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(54) Corner shaping assembly for a carton box forming machine

(57) The corner shaping assembly comprises a main support and an elongated inner flap guiding member (22), supported in cantilever and fixed to said main support by means of an adjustable support unit (50) comprising first, second and third sliding support elements (18, 19, 20) and a pivoting base support (21) connected to one another in a chain by respective fixing and guiding means. The first support element (18) is fixed to the main support and the inner flap guiding member (22) is fixed to the base support (21) by other respective fixing and guiding means, which as a whole allow adjusting the linear position of the inner flap guiding member (22) in relation to the main support in first, second and third directions (D1, D2, D3) and its angular position around first and second axes (E1, E2).

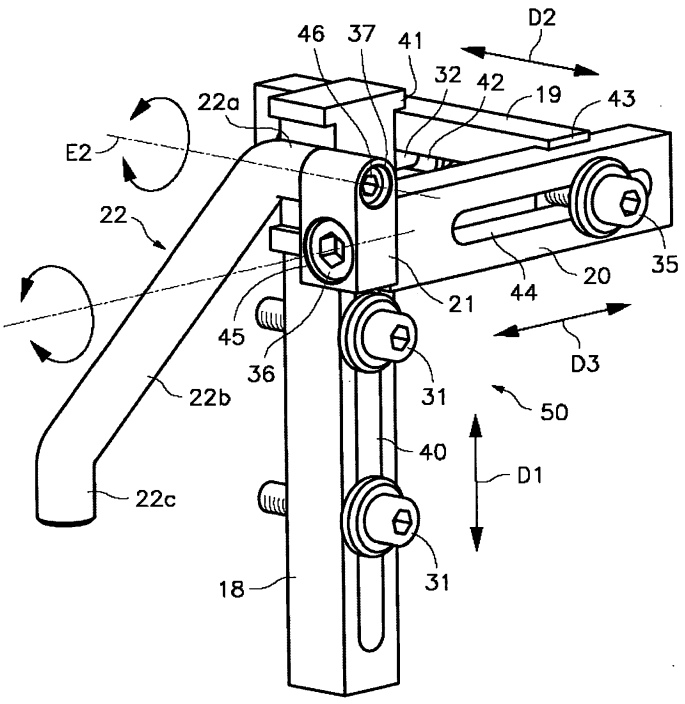

Fig.3

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Description

Technical Field

[0001] The present invention generally relates to a corner shaping assembly for a cardboard box forming machine, and more particularly to an adjustable support unit for supporting a guiding member and to a pressing unit forming part of said corner shaping assembly.

Background of the Invention

[0002] Cardboard box forming machines are well known in the state of the art, such machines comprising four corner shaping assemblies which are symmetrically configured and arranged delimiting therebetween a molding cavity on which there is placed a die-cut cardboard sheet, and a plunger driven in a downward direction to press said die-cut cardboard sheet towards the inside of said molding cavity for the purpose of folding parts of the die-cut cardboard sheet in cooperation with the corner shaping assemblies to form a cardboard box from the die-cut cardboard sheet, the finished cardboard box going out through a lower end of the molding cavity. Each corner shaping assembly comprises a main support configured to be fixed to a structure of the machine and a plurality of shaping members and units arranged to guide, fold, bend, glue and press different parts of said die-cut cardboard sheet during the action of said plunger.

[0003] The forming machine is generally provided with several adjustment possibilities for being adapted to cardboard boxes of different formats. For example, the forming machine normally includes adjustable fixing means for adjusting the positions of the four corner shaping assemblies in two horizontal directions perpendicular to one another to adapt the rectangular plan of the molding cavity to cardboard boxes of different formats with a rectangular base, and the plunger accordingly includes adjustment means for adjusting the positions of several elements thereof. Furthermore, several of the shaping members and units integrated in each corner shaping assembly can also include adjustment means for being adapted to the different formats of the cardboard boxes, although the adjustment possibilities are generally scarce or incomplete.

