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(71) Applicant: **Bema - S.r.l.**
42030 Viano (RE) (IT)

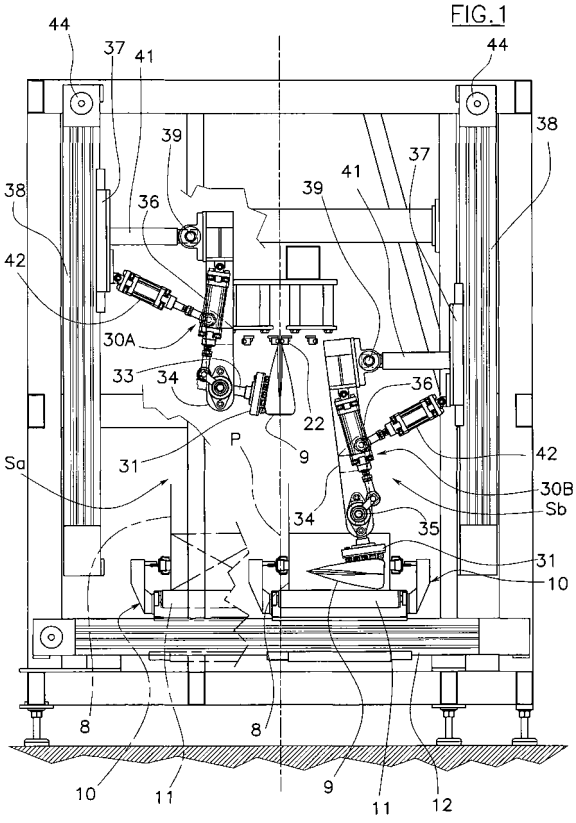
(72) Inventor: **Murarotto, Emilio**
c/o Bema - S.r.l.
42030 Viano (Reggio Emilia) (IT)

(74) Representative: **Corradini, Corrado et al**
Ing. C. Corradini & C. S.R.L.
Via Dante Alighieri 4
I-42100 Reggio Emilia (IT)

(54) Machine for boxing objects in groups

(57) The machine comprises a support means (10) for at least one box suitable for receiving the group of objects and a feeding means (20) of the objects. Moreover a pair of manipulating devices (30A, 30B) is foreseen, each suitable for operating according to transfer cycles with which it picks up at least one object at a time from the feeding means (20) and arranges it in the box, said manipulating devices (30A, 30B) being actuated in a substantially uninterrupted manner, and each manipulating device (30A, 30B) operating so as to carry out transfer cycles that are staggered with respect to the other manipulating device (30A, 30B). In particular, each gripping member (31) is suitable for taking at least one object at a time from the feeding means to take it to the box to carry out said transfer cycle; the gripping member (31) of each manipulating device (30A, 30B) is mobile in a respective space separated from the space of the gripping member of the other manipulating device (30A, 30B) by an axial plane (P).

FIG.1



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Description

[0001] The present invention concerns a machine for arranging groups of objects in boxes comprising a support means for at least one box suitable for receiving the group of objects and a feeding means of the objects that one wishes to insert into the box.

[0002] A purpose of the invention is, generally speaking, to make a machine having a relatively high operative rhythm. A typical and advantageous application of the invention is to box packets containing fluid material and having a yielding consistency, having an upper sealing edge, which is more or less flat. Indeed, machines for boxing packets filled with fluid, having yielding consistency and unreliable stability, are not known; this operation is currently carried out manually.

[0003] Therefore, with reference to this particular application, a purpose of the present invention is to make a machine capable of manipulating such types of objects.

[0004] This and other purposes are accomplished by the invention in object as characterised in the claims.

[0005] According to the invention, the machine comprises a pair of manipulating devices each suitable for operating according to transfer cycles with which it picks up at least one object at a time from the feeding means and arranges it in the box, said manipulating devices being actuated in a substantially uninterrupted manner, and each manipulating device operating so as to carry out transfer cycles that are staggered with respect to the other manipulating device.

[0006] In particular, said manipulating devices each comprise at least one gripping member suitable for taking at least one object at a time and means suitable for moving said gripping member from the feeding means to the box to carry out said transfer cycle, the gripping member of each manipulating device being mobile in a respective space separated from the space of the gripping member of the other manipulating device by an axial vertical plane. The support means is suitable for transferring the box alternatively from the space in which a gripping member operates to the space in which the other gripping member operates.

[0007] Thanks to such characteristics, the gripping member of each manipulating device can operate at the same time as that of the other manipulating device, without interfering with the movements thereof, but rather working in coordination with it.

[0008] Generally speaking, the result is that the machine is capable of operating with much higher speeds compared to conventional machines.

[0009] Also, in the case in which one operates on yielding packets filled with fluid, the result is, indeed, that it becomes possible to box such objects with a machine.

[0010] The operating speed is in any case very high; to box yielding packets filled with fluid, of a weight of 1 kg, it is possible to reach 14-15 boxing cycles per minute.

[0011] The invention is outlined in detail hereafter with the help of the attached figures that illustrate an embodiment thereof, as an example and not for limiting purposes.

FIG. 1 is a front vertical elevation view of the machine.
FIG. 1A is an enlarged detail of Fig. 1.
FIG. 2 is a side vertical elevation view of Fig. 1.
FIG. 2A is an enlarged detail of Fig. 2.
FIG. 3 is a plan view from above of Fig. 1.
FIG. 3A is an enlarged detail of Fig. 3.
FIG. 4 shows an example of a packet that is treated with the machine of Fig. 1.
FIG. 4a shows an example of an arrangement of a group of packets boxed with the machine of Fig. 1.

