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(54) Packaging method and system

(57) There is provided a method of and system for packing articles in a box having an open bottom and where the bottom can be closed by means of one or more flaps hingedly attached to the box along one or more of the edges of the open bottom. Hereby an extremely simple closing of at least a portion of the open bottom of the box is achieved with the articles inside the box.

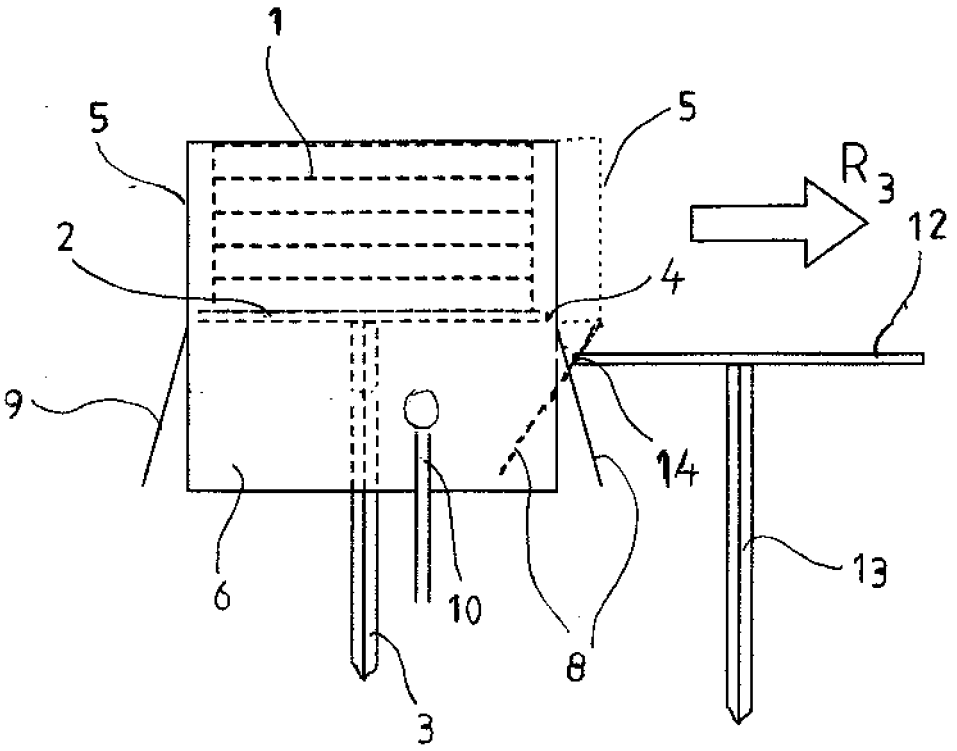

FIG. 4

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Description

[0001] The present invention relates to a method of and system for packing articles in a box having an open bottom and where the bottom can be closed by means of one or more flaps hingedly attached to the box along one or more of the edges of the open bottom.

[0002] Methods and systems of the type indicated are known from US 5,115,625, US 4,742,670, US 6,968,668 and US 3,605,377. All these known methods and systems suffer from the disadvantage of being rather complicated, and the systems are relatively expensive and require a large degree of maintenance.

[0003] It is the object of the invention to provide a method and a system that is simple and relatively inexpensive and requires a very low degree of maintenance.

[0004] This object is achieved by the method being applied to a box having an open bottom where said open bottom can be at least partly closed by means of at least a first flap hingedly attached to the box along a first box edge of said open bottom, the method comprising the steps of providing a first support surface and a second support surface spaced horizontally from said first support surface such that a first gap is formed between said first and second support surfaces, said second support surface having a first edge facing said first support surface and said second support surface being located lower than said first support surface, placing said articles on said first support surface, lowering said box towards said first support surface such that said articles are placed within said box and said first flap extends downwards through said first gap, and displacing said box with said articles generally horizontally from said first support surface on to said second support surface such that said first edge pivots said first flap around said first box edge into a horizontal position wherein said first flap covers and closes at least a portion of said open bottom of said box.

[0005] Hereby an extremely simple closing of at least a portion of the open bottom of the box is achieved with the articles inside the box.

[0006] In the currently preferred embodiment of the method according to the invention, said first support surface has a second edge facing said second support surface and said box has a second flap opposite said first flap and hingedly connected to a second box edge opposite said first box edge, the method comprising the further steps of ensuring that said second flap extends downwards through said first gap when said box and said articles have been displaced on to said second surface, causing said second support surface to be higher than said first support surface, and displacing said box with said articles generally horizontally from said second support surface on to said first support surface such that said second edge pivots said first flap around said second box edge into a horizontal position wherein said second flap covers and closes at least a portion of said open bottom of said box.

[0007] Advantageously, said box has a third and fourth flap located opposite each other and hingedly connected to a third and fourth box edge of said bottom, respectively, said third and fourth box edges extending at right angles to said first and second box edges such that said first to fourth box edges define the opening in the bottom of said box.

[0008] Preferably, at least one further support surface with a further edge for pivoting one of said flaps around the corresponding box bottom edge is provided, the method comprising the further step of displacing said box with articles on to said further support surface such that said further edge pivots one of said flaps around the corresponding box edge into a horizontal position wherein said further flap covers and closes at least a portion of said open bottom of said box.

[0009] Advantageously the method comprises the further step of rotating at least one of said support surfaces around a vertical axis while said box with articles is located on said rotated support surface such that one of said flaps extends downwards through a gap between said rotated support surface and an adjacent, lower support surface.

[0010] In the currently preferred embodiment of the method according to the invention at least one of said support surfaces is a plate, the method comprising the step of pivoting at least one of said flaps around the corresponding box bottom edge such that said flap is held against the bottom surface of said plate while said box with articles is displaced on to an adjacent, lower support surface.

[0011] Advantageously, glue is sprayed on to the bottom surface of at least one of said flaps while said box with articles is displaced from one of said support surfaces on to an adjacent support surface.

[0012] Advantageously, displacement of said box from one support surface on to another adjacent support surface is carried out by displacing these two adjacent support surfaces horizontally while preventing said box from moving horizontally.

[0013] In another aspect the invention relates to a system for packing articles in a box having an open bottom where said open bottom can be at least partly closed by means of at least a first flap hingedly attached to said box along a first box edge of said open bottom, said system comprising a first support surface and a second support surface spaced horizontally from said first support surface such that a first gap is formed between said first and second support surfaces, said second support surface having a first edge facing said first support surface and said second support surface being located lower than said first support surface, means for placing said articles on said first support surface, means for lowering said box towards said first support surface such that said articles are placed within said box and said first flap extends downwards through said first gap, and means for displacing said box with said articles generally horizontally from said first support surface on to said second

support surface such that said first edge pivots said first flap around said first box edge into a horizontal position wherein said first flap covers and closes at least a portion of said open bottom of said box.

[0014] In the currently preferred embodiment said first support surface has a second edge facing said second support surface and said box has a second flap opposite said first flap and hingedly connected to a second box edge opposite said first box edge and said box has a third and fourth flap located opposite each other and hingedly connected to a third and fourth box edge of said bottom, respectively, said third and fourth box edges extending at right angles to said first and second box edges such that said first to fourth box edges define the opening in the bottom of said box.

[0015] Advantageously, at least one further support surface with a further edge for pivoting one of said flaps around the corresponding box bottom edge is provided.

[0016] Advantageously, rotating means are provided for rotating at least one of said support surfaces around a vertical axis while said box with articles is located on said rotated support surface such that one of said flaps extend downwards through a gap between said rotated support surface and an adjacent, lower support surface.

[0017] In the currently preferred embodiment at least one of said support surfaces is a plate and pivoting means such as a linear actuator is provided for pivoting at least one of said flaps around the corresponding box bottom edge such that said flap is held against the bottom surface of said plate while said box with articles is displaced on to an adjacent, lower support surface.

[0018] In the currently preferred embodiment and other alternative advantageous embodiments vertical displacement means are provided for displacing at least one of said support surfaces vertically up and down.

[0019] Advantageously, horizontal displacement means are provided for horizontally displacing two adjacent support surfaces and fixation means are provided for preventing said box from being displaced horizontally while said two adjacent support surfaces are being displaced horizontally.

[0020] Preferably, said first support surface is provided with apertures for allowing stabilizing or containment elements such as plates, rods and the like to retractably protrude upwards from said support surface for stabilizing or containing said articles on said first support surface while said box is being lowered over said articles.

[0021] In a further aspect, the present invention relates to a method and device for facilitating packing of articles in a container, for instance a box or a bag.

[0022] Many articles are difficult to assemble such that they may be introduced into a box or bag or the like for being transported to another site.

[0023] A straightforward way to assemble articles for being packed is to arrange them on a support surface in such a manner that they can be introduced into the intended package.