[0004] A corner shaping assembly for a cardboard box forming machine is known on the market which comprises an inner flap guiding member arranged to guide a part of the die-cut cardboard sheet which will form an inner flap in a finished cardboard box. The mentioned inner flap guiding member is formed by an inclined upper edge of a metal plate fixed in a projecting manner and in a vertical position in relation to the main support of the corner shaping assembly. The mentioned upper edge is inclined downwardly and towards the inside of the cavity of the mold, and said part of the die-cut cardboard sheet slides thereon while at the same time it bends under the pressure exerted by the plunger. A drawback of this inner flap guiding member is that it is fixed to the main support of the corner shaping assembly without means which allow adjusting its position in relation thereto.

[0005] A corner shaping assembly for a cardboard box forming machine is also known on the market which comprises a pressing unit having a pressure plate driven by a dynamic fluid cylinder to press one or more previously glued flap portions against a wall portion of the cardboard box while an element of the plunger, which is stopped in a lowered position during the time in which the pressing unit operates, acts as a dolly. The mentioned pressure plate is rotatably assembled with respect to a vertical shaft, or alternatively with respect to a horizontal shaft, and is connected to a ball joint fixed to the end of the stem of said dynamic fluid cylinder to rotate between a passive position and an active position. The pressure plate is optionally interchangeable to be adapted to cardboard boxes of different formats. A drawback of this arrangement is that, due to the rotating movement of the pressure plate, the pressure that it exerts against the flap portion is not uniform in the entire plate, the pressure being stronger in the regions of the plate which are closer to the axis of rotation. Furthermore, the pressing unit does not include means for adjusting the pressure exerted by the plate under the action of the dynamic fluid cylinder.

[0006] Therefore, an objective of the present invention is to provide a corner shaping assembly for a cardboard box forming machine comprising an inner flap guiding member the position of which can be adjusted at least in three directions in relation to a main support.

[0007] Another objective of the present invention is to provide a corner shaping assembly for a cardboard box forming machine comprising a pressing unit with a pressure plate driven to perform a substantially linear pressing movement.

Disclosure of the Invention

[0008] The present invention contributes to reaching the previous and other objectives by providing a corner shaping assembly for a cardboard box forming machine, wherein said machine comprises four of said corner shaping assemblies which are symmetrically configured and arranged delimiting therebetween a molding cavity which cooperates with a downward plunger to fold a die-cut cardboard sheet and form a box therefrom. Each corner shaping assembly comprises a main support configured to be fixed to a structure of the machine and a plurality of shaping members and units arranged to interact with different parts of said die-cut cardboard sheet during the action of said plunger. Between said shaping members and units, the corner shaping assembly of the present invention comprises an elongated inner flap guiding member, supported in a projecting manner and fixed to said main support by means of an adjustable support unit including first, second and third support elements.

[0009] The mentioned first support element is fixed to the main support by first fixing and guiding means which

allow adjusting its relative linear position in a first direction, said second support element is fixed to said first support element by second fixing and guiding means which allow adjusting its relative linear position in a second direction, and said third support element is fixed to said second support element by third fixing and guiding means which allow adjusting its relative linear position in a third direction. Thus, the position of the mentioned inner flap guiding member, which is fixed to said third support element, can be adjusted in relation to the main support in three different directions by selectively adjusting the linear positions of the first, second and third support elements.

[0010] In one embodiment, the mentioned second direction is perpendicular to said first direction and said third direction is perpendicular to the first and second directions. In another preferred embodiment, the first direction is a vertical direction, the second direction is a horizontal direction perpendicular to the advance direction of the die-cut cardboard sheet when it is supplied to the forming machine, and the third direction is a horizontal direction parallel to said advance direction of the die-cut cardboard sheet, although it will be understood that these orientations of the first, second and third support elements could be interchanged with an equivalent result.

