.

[0003] For the automated packaging of paper napkins, the state of the art in the field entails the use of at least three different categories of machines, mutually differentiated according to: the type of product package (single or double, side-by-side, packages); and the maximum height of the sets of products that can be obtained: in the sense that a certain type of machine is suitable for packaging products whose overall height does not exceed about 50 mm, whilst a different type of machine is dedicated to packaging sets of products whose height can vary between a minimum and a maximum value, corresponding, by way of indication, to 50 and 100 mm.

[0004] Additional, no less important, differentiation aspects - such as to influence the structural and functional design of the known packaging machines - are closely correlated to the type of material used for the packaging containers.

[0005] It should be stated that, currently, the best suited materials for applications of this kind are polypropylene and polythene.

[0006] It is well known that polypropylene has a consistency and a rigidity that are roughly comparable to those of paper, so that it is relatively easy to cause the translation of sheets positioned in planar bearing on a sliding plane of a packaging machine; consequently, the physical structuring of the devices dedicated to this functionality is relatively simple. This material, on the other hand, has the disadvantage of a rather high cost.

[0007] Polythene is more economical, but packing sheets made of polythene have a high flexibility, comparable in some respects to that of elastomeric materials; therefore, the mechanised advance of sheets of this material inside the automatic machine is much more difficult than for polypropylene.

[0008] This greater difficulty, penalising in itself, is further enhanced from the machine construction point of view by the high capacity for electrostatic adhesion to the sliding surfaces exhibited by this material, which therefore tends to be electrically discharged by effect of the sliding against the support surfaces and to adhere thereto. All these aspects, in addition to influencing the constructive design of the various machines, are such as to imply the reduction of the working rates of the machine and hence to influence the cost-effectiveness of the packaging process also in terms of productivity.

[0009] Within the range of variability of the design types recalled above, all known machines have in common the fact of comprising a succession of operative stations in which:

- the sets of products, in distanced relationship, translate in succession, advancing along a horizontal plane with a discontinuous movement; and
- the packing sheet, under the action of transport and holding means, is first carried and held in a position to await the sets, in a condition in which its own plane of lay is oriented vertically, i.e. transversely to the plane of advance; thereupon it is intercepted by a set of layered products; dragged and folded progressively on the set in such a way as to circumscribe its longitudinal edge; closed with the superposition of parallel flaps; and lastly sealed in correspondence with the area of superposition of said flaps.

[0010] Whereas in the generality of known machines the packing sheets are obtained starting from a continuous film that unwinds from a dispensing reel, a first known constructive solution provides for forming the sheets by means of the execution, in succession, of rhythmic cuts of the film into segments. The sheets thereby obtained are both transported and retained in the operative station by means of belts integrated by vacuum means.

[0011] Maintaining the vacuum means in operation allows in particular to keep motionless the sheet in the vertical waiting position between the first and the second operative station, until the sheet itself is reached by the set of products to be wound. The subsequent locking of the sheet, scarfed between two sets of products following each other along the plane of advance allows to hold the sheet itself and hence allows to command the subsequent deactivation of the vacuum means, without thereby causing the sheet to fall by effect of its own weight before starting the operations of dragging and folding on the set of products to be packaged.

[0012] For the proper operation of such a solution, an accurate timing of the operative phases of scarfing and deactivating the vacuum means is required. If the vacuum means are deactivated too early relative to the scarfing, the sheet falls. If, vice versa, they are deactivated late, the sheet undergoes a forced stretching and possible consequent displacements under the concurring effect of opposite forces due on one hand to the vacuum and on the other to the thrust of the sets of products which in the meantime are made to advance against the resistance offered by the packing sheet, still retained.

[0013] The practical realisation of such a timing by means of an elastic fluid, such as air, requires a careful calibration of the practical synchronism of operation of the machine. This, while technically possible, makes changing the packaging format of the products a laborious and not immediate operation, and consequently

setting the machine up for varied operating conditions is not rapid, as would be required for a modern and flexible packaging machine.

[0014] Such machines thus exhibit a better behaviour in the case of work processes with a fixed format, or at most with a format that varies little from the basic format for which they were originally conceived.

[0015] Another known solution provides instead for forming the sheets by the non-continuous stepped dispensing of the film from the reel and by the intervention, during the stops between one step and the next, of a scissors cutter that shears segments conforming to the desired single sheets from the film. Said sheets are then transported to the operative station by means of a system of belts which, in the case of packaging with polythene sheets, also employ numerous constructive contrivances able to cause the sheet to advance cancelling or reducing the effect of electrostatic adhesion with the parts of the machine with which the sheet comes in contact.

[0016] To prevent the sheet, when stopped in the operative position, from falling due to any insufficient retention by the belts, whose motion in the meantime has temporarily been stopped, the film is not cut until the packing sheet is scarfed between to sets of products succeeding each other along the plane of advance: one already packaged and the other one being packaged.

[0017] It is also necessary to stress that the sequence of non-continuous dispensing of the film, described above, also causes accelerations and decelerations that produce the film to be tightened and loosened, with possible uncontrolled lateral displacements of the sheets; displacements, which in the case of sheets decorated with prints, can lead to erroneous relative positioning between the print of the package and the products contained therein.

[0018] To reduce the effect of such drawbacks, in the machine of this type it is common to position the reels dispensing the film in the upper part of the machine, i. e. in as close position as possible to the cutting assembly, i.e. such as to minimise the length of the film segment that could be most influenced by the negative effects of the rhythmic alternation of the tightening and loosening. Very often, to overcome any displacements which may still take place, the machine is also provided with a print self-centring assembly which, using sensors and appropriate actuator organs, detects the displacement error, processes it and then commands corrective actions able progressively to bring the sheet back to the correct position.

[0019] A machine of this type is very complex and costly. It also has a working rate threshold that is difficult to change by effect of the numerous functional constraints relating to the timing coordination between the cutting phase and the retention phase.

[0020] Such operative rigidity considerably limits the possibilities of changing the geometric format of the packages, relative to the basic format initially provided, for instance relating to the planar dimensions, the height of the sets, or even the arrangement in simple packs or dual packs of the sets themselves.

[0021] Regarding, in particular, the aforementioned positioning of the reels, replacing spent reels is an inconvenient and difficult operation, requiring considerable physical exertion.

[0022] The aim of the present invention is to eliminate the aforementioned drawbacks by means of a packaging machine able indifferently to allow the packaging of a multiplicity of different packaging formats; formats which, for instance, can differ from each other by the planar dimensions of the products; by the heights of the unitary grouping sets; by the physical-chemical characteristics of the materials constituting the packing sheets; and by the broadest possible combinations of such elements.

