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(54) Deforming device and deforming method

(57) The present invention relates to a deforming device for deforming a blank into a packaging element. The deforming device comprises a feeding device by means of which a blank is fed to a surface of the deforming device that is provided with a passage, a punch having a punching side that engages a blank, which punch moves to and fro through the passage in use, being driven by a driving device between a first position on one side of the passage, in which position a blank can be passed between the punch and the surface, and a second position, in which the punch is at least partially located on the opposite side of the passage. The device comprises a discharging device for discharging a blank deformed in this manner. The punch has at least one edge punching surface at each of two opposite circumferential edges on the punching side, between which edge punching surfaces at least one further punching surface extending substantially parallel to the edge punching surfaces, spaced therefrom, is located. Furthermore, resistance means are provided, which impart resistance against the punch movement to at least part of the blank upon movement of the punch from the first to the second position. The invention further relates to a method for deforming a blank.

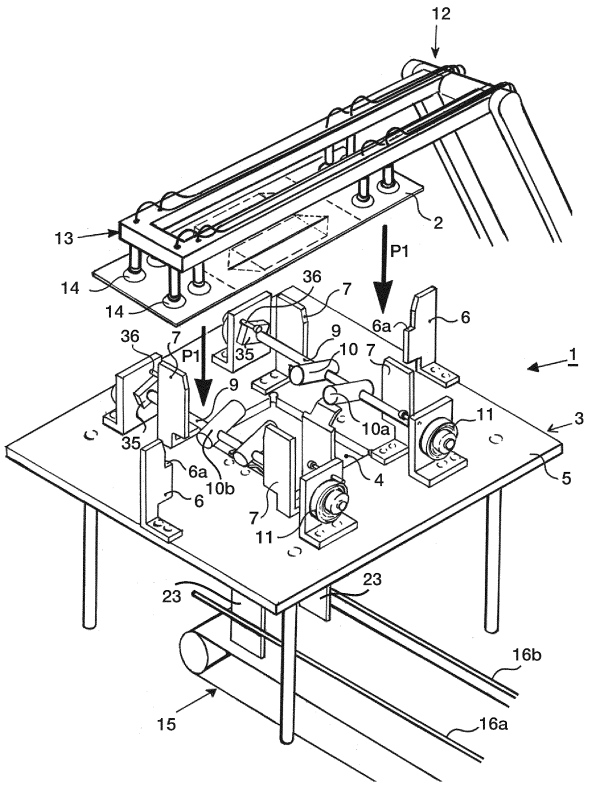

Fig. 1

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Description

[0001] The present invention, according to a first aspect thereof, relates to a deforming device for at least partially deforming a blank into a packaging element, said deforming device comprising a feeding device by means of which, in use, a blank is fed to a surface of the deforming device that is provided with a passage, a punch having a punching side that engages a blank in use, which punch moves to and fro through the passage in use, being driven by a driving device between a first position on one side of the passage, in which position a blank can be passed between the punch and the surface, and a second position, in which the punch is at least partially located on the opposite side of the passage, and a discharging device for discharging a blank deformed in this manner. The term "packaging element" is understood to mean a part of a packaging unit. Said packaging unit may be a conventional box having a bottom and four upright side walls, possibly with a lid. It may also be another packaging element, for example an insert that can be placed in such a box for separating or protecting products to be packaged.

[0002] Such a device is known. The passage in such a device is rectangular. The circumference of the punch is just a little smaller than the circumference of the passage. In the known device, a blank, preferably provided with pre-formed fold lines, is carried on the surface to the passage by the feeding device, so that the fold lines that define the bottom of the packaging unit to be formed are located just within the circumferential edges of the passage. Subsequently, the punch is driven in the direction of the second position. During said movement, the punch engages the part of the blank that defines the bottom of the packaging unit. The punch is driven further through the passage. Four surfaces surrounding the bottom are thus engaged by the circumferential edge of the passage and folded in a direction perpendicular to the bottom, counter to the direction of movement of the punch. Thus, at least one bottom having upright edges is formed. This condition can be maintained in that parts of the packaging unit mechanically interlock, as a result of being glued together or otherwise. Subsequently, a packaging unit which has thus been at least partially deformed is discharged. Before, during or after said discharging, the at least partially deformed blank may be subjected to additional operations.

[0003] The known device functions excellently for deforming a blank into a simple rectangular box. A drawback of the known device, however, is that boxes having separating walls cannot be formed by means of said device, at least not in the above-described processing step.

[0004] Accordingly it is an object of the present invention, according to the first aspect thereof, to provide a deforming device by means of which at least a part of a packaging element comprising one or more separating walls can be formed upon deformation of the blank. According to the first aspect of the present invention, this object is accomplished in that the punch has at least one edge punching surface at each of two opposite circumferential edges on the punching side, between which edge punching surfaces at least one further punching surface extending substantially parallel to the edge punching surfaces, spaced therefrom, is located, and in that the deforming device comprises resistance means which impart resistance against the punch movement in use to parts of the blank present at least between the edge punching surfaces and the further punching surface upon movement of the punch from the first to the second position.

[0005] In a preferred embodiment of the present invention, said edge punching surfaces and said at least one further punching surface extend substantially in the same imaginary plane. As a result, all the parts of a blank to be engaged by the punch are engaged at least substantially at the same moment. It is conceivable, for that matter, that said at least one further punching surface projects relative to the edge punching surfaces so as to engage a blank sooner than do the edge punching surfaces. It is also conceivable that said at least one further punching surface occupies a receded position relative to the edge punching surfaces, so that the edge punching surfaces, in use, will engage a blank sooner than said at least one further punching surface.

[0006] In a preferred embodiment of the present invention, the resistance means comprise at least one counterpressure element, which engages the blank upon deformation of the blank between two punching surfaces. Said at least one counterpressure element slightly checks the blank between two punching surfaces when the blank is being moved by the punch, so that the blank is bent, thus starting the formation of separating surfaces which, in the case of a fully deformed blank, extend at least substantially perpendicularly to, for example, a bottom formed from the blank.

[0007] It is preferable in that case if said at least one counterpressure element is pivotably mounted to the deforming device. This enables said at least one counterpressure element to exert an initial counterpressure upon movement of the blank, so that the blank will bend at a desired location. When the pressure of the punch, via the blank, on said at least one counterpressure element increases, the counterpressure element can pivot out of the path of the punch and the blank, so that the punch can press the blank through the passage.

[0008] If biasing means are provided which bias said at least one counterpressure element against rthe direction of movem t of the blank, said at least one counterpressure element can simply return to the starting position once a force exerted on said at least one counterpressure element by the blank is released. Thus, a relatively simple repetitive deforming operation can be realised.

[0009] Preferably, said at least one counterpressure element is a shaft which is tiltably mounted to the frame of the deforming device. The shaft may be tiltable about

a physical or an imaginary tilt axis that is oriented perpendicularly to the longitudinal direction of the shaft.