[0011] Furthermore, the inner flap guiding member is fixed to a base support, which is in turn fixed to the third support element by fourth fixing and guiding means which allow adjusting its relative angular position around a first axis. The inner flap guiding member is preferably fixed to said base support by fifth fixing and guiding means which allow adjusting its relative angular position around a second axis. In a preferred embodiment, the inner flap guiding member is elongated, for example in the form of a bar with a circular cross section, and has bends defining a fixing portion at a proximal end, a guiding portion extending in cantilever in an inclined position from said fixing portion forming an angle with respect to it, and a final portion at a distal end, which forms an angle with respect to said guiding portion.

[0012] Thus, the inclination of the guiding portion of the inner flap guiding member can be adjusted in relation to said first and second axes by adjusting the angular positions of the base support and of the inner flap guiding member itself. In one embodiment, the mentioned first axis is parallel to one of said first, second or third directions, preferably to that which is parallel to the advance direction of the die-cut cardboard sheet, and said second axis is perpendicular to the first axis.

[0013] Between the several shaping members and units, the corner shaping assembly of the present invention also comprises a pressing unit for assuring the sticking of an outer flap of the cardboard box. This pressing unit includes a pressure plate connected to a stem of a dynamic fluid cylinder, which has a casing supported in an auxiliary support fixed to the main support. The mentioned pressure plate is linearly moved by said stem, preferably in a horizontal direction, between an inactive position, separated from the cardboard box, and an active position, pressing on the cardboard box. Said auxiliary support is fixed to the main support by sixth fixing and guiding means which allow adjusting its relative linear position in a direction parallel to the direction of the movement of said stem. Thus, the distance between the pressure plate, when it is in the inactive position, and the cardboard box can be adjusted, which is equivalent to adjusting the pressure that the pressure plate will exert against the cardboard box in the active position for equivalent operating conditions of the dynamic fluid cylinder.

[0014] The linear movement of the pressure plate between the inactive and active positions allows pressing the pressure plate against the cardboard box in a direct and completely perpendicular manner, which assures high uniformity in the pressure exerted by the pressure plate on the cardboard box. Advantageously, the pressing unit comprises a plurality of said pressure plates of different shapes and sizes, preferably made of a plastic material, adapted to cardboard boxes of different formats, these pressure plates being easily interchangeable.

Brief Description of the Drawings

[0015] The previous and other features and advantages will be more fully understood from the following detailed description of exemplary embodiments with reference to the attached drawings, in which:

Figure 1 is a perspective view of a corner shaping assembly for a cardboard box forming machine, showing a side thereof;

Figure 2 is a perspective view of the corner shaping assembly of Figure 1 showing the opposite side thereof;

Figure 3 is a perspective view of an inner flap guiding member and of a corresponding adjustable support unit forming part of the corner shaping assembly of Figures 1 and 2, showing a side thereof;

Figure 4 is a perspective view of the inner flap guiding member and of the corresponding adjustable support unit of Figure 3, showing another side thereof; and

Figure 5 is a perspective view of a pressing unit forming part of the corner shaping assembly of Figures 1 and 2.

Detailed Description of Exemplary Embodiments

[0016] Referring first to Figures 1 and 2, reference numeral 60 indicates a corner shaping assembly according to an embodiment of the present invention. The corner shaping assembly is applicable to a conventional type of cardboard box forming machine including four of said corner shaping assemblies 60, which are symmetrically configured and arranged delimiting therebetween a molding cavity which cooperates with a plunger (not

shown) driven in a downward direction to fold a die-cut cardboard sheet (not shown) and form a box therefrom. Each corner shaping assembly 60 comprises a main support 1 configured to be fixed to a structure of the machine and a plurality of shaping members and units arranged to interact with different parts of said die-cut cardboard sheet during the formation of the cardboard box by the action of said plunger in cooperation with the four corner forming assemblies 60.