[0023] In accordance with the invention said aim is achieved by a machine of the type corresponding with the preamble of claim 1, in which the means for transporting and retaining the packing sheet comprise a funicular apparatus which includes first and second endless flexible elements, facing each other, which are supported by the machine, are continuously motorised and are able to close the sheet between them and to make it advance towards the direction of advance of the sets; said transportation and retention means comprise aspirating means, associated to the first flexible elements and positioned downstream of the second flexible elements, which are operated in phase coordination with said funicular apparatus in such a way as to bring the sheet to traverse the plane of advance whilst a corresponding set, arriving in the meantime, is about to intercept it.

[0024] The machine provides for holding the film in all phases preceding the impact with the set of products to be packaged without interruptions and without the contribution of the previously packaged products that precede the set of products undergoing packaging.

[0025] The second flexible element is also provided with a movable pulley able to allow to vary according to necessity the length of the useful branch for transporting the sheet where the first and the second flexible element correspondingly face each other. This allows to obtain a "dandy roll" adjustment means which enables to adjust the machine in a simple and reliable manner according to the dimensional variations of the sheets, correlated with the format of the product sets.

[0026] Since the intervention of the vacuum means is limited solely to the transfer of the film across the plane of advance of the products, the actual packaging cycle of the product sets is to a great extent extraneous to this phase of the packaging process, without thereby being appreciably affected by unforeseeable influences potentially connected with the elastic nature of the air that constitutes the operating fluid of the vacuum means. Therefore, the working rates of the machine can be varied with great ease in relation with the format of the prod-

ucts; the coordination of the activation and deactivation of the retaining means being manageable in a wholly satisfactory manner also with wide margins of variability of the various instants in which the transitions between the specific operative phases of the machine are activated.

[0027] In regard to the formation of the packing sheets starting from the continuous film, the machine comprises a station for incising the continuous sheet of packing material and an apparatus for transporting the incised film, mutually consecutive and located upstream of the means for transporting and retaining the sheet. The incising station, the apparatus for transporting the incised film and said means for transporting and retaining the sheet are mutually synchronised and actuated with differential velocities in such a way as to determine the ripping in succession of single sheets to be supplied to the operative station. Such an operative technique, in combination with the aforesaid characteristics, makes the operation of the machine practically indifferent to the specific nature of the material constituting the sheet, so that the operative versatility of the machine is further enhanced by the possibility to use, with the same physical and functional structure, different materials and in particular more economical packing materials.

[0028] An additional advantage of the machine is also represented by the ability to operate the feeding line, which brings the sets of products to be packaged into the operative station, at variable speeds within the range of a pre-set mean value of speed. This is particularly advantageous especially in the case of packaging of pairs of product sets placed in the line simultaneously and mutually adjacent to form the so-called double packages.

[0029] The slowing of the line at the moment of the introduction of the pairs of products sets placed side-by-side facilitates the operators who introduce the packs without thereby causing interference with the mechanical thrusters equipping the line; the successive acceleration to a speed exceeding the nominal speed will also allow to make up any delays in full compliance with the mean velocity desired for the machine: all of the above being achieved via software, without intervention on the physical members of the feeding line.

[0030] The technical characteristics of the invention, according to the aforesaid aims, can be clearly noted from the content of the claims set out below and its advantages shall become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which show an embodiment provided purely by way of non limiting example, in which:

- Figure 1 is a global representation of the machine, in an elevation view;
- Figure 2 is a global representation of the machine, in a top plan view;
- Figure 3 is a representation in enlarged scale of a first part of the machine, as shown in Figure 1;
- Figure 4 is a representation in enlarged scale of a second part of the machine, as shown in Figure 3;
- Figure 5 is a descriptive diagram of some more significant operative phases of the machine;
- Figure 6 is a representation in enlarged scale of a third part of the machine, as shown in Figure 1;
- Figure 7 is a schematic elevation view of a feeding line comprised in the part of the machine according to the invention;
- Figure 8 is a schematic velocity diagram of the feeding line of Figure 7.

[0031] With reference to the figures of the accompanying drawings, the reference number 1 globally indicates a packaging machine for packaging sets 2 of layered products, made of soft material, mutually stacked along a vertical direction 3; such as paper napkins destined to be collectively contained inside containers formed on said sets 2 starting from a sheet 6 of packaging material, for instance polypropylene or polythene.

[0032] The machine 1 (Figures 1 and 2) receives at its input above a plane of advance 5 the sets 2 of products to be packaged which come from a lateral feeding line 27. The plane of advance 5 is substantially formed by four component parts 5a, 5b, 5c, 5d, separated from each other and aligned in mutual succession.

[0033] The feeding line 27, lateral to a first component part 5a of the plane of advance 5, is coplanar and orthogonal to the plane of advance 5 itself.

[0034] The packing sheets 6 for forming the containers are prepared inside the machine 1 itself starting from a reel 40 that dispenses with continuous motion a continuous film of packing material, reel that is connected in the lower part of the structure of the machine 1.

[0035] The packing sheets 6, obtained in ways that shall be described farther on, and the product sets 2 converge separately towards a first operative station of the machine 1, indicated as 4a, in which they will then be mutually associated, and wherefrom they will then continue, together, towards other operative stations 4b, 4c, 4d, located farther downstream, until the entire packaging cycle is complete.

[0036] In the first operative station 4a (Figure 3), each packing sheet 6, under the action of transportation and retention means 10 and 21, is carried to transit between the first 4a and the second operative station 4b, across the plane of advance 5 of the sets and with its own plane of lay oriented vertically, i.e. transversely to the plane of advance 5.

[0037] In the passage of the product sets 2 from the first 4a to the second 4b operative station, each sheet 6 transiting along the plane 5 is intercepted in orderly fashion by a set 2 and dragged and progressively folded back onto the set 2 (Figure 5) in such a way as to circumscribe its longitudinal contour 7; it is then closed posteriorly with the superposition of parallel flaps 8, 9; and lastly it is sealed in correspondence with the area

of superposition of said flaps 8,9 (Figure 4 - right side).

[0038] Suitable vertical plane folders 41, lateral to the sets 2 and located in the second operative station 4b, obtain lateral folds in wholly conventional fashion; folds which then subsequent fixed helical folders 42, borne by the third operative station 4c, mutually superpose and which conventional sealing means, borne downstream and not shown herein, then mutually seal in equally known ways.

[0039] More specifically, the feeding line 27 that conveys the product sets 2 at the entry in the machine 2 comprises (Figures 7 and 8) a continuous conveyor belt 28 wound in a loop about pulleys 60 supported by the feeding line 27. The conveyor 28 has its plane of sliding 43 horizontal, is actuated with continuous movement and bears thruster elements 29, stepped in the longitudinal direction to the feeding line 27.

