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(54) Machine for inserting reinforcing panels within corresponding cardboard boxes

(57) A cardboard box (3) is picked from a first initial, flattened configuration thereof, in which the box (3) is arranged according to two reciprocally overlapping layers (11, 12), by means of a gripping and expanding device (17) adapted to reciprocally displace the two layers (11, 12) to confer to the box (3) a final expanded configuration, in which an inserting device (34) displaces a reinforcing panel (2) within the box (3) and in contact with a wall (6) of the box (3) for allowing a fastening portion of the reinforcing panel (2) to couple with the wall (6) itself.

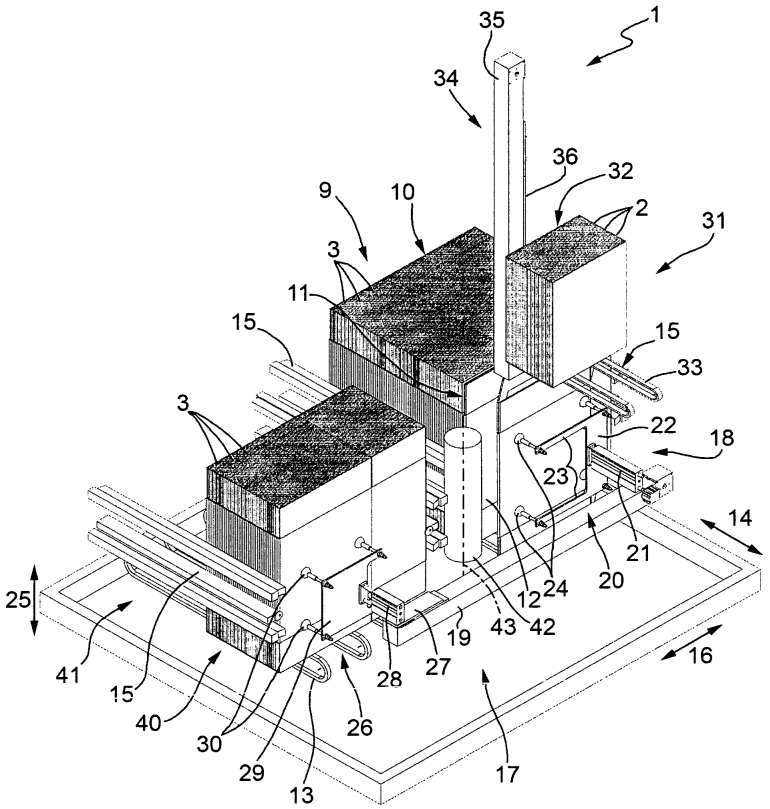

FIG.1

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Description

[0001] The present invention relates to a machine for inserting reinforcing panels within corresponding cardboard boxes.

[0002] Specifically, the present invention relates to a machine for displacing a reinforcing panel within a cardboard box and in contact with a wall thereof defined by two reciprocally separated portions by a weakening line so as to allow an adhesive portion of the reinforcing panel to couple with the wall itself.

[0003] According to the present invention, there is provided a machine for inserting reinforcing panels within corresponding cardboard boxes as claimed in the appended claims.

[0004] The present invention will now be described with reference to the accompanying drawings, which show a non-limitative embodiment thereof, in which:

- figure 1 is a diagrammatic perspective view, with parts removed for clarity, of a preferred embodiment of the machine of the present invention;
- figure 2 is a diagrammatic side view, with parts removed for clarity, of the machine in figure 1;
- figure 3 is a diagrammatic plan view, with parts removed for clarity, of the machine in figure 1; and
- figure 4 is a perspective view of a cardboard box provided with the corresponding reinforcing panel.

[0005] With reference to figures 1 and 4, numeral 1 indicates as a whole a machine for inserting flat reinforcing panels 2 inside corresponding cardboard boxes 3, each of which comprises, in use, a horizontal upper wall 4 and a horizontal lower wall 5 which are parallel to each other, a vertical front wall 6 and a vertical rear wall 7 which are parallel to each other and orthogonal to the walls 4 and 5, and two vertical side walls which are parallel to each other and orthogonal to the walls 3, 4, 5, and 6. Each wall 4, 6, and 8 comprises two portions 4a and 4b, 6a and 6b, 8a and 8b reciprocally separated by a corresponding weakening line 4c, 6c, and 8c.