[0010] In a preferred embodiment of the present invention, at least one guide element is provided, which guides the blank between two adjacent punching surfaces upon deformation of a blank. Said at least one guide element can engage a part of the blank that is (to be) bent relative to the plane of the original blank. The guide element can thus be used for further bending the blank, if desired, during a deformation process.

[0011] If the guide element forms part of the resistance means, the number of elements, and thus the complexity, of the deforming device is limited.

[0012] In an alternative deforming device according to the present invention, the resistance means comprise an air pressure device, which blows air between two parts of the blank being engaged by the punching surfaces during the deformation of a blank. A part of the blank present between the punching surfaces can be bent out of the plane of the blank in that situation. In this way a separating surface, or at least the onset to that, can be formed.

[0013] A punching surface is preferably formed by a surface of a rib of the punch. A combination of ribs is a simple solution for providing leading surfaces that form the punching surfaces in question, and between which a recessed cavity is present.

[0014] To realise multiple usability of the punch, for example for forming different packaging units, the punch preferably comprises adjusting means by which the punch can be adjusted by removing or replacing one or more punching surfaces or adding one or more further punching surfaces. The edge punching surfaces may be exchangeable as well, but this is less obvious because the edge punching surfaces extend along outer circumferential surfaces of a bottom or an upper side of a packaging unit to be formed. Furthermore, an entire punch, or at least the base part with any accessories, may be exchangeable in combination with the passage so as to adapt the device for use with packaging elements having different dimensions or exhibiting a different arrangement of separating surfaces.

[0015] If a blank is to be deformed into a packaging element comprising two or more separating surfaces, this can preferably be realised in that two or more further punching surfaces extending substantially parallel to the edge punching surfaces, being spaced from said edge punching surfaces and from each other, are present between the two edge punching surfaces.

[0016] The present invention, according to a second aspect thereof, relates to a method for at least partially deforming a blank into a packaging element, comprising the steps of:

- feeding a suitable blank to a surface provided with a passage for a deforming tool of a deforming device, further comprising a punch having a punching side that engages a blank in use, which punch moves to and fro through the passage in use, being driven by a driving device between a first position on one side of the passage, in which position a blank can be passed between the punch and the surface, and a second position, in which the punch is at least partially located on the opposite side of the passage. Such a method is known and is described in the opening paragraph of the present document with reference to a known deforming device. The known method is suitable for deforming a blank into a bottom and upright surfaces of a packaging element. As is the case with the known deforming device, the known method is not suitable for forming a packaging element comprising side walls and at least one separating wall for use in a packaging element in one operation. This is a problem which the present invention, according to a second aspect thereof, aims at solving. This is achieved by the present invention achieves this in that the blank is engaged by spaced-apart punching surfaces of the punch at two bottom edges located on either side of a bottom surface of the packaging unit defined on the blank and at least one intermediary bottom portion extending at least substantially parallel to the bottom edges, being spaced from said bottom edges, wherein resistance against the direction of movement is imparted to at least part of the blank during movement of the punch from the first to the second position. The manner in which this can be achieved, using a method according to the present invention, has already been explained in the foregoing with reference to the first aspect of the present invention.

[0017] In a method according to the present invention, the resistance is preferably imparted to the bottom surface between the intermediary bottom portion and the respective bottom edges. As a result, resistance-encountering bottom surface parts will be bent against the direction of movement of the punch.

[0018] Preferably, a blank comprising a bottom surface defined by fold lines is fed to the surface in the method according to the present invention. Said bottom surface can be placed above the passage in the surface in that case. If subsequently the punch moves in the direction of and through the passage, the blank can be readily folded on the fold lines.

[0019] It is furthermore preferable if a blank provided with cutting lines is fed to the surface between the intermediary bottom portion and the respective bottom edges. If resistance means engage bottom portions provided with cutting lines during the deformation operation, the blank can be readily moved and bent against the direction of movement of the punch at the location(s) in question. Preferably, score lines are provided in addition to cutting lines, which score lines facilitate the bending of the blank.

[0020] The present invention will be explained in more detail in the description below of an exemplary embodiment of the present invention, in which reference is made

to the drawing, in which:

Figure 1 is a perspective top plan view of a device according to the present invention, in which a blank is being fed to the device;
Figure 2 is a perspective top plan view of the device of figure 1, in which the blank is placed on the device;
Figure 2a is a perspective side view of the punch of figure 1;
Figure 3 is a perspective top plan view of the device of figure 1, in which a punch engages the blank;
Figure 3a is a schematic side view of the situation shown in figure 3;
Figure 3b is a schematic side view of a situation after the punch has been driven slightly further downwards from the position shown in figure 3a;
Figure 4 is a perspective top plan view of the device of figure 1, in which the punch presses the blank through an opening in the table of the device;
Figure 4a is a schematic side view of the situation of figure 4;
Figure 5a is a perspective top plan view of a blank for use with the present invention;
Figure 5b is a perspective top plan view of a packaging element that has been deformed from a blank shown in figure 5a, using the device and the method according to the present invention.

[0021] Like elements are indicated by the same numerals in the figures.

[0022] With reference now to the figures, figure 1 shows a deforming device 1 by means of which a blank 2, which is shown in more detail in figure 5a, and which is made of paper in this example, can be deformed into a part of a packaging unit (see figure 5b). The deforming device 1 comprises a table 3 provided with an opening 4 in the tabletop 5. Disposed on the tabletop 5 are two supports 6 comprising support surfaces 6a and four guides 7. L-sections 8 support two rotary shafts 9 fitted with auxiliary shafts 10 which comprise a short end 10a and a guide surface 10b and which are each biased by a leaf spring 11. Provided on said L-sections 8 is a stop member 36 for a cam 35 of the rotary shaft 9. Disposed above the table 3 is a feeding device 12, an arm 13 of which is provided with vai uum cups 14 that hold a blank 2. Under the table 3, two guide blades 23 extend in the direction of a belt conveyor 15 provided with guide rails 16a, 16b.

[0023] Figure 2 shows the deforming device 1 of figure 1, in which the feeding device (not shown in figure 2) has positioned the blank 2 on the supporting surfaces 6a and has retracted to a starting position for engaging a blank to be worked in a next work cycle. A punch 17 is driven in the direction of the blank 2 by means of a shaft 18 (see arrows P2).

[0024] Figure 2a shows a perspective side view of the punch 17 in disassembled condition. The punch 17 comprises an inverse U-section 19, which is provided with a slot 20 at the upper side of the base, in which slot an auxiliary element 21 can be mounted by means of bolts 22.

[0025] Figure 3 shows a perspective top plan view of the deforming device 1, in which the punch 17 engages the blank 2 to be subsequently driven further in the direction indicated by the arrows P2.

[0026] Figure 3a shows in schematic side view the situation shown in figure 3. An opening 4 is provided in the tabletop 5, above which a blank is supported on supports 6. Short ends 10a of auxiliary shafts 10 just touch the underside of the blank 2.