[0040] The conveyor 28 is moved at a velocity V that can vary (Figure 8) around a pre-set mean value Vm. The law for the variation of the velocity V is determined as a function of the working rate of the packaging machine 1 and it is such that the introduction of the sets 2 between two consecutive thruster elements 29 takes place where the thrusters 29 have the lowest velocity; the subsequent fast translation of the thrusters 29, with instantaneous velocities exceeding the mean value Vm, will then make up for the delay due to the loading operations.

[0041] All of this advantageously allows to vary the velocity with which the product sets 2 are fed towards the packaging machine 1 according to the productivity requirements of said machine, or of the various formats of the packages being prepared, without thereby having to intervene on the physical parts that compose the feeding line 27; i.e. without having materially to remove or add thrusters 29 to the conveyor 28, as was instead required by the operating practice of known packaging machines.

[0042] In regard to the dispensing of the packing film, Figure 1 shows in particular that it, dispensed from the reel 40, by intervention of an uncoiling assembly 44 transits across an incision station 25 in which a rotary blade 45 and a fixed blade 46 in mutual collaboration (Figure 3) apply discontinuous cut lines, i.e. incision lines, mutually distanced according to a predetermined pitch. The incised, but as yet uninterrupted film is the drawn by a transportation apparatus 26, consecutive to the incision station 25, comprising two belt systems having planar branches 47, 48 that face each other, between which the film is held, and made to advance towards the aforesaid transportation and retention means 10 and 21 located farther downstream.

[0043] The transportation and retention means are embodied in particular by a funicular apparatus, globally indicated as 10, which includes two pairs of mutually parallel grip organs 13 substantially located in correspondence with the lateral edges of the packing film, and associated to the opposite faces of the packing films and motorised by shared shafts 49.

[0044] Each grip organ 13 in turns includes a first 14 and a second flexible element 17.

[0045] The first flexible element 14, starting from an area overlying the plane of advance 5, projects towards the underlying plane 5; traverses it; and then continues underneath it.

[0046] The first flexible element 14 is wound as a loop, enclosed, about a series of pulleys 15 located in space in such a way as to define a transportation branch 16 having a rectilinear segment, oriented vertically - transversely to the plane of advance 5 - and interposed between the first 4a and the second operative station 4b.

[0047] The second flexible element 17 is wound in a loop about a respective series of pulleys 18, and it is provided with a rectilinear transportation branch 19 facing the transportation branch 16 of the first flexible element 14 and considerably shorter than it.

[0048] Associated to the first flexible element 14 and in correspondence with the part thereof that exceeds the length of the transportation branch 19 of the second flexible element 17, the transportation and retention means comprise aspiration means 21, operating by vacuum, which are able to make sheet 6 integral with the transportation branch 16 of the first flexible element 14 during the transfer of the sheet 6 across the plane 5 of advance of the products.

[0049] The first and the second flexible elements are motorised in continuous fashion and in mutual synchronism; the aspiration means 21 are instead activated and deactivated rhythmically, and in phase coordination with the flexible elements 14 and 17, i.e. with the funicular apparatus 10.

[0050] The transportation and retention means 10 and 21 defined above are synchronised with the apparatus 26 for transporting the film egressing the incision station 25 in such a way as to have, in appropriate moments of the operating cycle of the machine 1, differential speeds able to produce on the continuous film a traction able to determine the ripping in succession, along the incision lines, of individual sheets 6 to be fed towards the first operative station 4a.

[0051] Once the sheets 6 are obtained, the transportation and retention means 10 and 21 bring the sheet 6 across the plane 5 whilst on the plane of advance 5 upstream of the sheet 6, a product set 2 is in the meantime arrive above a rigid bearing plane 22 which embodies the first component part 5a of the plane of advance 5 of the sets 2.

[0052] A presser plane 23, parallel to the bearing plane 22, movable along a direction 3 transverse to said planes 22, 23 is then moved to compress the interposed product set 2 abutting the bearing plane 22 and thereby to compact the product set 2 and reduce its height.

[0053] When this is achieved, a movable equipment 51, which unitarily supports the pair of bearing planes 22 and presser 23 and a lateral thruster 50, is made to translate forward parallel to the plane of advance 5.

[0054] Thereby, the end 24 of the support planes 22 and 23, oriented towards the packing sheet 6, and suitably tapered, preceding the product set 2, intercept the sheet 6 and progressively move closer to the second operative station 4b, where the sheet 6, released inferiorly from the grip area 20 and still held above the plane of advance 5, progressively favours said motion.

[0055] When the sheet 6 has arrived in proximity to the entrance of two parallel conveyor belts 52, 53 of the second operative station 4b, the advancement of the thruster 50 causes the forward movement of the product set 2 between the bearing planes 22 and presser 23. The set 2, once it arrives in correspondence with the tapered ends 24 of the planes, intercepts the sheet 6 and continues forward towards the entrance of the belts 52, 53 whilst the sheet 6 continues to be dispensed towards the plane of advance.

[0056] At this point, a folding-sealing organ 56 above the plane of advance 5, bearing heating means 57, interposed between the first 4a and the second operative station 4b, drops downward progressively folding back the first flap 8 of the container. Simultaneously a folding organ 58, movable inferiorly to the plane of advance 5, instead intercepts the second flap 9 of the sheet and moves it closer to the set 2 and places it in a position awaiting the previous flap 8 which in the meantime arrives in superposition thereto. After the execution of the seal and after a stop sufficient to consolidate the union of the two flaps 8, 9, the set 2 then resumes its advance along the second station 4b and completes the packaging cycle through the other subsequent stations 4b and 4c as stated previously.

[0057] At this point a new sheet 6 must be fed posteriorly to the packaged product and anteriorly to a set 2 which in the meantime is arriving in the first operative station 4a.

[0058] Said re-feeding operation is made possible by the presence, on the rectilinear segment of the first flexible element of the means 21 for aspirating the sheet 6 on the funicular element 10, operated in phase coordination with the funicular element 10 itself, to allow transporting the sheet 6.

[0059] In particular regard to the latter, from Figure 3 it is possible to note that one of the second flexible elements 17, the one shown superiorly to the plane of advance 5 in the figure, is provided with a movable pulley 18b, with adjustable position, so as to vary the relative distance between the second flexible elements 17, longitudinally to the rectilinear segment of the first transportation branch 16, i.e. to vary the distance from the plane of advance 5; all compatibly with the dimensions, i.e. with the packaging format prescribed for the product sets 2 undergoing packaging.

[0060] The invention thus conceived is suitable for evident industrial application; furthermore, it can be subject to numerous modifications and variations, without thereby departing from the scope of the inventive concept. Moreover, all components can be replaced with technically equivalent elements.