[0012] An example of an object that is treated with the machine according to the invention is illustrated in Fig. 4. This object is a soft packet 9, in particular formed with a film of polymeric material, filled with a fluid substance, typically food; the object has a general yielding consistency to the point that it is not sufficiently self-supporting, and its ability to keep stable and upright is clearly insufficient. Its general shape is roughly a prism with a rectangular base and tapered towards the top, where it ends with a flat sealing upper edge 91.

[0013] Such packets 9 advantageously lend themselves to being boxed in the way illustrated in Fig. 4A: a lower layer of packets is placed, laid down flat, with the upper edge 91 facing in one direction (towards the left in the figure) and above it a second layer is arranged, laid down flat, with the upper edge 91 facing in the opposite direction (towards the right); in such a way one proceeds by depositing a desired number of layers until the box 8 (shown as transparent in Fig. 4A) is filled. A particularly rational pile of packets is obtained that completely exploits the volume of the box 8.

[0014] The machine comprises a support means 10 suitable for supporting at least one box 8 (in particular two boxes 8 in the figures) suitable for receiving the group of packets 9 and a feeding means 20 that carries the packets 9 near to the box to be filled.

[0015] According to the invention a pair of manipulating devices 30A and 30B is foreseen, each suitable for operating according to transfer cycles with which it picks up at least one packet 9 at a time from the feeding means 20 and arranges it in the box 8 placed on the support means 10.

[0016] Each manipulating device comprises at least one gripping member 31 suitable for taking at least one packet 31 from the feeding means 20 to the box 8 to carry out said transfer cycle.

[0017] The gripping member 31 of each manipulating device 30A, 30B is mobile in a respective space separated from the space of the gripping member 31 of the other manipulating device by an axial vertical plane P. More specifically, the gripping member 31 of the manipulating device 30A moves within a space Sa whereas the gripping member 31 of the manipulating device 30B

moves within a space Sb that is separated from the space Sb through the vertical (ideal) plane P, in particular passing through the axis of the feeding device 20.

[0018] In greater detail, each gripping member 31 comprises at least one group of suction cups 32 connected with a suction means (not illustrated in the figures) suitable for gripping, by suction action, at least one packet at a time, in particular being rested against its side wall 92. The gripping member 31 is fixed to the end of an arm 33 supported by a frame 34, to which it is firmly attached with the possibility of oscillation through a pin 35 with horizontal and longitudinal axis. A jack 36, firmly attached to the frame 34, acts upon the arm 33 producing the desired oscillation of the gripping member 31.

[0019] For its part, the frame 34 is supported by a trolley 37 that is able to slide along a vertical column 38 arranged at the side of the space Sa, Sb. The frame 34 is firmly attached to the trolley 37 with the possibility of oscillation, through a pin 39 with horizontal and longitudinal axis arranged at the end of an arm 41 fixed canti-levered to the trolley 37. A jack 42, firmly attached to the trolley 37, acts upon the frame 34 producing the desired oscillation thereof about the axis of the pin 39.

[0020] The trolley 37 can slide with translation movement in the vertical direction, actuated by a chain in turn actuated by a motor 44.

[0021] The gripping member 31 therefore has three degrees of freedom with which it is able to carry out a transfer cycle of the packet where:

a) initially, through the suction cups 32, it grips at least one packet 9 held arranged vertically by the feeding means 20 at the plane P (this position is indicated with A in Fig. 1A, where the gripping member is indicated with 31a and the packet with 9a),

b) it detaches the packet from the feeding means 20 (which for its part lets go, as specified below) and takes it away sideways from the plane P after rotation of the frame 34 about the pin 39,

c) it rotates (more or less simultaneously) the packet 9 to arrange it lying substantially horizontally, after rotation of the arm 33 about the axis of the pin 35 (this position is indicated with C in Fig. 1A, where the gripping member is indicated with 31c and the packet with 9c) ,

d) it transfers the packet downwards until it is deposited in the box 8 placed on the support means 10, after vertical translation of the trolley 37 along the column (this position is indicated with D in Fig. 1A, where the gripping member is indicated with 31d and the packet with 9d),

e) it roughly repeats the described movements in reverse so as to go back into the initial position of the cycle.

[0022] In the embodiment illustrated in the figures, each manipulating device 30A, 30B comprises two gripping members 31 arranged side-by-side and aligned and acting simultaneously and each member 31 is suitable for taking and moving three packets 9. Therefore, two axially aligned boxes 8 are loaded, in each of which three columns of packets 9 are formed.

[0023] According to the invention, the manipulating device 30A and 30B are actuated in a substantially uninterrupted manner, and each of them operates so as to carry out the described transfer cycles that are staggered with respect to the other device.

[0024] For example, whereas the device 30A is in a gripping step of the packet 9 carried by the means 20 (step a)), the device 30B transfers the packet downwards and places it in the box below (step d)), and vice-versa.

[0025] According to the invention, said support means 10 is suitable for transferring the box alternatively from the space Sa in which the gripping member 31 of a manipulating device 30A operates to the space Sb in which the gripping member 31 of the other manipulating device 30B operates, and vice-versa.

[0026] In particular, the support means 10 comprises a conveyor belt 11, arranged in the lower part of the spaces Sa and

[0027] Sb, having a sufficient length to contain the desired number of boxes resting there that are filled simultaneously, arranged with its longitudinal axis horizontal and parallel to the axis of the feeding means 20. The conveyor belt 11 is slidably supported by two fixed rails 12, horizontal and transversal, through which it can translate in the transversal direction. Suitable moving members take care of alternatively moving the conveyor belt 11 and with it the box 8 (two boxes in the figures) from the space Sa to the space Sb and vice-versa, in two extreme positions arranged symmetrically with respect to the vertical plane P.

[0028] The alternative transfer in a transversal and horizontal direction of the box 8, arranged on the conveyor belt 11, is carried out in synchrony with the transfer cycles operated by the gripping members 31 so that the box 8 is, in every cycle, below the member that at that moment is setting down the packet 9 so as to be able to receive that packet.