[0024] According to the invention a packaging method is provided wherein a support surface is provided with apertures for allowing stabilizing or containment elements such as plates, rods and the like to be retractably protruded upwards from said support surface for stabilizing or containing said articles on said support surface while a package such as a downwards open box or bag is arranged around said articles, said elements being adapted for being retracted when said package is arranged around said articles.

[0025] Furthermore according to the invention, a packaging apparatus is provided for packaging articles difficult to assemble on a support surface, the apparatus comprising

- a support surface having passageways providing apertures in said support surface ,
- stabilizing or containment elements such as plates, rods or the like,
- means to introduce said elements into said passageways such that they protrude upwards from said support surface, and
- means to retract said elements such that said elements do not protrude upwards from said support surface.

[0026] In the following, the invention will be explained more in detail in connection with the various different embodiments thereof shown, solely be way of example, in the accompanying drawings, where:

Figs. 1-3e are a series of schematic perspective views illustrating the various steps in the currently preferred embodiment of the method according to the invention,

Figs. 4-5 are schematic elevational views illustrating the various steps in the currently preferred embodiment of the method according to the invention

Figs 6-7 are diagrammatical perspective views, seen from the side and from the end, respectively, of the currently preferred system or apparatus for carrying out the currently preferred method illustrated by means of Figs. 1-5,

Figs. 8a-8b are schematic perspective views of devices according to the invention provided for allowing arrangement of different non-stackable articles on a support table prior to packing in a box according to the invention,

Fig. 9 is a series of schematic perspective views illustrating the various steps in a first alternative embodiment of the method according to the invention,

Fig. 10 is a series of schematic elevational views illustrating the various steps in a second alternative embodiment of the method according to the inven-

tion as well as the corresponding system or apparatus, and

Figs. 11-16 are schematic top views illustrating the various steps in third, fourth, fifth, sixth, seventh and eighth alternative embodiments of the method according to the invention.

[0027] Referring now to Figs. 1-7, a stack of articles 1 to be packed is arranged on the surface of a generally horizontal first support plate 2 arranged on a support column 3 in such a manner that the first plate 2 can be moved up and down. The first plate 2 has a front edge 4.

[0028] A box 5 with an open bottom and provided with four flaps, i.e. two side flaps 6 and 7 and two end flaps 8 and 9 arranged hingedly pivotable at the edges of the bottom opening of the box 5 is placed over the articles 1 in the direction of the arrow R1 so that the flaps 6-9 hang downwards relative to the support surface of plate 2.

[0029] Two hydraulically actuated linear actuators 10 and 11 push and pivot the side flaps 6 and 7 upwards until they are horizontal and abut the bottom surface of the first support plate 2 (see Figs. 2 and 4).

[0030] Referring now to Figs. 3a-3e and 4-7 a second support plate 12 on a support column 13 is arranged adjacent support plate 2 with end flap 8 hanging downwards between front edge 4 of support plate 2 and front edge 14 of support plate 12. Plate 2 is arranged slightly higher than support plate 2 in Figs. 3a-3c and Fig. 4.

[0031] First (see Figs. 3a-3c and Fig. 4), the box 5 with articles 1 is pushed over from plate 2 on to plate 12 in the direction of arrow R3 whereby the front edge 14 of the lower second support plate 12 pushes and pivots the end flap 8 up until it abuts the bottom surface of the side flaps 6 and 7 (Fig 3c).

[0032] Finally, (see Figs. 3s, 3e and 5) the first support plate 2 is lowered to a level slightly below second support plate 8 (Fig. 3d) and the box 5 with articles 1 is pushed over from plate 12 on to plate 2 in the direction of arrow R4 whereby the front edge 4 of the lower first support plate 2 pushes and pivots the end flap 9 up until it abuts the bottom surface of the side flaps 6 and 7 (Fig 3e).

[0033] During the operation shown in Fig. 3b glue is applied to the bottom surfaces of side flaps 6 and 7 in the region to be covered by end flap 8 in Fig. 8, and during the operation shown in Fig. 3d glue is applied to the bottom surfaces of side flaps 6 and 7 in the region to be covered by end flap 9 in Fig. 8. Hereby the bottom opening of box 5 is closed and the box 5 with articles 1 can be removed for transport.

[0034] The displacement of the box between the two plates may be carried out in many manners, for instance by a robot or hydraulic actuators or as described below in connection with Fig. 10.

[0035] Referring now to Figs. 6-7, a currently preferred practical embodiment of the system or apparatus according to the invention is illustrated. The table or plate 2 is provided with 15 to allow gripping means arranged for supporting the underside of a stack of paper sheets or brochures to be arranged on the plate 2 to be received therein and retracted before the box 5 is placed over the stack.

[0036] Glue squirting nozzles 17 are arranged displaceable (see dotted position 17' thereof) so as to be able to squirt glue towards the bottom of the end flaps 6 and 7 of the box 5 when the box 5 with articles 1 is displaced from table 2 to table 12 and vice versa. Notches 16 are provided in the edge 14 of table 12 to allow the jets of glue emitted by nozzles 17 to impact the flaps 6 and 7 when the box 5 is displaced from table 12 to table 2.

[0037] An actuator 18 is provided to lift and lower table 2. The support 13 of table 12 is arranged displaceable on base plate 19 such that different sizes of tables 2 and 12 can be accommodated for different sizes of boxes 5.

[0038] Referring now to Figs. 8a-8b, devices according to the invention provided for allowing arrangement of different non-stackable articles on a support table prior to packing in a box according to the invention are illustrated.

[0039] Elongate slots 20 and round holes 21 are provided in the table 2 for allowing rectangular support walls 22 and rods 23, respectively, to be inserted from the bottom of the plate 2 so they protrude from the surface of the table 2. The walls 22 are intended for stabilizing stacks of articles that cannot be stacked without the support of the walls 22, while the rods 23 provide a containment means for containing articles that cannot be stacked at all, for instance the indicated balls 24.

[0040] When the box 5 has been placed around the articles and thus serves as a stabilizing means in Fig. 8a and as a containment means in Fig 8b, then the walls 22 or rods 23 can be pulled out downwards to allow the box with articles to be displaced on to the table 12.

[0041] This feature can, in fact, as discussed above, be applied to any situation where difficult to stack or unstackable articles are to be placed on a surface for being packed in a bag or any other container in any of the possible ways of doing so and not just the method according to the invention.

[0042] Referring now to Fig. 9, an alternative method and apparatus according to the invention is illustrated. A further table or support surface 25 is provided at a lower level than table 12. Table 12 is mounted on a support 26 that can rotate 90 degrees in the direction of arrow R5 such that the flap 9 is suspended between the tables 12 and 25. The box 5 with articles is displaced from table 12 to table 25 so that the edge 26 of table 25 pivots flap 9 into a horizontal position. The table 25 can now be displaced for transporting the packed and closed box away from the packing region for further handling whereby the packing capacity of the system is enhanced by placing new articles and a new box 5 on table 2 immediately after the previous box 5 has been displaced on to table 12. In this embodiment the levels of the tables 2, 12 and 25 may be fixed so that a mechanism for lifting and lowering one or more of the tables is eliminated.

[0043] Referring now to Fig. 10, the base plate 19 car-

rying the tables 2 and 14 is mounted on wheels 27 such that it can move to and fro from right to left (arrow R10) and back (arrow R10') allowing fixed walls or other fixation means 28 and 29 to displace the box from table 2 to table 12 and vice versa, the table 2 being lifted and lowered (arrow R10") as described above in connection with Figs. 1-7. This principle of displacing the support surfaces may be applied to all embodiments of the method according to the invention described above and below.

[0044] In the following various methods and systems for packing a box 5 without employing the two linear actuators 10 and 11 are described in relation to Figs. 11-16.

[0045] In Fig. 11 a box is placed on table 2 and moved to and fro on to and away from table 12 in the direction of arrows Ra and Rb whereby two opposed flaps 6 and 7 are pivoted upwards to at least partly close the bottom opening of the box. Thereafter the table 2 is pivoted 90 degrees in the direction of arrow R11. Then the box with contents is displaced to and fro on to and away from table 12 whereby the last two opposed flaps 8 and 9 are pivoted upwards to finish closing the open bottom of the box.

[0046] In Fig. 12 a box is placed on table 30 and moved to and fro on to and away from table 31 in the direction of arrows Ra and Rb whereby two opposed flaps 6 and 7 are pivoted upwards to at least partly close the bottom opening of the box. Then the box with contents is displaced to and fro on to and away from table 32 whereby the last two opposed flaps 8 and 9 are pivoted upwards to finish closing the open bottom of the box.