Claims

1. Packaging machine, for packaging sets (2) of layered products, stacked within containers formed on said sets (2) starting from a sheet (6) of packing material, which comprises operative stations (4a, 4b, 4c) in which the sets (2) translate in succession in steps along a discontinuous plane of advance (5) and in which the packing sheet (6), under the action of transportation and retention means (10; 21), is carried across the plane of advance (5), is intercepted by a set (2) of products, is dragged and progressively folded back on the set (2) and is closed with the superposition and sealing of related flaps (8,9); said machine (1) being **characterised in that** the means (10; 21) for transporting and retaining the packing sheet (6) comprise a funicular apparatus (10) which includes first (14) and second flexible elements (17), continuous, facing each other, which are supported by the machine (1), are continuously motorised and are able to grip between them the sheet (6) and to make it advance along the direction of advance of the sets (2); said transportation and retention means (10; 21) comprising aspirating means (21), associated to the first flexible elements (14) and positioned downstream of the second flexible elements (17), which are operated in phase coordination with said funicular apparatus (10) in such a way as to bring the sheet (6) across the plane of advance (5) whilst a corresponding set (2) of products translating with continuous motion, arriving in the meantime, is about to intercept it.

2. Machine, as claimed in claim 1, **characterised in that** said funicular apparatus (10) includes a pair of grip organs (13) bilateral to the packing sheet (6), each of which includes a first flexible element (14) associated to a second flexible element (17) opposite thereto; the first flexible element (14) being wound in a loop about a series of pulleys (15) so positioned in space as to define a first branch (16) for transporting the sheet (6), rectilinear and transverse to the plane of advance (5); the second flexible element (17) being wound in a loop about respective series of pulleys (18) and delimiting a second rectilinear transportation branch (19) opposite to said first transportation branch (16).

3. Machine, as claimed in claim 2, **characterised in that** at least one of said second flexible elements (14) is provided with a pulley (18b) able to be translated and adjustable in position.

4. Machine as claimed in claim 1, comprising a bearing plane (22) for supporting the product sets (2); a

presser plane (23), parallel to the bearing plane (22), which is alternatively movable parallel to a direction (3) transverse to said planes (22, 23) to compress an interposed set (2) of products abutting the related plane of bearing (22); said bearing plane and presser (22, 23) being located, with reference to the direction of advance of the sets along the plane of advance (5), upstream of a first said operative station (4a); **characterised in that** said bearing planes (22) and presser plane (23) are able to translate together, parallel to the plane of advance (5), to intercept the sheet (6) anteriorly to the set (2) of products and to make it advance towards the first operative station (4a).

5. Machine, as claimed in claim 4, **characterised in that** the bearing plane (22) and the presser plane (23) have their own ends (24), oriented towards the packing sheet (6), suitably tapered.

6. Machine, as claimed in claim 4, comprising a thruster (25) movable parallel to the plane of advance (5) of the product sets (2), **characterised in that** said thruster (25) is moved in phase synchronism with said bearing plane (22) and presser plane (23) in a manner suitable to determine the arrival of the set (2) of products in a second said operative station (4b), delayed relative to the arrival of the packing sheet (6) in said second operative station (4b).

7. Machine, as claimed in any of the previous claims, **characterised in that** it comprises a station (25) for the incision of a continuous film of packing material and an apparatus (26) for transporting the incised film, mutually consecutive and located upstream of the means (10; 21) for transporting and retaining the sheet (6), said incision station (25), said apparatus (26) for transporting the incised film and said means (10; 21) for transporting and retaining the sheet (6) being mutually synchronised and moved with differential velocities in such a way as to produce on the continuous film a traction suitable to determine the ripping in succession of individual said sheets to be fed towards said first operative station (4a).

8. Machine, as claimed in any of the previous claims, comprising a line (27) for feeding the product sets (2) provided with a conveyor (28) moved with continuous motion, provided with stepped thruster elements (29) between which are connected the sets (2) of products to be packaged, **characterised in that** said conveyor (28) is moved at variable velocity (V) around a pre-determined mean value (Vm), said variable velocity (V) assuming lesser intensities in correspondence with the introduction of the sets (2) between the thruster elements (29) and assuming greater intensities in correspondence with their transfer along the feeding line (27).