[0017] First, second and third directions D1, D2, D3 are indicated by means of respective arrows in Figures 1 and 2, wherein the first direction D1 is a vertical direction, the second direction D2 is a horizontal direction perpendicular to the advance direction of the die-cut cardboard sheet when it is supplied to the forming machine, and the third direction D3 is a horizontal direction parallel to said advance direction of the die-cut cardboard sheet.

[0018] In each corner forming assembly 60, all the mentioned shaping members and units are supported in the corresponding main support 1, which is installed in the structure of the forming machine such that its position can be adjusted at least in the third direction D3, and preferably also in the second direction D2 to adapt the molding cavity to boxes of different formats.

[0019] The shaping members and units of the corner shaping assembly 60 comprise a flap bender support 2, which is attached to the main support 1 by means of an appendage 2a secured in a clamp 11 which allows adjusting its position in the second direction D2. A flap guide 4 is fixed to said flap bender support 2 by means of a multiple clamp 3 provided with multiple boreholes and grooves which allow adjusting its relative position in the first and third directions D1, D3. Said flap guide 4 is an element on which flaps of the die-cut cardboard sheet slide when the latter is pushed downwards by the plunger.

[0020] On the flap bender support 2A there is also installed a crosspiece 5 (Figure 2) formed by a vertical portion 9a and a horizontal portion 9b which are intercrossed. In said vertical portion 9a there is formed an elongated groove through which a fixing screw 10 which allows adjusting the position of said crosspiece 5 in the first direction D1 is installed. On the horizontal portion 9b of the crosspiece 5 there is installed a dynamic fluid cylinder 6 the stem of which is connected to a support finger 8 received in a guide 7. The activation of the dynamic fluid cylinder 6 linearly moves the support finger 8 between an extended position, in which it supports the base of the cardboard box inside the molding cavity during the operation for the formation thereof, and a retracted position, in which it allows the finished box to fall from the molding cavity. The adjustment of the position of the crosspiece 5 in the first direction D1. positions the support finger 8 at a height suited to the height of the box to be formed.

[0021] At a higher level with respect to the support finger 8 there is located an anti-return member 12 (Figure 2) fixed to a rocker 13 assembled such that it can pivot with respect to a horizontal shaft 13a fixed to the flap bender support 2 between a retracted position, in which the anti-return member 12 allows the die-cut cardboard sheet to pass when it is pushed by the plunger towards the inside of the molding cavity, and an extended position, in which the anti-return member 12 prevents the recently formed cardboard box from being driven upwards by the plunger in its upward return movement. The position of the anti-return member 12 in relation to the rocker 13 can be adjusted in the first direction D1 by means of a pair of screws (not shown) inserted through an elongated groove to be adapted to boxes of different heights. A spring 14 is arranged under compression between a rear stop 15 fixed to the flap bender support 2 and the rocker 13 to push the latter towards the extended position, which is limited by a front stop 16. The anti-return member 12 has an inclined bevel edge at the upper part which is pushed by the die-cut cardboard sheet in its downward movement to force the rocker 13 to pivot against the elastic force of the spring 14. When the die-cut cardboard sheet, in its downward movement, has surpassed the anti-return member 12, the rocker 13 returns to the extended position being pushed by the spring 14.

[0022] A side bender 17 is fixed to the flap bender support 2 by fixing and guiding means (not shown) which allow adjusting its relative position in the first direction D1. This side bender 17 performs the guiding and positioning of portions of the die-cut cardboard sheet which will form the sides of the cardboard box.

[0023] The corner shaping assembly further comprises an elongated inner flap guiding member 22, supported in cantilever and fixed to said main support 1 by means of an adjustable support unit 50 (shown separately in Figures 3 and 4) which allows adjusting the linear position of said inner flap guiding member 22 in relation to the main support 1 in the first, second and third directions D1, D2, D3 and the angular position of the inner flap guiding member 22 around first and second axes E1, E2.