[0047] In Fig. 13 a box is placed on table 33 and moved to and fro on to and away from table 34 in the direction of arrows Ra and Rb whereby two opposed flaps 6 and 7 are pivoted upwards to at least partly close the bottom opening of the box. Then the table 33 is rotated 90 degrees clock-wise in the direction of arrow R13 and the box with contents is displaced on to table 34 in direction Rc whereby flap 8 is pivoted upwards. Then the table 34 is rotated 90 degrees counter clock-wise in the direction of arrow R13' and the box with contents is displaced on to table 35 in direction Rd whereby flap 9 is pivoted upwards.

[0048] In Fig. 14 a box is placed on table 36 and moved to and fro on to and away from table 38 in the direction of arrows Ra and Rb whereby two opposed flaps 6 and 7 are pivoted upwards to at least partly close the bottom opening of the box. Then the box with contents is displaced on to table 37 in direction Rc whereby flap 8 is pivoted upwards. Then the table 37 is rotated 90 degrees counter clock-wise in the direction of arrow R14 and the box with contents is displaced on to table 39 in direction Rd whereby flap 9 is pivoted upwards.

[0049] In Fig. 15 a box is placed on table 1 and moved on to table 2 in the direction of arrow Ra whereby flap 6 is pivoted upwards to at least partly close the bottom opening of the box. Then the table 2 is rotated 180 degrees counter clock-wise in the direction of arrow R15 and the box with contents is displaced on to table 3 in direction Rb whereby flap 7 is pivoted upwards. Then the table 3 is rotated 90 degrees counter clock-wise in the direction of arrow R15' and the box with contents is displaced on to table 4 in direction Rb whereby flap 8 is pivoted upwards.Then the table 4 is rotated 180 degrees counter clock-wise in the direction of arrow R15" and the box with contents is displaced on to table 5 in direction Rd whereby flap 9 is pivoted upwards.

[0050] In Fig. 16 a box is placed on table 1 and moved on to table 2 in the direction of arrow Ra whereby flap 6 is pivoted upwards to at least partly close the bottom opening of the box. Then the table 2 is rotated 180 degrees counter clock-wise in the direction of arrow R16 and the box with contents is displaced on to table 3 in direction Rb whereby flap 7 is pivoted upwards. Then the box is displaced on to table 4 in the direction of arrow Rc whereby flap 8 is pivoted upwards. Then the table 4 is rotated 180 degrees counter clock-wise in the direction of arrow R16' and the box with contents is displaced on to table 5 in direction Rd whereby flap 9 is pivoted upwards.

[0051] In all the embodiments of Figs. 11-16 the tables or support surfaces may be arranged on one or more support base plates analogous to base plate 19 in Fig. 10 so that displacement can take place by displacing the one or more base plates and having fixed displacement means analogous to walls 28, 29 in Fig. 10. The Figs. 9 and 11 embodiments are particularly advantageous in this respect.

[0052] Although the support surfaces have been shown as being rectangular, any suitable shape of support surface may be used, for instance round, as long as the articles can be placed on the support surface ans there is an adge to pivot a flap into closed horizontal position.

[0053] Any suitable method to fixate the flaps to one another or a box bottom opening edge can be used instead of glue, for instance adhesive tape, clamps, etc.

[0054] Although the support surfaces in the various embodiments where one of the surfaces can rotate are shown arranged such that the rotation is a multiple of 90 degrees, a surface adjacent to a rotatable surface could be placed such that the necessary rotation is for instance 45 degrees.

Claims

1. A method of packing articles in a box having an open bottom where said open bottom can be at least partly closed by means of at least a first flap hingedly attached to the box along a first box edge of said open bottom, the method comprising the steps of:

    - providing a first support surface and a second support surface spaced horizontally from said first support surface such that a first gap is formed between said first and second support surfaces, said second support surface having a

first edge facing said first support surface and said second support surface being located lower than said first support surface,
- placing said articles on said first support surface,
- lowering said box towards said first support surface such that said articles are placed within said box and said first flap extends downwards through said first gap, and
- displacing said box with said articles generally horizontally from said first support surface on to said second support surface such that said first edge pivots said first flap around said first box edge into a horizontal position wherein said first flap covers and closes at least a portion of said open bottom of said box.

2. A method according to claim 1, wherein said first support surface has a second edge facing said second support surface and said box has a second flap opposite said first flap and hingedly connected to a second box edge opposite said first box edge, the method comprising the further steps of

- ensuring that said second flap extends downwards through said first gap when said box and said articles have been displaced on to said second surface,
- causing said second support surface to be higher than said first support surface, and
- displacing said box with said articles generally horizontally from said second support surface on to said first support surface such that said second edge pivots said first flap around said second box edge into a horizontal position wherein said second flap covers and closes at least a portion of said open bottom of said box.

3. A method according to claim 1 or 2, wherein said box has a third and fourth flap located opposite each other and hingedly connected to a third and fourth box edge of said bottom, respectively, said third and fourth box edges extending at right angles to said first and second box edges such that said first to fourth box edges define the opening in the bottom of said box.

4. A method according to any of the preceding claims, wherein at least one further support surface with a further edge for pivoting one of said flaps around the corresponding box bottom edge is provided, the method comprising the further step of displacing said box with articles on to said further support surface such that said further edge pivots one of said flaps around the corresponding box edge into a horizontal position wherein said further flap covers and closes at least a portion of said open bottom of said box.

5. A method according to any of the preceding claims, the method comprising the further step of rotating at least one of said support surfaces around a vertical axis while said box with articles is located on said rotated support surface such that one of said flaps extends downwards through a gap between said rotated support surface and an adjacent, lower support surface.

6. A method according to any of the preceding claims, wherein at least one of said support surfaces is a plate, the method comprising the step of pivoting at least one of said flaps around the corresponding box bottom edge such that said flap is held against the bottom surface of said plate while said box with articles is displaced on to an adjacent, lower support surface.

7. A method according to any of the preceding claims, wherein glue is sprayed on to the bottom surface of at least one of said flaps when said box with articles is displaced from one of said support surfaces on to an adjacent support surface.

8. A method according to any of the preceding claims, wherein displacement of said box from one support surface on to another adjacent support surface is carried out be displacing these two adjacent support surfaces horizontally while preventing said box from moving horizontally.

9. A system for packing articles in a box having an open bottom where said open bottom can be at least partly closed by means of at least a first flap hingedly attached to said box along a first box edge of said open bottom, said system comprising:

- a first support surface and a second support surface spaced horizontally from said first support surface such that a first gap is formed between said first and second support surfaces, said second support surface having a first edge facing said first support surface and said second support surface being located lower than said first support surface,
- means for placing said articles on said first support surface,
- means for lowering said box towards said first support surface such that said articles are placed within said box and said first flap extends downwards through said first gap, and
- means for displacing said box with said articles generally horizontally from said first support surface on to said second support surface such that said first edge pivots said first flap around said first box edge into a horizontal position wherein said first flap covers and closes at least a portion of said open bottom of said box.

10. A system according to claim 9, wherein said first support surface has a second edge facing said second support surface and said box has a second flap opposite said first flap and hingedly connected to a second box edge opposite said first box edge.

11. A system according to claim 9 or 10, wherein said box has a third and fourth flap located opposite each other and hingedly connected to a third and fourth box edge of said bottom, respectively, said third and fourth box edges extending at right angles to said first and second box edges such that said first to fourth box edges define the opening in the bottom of said box.

12. A system according to any of the claims 9-11, wherein at least one further support surface with a further edge for pivoting one of said flaps around the corresponding box bottom edge is provided.

13. A system according to any of the claims 9-12, wherein rotating means are provided for rotating at least one of said support surfaces around a vertical axis while said box with articles is located on said rotated support surface such that one of said flaps extend downwards through a gap between said rotated support surface and an adjacent, lower support surface.

14. A system according to any of the claims 9-13, wherein at least one of said support surfaces is a plate and pivoting means such as a linear actuator is provided for pivoting at least one of said flaps around the corresponding box bottom edge such that said flap is held against the bottom surface of said plate while said box with articles is displaced on to an adjacent, lower support surface.

15. A system according to any of the claims 9-14, wherein vertical displacement means are provided for displacing at least one of said support surfaces vertically up and down.

16. A system according to any of the claims 9-15, wherein horizontal displacement means are provided for horizontally displacing two adjacent support surfaces and fixation means are provided for preventing said box from being displaced horizontally while said two adjacent support surfaces are being displaced horizontally.

17. A system according to any of the claims 9-16, wherein said first support surface is provided with apertures for allowing stabilizing or containment elements such as plates, rods and the like to retractably protrude upwards from said support surface for stabilizing or containing said articles on said first support surface while said box is being lowered over said articles.