[0029] The described manipulating device 30A and 30B have components arranged symmetrically with respect to the vertical plane P; thanks to this the rotation of the packet operated by a gripping member 31 to make it lie down horizontally (step c)) takes place in two opposite directions in the two manipulating devices, with the result that the packets operated upon by the manipulating device 30A, arranged to the left, are arranged in the box 8, with the upper edge 91 facing to the right, and vice-versa in the packets operated upon by the manipulating device 30B, arranged to the right; the result is that the packets are arranged in the box 8 with the arrangement illustrated in Fig. 4A, just as desired.

[0030] In the case in which, as illustrated in the figures, the object to be boxed is a soft packet filled with fluid material (as described above and illustrated in Fig. 4), the feeding means 20 comprises a final conveyor belt

21c having two motorised belts 22, opposite and mobile in harmony, which clasp the packets 9 close to the upper edge 91.

[0031] The extreme portion upstream of the conveyor 21a has two symmetrically oscillating branches 24, suitable for moving away to receive the packets 9 that are taken into that position by the dispensing machine of the packets themselves (indicated with 50 and schematically illustrated in the figures) and suitable for then moving closer to squeeze and hold such packets 9. The movement of such branches 24 is actuated through a linkage 241, actuated by a jack (not illustrated in the figures), which moves the two front end pulleys 243 of the conveyor 21a. In Fig. 3A, the separated position of the two pulleys 243 is indicated with a solid line and the close together position is indicated with a broken line.

[0032] Downstream of the conveyor 21a and upstream of the conveyor 21c an intermediate conveyor 21b is arranged, also formed from two motorised belts 25, opposite and mobile in harmony, which clasp the packets 9 close to the upper edge 91.

[0033] In operation, the first conveyor belt 21a takes care of picking up the packets 9 from a dispensing machine (for example the filling machine).

[0034] The next conveyor belt 21b takes care of arranging the packets that it receives from the conveyor 21a at the correct distance (pitch), in particular adjacent to each other.

[0035] The final conveyor belt 21c takes care of taking the packets to the action zones Sa and Sb of the manipulating device 30A and 30B.

[0036] Here, as soon as the packets have been gripped by the gripping members 31, the two branches of the belts 21c are moved apart (through a compound lever actuated by a pneumatic jack, not illustrated in the figures) and the packets themselves are released by the gripping members 31 and, with a succession of transfer cycles produced alternatively by one device 30A and by the other 30B whilst the box 8 moves alternatively and in synchrony between one space Sa and the other Sb, they are dropped down according to predetermined groups, inside the box 8. When a box 8 is completed (or a group of two boxes as illustrated in the figures, or a group of more boxes) it is taken away by the line and other empty boxes are placed on the support means 10.

[0037] Of course, numerous practical-application modifications can be made to the invention in object, without for this reason departing from the scope of the inventive idea as claimed below.

Claims

1. Machine for boxing objects in groups, comprising a support means (10) for at least one box suitable for receiving the group of objects and a feeding means (20) of the objects, **characterised in that** it comprises a pair of manipulating devices (30A, 30B) each suitable for operating according to transfer cycles with which it picks up at least one object at a time from the feeding means (20) and arranges it in the box, said manipulating devices (30A, 30B) being actuated in a substantially uninterrupted manner, and each manipulating device (30A, 30B) operating so as to carry out transfer cycles that are staggered with respect to the other manipulating device (30A, 30B).

2. Machine according to claim 1, **characterised in that** said manipulating devices (30A, 30B) each comprise at least one gripping member (31) suitable for taking at least one object at a time and means suitable for moving said gripping member (31) from the feeding means (20) up to the box to carry out said transfer cycle, the gripping member (31) of each manipulating device (30A, 30B) being mobile in a respective space separated from the space of the gripping member of the other manipulating device (30A, 30B) by an axial vertical plane (P).

3. Machine according to claim 2, **characterised in that** said support means (10) is suitable for transferring the box alternatively from the space (Sa) in which the gripping member (31) of one manipulating device (30A) operates to the space (Sb) in which the gripping member (31) of the other manipulating device (30B) operates, and vice-versa.

4. Machine according to claim 3, **characterised in that** the alternative transfer in the transversal and horizontal direction of the box (8), operated by the support means (10), is carried out in synchrony with the transfer cycles operated by the gripping members (31) so that the box (8) is, at every cycle, under the member (31) that at that moment is setting down the packet (9) so as to be able to receive such a packet.