FIG. 1

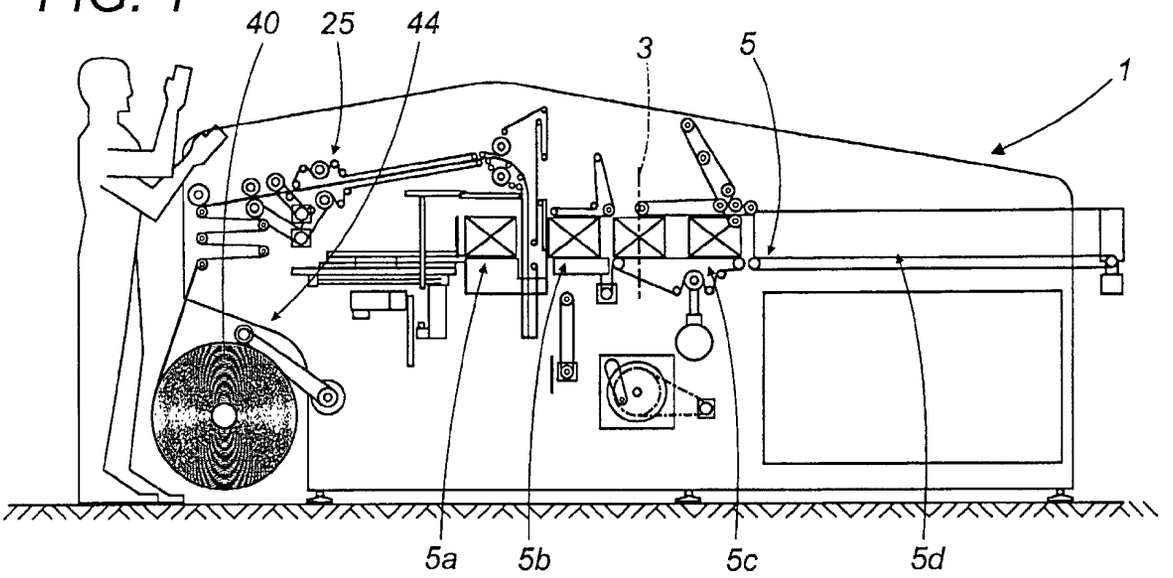
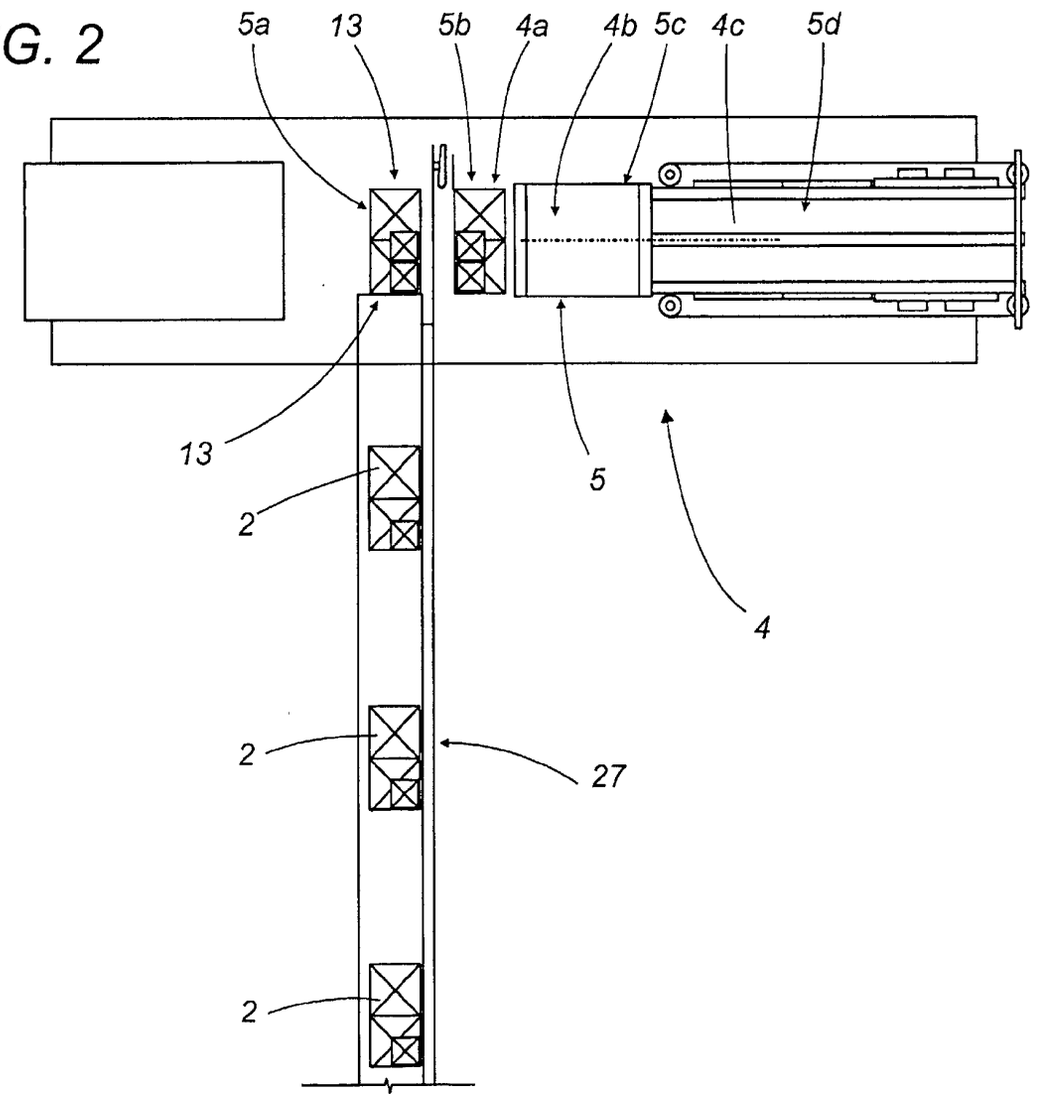
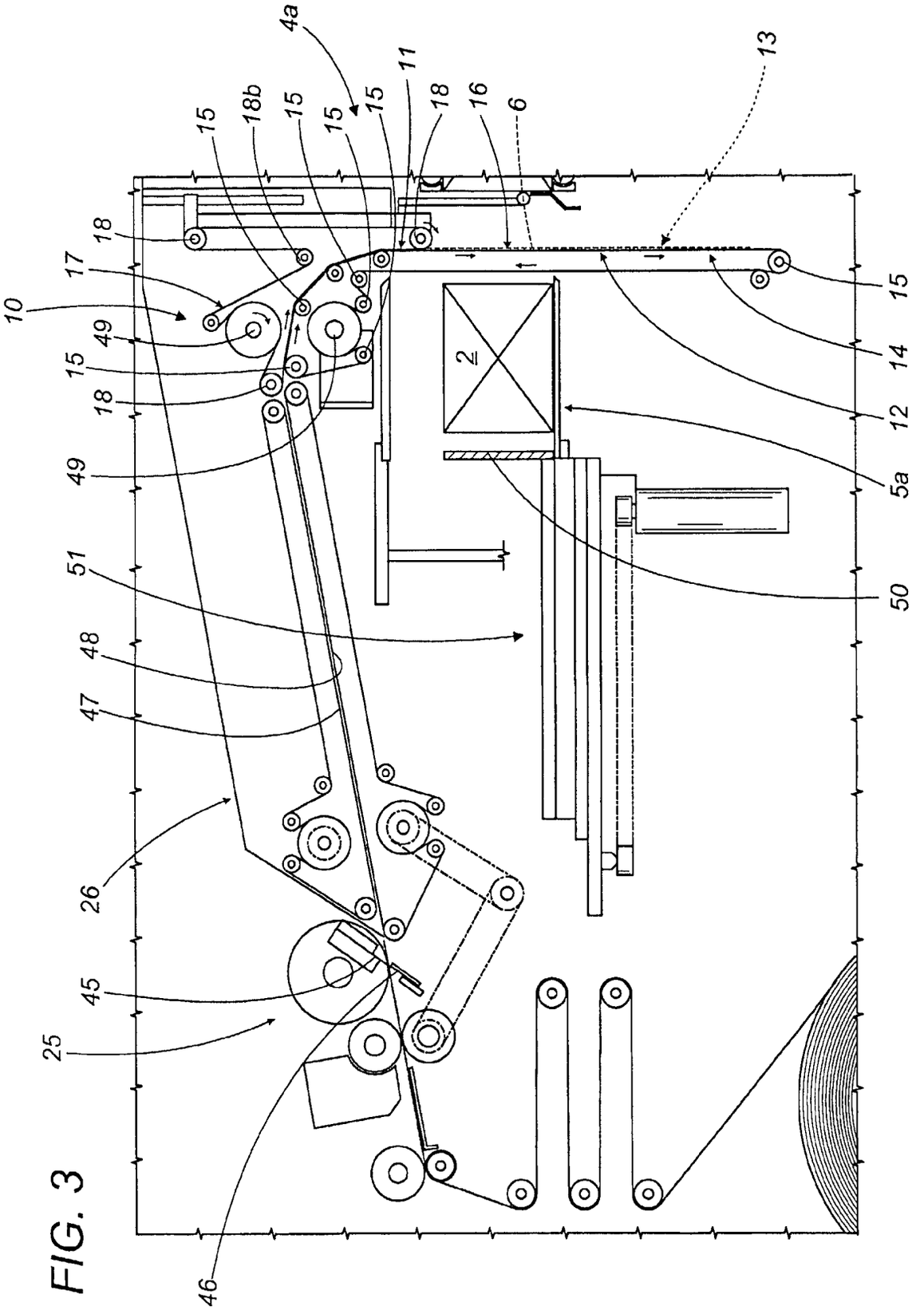