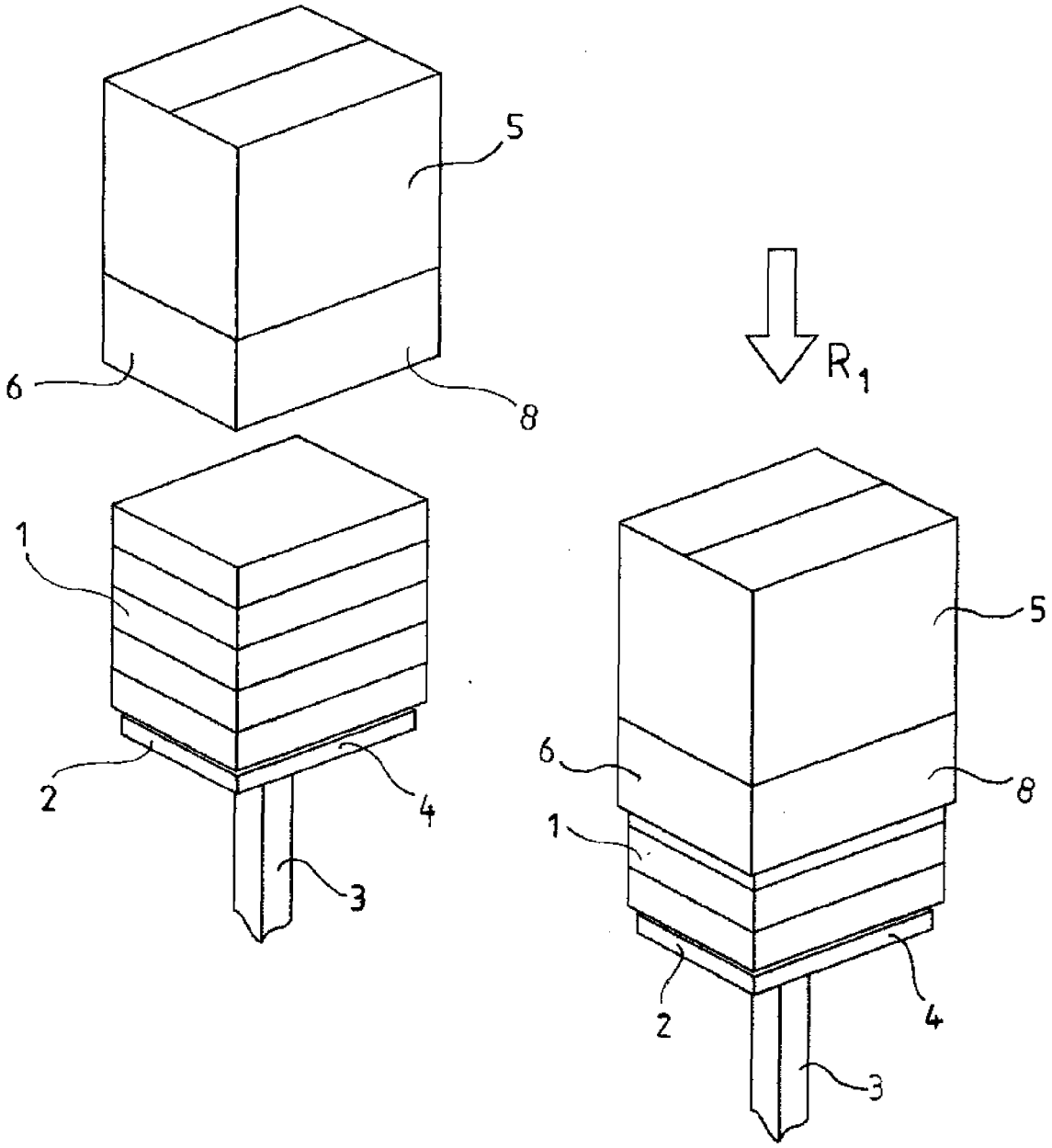


FIG. 1

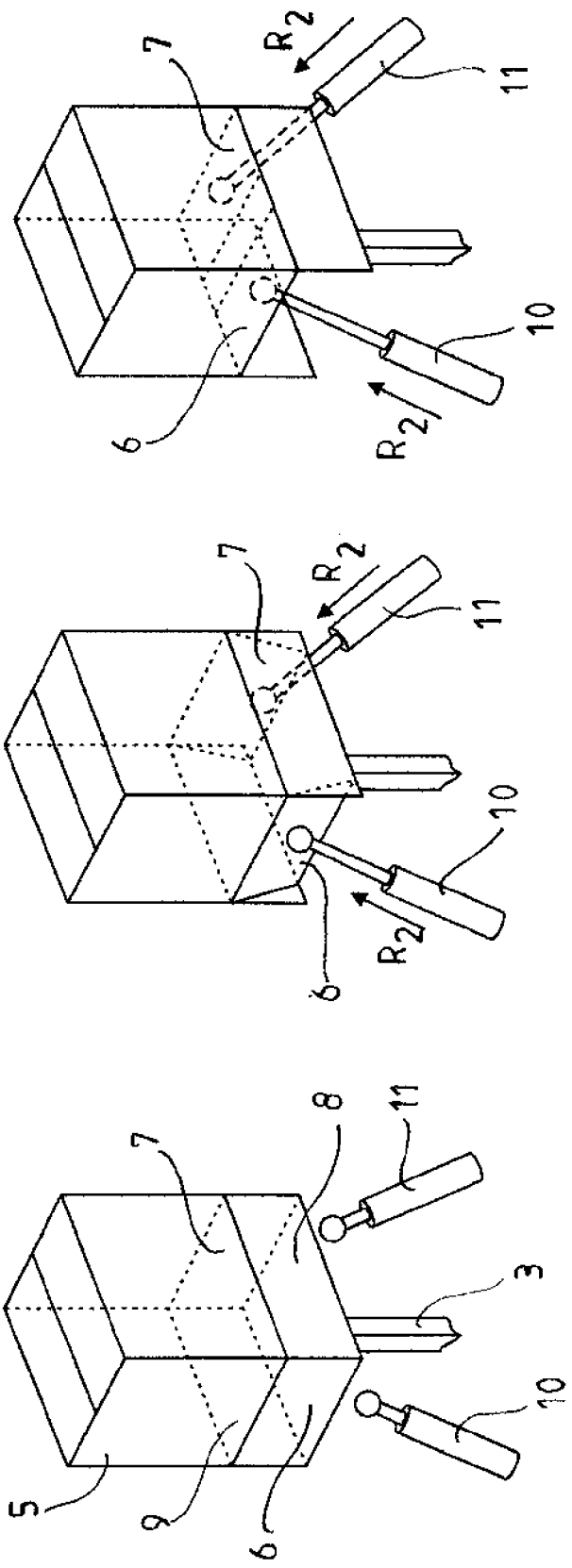


FIG. 2

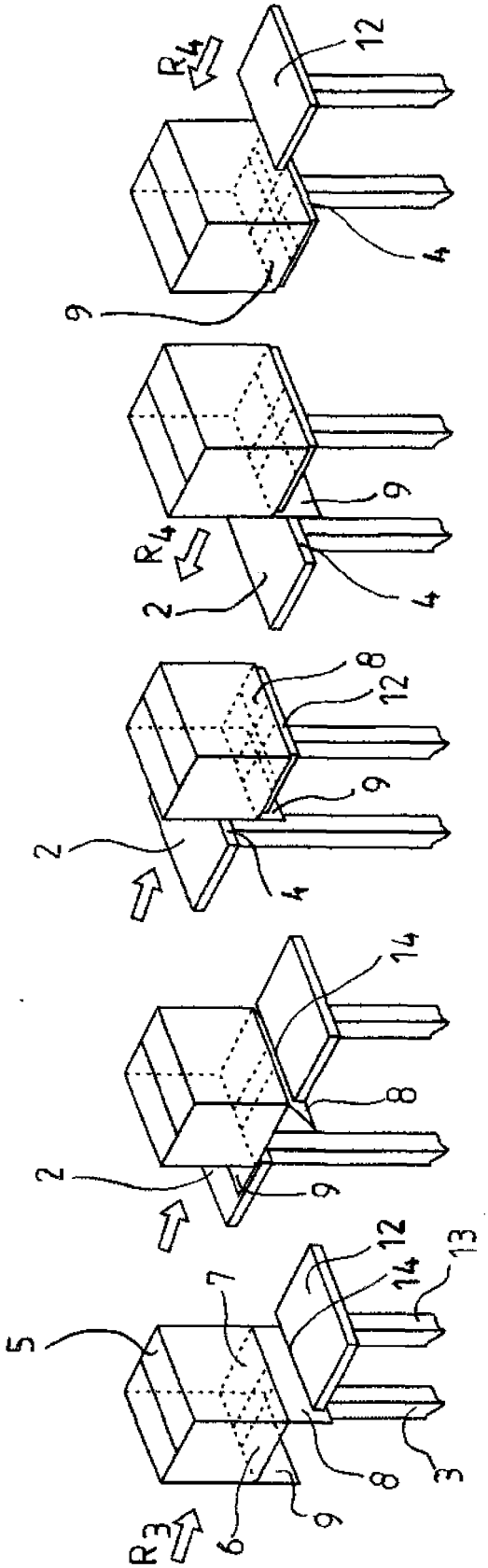


FIG. 3e

FIG. 3d

FIG. 3c