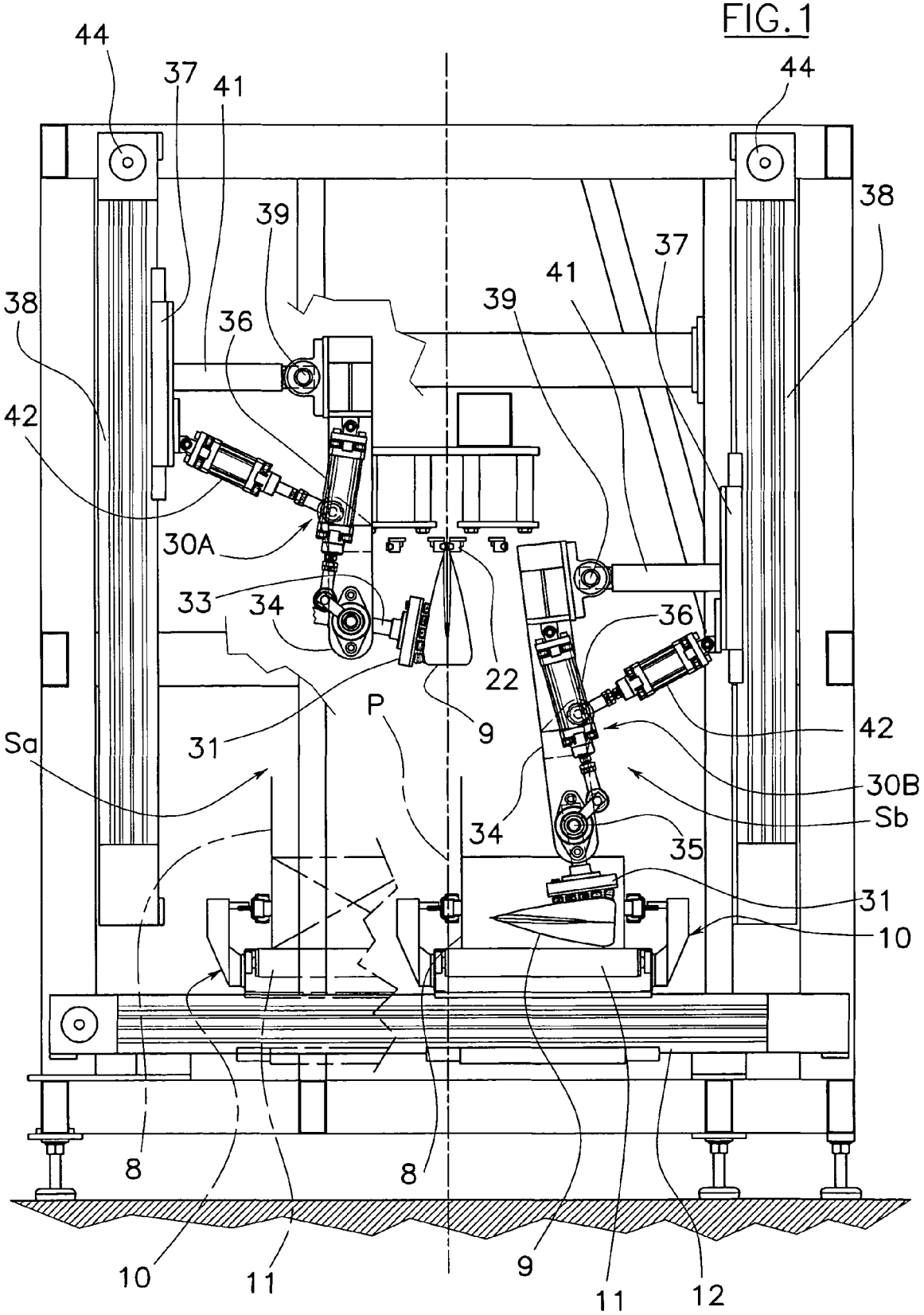
5. Machine according to claim 2, **characterised in that** the manipulating devices (30A, 30B) have components arranged symmetrically with respect to the vertical plane (P).

6. Machine according to claim 1, **characterised in that** the feeding means (20) comprises a conveyor belt having two belts, opposite and mobile in harmony, which clasp the upper edge of the object.

7. Method for boxing objects in groups, using a machine comprising: a support means (10) for at least one box suitable for receiving the group of objects; a feeding means (20) of the objects, and a pair of manipulating devices (30A, 30B),
characterised in that each manipulating device (30A, 30B) operates according to transfer cycles with which it picks up at least one object at a time from the feeding means (20) and arranges it in the box, said manipulating devices (30A, 30B) being actuated