[0006] Furthermore, the box 3 is provided with a reinforcing panel 2 overlapping the wall 6 and glued to the portion 6a to assure a relatively high resistance to vertical compression to the wall 6 and thus to the box 3.

[0007] The separation of the portions 4a, 6a, and 8a from the corresponding portions 4b, 6b, and 8b and the removal of the assembly defined by the portions 4a, 6a, and 8a and by the panel 2 allow the box 3 to be opened.

[0008] As shown in figures 1, 2, and 3, the machine 1 comprises a storage 9 for a stack 10 of boxes 3 arranged in an initial flattened configuration, in which each box 3 is arranged according to two overlapping layers 11, 12 substantially in reciprocal contact.

[0009] The storage 9 is limited at the lower end thereof by a conveying device 13, which extends in a substantially horizontal direction 14, defines a resting plane for the stack 10, and is adapted to feed the boxes 3 of the stack 10 in the direction 14, and is further laterally limited by two reciprocally parallel guides 15, which extend in the direction 14, and are arranged on opposite sides of the stack 10 in a horizontal direction 16 transversal to the direction 14 itself.

[0010] Furthermore, the machine 1 comprises a gripping and expanding device 17, which is adapted to extract in sequence the boxes 3 from the storage 9 at a loading station 18, and comprises, in turn, a longitudinal guide 19 parallelly mounted to the direction 16 for supporting a first gripping assembly 20 placed in a position facing the station 18 itself.

[0011] The assembly 20 comprises an actuator cylinder 21 fixed to the guide 19 parallelly to the direction 14, and a supporting plate 22, which extends on a plane orthogonal to the direction 14, is fixed at a free end of an outlet rod of the cylinder 21, is substantially C-shaped, comprises two arms 23 which are parallel to the direction 16, and is provided with a plurality of suction caps 24 (in this case four suction caps 24), which are connected to a pneumatic suction device (of known type and not shown), and are aligned reciprocally in pairs in the direction 16 and in a vertical direction 25 which is orthogonal to the directions 14 and 16.

[0012] Furthermore, the device 17 comprises a second gripping assembly 26 including, in turn, a slide 27 slidingly coupled to the guide 19 to perform rectilinear displacements in the direction 16, along the guide 19 and under the bias of an actuating device (known and not shown); an actuator cylinder 28 fixed to the slide 27 parallel to the direction 14; and a quadrilateral supporting plate 29, which is parallel to the plate 22, is fixed at a free end of the outlet rod of the cylinder 28, has a height, measured parallelly to the direction 25, smaller than a distance between the arms 23, which is also measured parallelly to the direction 25, and is provided with a plurality of suction caps 30 (in this case four suction caps 30), which are connected to the aforesaid pneumatic suction device (not shown), and are aligned reciprocally in pairs in the directions 16 and 25.

[0013] Furthermore, the machine 1 comprises a storage 31 for a stack 32 of reinforcing panels 2.

[0014] The storage 31 is limited at a lower end thereof by a conveying device 33, which extends in the direction 14, is adapted to feed the panels 2 of the stack 32 in the direction 14, and defines a resting plane for the stack 32 extending over the stack 10 of boxes 3, and is further laterally limited by two reciprocally parallel guides (not shown) which extend in the direction 14 and are arranged on opposite sides of the stack 32 in the direction 16.

[0015] Machine 1 is also provided with an inserting device 34 adapted to extract in sequence the panels 2 from the storage 31 and comprising a vertical upright 35, which extends in the direction 25, and supports a slide 36 slidingly coupled to the upright 35 for performing rectilinear displacements in the direction 25 itself, along the upright 35 and under the bias of an actuating device (known and not shown).

[0016] Moreover, the device 34 comprises an actuator cylinder 37 fixed to the slide 36 parallelly to the direction 14, and a supporting plate 38, which is parallel to the plates 22 and 29, is fixed at a free end of an outlet rod of the cylinder 37, and is provided with four suction caps (not shown) connected to the aforesaid pneumatic suction device (not shown) and reciprocally aligned in pairs in the directions 16 and 25.

[0017] Finally, the device 34 comprises, in this case, a gluer 39 mounted between the two stacks 10 and 32 in a position facing the upright 35.