FIG. 3b

FIG. 3a

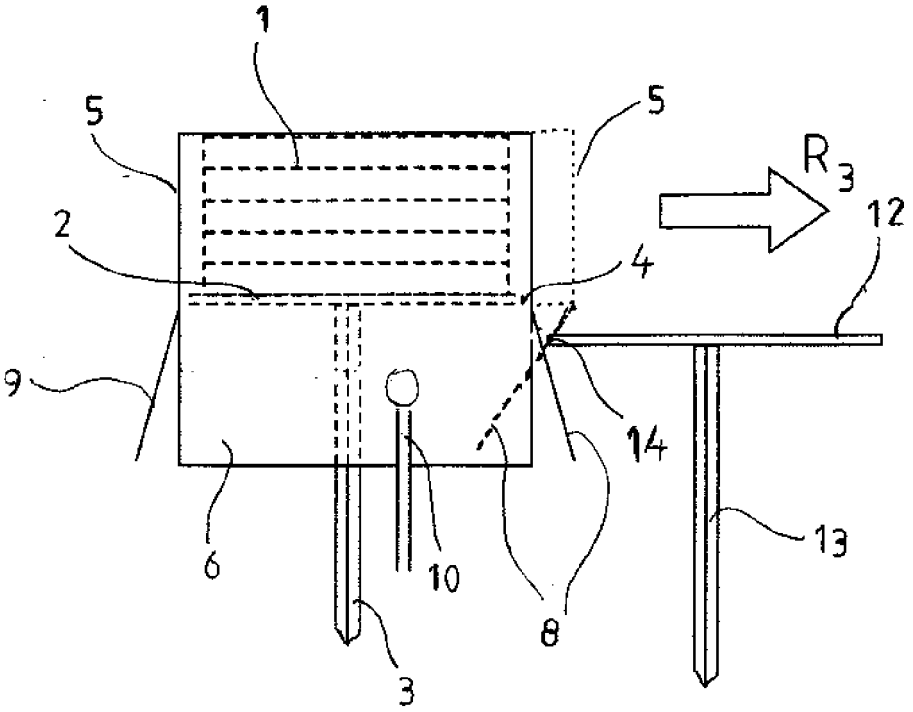


FIG. 4

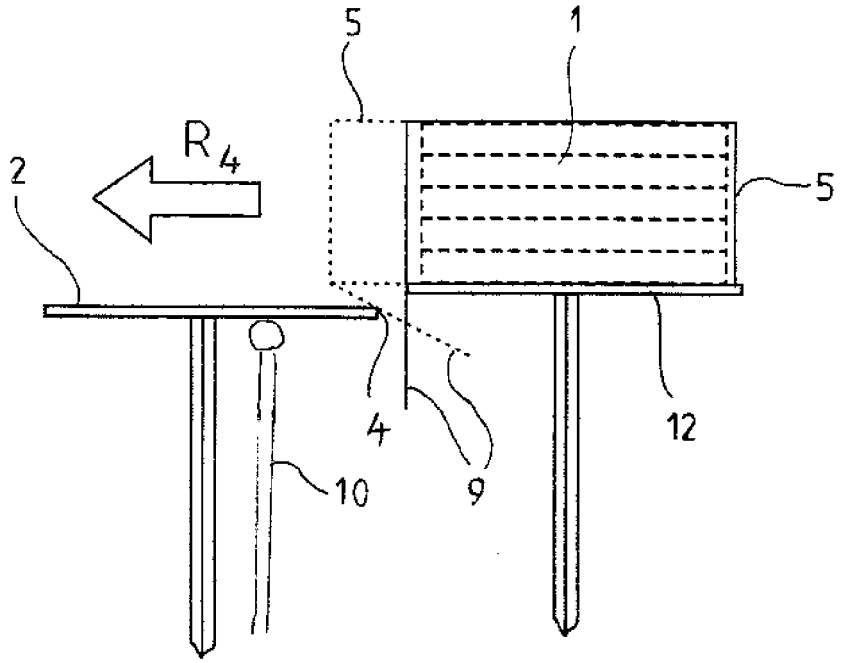


FIG. 5

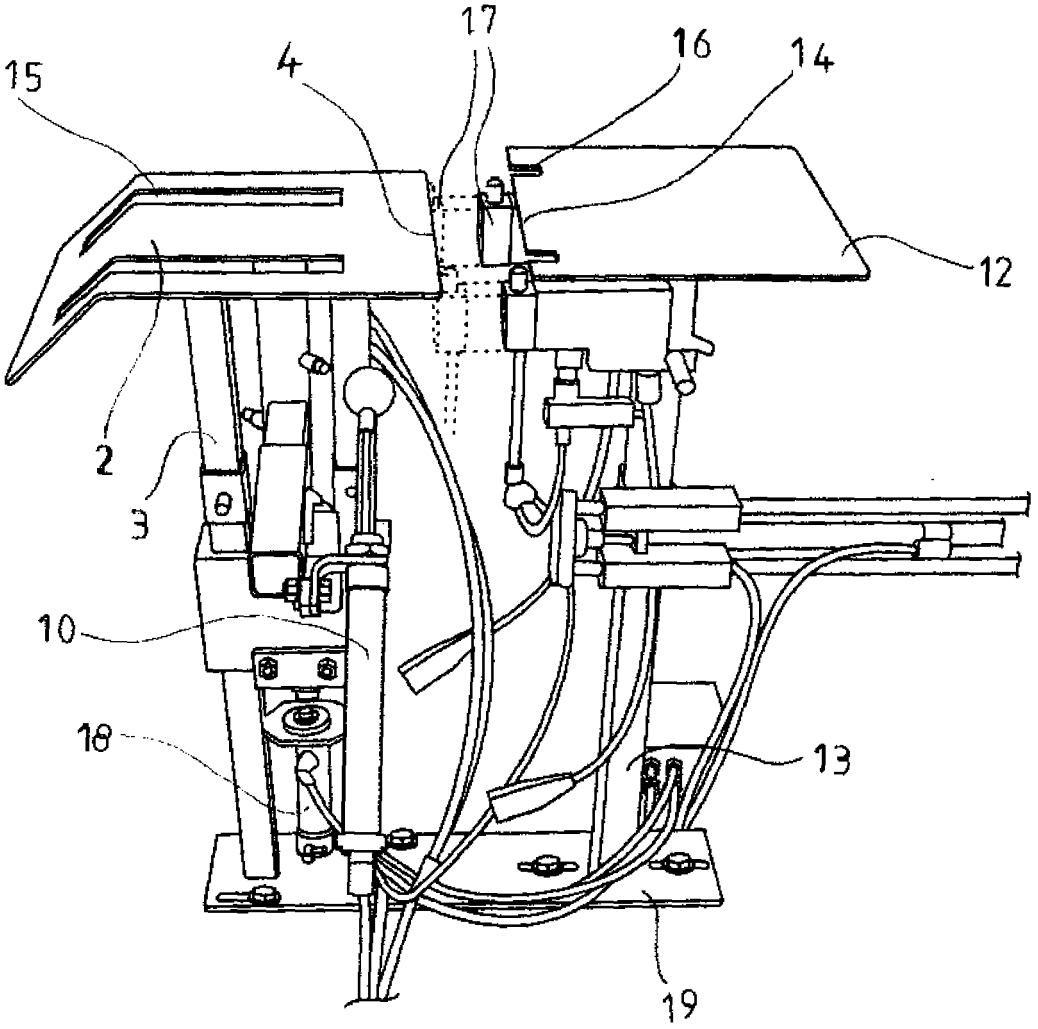


FIG. 6