in a substantially uninterrupted manner, and each manipulating device (30A, 30B) operating so as to carry out transfer cycles that are staggered with respect to the other manipulating device (30A, 30B).

FIG.1


44
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38
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37
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39
38
36
42
30A
33
34
36
22
P
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42
31
Sa
30B
Sb
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31
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11
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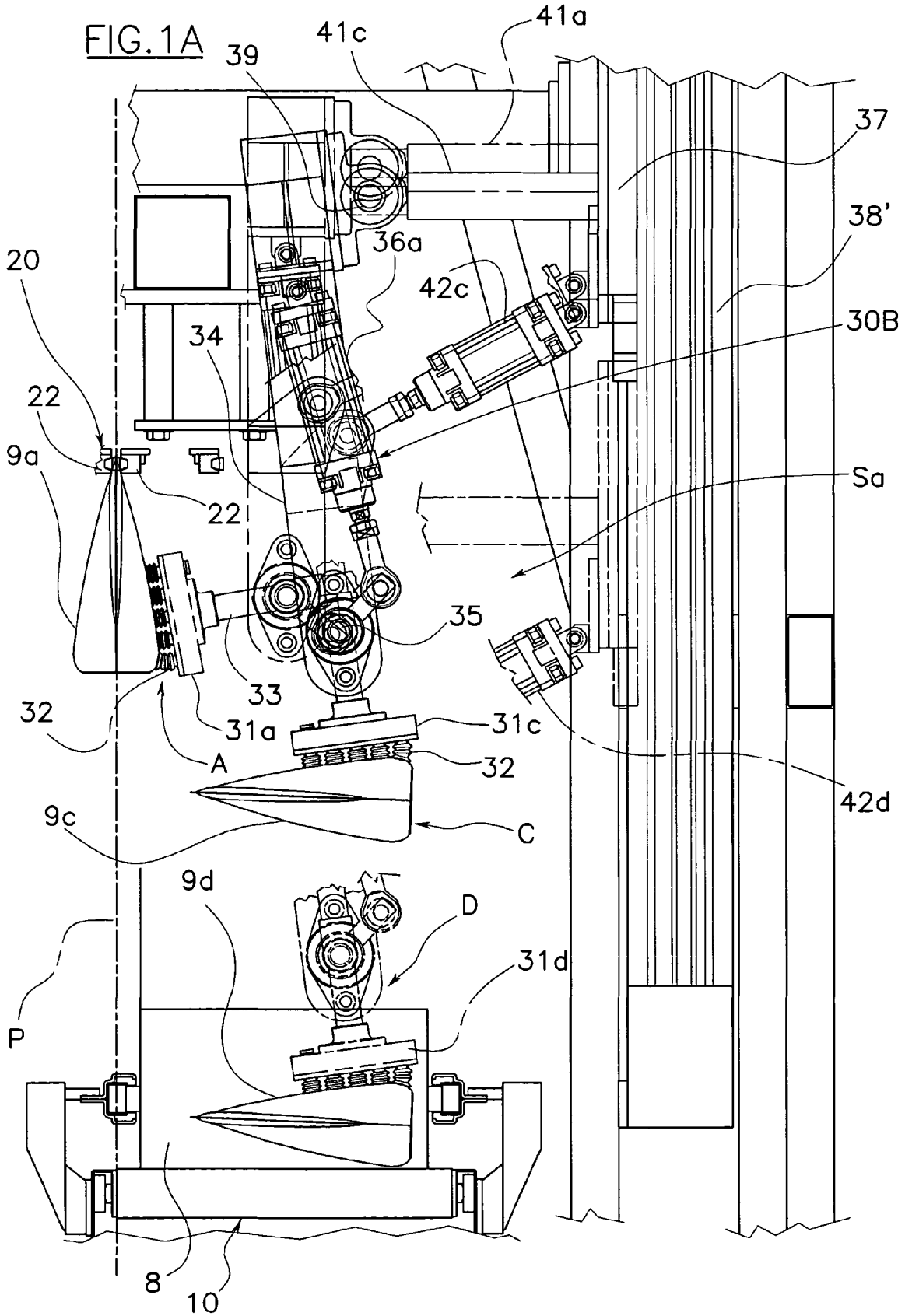
11
12