[0018] In use, the suction caps 24 of the first gripping assembly 20 are displaced in the direction 14 in an advanced position to engage the layer 12 of the box 3 arranged in the station 18; the layer 11 is withheld by means of a pair of stopping elements (not shown), which are mounted at the station 18, and are movable between a stopping position and a releasing position of the layer 11; and the suction caps 24 are displaced in the direction 14 to a first retracted position to reciprocally separate the two layers 11, 12 and to confer a final expanded configuration to the box 3, in which the box 3 shows a parallelogram section.

[0019] The plate 38 of the inserting device 34 is firstly displaced in the direction 14 to an advanced position to allow the corresponding suction caps (not shown) to engage the first panel 2 of the stack 32 and, then, to a retracted position to extract the panel 2 itself from the storage 31; the slide 36 is lowered in the direction 25 firstly to allow the gluer 39 to apply the glue onto the newly picked panel 2 and then to insert the panel 2 inside the box 3; and the actuator cylinder 37 is actuated to displace the panel 2 in the direction 14, substantially in contact with the layer 12 at the front wall 6.

[0020] At this point, the plate 38 is displaced again to its retracted position; the slide 36 is raised in the direction 25 outside the box 3; the second gripping assembly 26 is displaced in the direction 16 so as to insert the plate 29 between the arms 23 of the plate 22; the plate 22 is displaced in the direction 14 to a second retracted position to disengage the box 3 from the storage 9 and to displace the layer 12 of the box 3 substantially in contact with the suction caps 30.

[0021] Finally, the suction caps 24 of the first gripping assembly 20 are deactivated; and the second gripping assembly 26 is displaced in the direction 16 to an unloading station 40, at which the second gripping assembly 26 releases the assembly defined by the panel 2 and by the box 3 to a storage 41 completely similar to the storage 9.

[0022] During the displacement from the storage 9 to the storage 41, the box 3 is returned again to its initial flattened configuration by a closing roller 42, which is mounted with its longitudinal axis 43 parallel to the direction 25, and protrudes inside the path of the box 3 to engage the layer 11 and to displace the two layers 11 and 12 substantially in reciprocal contact with the interposition of the panel 2.

[0023] According to a variant (not shown), the gluer 39 is eliminated and the panel 2 has at least one adhesive portion which is protected by a backing sheet, which is removed from the panel 2 before inserting the panel 2 inside the box 3.

Claims

1. A machine for inserting reinforcing panels (2) within corresponding cardboard boxes (3), the machine being **characterized in that** it comprises a gripping and expanding device (17) for picking at least one box (3) in an initial flattened condition, in which the box (3) is arranged according to two reciprocally overlapping layers (11, 12), each defined by at least one corresponding wall (4, 5, 6, 7, 8) of the box (3) itself, and for reciprocally displacing the two layers (11, 12) so as to confer a final expanded configuration to the box (3) itself; and an inserting device (34) for inserting a reinforcing panel (2) of one first said wall (6) within the box (3) arranged in its final expanded configuration; the inserting device (34) comprising movable inserting means (38) for displacing the reinforcing panel (2) in contact with the first wall (6) and allowing to a fastening portion of the reinforcing panel (2) to couple with the first wall (6) itself.

2. A machine according to claim 1, wherein the fastening portion comprises at least one adhesive element and a backing sheet of the adhesive element itself; a removing device being provided to remove the backing sheet from the adhesive element before inserting the reinforcing panel (2) inside the box (3).

3. A machine according to claim 1 and further comprising a gluer device (39) for applying the glue to a fastening portion before inserting the reinforcing panel (2) inside the box (3).

4. A machine according to any one of the preceding claims, wherein the first wall (6) comprises two portions (6a, 6b) reciprocally separated by a weakening line (6c) adapted to allow, in use, the reciprocal separation of the two portions (6a, 6b).

5. A machine according to any one of the preceding claims, wherein the inserting means (38) are movable in a first direction (25) to insert the reinforcing panel (2) inside the box (3), and in a second direction (14) substantially transversal to the first direction (25) to displace the reinforcing panel (2) in contact with the first wall (6).

6. A machine according to any one of the proceeding claims, wherein the gripping and expanding device (17) comprises first and second gripping means (20), each adapted to engage one corresponding said lay-

er (11, 12), and actuator means (21) for reciprocally displacing the first and second gripping means (20) so as to reciprocally separate the two layers (11, 12).