[0027] Figure 3b shows the situation starting from figure 3a, in which the punch 17 has driven the blank 2 just a little further downward.

[0028] Figure 3c shows the situation starting from figure 3b, in which the punch 17 has driven the blank 2 even further in the direction of the opening 4 in the tabletop 5.

[0029] Figure 4 shows the deforming device in a situation in which at least the underside of the punch 17 has passed the opening 4 in the tabletop 5.

[0030] Figure 4a shows in perspective side view the situation shown in figure 4.

[0031] Figure 5a shows the blank 2 as it is being fed to the device described herein for forming a part of a packaging unit as shown in figure 5b. The elongated blank 2 is provided with score lines (illustrated in dotted lines) and cutting lines (illustrated in full lines). Two outer score lines 24 define two bottom panels 25, 26, which overlap in the deformed condition. Together with the respective score lines 24, two score lines 27 located further inwards, which extend parallel to the score lines 24, define side walls 28 of the deformed blank 2. Two outer trapezoidal planes 29 defined by score lines 30a, 30b, 30c, cutting lines 31 and respective halves of respective cutting lines 32 form semi-short end walls 29. Two middle trapezoidal surfaces 33 are defined by cutting lines 31, respective other halves of respective cutting lines 32 and score lines 34a, 34b, 34c. The lines and planes shown in figure 5a are largely distinguishable in figure 5b. It should be noted that the undeformed blank 2 of figure 5b is shown in upside-down position in comparison with the position in which it is worked by the device 1. In fact, the packaging element is produced upside-down and shown in the correct orientation in figure 5b.

[0032] With reference again to figure 1, the deforming device 1 is shown in a situation in which the blank 2 is fed to the deforming device 1, in a suspended condition, in the direction indicated by arrows P1, by the arm 13 of the feeding device 12 from vacuum cups 14. The deforming device 1 is in a starting position, in which rotary shafts 9 are in a biased condition effected by leaf springs 11. Cams 35 connected to the shafts 9 are stopped by stop members 36, thus preventing the rotary shafts from rotating further under the influence of the bias imparted by the leaf springs. The upper edges of the short ends 10a of the auxiliary shafts 10 are located at the same horizontal level as the supporting surfaces 6a of the supports

6. When the arm 13 moves downward, the blank 2 is guided to the desired position by the supports 6 and the guides 7. This position is shown in figure 2.

[0033] In the position that is shown in figure 2, the blank 2 is supported on supporting surfaces 6a (not shown in figure 2) and upper edges of the short ends 10a of the auxiliary shafts 10. Two inner score lines (indicated at 27 in figure 5a) extending perpendicularly to the longitudinal axis of the blank 2 are located just above side edges of the opening 4. The arm shown in figure 1 of the feeding device is in a retracted position (not shown) for picking up a blank to be worked in a next cycle. The punch 17 is driven downward in the direction of the blank by the shaft 18, as illustrated by the arrows P2.

[0034] Figure 2a schematically shows a perspective view of the punch 17. The punch 17 is formed by a U-section 19 (shown in upside-down position), which is provided with a central slot 20 on the inner side of the base, in which an auxiliary element 21 can be accommodated. The auxiliary element 21 is subsequently fixed in position by means of bolts 22. The punch 17 can thus be adapted by mounting an alternative auxiliary element, for example an element having two legs for forming a packaging element comprising two separating walls.

[0035] Figure 3 shows the situation of the deforming device 1 in which the punch 17 has been moved downwards in the direction indicated by the arrows P2 to a position in which it just reaches the blank 2. The punching surfaces at the bottom ends of the punch 17 engage the blank 2 at the outer edge thereof, and that in the shape of an edge punching surface between the outer edge and the adjacent score line (30b in figure 2) and in the shape of a further punching surface in the middle between two score lines (34b in figure 5a).

[0036] This situation is shown in schematic sectional view in figure 3a. As figure 3a shows, the blank 2 is supported at the bottom side by supporting surfaces 6a of supports 6 and the upper edges of short ends 10a of auxiliary shafts 10. At the upper side, the punch 17 engages the blank 2.

[0037] Figure 3b shows the situation a fraction later, when the punch 17 has been driven slightly further downwards in the direction indicated by the arrows P2 by the shaft 18. In its centre, the blank 2 has been driven slightly further downward by the punch 17. As a result of the bias on the shafts 9, and thus on the auxiliary shafts 10, the auxiliary shafts 10 have slightly folded (see dotted line) the respective pairs of opposite trapezoidal surfaces (see figure 5) about the respective score lines (see figure 5a for this), as is shown in figure 3b. This is possible because of the score lines 31, 32 provided in the blank (see figures)

[0038] When the punch 17 is driven further downwards as indicated by the arrows P2, a situation as shown in figure 3c will result. In this situation, the punch 17 has pivoted the auxiliary shafts 10 downwards against the bias of the leaf springs 11 on the rotary shafts 9. In this situation, the triangular ends of the openings formed in the above-described step are supported on guide surfaces 10b formed by the outer surface of the auxiliary shafts 10. As a result, the trapezoidal surfaces are driven further apart, resulting in the formation of short end walls (29 in figure 5b) and separating walls (33 in figure 5b). As is also shown in the figure, the side walls 28 have been pivoted obliquely upwards together with the respective bottom panels 25, 26.

[0039] Figure 4 shows the situation in which the punch 17, at least the surfaces thereof that engage the blank 2, has passed through the opening 4 in the table 5. The side walls with the bottom panels now extend vertically upwards. The guide shafts are retained in their position in that they are stopped by the adjacent parts of the blank 2. Once the blank 2 has passed the auxiliary shafts 10, the auxiliary shafts pivot back to the starting position shown in figure 1 under the influence of the bias imparted by the leaf springs 11. The punch 17 then presses the partially deformed blank 2 further downwards until the guide blades 23 release the partially deformed blank 2 so that it can be placed on a belt conveyor 15. The belt conveyor 15 discharges the partially deformed blank 2 in the direction indicated by the arrow P3, whilst guide rails 16a, 16b fold the still upwardly extending bottom panels 25, 26 onto each other. This is not shown, but the skilled person will be familiar with the way in which this is effected in a conventional manner by having the respective guide rails extend inwards.

[0040] In figure 5a the cooperation between the blank 2 and the auxiliary shafts 10 of figure 3b is schematically shown in more detail. The upper edges of the ends 10a of the auxiliary shafts 10 have pushed open the trapezoidal surfaces 29, 33, as it were.

[0041] In the appended drawings and the above description, the present invention is only shown and described with reference to one exemplary embodiment. It will be apparent, however, that several variants, which may or may not be obvious to the skilled person, are conceivable within the scope of the present invention. Thus, the method has been explained on the basis of a specific embodiment of a deforming device. It is possible, however, to implement the method with any deforming device suitable for that purpose. Furthermore, a method and a device only for deforming a blank into a packaging element comprising one separating wall have been described. Using a blank in which more than two pairs of trapezoidal wall parts are defined by means of score lines and cutting lines, it is possible to form packaging elements comprising two or more separating walls, in which case the punch must be adapted accordingly, of course, and the number of auxiliary shafts must also be adapted to the product to be formed. Instead of being made of paper, as in the described embodiment, the blank may also be made of another material that may or may not contain paper, for example a plastic or the like.