FIG. 1A


41a
41c
39
37
38'
36a
42c
20
34
30B
22
9a
Sa
22
35
33
32
31a
31c
A
32
42d
9c
C
9d
D
31d
P
8
10

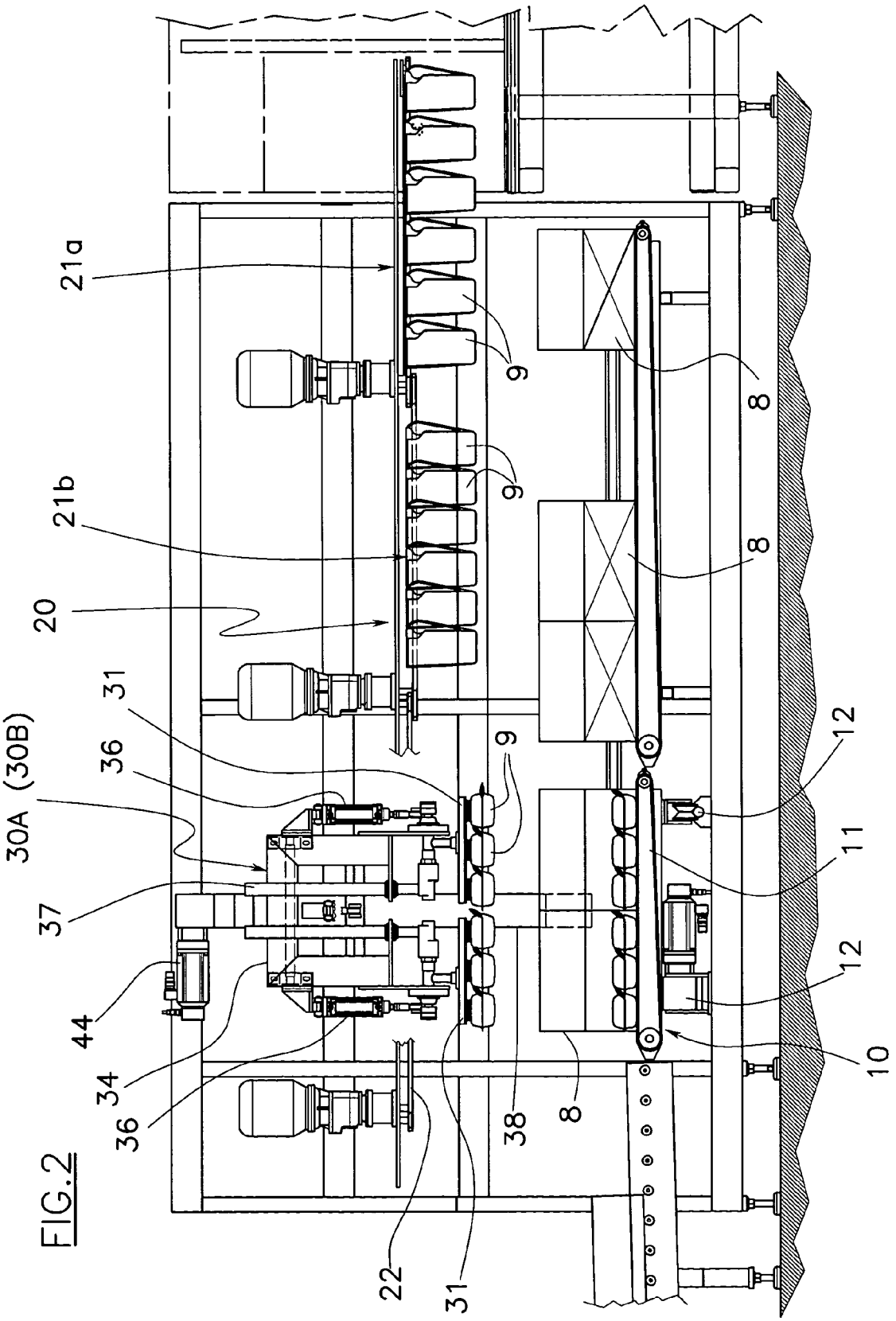
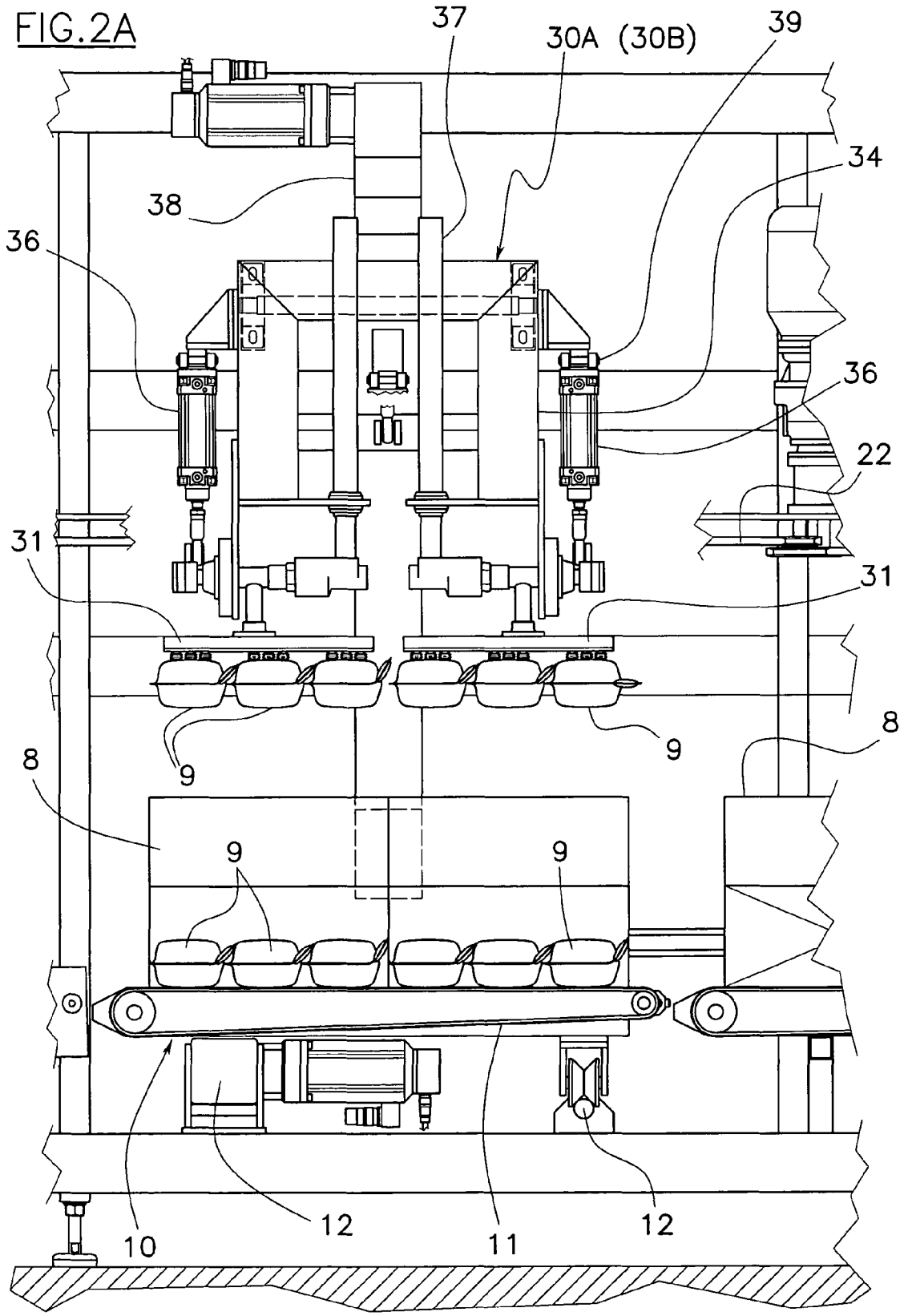