FIG. 2

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18b
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15
15
18
16
6
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17
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14
12
5a
50

FIG. 3

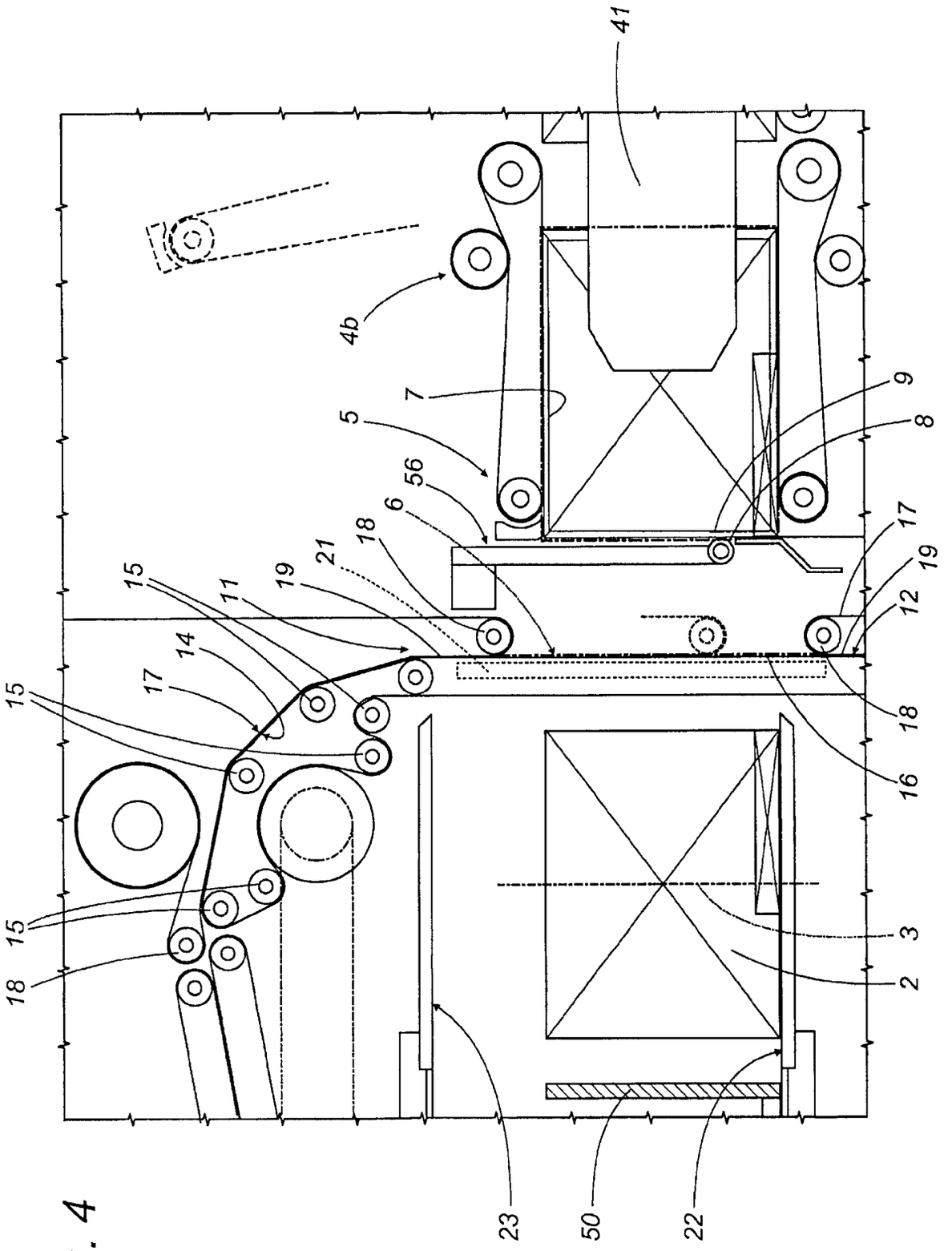


FIG. 4

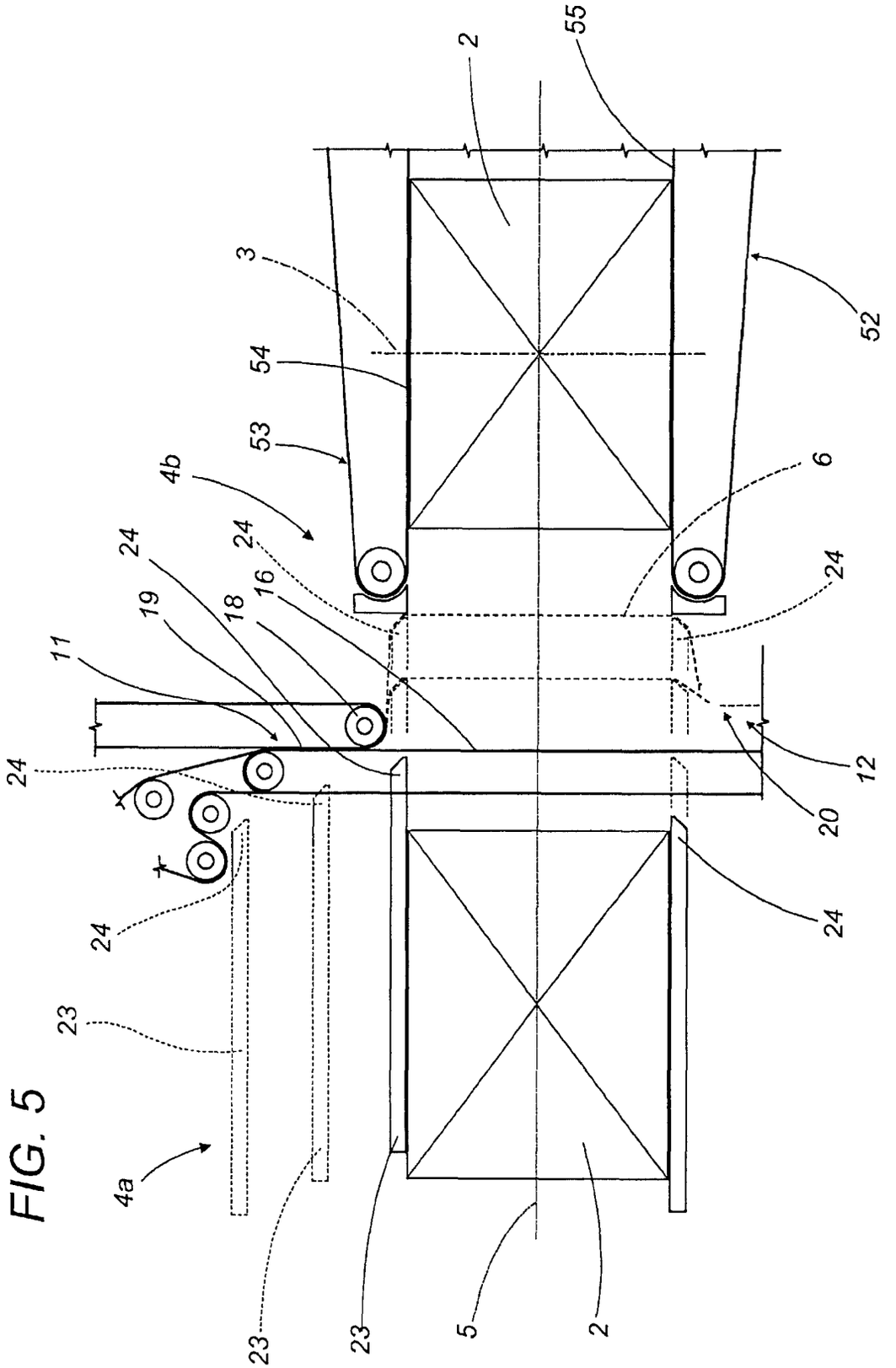


FIG. 5

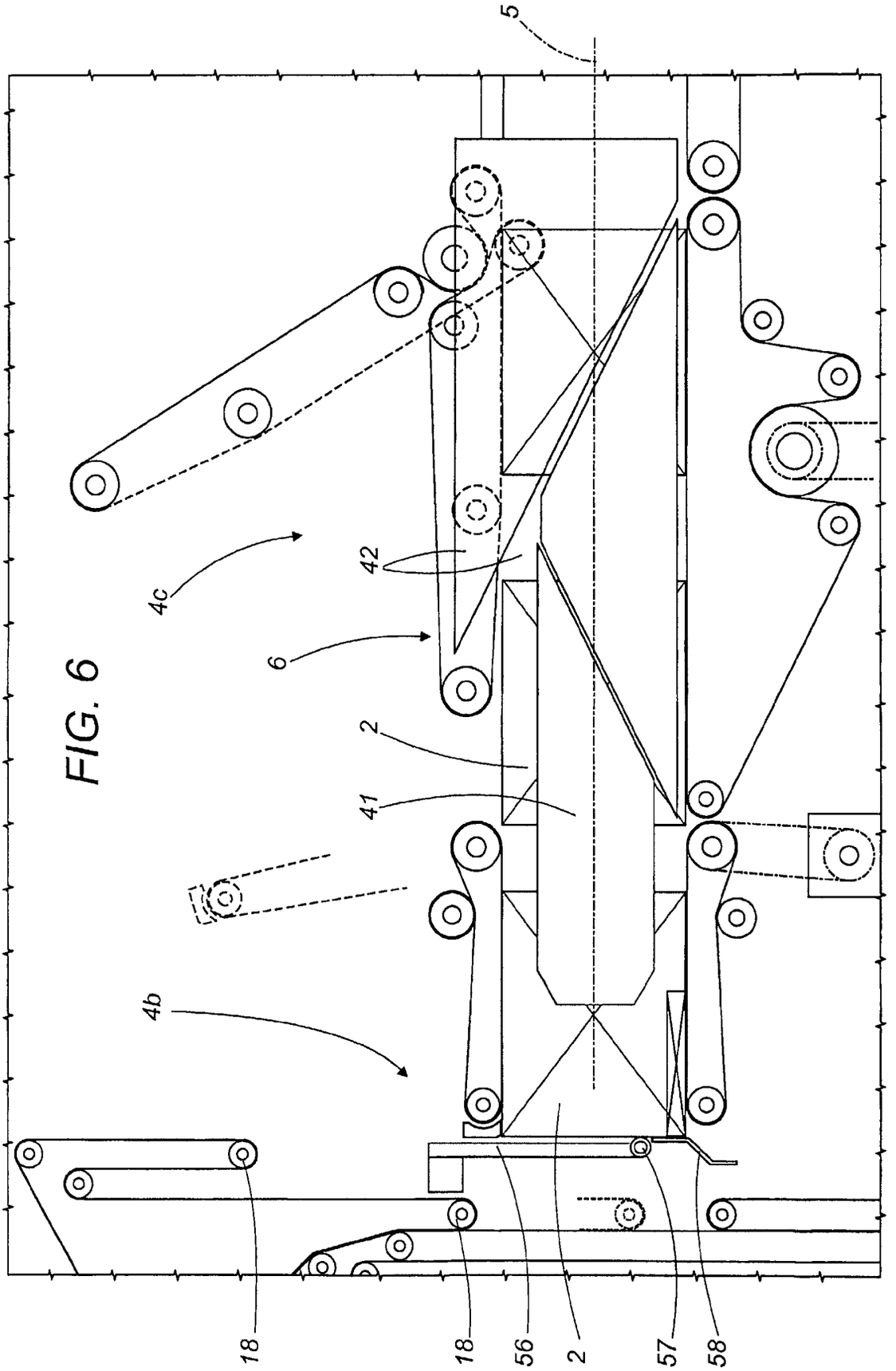


FIG. 6

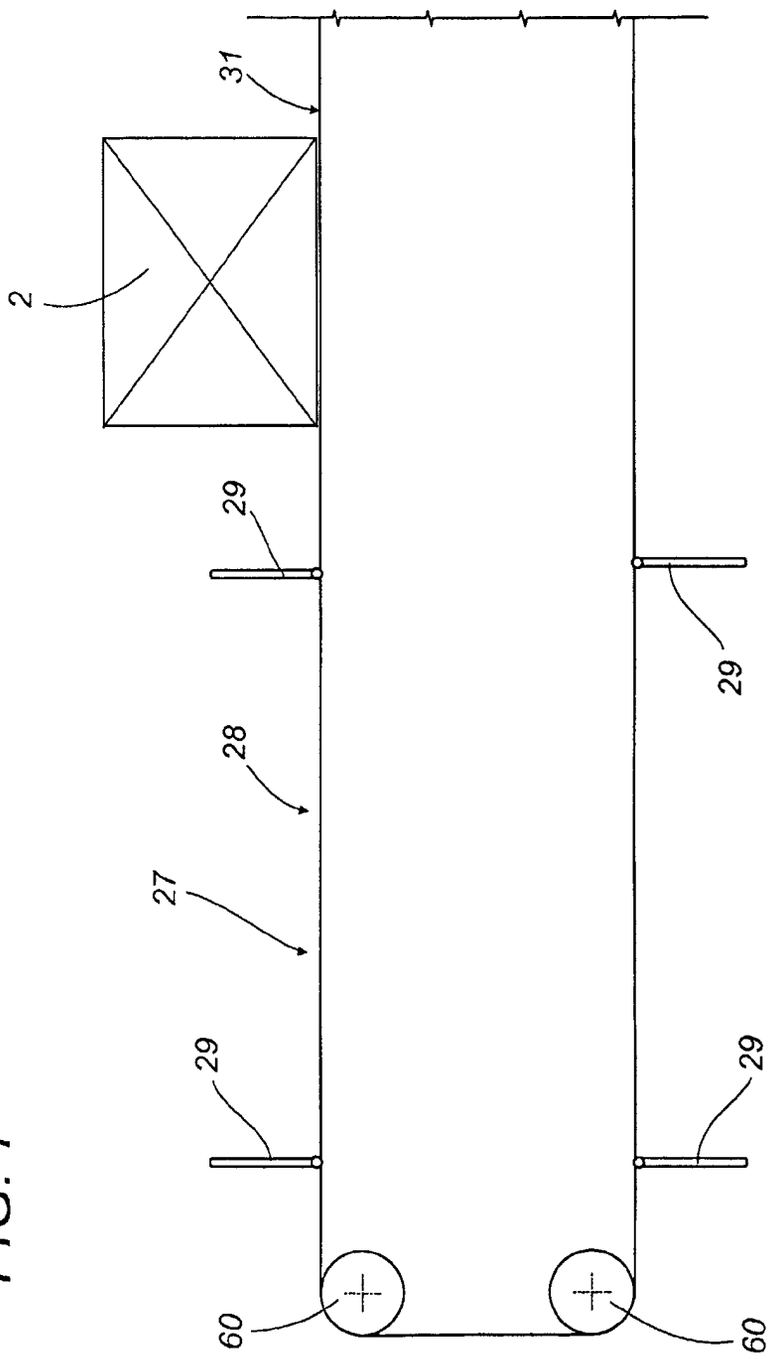