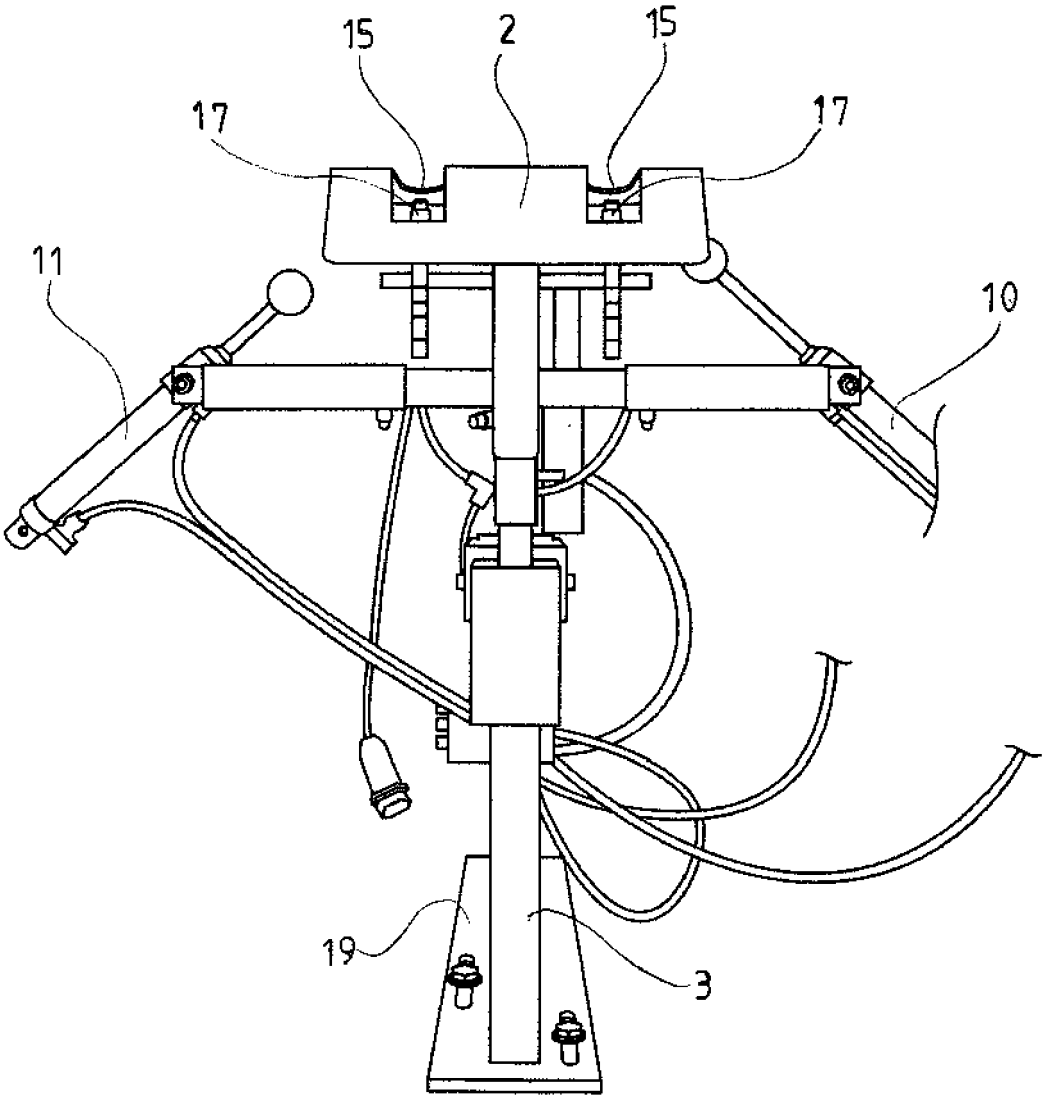


FIG. 7

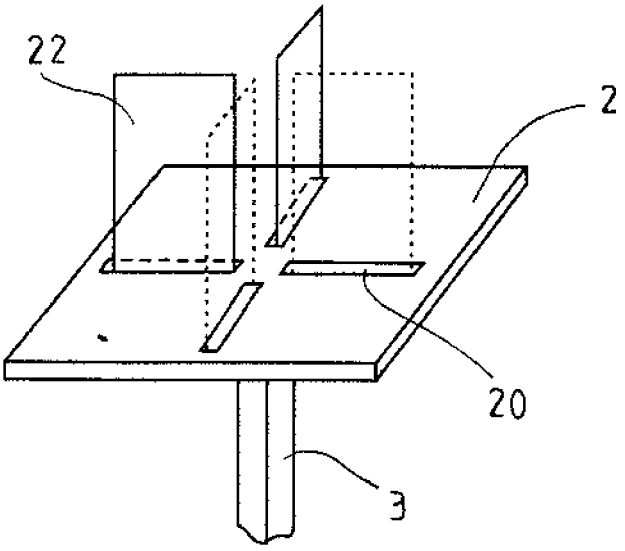


FIG. 8a

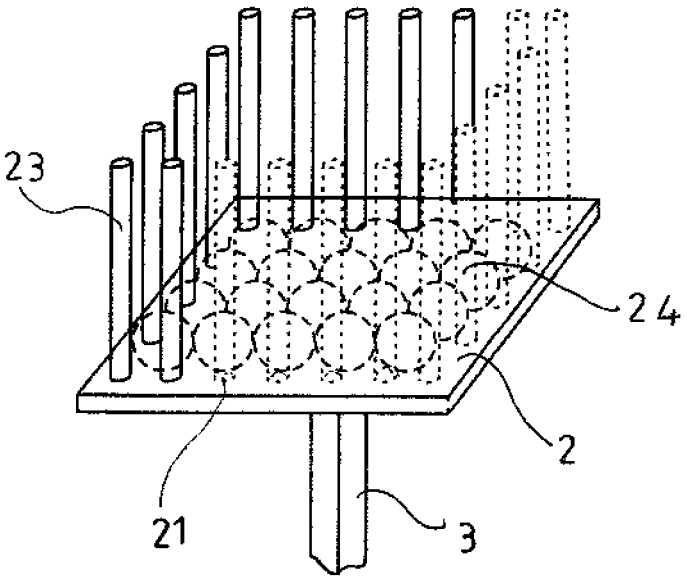


FIG. 8b