FIG.2

FIG.2A



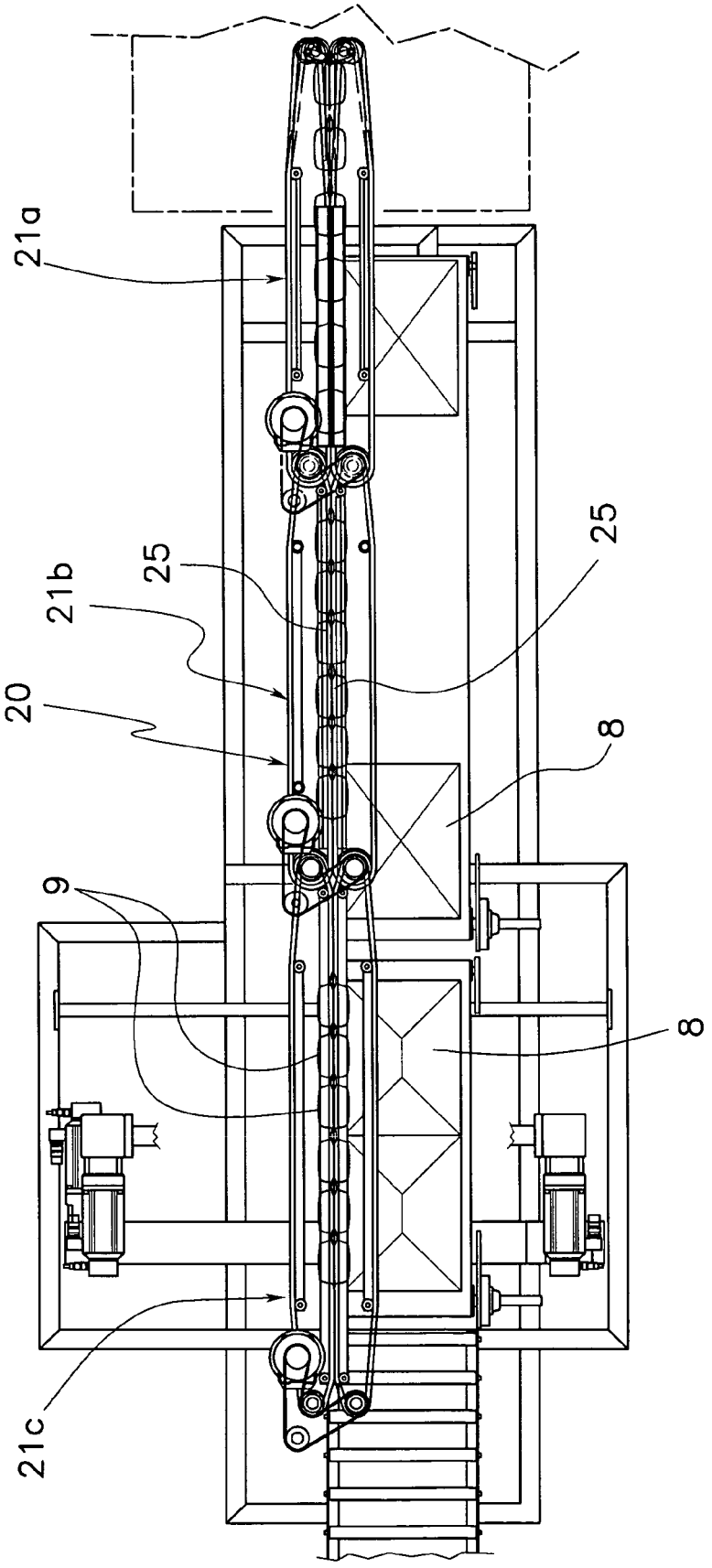


FIG.3

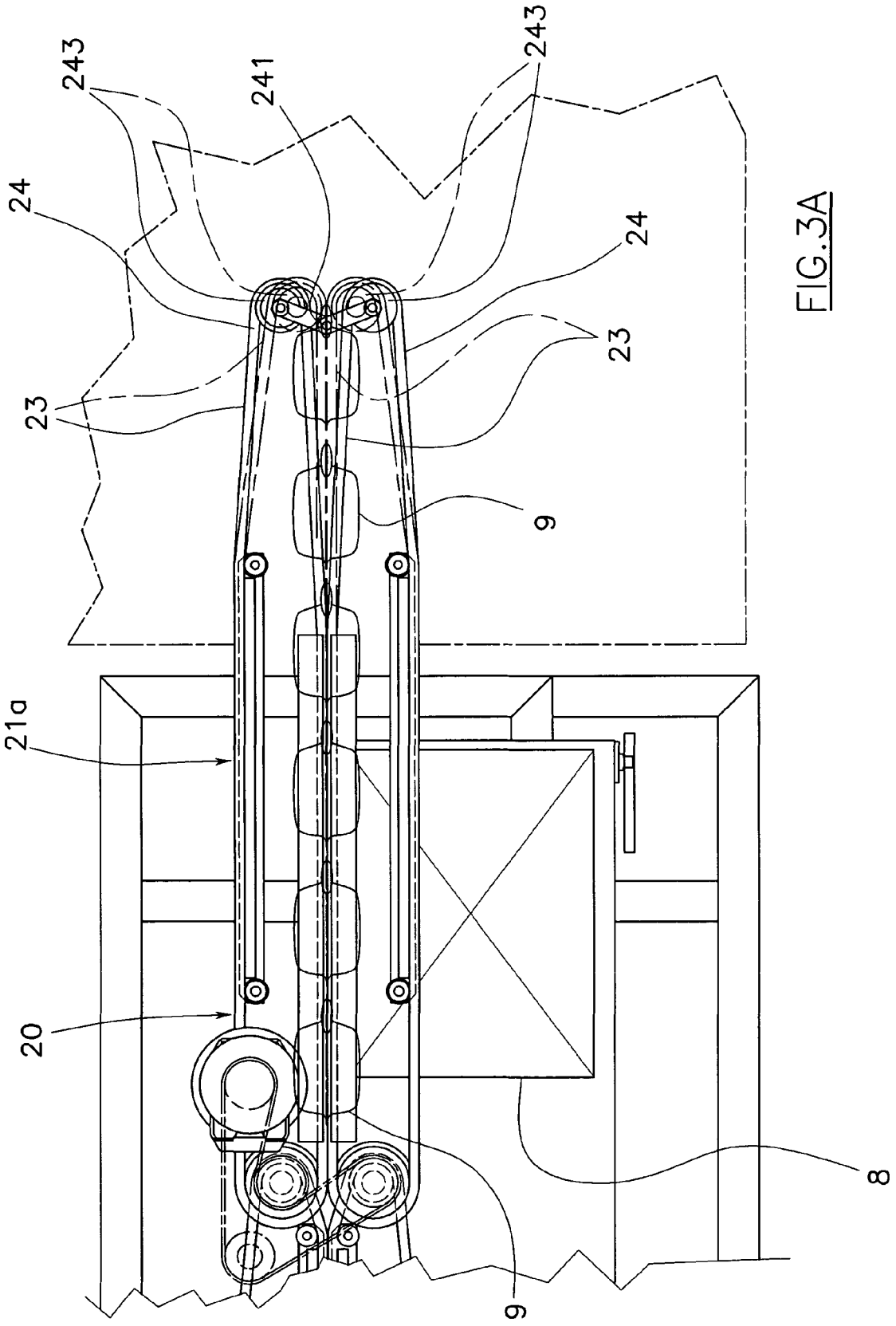


FIG.3A

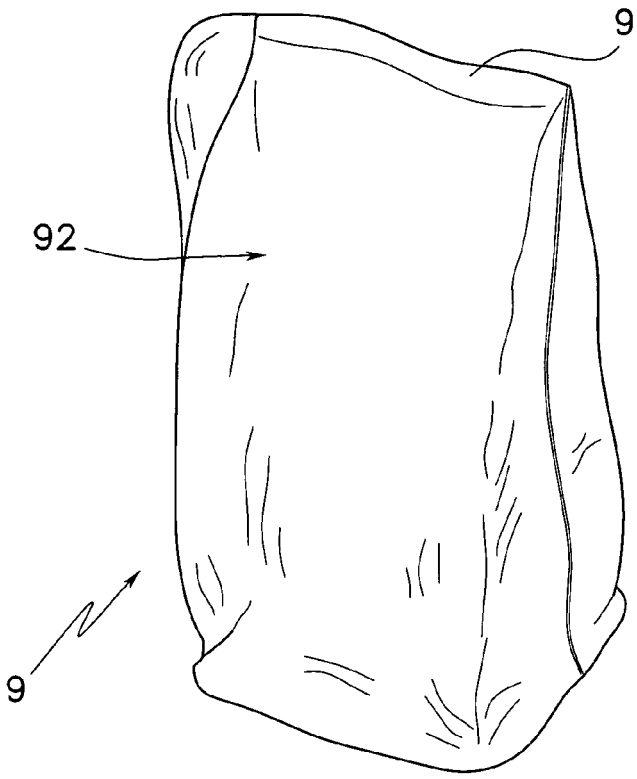


FIG.4

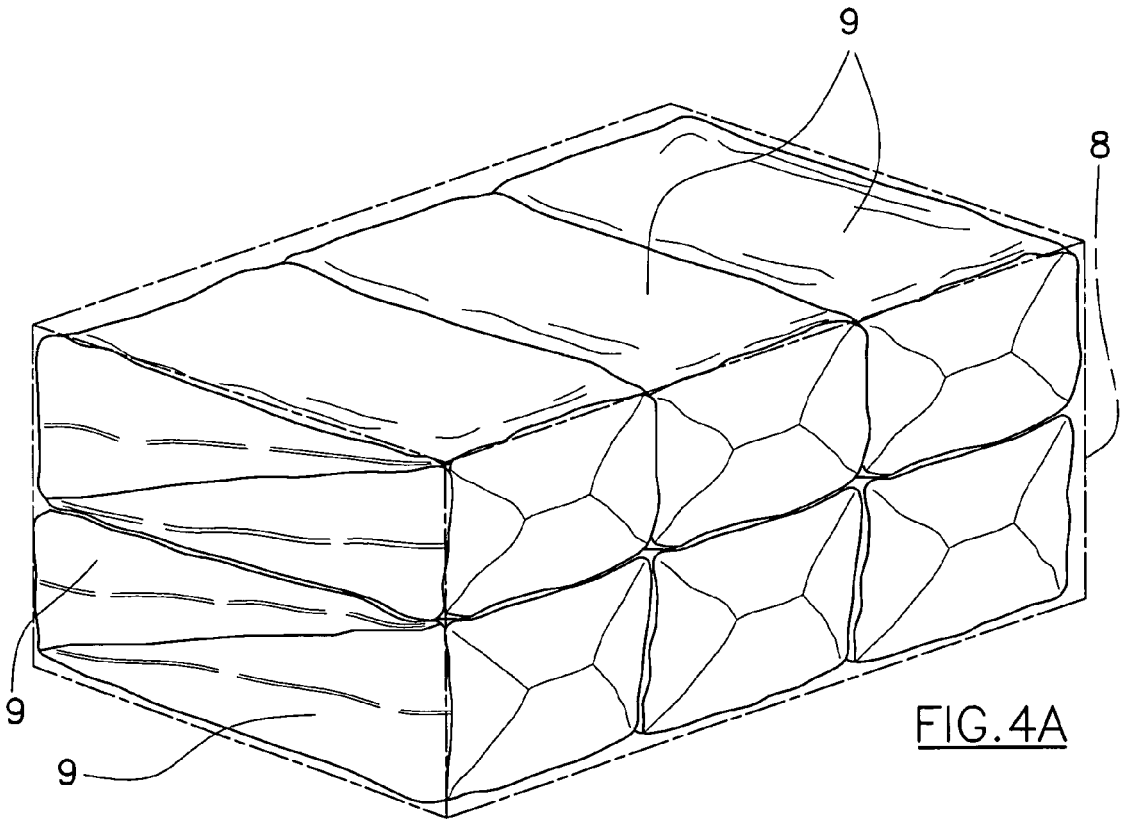


FIG.4A

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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7133

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 1 375 703 A (BAKER PERKINS DEVELOPMENTS LIMITED) 27 November 1974 (1974-11-27) * page 2, line 102 - page 3, line 78; figures 1-3 *	1,2,5,7	B65B5/08 B65B5/10 B65B43/56 B65B35/24
A		3,4,6	

A	DE 39 06 635 A1 (AUGUST KREMPEL SOEHNE GMBH & CO, 7000 STUTTGART, DE) 6 September 1990 (1990-09-06) * column 7, line 22 - column 8, line 28; figures 1,3-7 *	1,7	

A	US 5 239 807 A (SOLERI ET AL) 31 August 1993 (1993-08-31) * abstract; figures 1,2 *	1,7	

A	FR 2 303 715 A (FANINI VINICIO) 8 October 1976 (1976-10-08) * page 6, line 11 - page 8, line 6; figures 1-13 *	1,7	
	-----		TECHNICAL FIELDS SEARCHED (IPC)
			B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 January 2006	Schelle, J

CATEGORY OF CITED DOCUMENTS

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17-01-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1375703 A	27-11-1974	NONE	
DE 3906635 A1	06-09-1990	NONE	
US 5239807 A	31-08-1993	NONE	
FR 2303715 A	08-10-1976	DE 2610269 A1 IT 1028779 B	23-09-1976 10-02-1979

EPO FORM P0459

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