7. A machine according to any one of the preceding claims and further comprising a loading station (18), in which the gripping and expanding device (17) picks the box (3) in its initial flattened configuration, and an unloading station (40), in which the gripping and expanding device (17) releases an assembly comprising the box (3) and the reinforcing panel (2).

8. A machine according to claim 7 and further including a closing device (42) adapted to engage a layer (11) of the box (3) during the displacement of said assembly from the loading station (18) to the unloading station (40) to confer its initial flattened configuration to the box (3) itself again, in which the two layers (11, 12) are reciprocally overlapping with the interposition of the reinforcing panel (2).

9. A machine according to claim 7 or 8 and further comprising a first storage (9) for said boxes (3) connected to the gripping and expanding device (17) at the loading station (18), a second storage (41) for said assemblies connected with the gripping and expanding device (17) at the unloading station (40), and a third storage (31) for the reinforcing panels (2).

10. A machine according to any one of the claims from 7 to 9, wherein the gripping and expanding device (17) comprises gripping means (26) movable between the loading and unloading stations (18, 40).

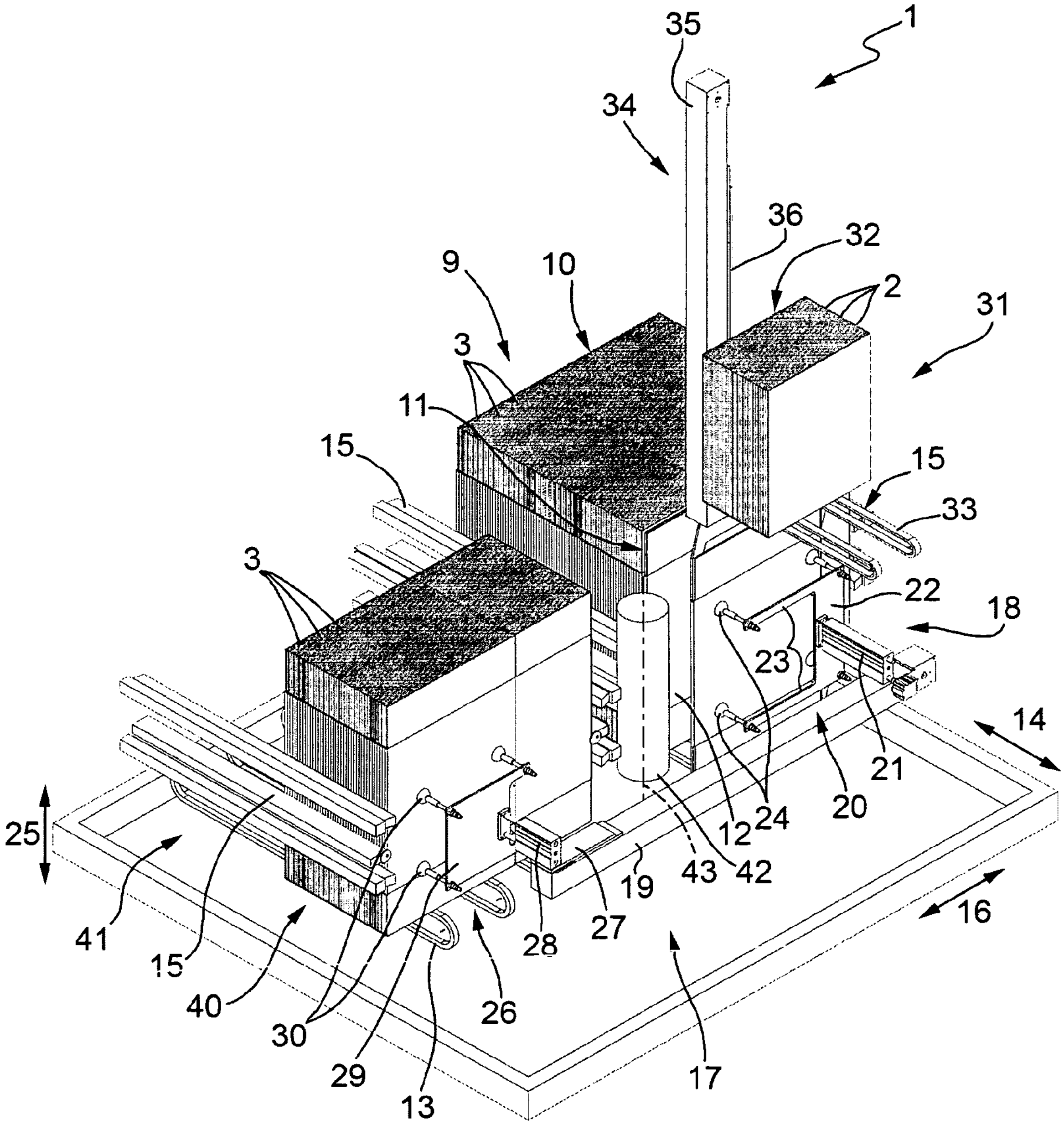
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FIG.1