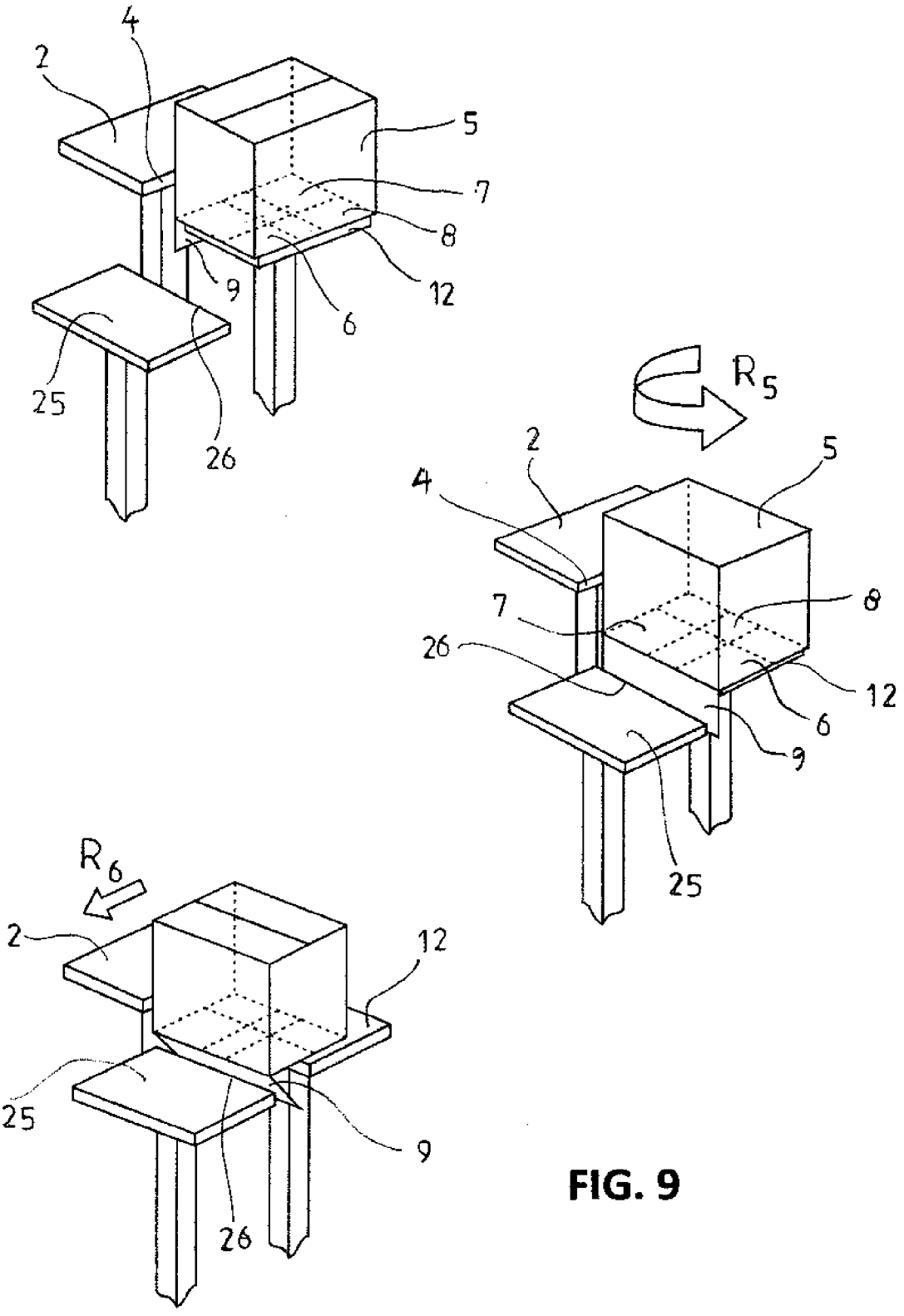


FIG. 9

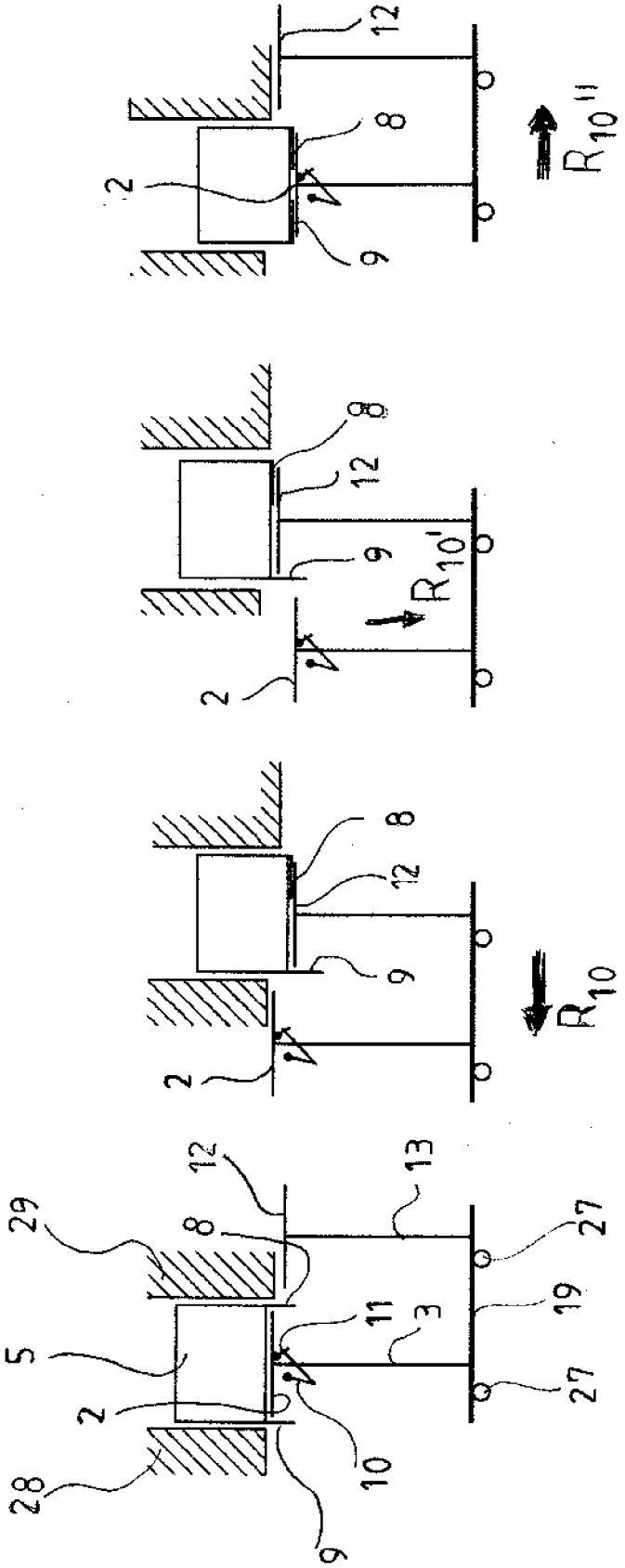


FIG. 10

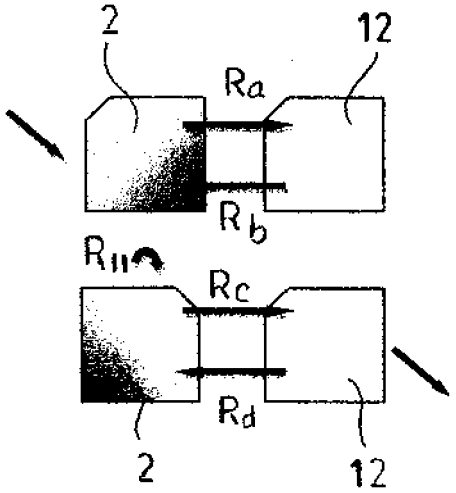
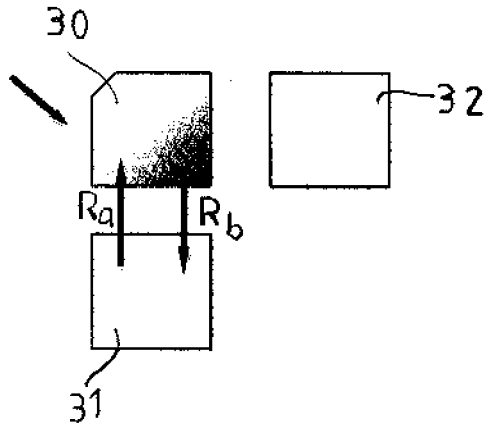