Claims

1. A deforming device for at least partially deforming a blank into a packaging element, said deforming device comprising a feeding device by means of which, in use, a blank is fed to a surface of the deforming device that is provided with a passage, a punch having a punching side that engages a blank in use, which punch moves to and fro through the passage in use, being driven by a driving device between a first position on one side of the passage, in which position a blank can be passed between the punch and the surface, and a second position, in which the punch is at least partially located on the opposite side of the passage, and a discharging device for discharging a blank deformed in this manner, **characterised in that** the punch has at least one edge punching surface at each of two opposite circumferential edges on the punching side, between which edge punching surfaces at least one further punching surface extending substantially parallel to the edge punching surfaces, spaced therefrom, is located, and **in that** the deforming device comprises resistance means which impart resistance against the punch movement in use to parts of the blank present at least between the edge punching surfaces and the further punching surface upon movement of the punch from the first to the second position.

2. A deforming device according to claim 1, **characterised in that** said edge punching surfaces and said at least one further punching surface extend substantially in the same imaginary plane.

3. A deforming device according to claim 1 or 2, **characterised in that** the resistance means comprise at least one counterpressure element, which engages the blank upon deformation of the blank between two punching surfaces.

4. A deforming device according to claim 3, **characterised in that** said at least one counterpressure element is pivotably mounted to the deforming device.

5. A deforming device according to claim 3 or 4, **characterised in that** biasing means are provided which bias said at least one counterpressure element against the direction of movement of the blank.

6. A deforming device according to one or more of claims 3 - 5, **characterised in that** said at least one counterpressure element is a shaft which is tiltably mounted to the frame of the deforming device.

7. A deforming device according to one or more of claims 1 - 6, **characterised in that** at least one guide element is provided, which guides the blank between two adjacent punching surfaces upon deformation of a blank.

8. A deforming device according to claim 7, **characterised in that** said guide element forms part of said resistance means.

9. A deforming device according to one or more of claims 1, 2 and 3, **characterised in that** the resistance means comprise an air pressure device, which blows air between two parts of the blank being engaged by the punching surfaces during the deformation of a blank.

10. A deforming device according to one or more of the preceding claims, **characterised in that** a punching surface is formed by a surface of a rib of the punch.

11. A deforming device according to one or more of the preceding claims, **characterised in that** the punch comprises adjusting means by which the punch can be adjusted by removing or replacing or adding further punching surfaces.

12. A deforming device according to one or more of the preceding claims, **characterised in that** two or more further punching surfaces extending substantially parallel to the edge punching surfaces, being spaced from said edge punching surfaces and from each other, are present between the two edge punching surfaces.

13. A method for at least partially deforming a blank into a packaging element, comprising the steps of:

    - feeding a suitable blank to a surface provided with a passage for a deforming tool of a deforming device, further comprising a punch having a punching side that engages a blank in use, which punch moves to and fro through the passage in use, being driven by a driving device between a first position on one side of the passage, in which position a blank can be passed between the punch and the surface, and a second position, in which the punch is at least partially located on the opposite side of the passage; and
    - pressing the blank through the passage by means of the punch,

    characterised in that the blank is engaged by spaced-apart punching surfaces of the punch at two bottom edges located on either side of a bottom surface of the packaging unit defined on the blank and at least one intermediary bottom portion extending at least substantially parallel to the bottom edges, being spaced from said bottom edges, wherein resistance against the punching direction is imparted to at least part of the blank during movement of the punch from

the first to the second position.

14. A method according to claim 13, **characterised in that** said resistance is imparted to the bottom surface between the intermediary bottom portion and the respective bottom edges.

15. A method according to claim 13 or 14, **characterised in that** a blank comprising a bottom surface defined by fold lines is fed to the surface.

16. A method according to one or more of claims 13 - 15, **characterised in that** a blank provided with cutting lines is fed to the surface between the intermediary bottom portion and the respective bottom edges.

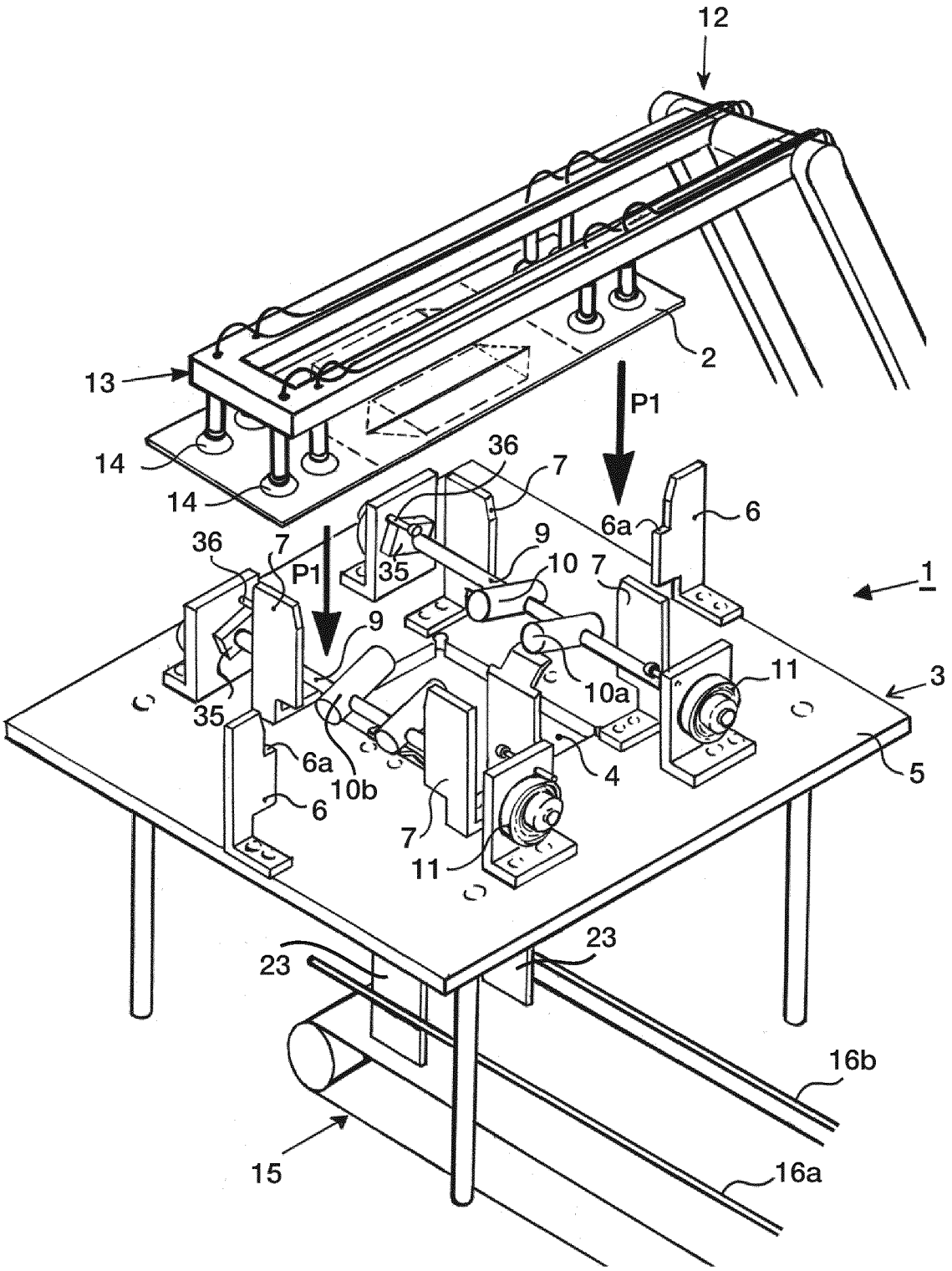
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Fig. 1