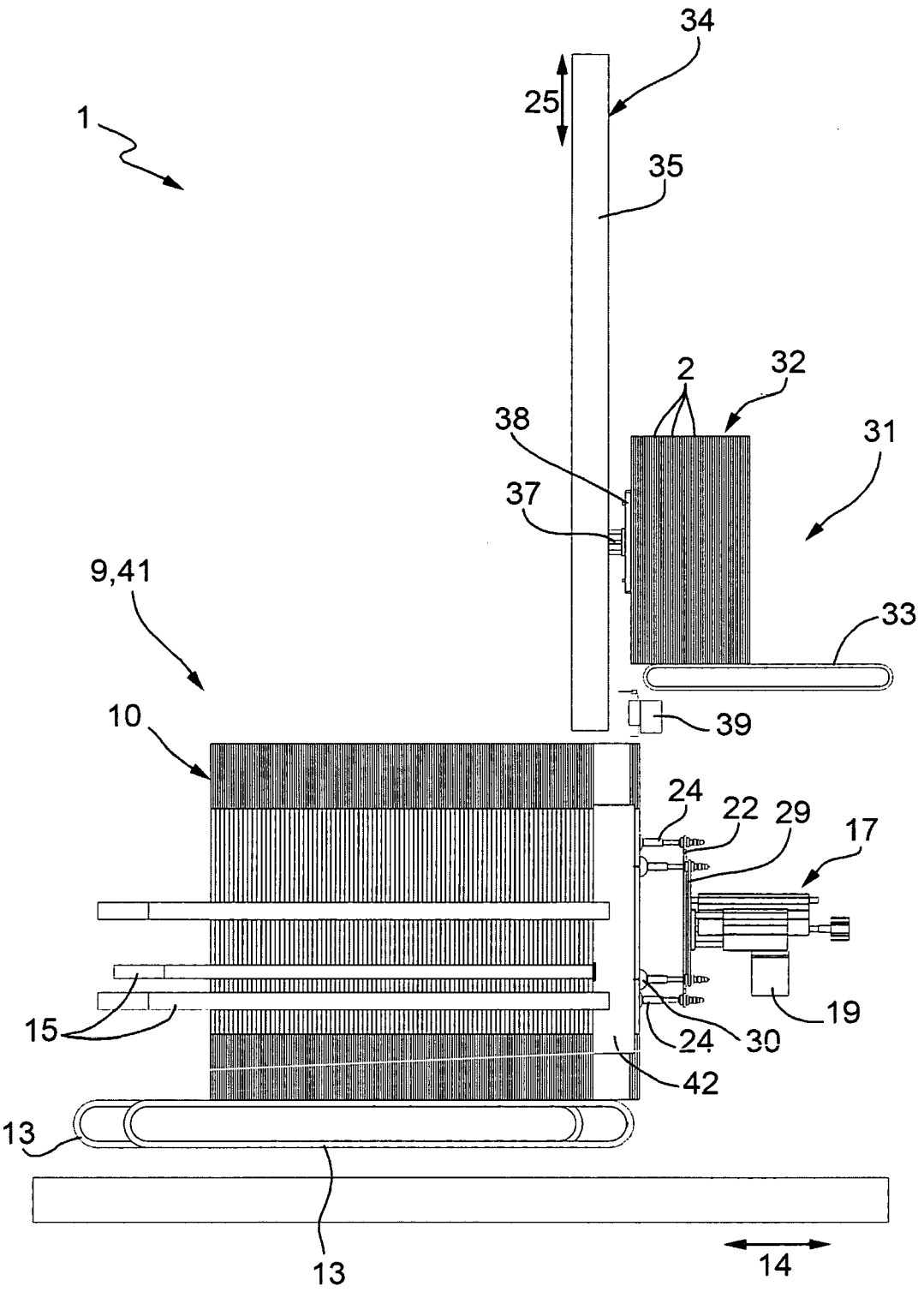

FIG.2

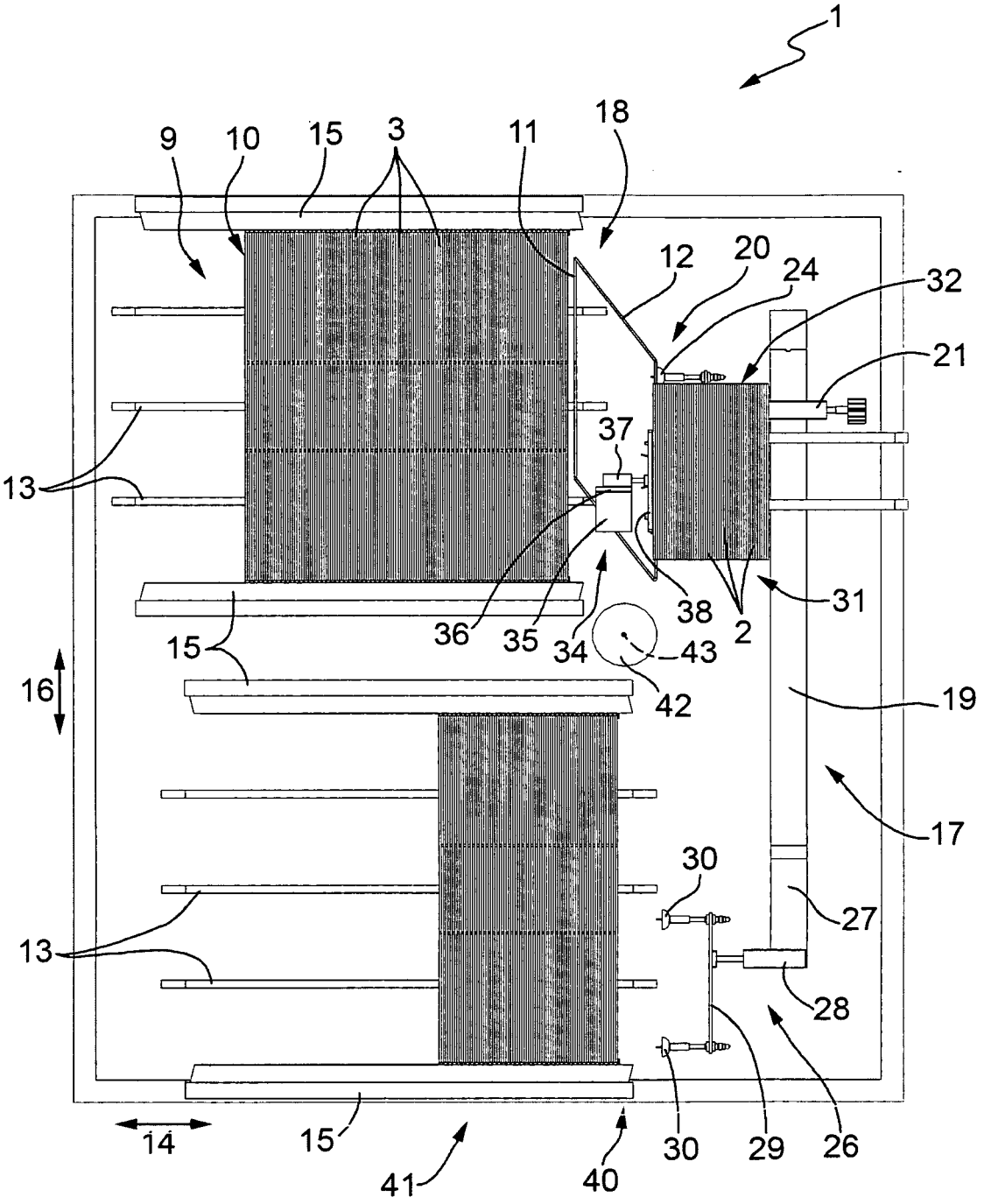
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FIG.3