FIG. 11



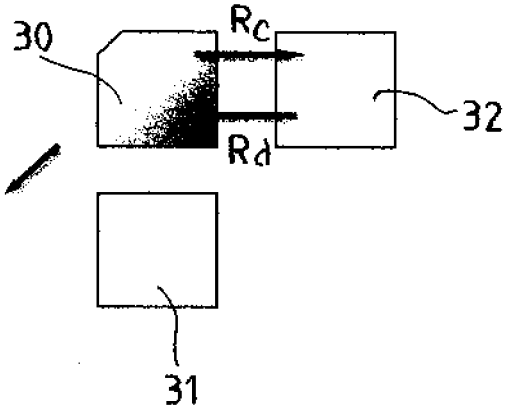


FIG. 12

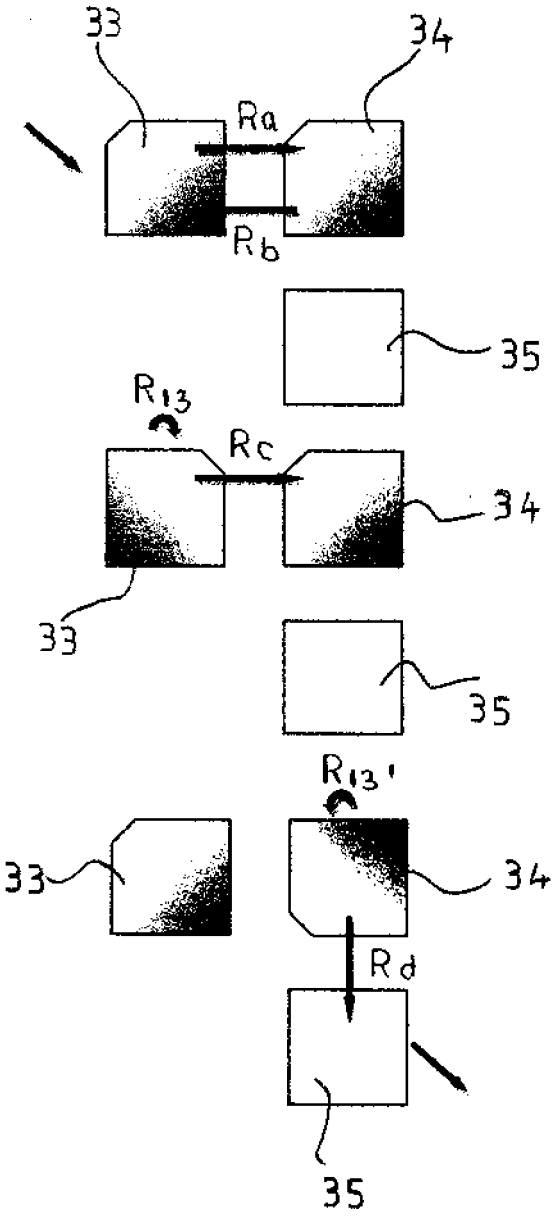


FIG. 13

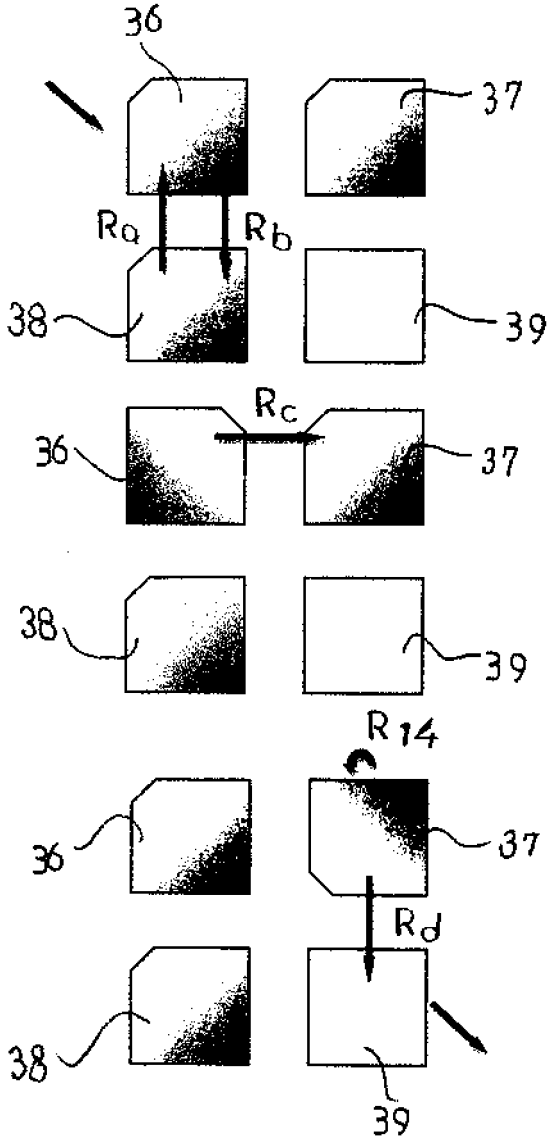


FIG. 14

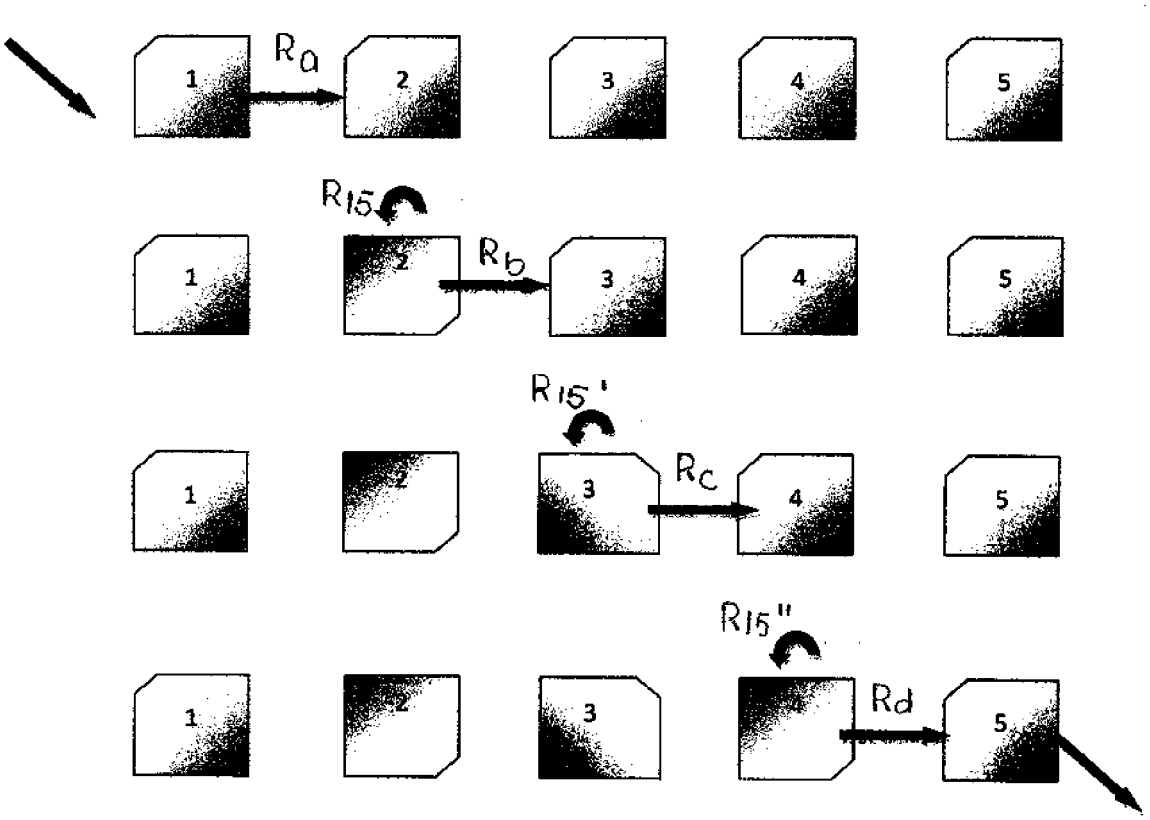


FIG. 15

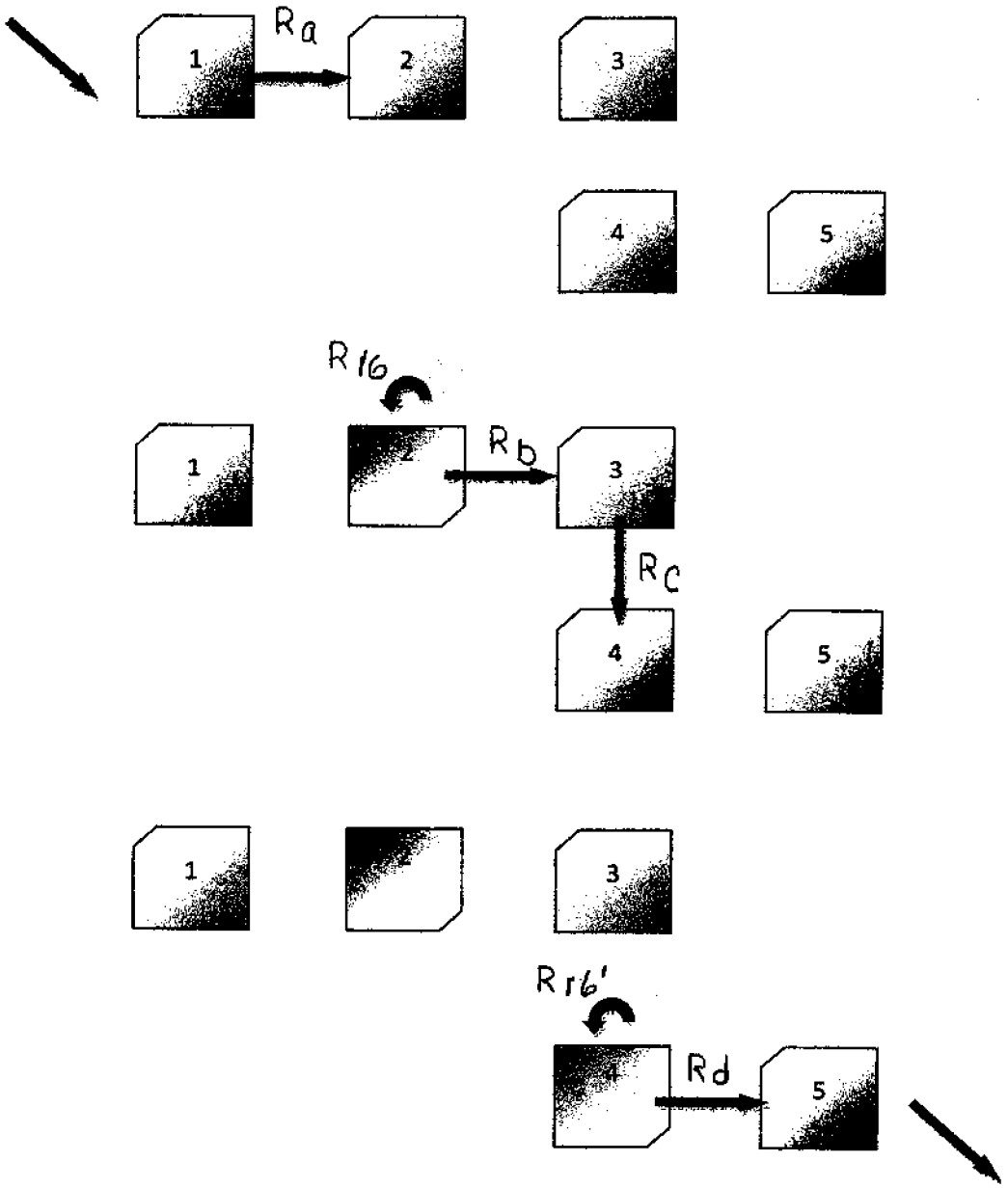


FIG. 16

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 3325

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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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
Munich	26 November 2009	Schelle, Joseph

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