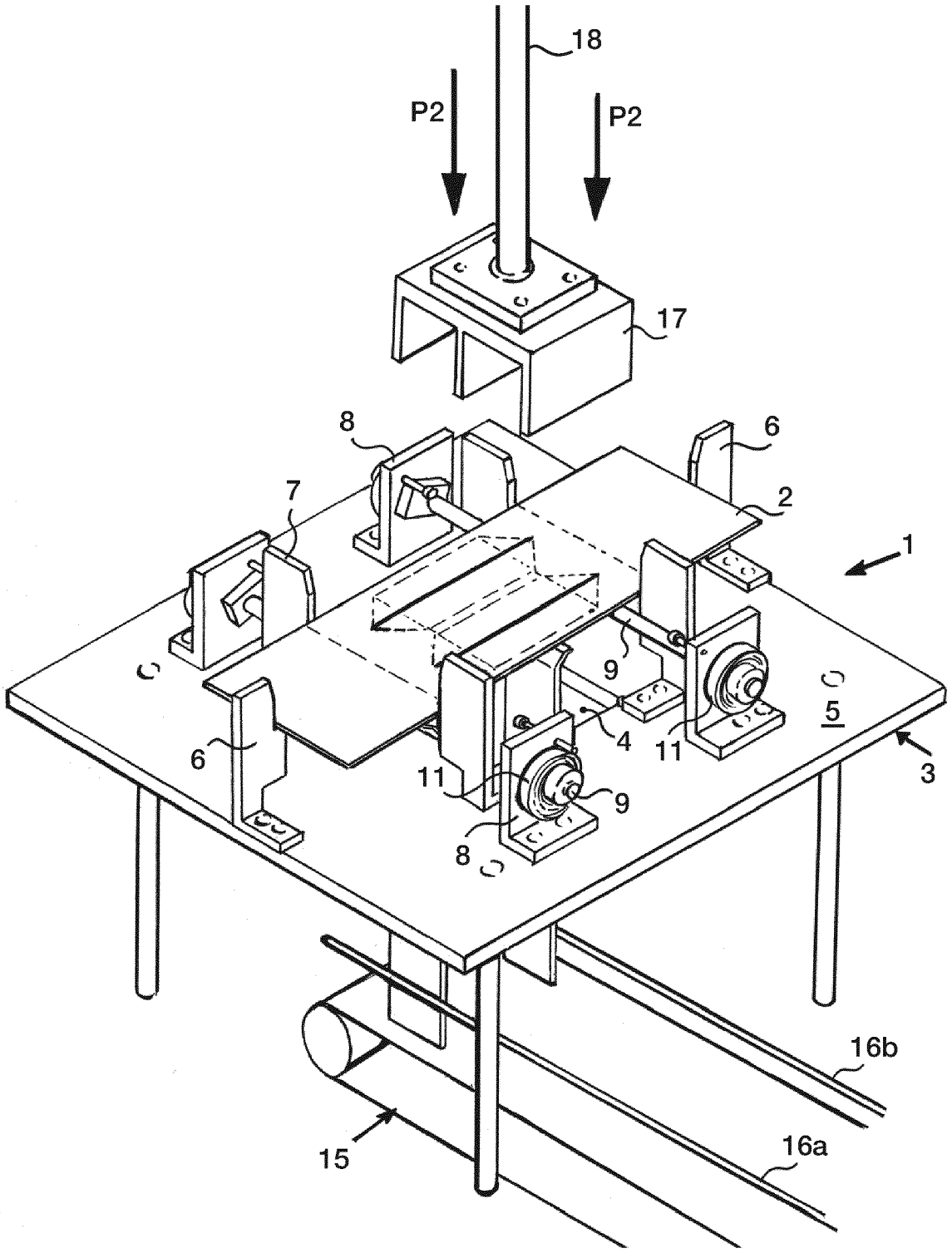

Fig. 2

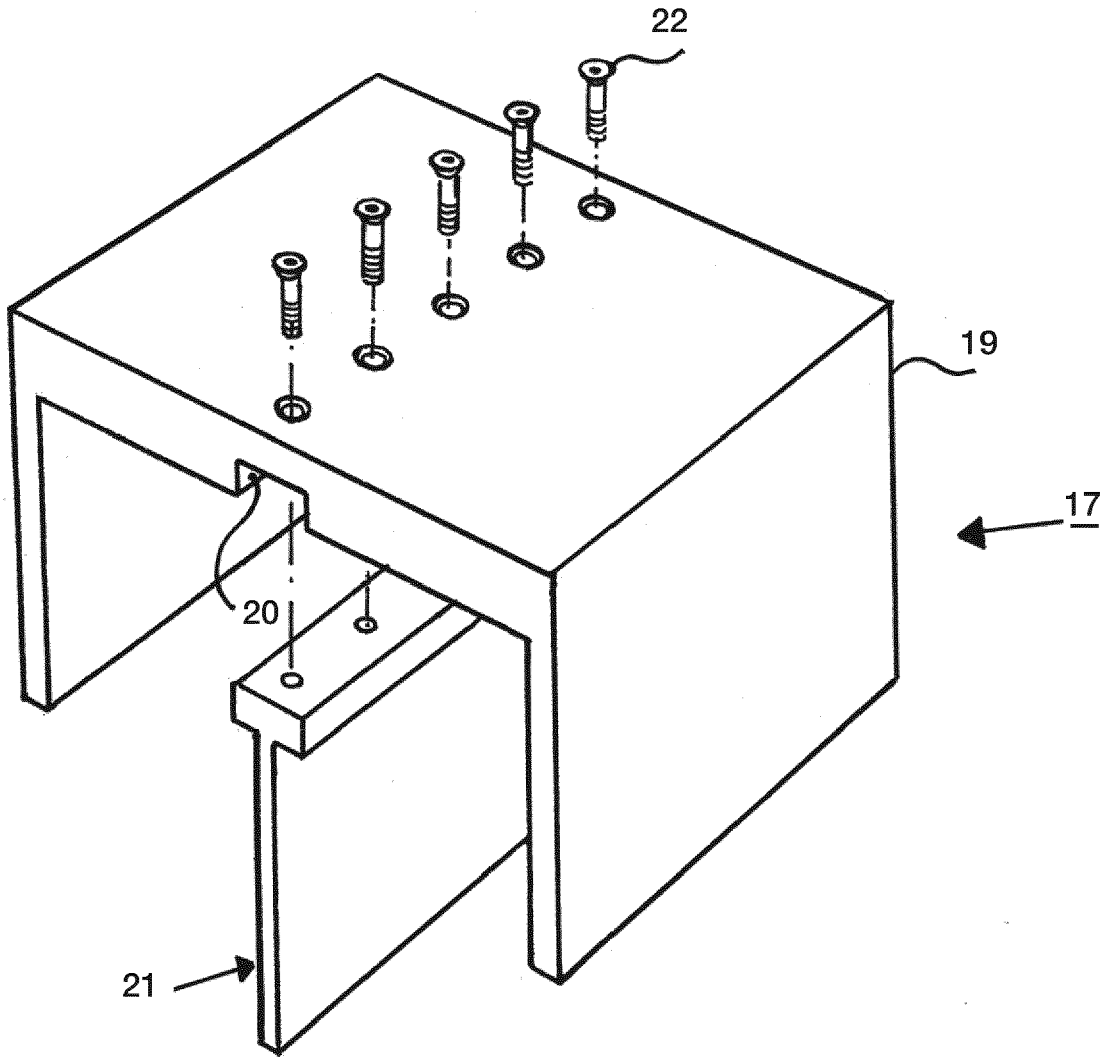

Fig. 2a

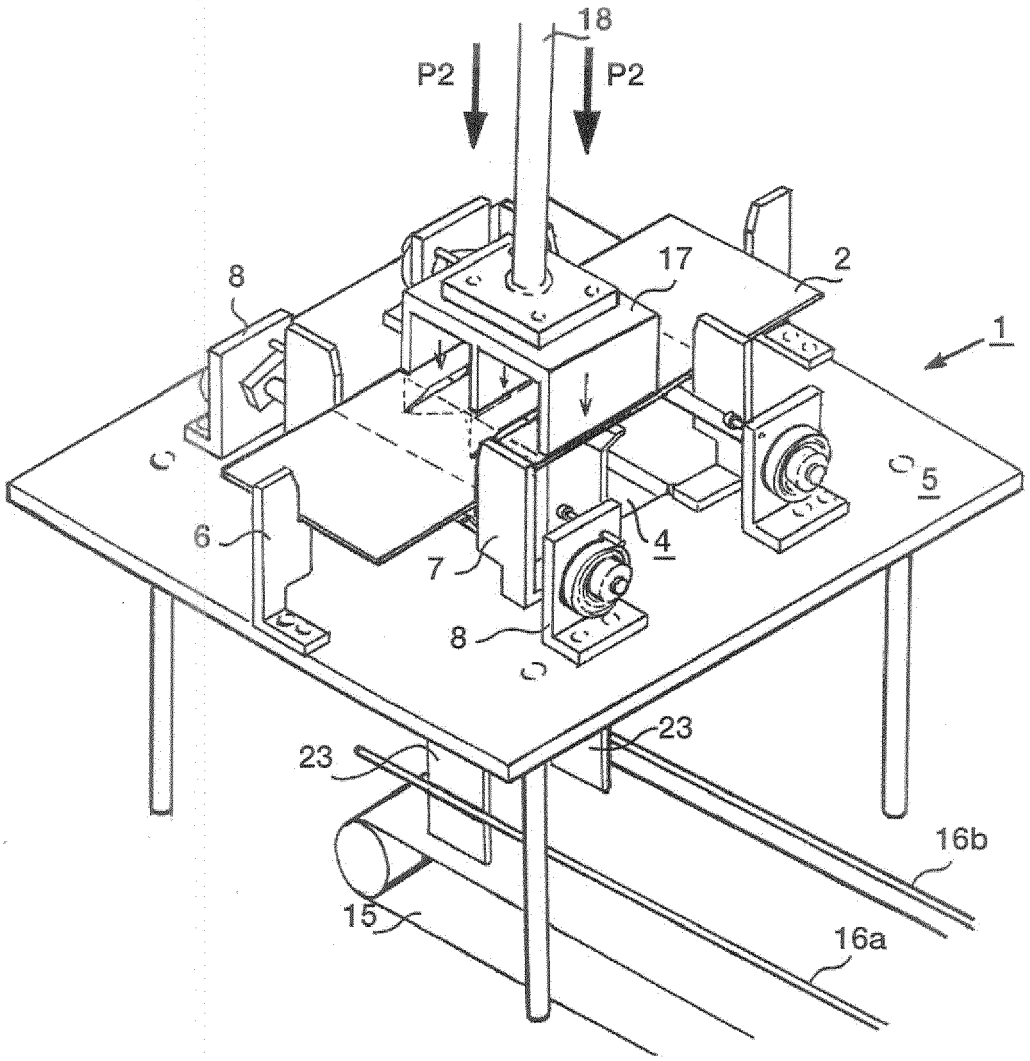

Fig. 3

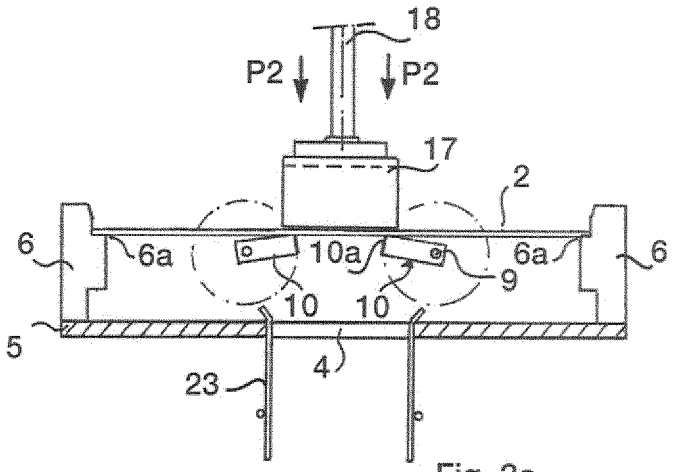
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Fig. 3a