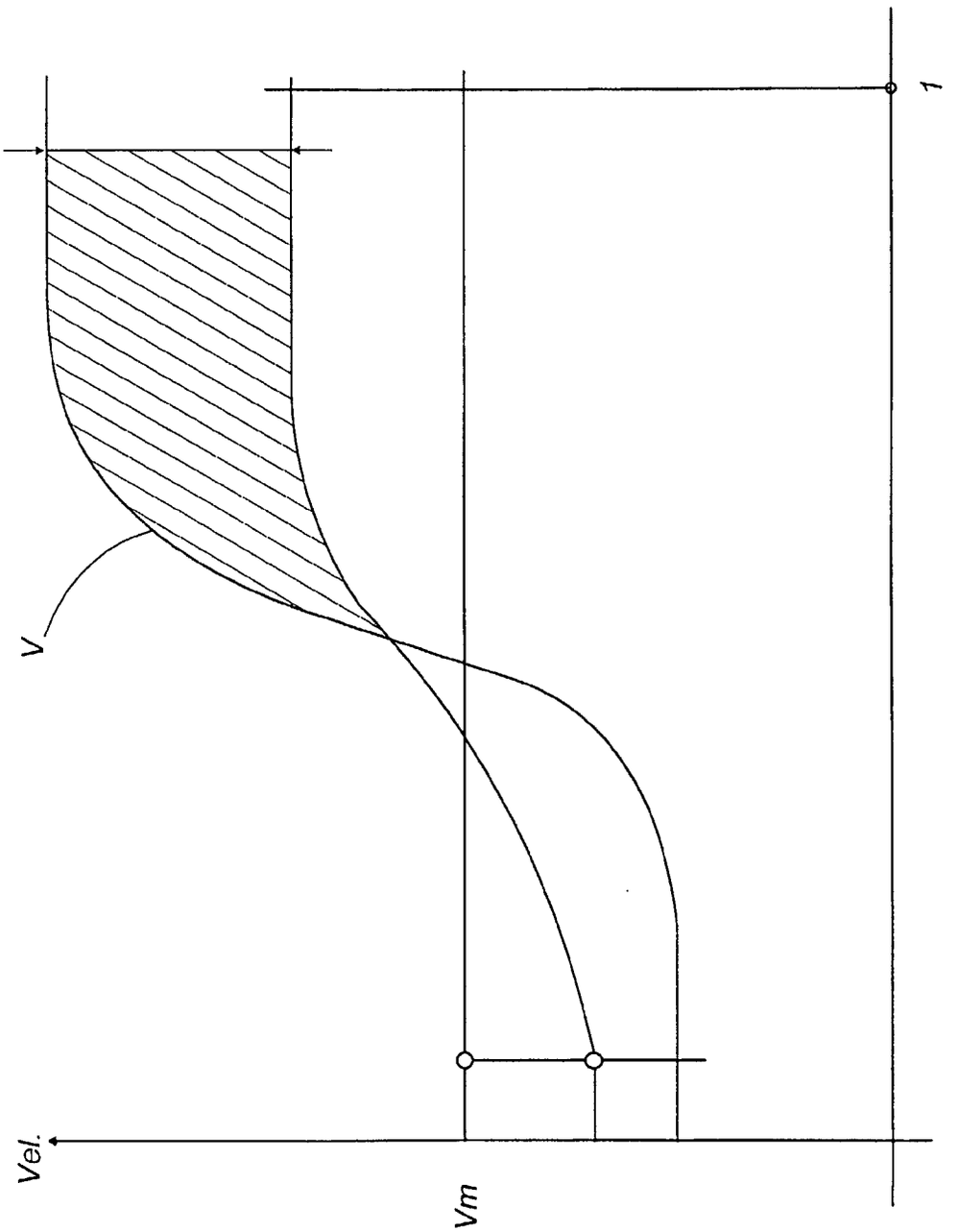


FIG. 7

FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0749

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 April 2002	Grentzius, W

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