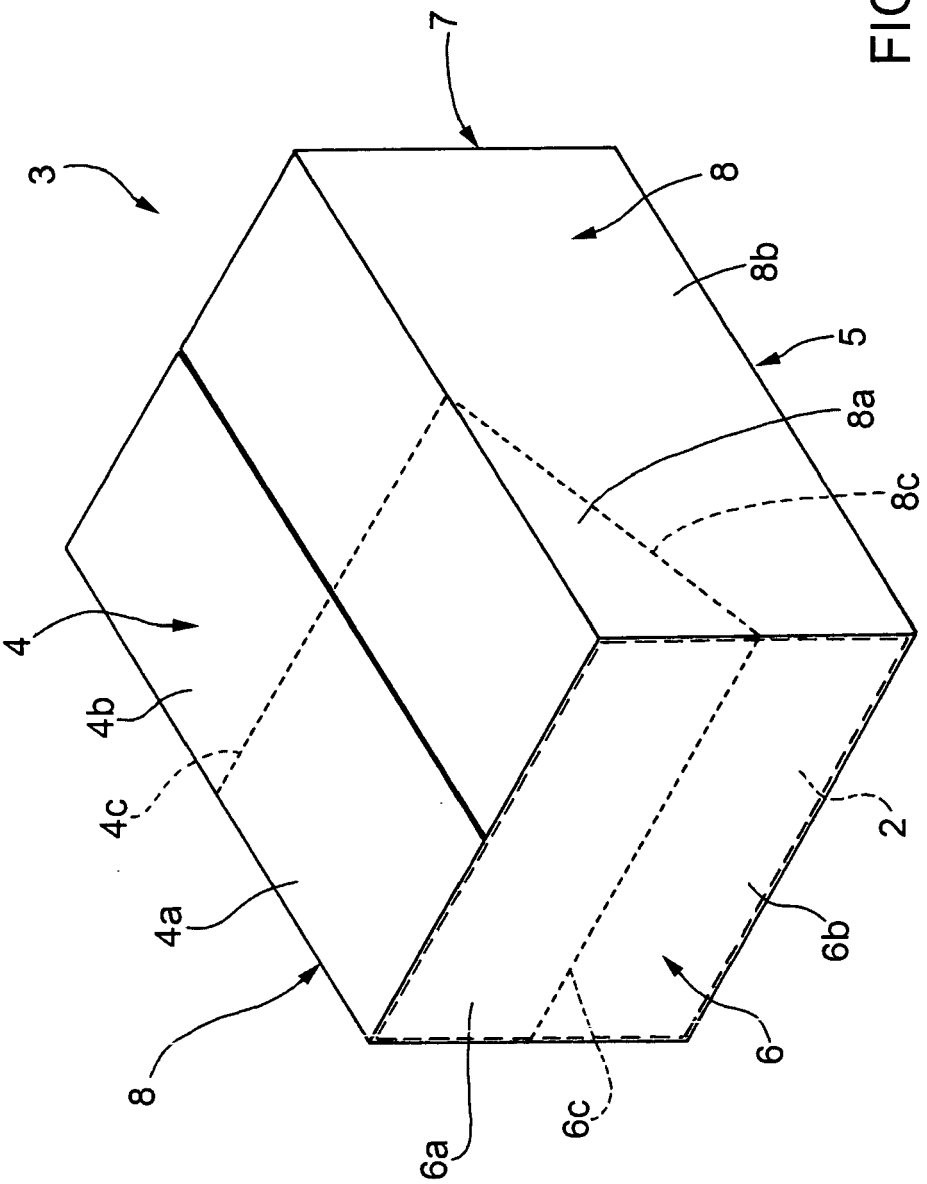

FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5385

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2007/057677 A (STEPHENSON JOHN [GB]) 24 May 2007 (2007-05-24) * paragraph [0168] - paragraph [0169]; figures 3,10,17 * -----	1-10	INV. B31B1/90 B31B5/80 B31B7/00 B65D5/44 B65D5/54
			TECHNICAL FIELDS SEARCHED (IPC) B31B B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 November 2008	Johne, Olaf

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007057677 A	24-05-2007	NONE	

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