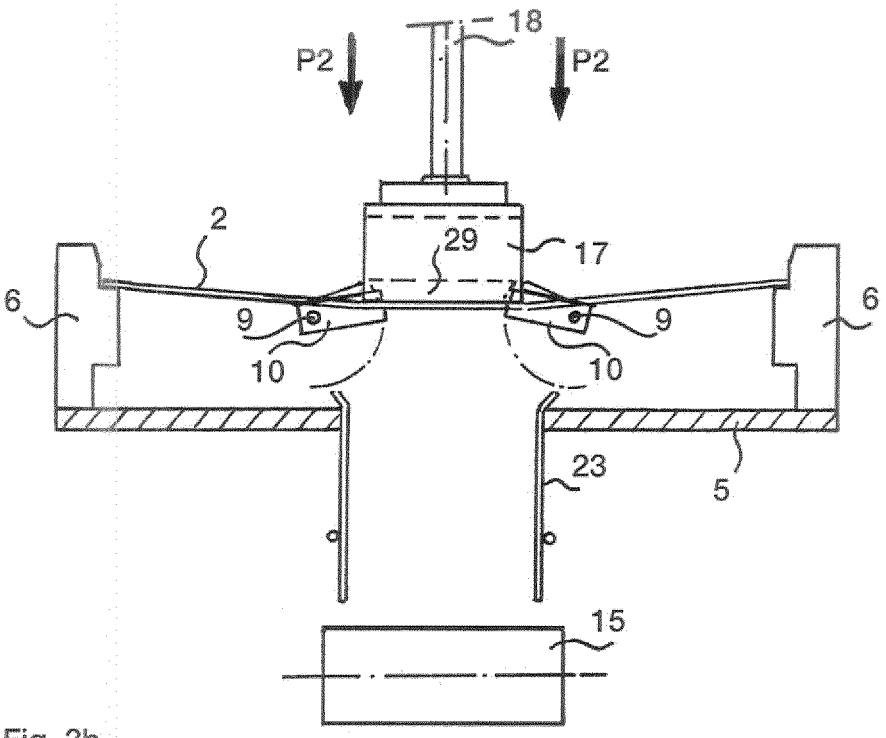
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Fig. 3b

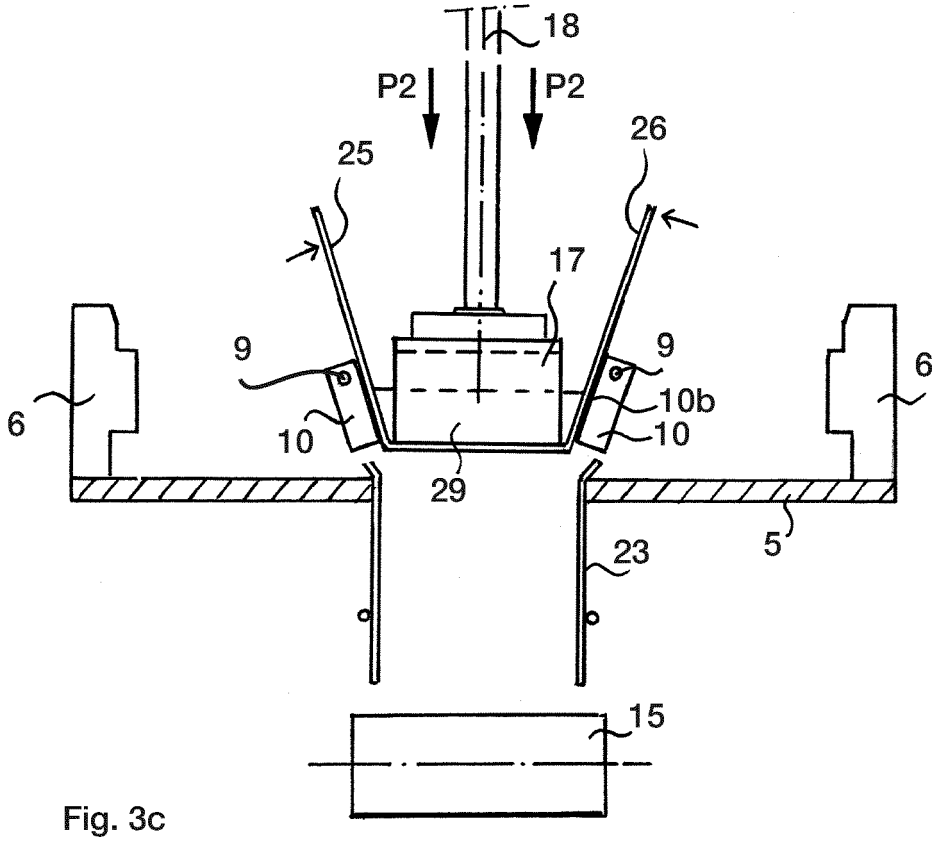
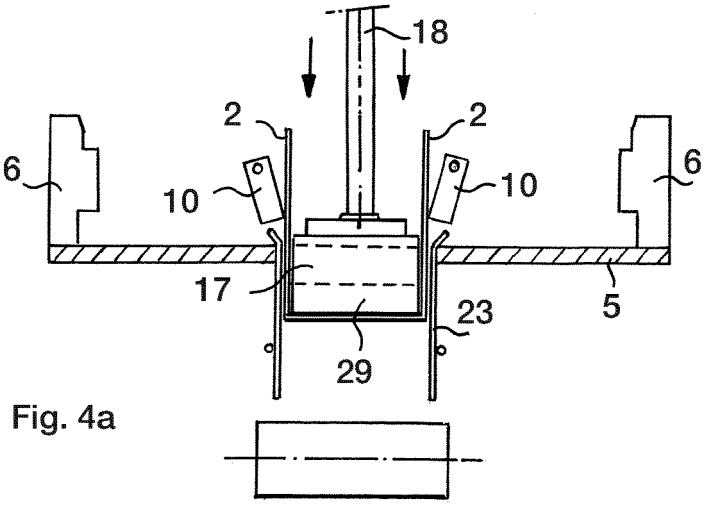


Fig. 3c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29

Fig. 4a

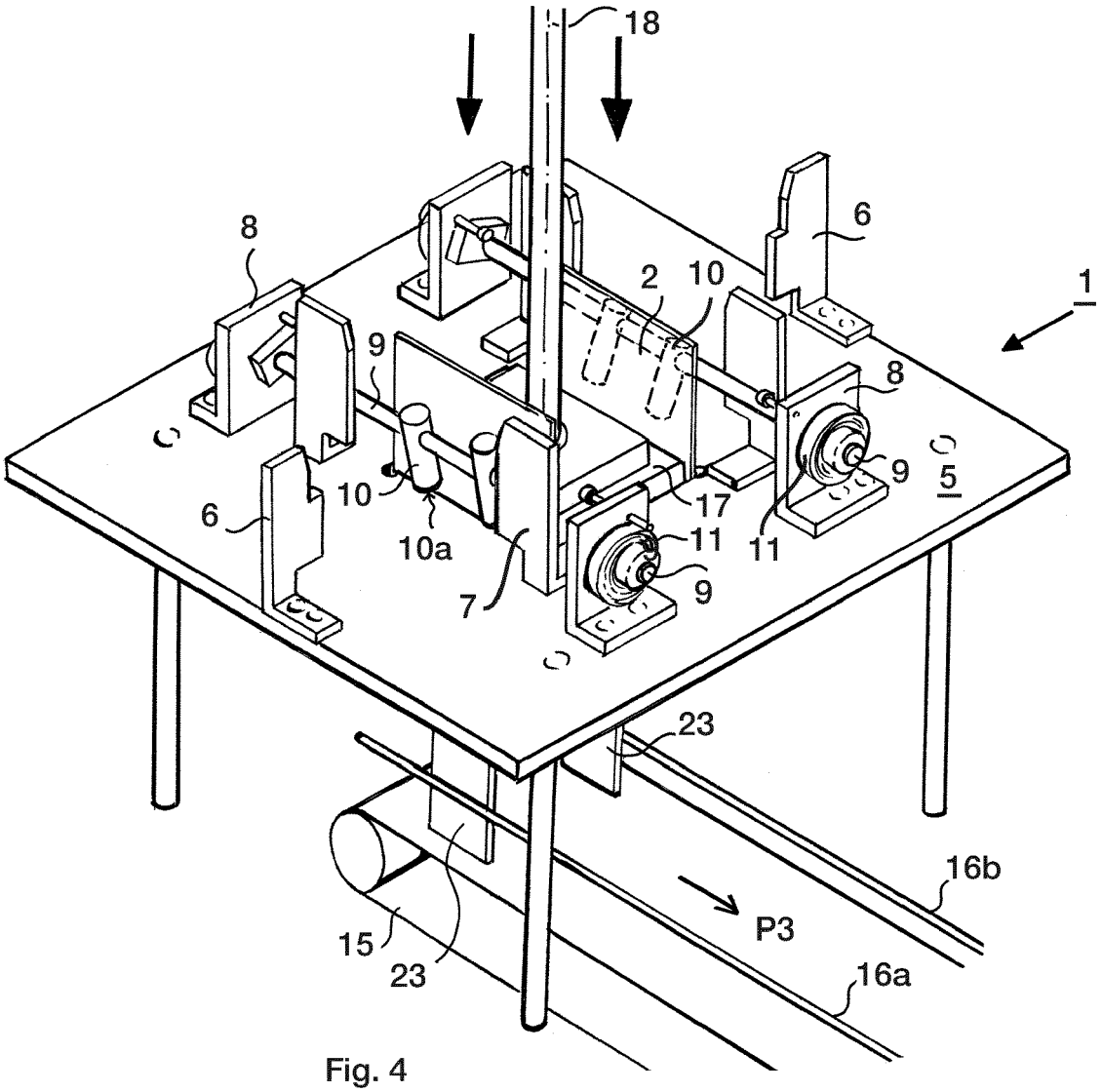
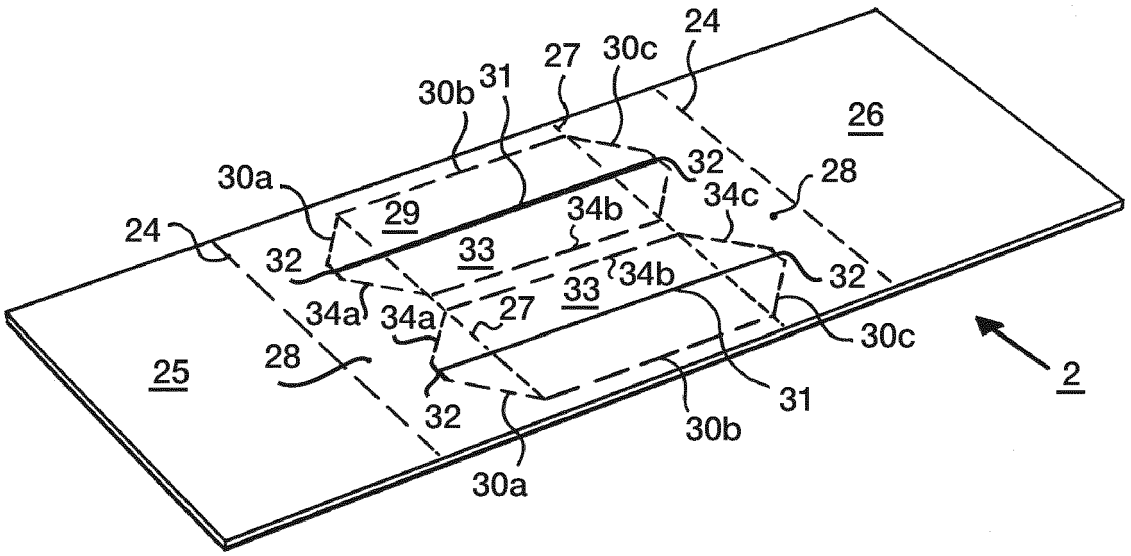

18
8
6
2
10
1
9
8
9
5
10
17
6
10a
11
11
9
7
23
16b
P3
15
23
16a

Fig. 4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27
30c
30b
31
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32
28
30a
34c
29
34b
24
33
32
34b
32
34a
34a
27
33
30c
28
25
2
32
31
30b
30a

Fig. 5a

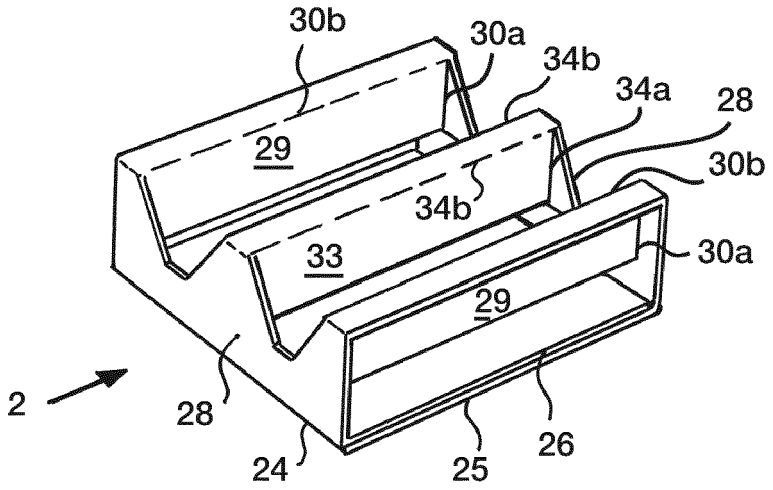
30b
30a
34b
34a
28
29
30b
34b
33
30a
29
2
28
24
25
26

Fig. 5b

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 5583

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 A	US 3 918 353 A (VOGELI I ERNST) 11 November 1975 (1975-11-11) * column 4, line 37 - column 5, line 56; figures 12-14 * -----	1-3,5-16 4	INV. B31D5/00 B65D5/48
A	US 4 793 547 A (LAPOULE PATRICK [FR] ET AL) 27 December 1988 (1988-12-27) * abstract; figures 9,11a-11d * -----	1,13	

TECHNICAL FIELDS SEARCHED (IPC)
B31D B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 May 2012	Farizon, Pascal

CATEGORY OF CITED DOCUMENTS

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25-05-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3918353 A	11-11-1975	NONE	
US 4793547 A	27-12-1988	NONE	

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