[0024] As is better shown in Figures 3 and 4, the mentioned adjustable support unit 50 includes a first sliding support element 18 fixed to the main support 1 by first fixing and guiding means, which according to the illustrated embodiment comprise a first elongated groove 40 formed in the first support element 18 and oriented in the first direction D1, and at least two first fixing screws 31 inserted through said first elongated groove 40 and screwed in corresponding threaded holes formed in the main support 1, such that, when the first fixing screws 31 are loosened, the first support element 18 can slide linearly along the first elongated groove 40 and the first fixing screws 31 can be tightened again to fix the first support element 18 to the main support 1 in a desired linear position. Thus, these first fixing and guiding means allow adjusting the linear position of the first support element 18 in relation to the main support 1 in the first direction D1.

[0025] A second sliding support element 19 is fixed to said first support element 18 by second fixing and guiding means comprising a second elongated groove 42 formed

in said second support element 19 and oriented in the second direction D2, and a second fixing screw 32 inserted through said second elongated groove 42 and screwed in a corresponding threaded holed formed in the first support element 18. To prevent the second support element 19 from rotating around the second fixing screw 32, from the first support element 18 there project two first guide ribs 41, which are arranged mutually parallel and oriented in the second direction D2 to make guiding contact with corresponding surfaces of the second support element 19.

[0026] Thus, when the second fixing screw 32 is loosened, the second support element 19 can slide linearly along the second elongated groove 40 and the first guide ribs 41, and the second fixing screw 32 can be tightened again to fix the second support element 19 to the first support element 18 in a desired linear position, such that these second fixing and guiding means allow adjusting the linear position of the second support element 19 with respect to the first support element 18 in the second direction D2.

[0027] A third sliding support element 20 is fixed to the second support element 19 by third fixing and guiding means comprising a third elongated groove 44 formed in said third support element 20 and oriented in the third direction D3, and a third fixing screw 35 inserted through said third elongated groove 44 and screwed in a corresponding threaded hole formed in the second support element 19. To prevent the third support element 20 from rotating around the third fixing screw 35, from the second support element 19 there project two second guide ribs 43 arranged mutually parallel and oriented in the third direction D3 to make guiding contact with corresponding surfaces of the third support element 20.

[0028] Thus, when the third fixing screw 35 is loosened, the third support element 20 can slide linearly along the third elongated groove 44 and the second guide ribs 43, and the third fixing screw 35 can be tightened again to fix the third support element 20 to the second support element 19 in a desired linear position, such that these third fixing and guiding means allow adjusting the linear position of the third support element 20 with respect to the second support element 19 in the third direction D3.

[0029] A pivoting base support 21 is fixed to the third support element 20 by fourth fixing and guiding means comprising a first through hole 45 formed in said base support 21, and a fourth fixing screw 36 inserted through said first through hole 45 and screwed in a corresponding threaded hole formed in the third support element 20, such that, when the fourth fixing screw 36 is loosened, the base support 21 can rotate around it, and the fourth fixing screw 36 can be tightened again to fix the base support 21 to the third support element 20 in a desired angular position. The mentioned threaded hole formed in the third support element 20 is aligned with a first axis E1, such that said fourth fixing and guiding means allow adjusting the angular position of the base support 21 around said first axis E1. In the illustrated embodiment, the first axis E1 is parallel to the third direction D3.

[0030] The inner flap guiding member 22 has the form of an elongated bar with a circular cross section provided with bends which provide a substantially horizontal short fixing portion 22a at a proximal end, a relatively long guiding portion 22b extending in cantilever in an inclined position from said fixing portion 22a, and a substantially vertical final portion 22c connected to a distal end of said guiding portion 22b.

[0031] The inner flap guiding member 22 is fixed to the base support 21 by fifth fixing and guiding means comprising a second through hole 46 formed in the base support 21 and a fifth fixing screw 37 inserted through said second through hole 46 and screwed in a corresponding threaded hole formed axially in the fixing portion 22a of the inner flap guiding member 22, such that, when the fifth fixing screw 37 is loosened, the inner flap guiding member 22 can rotate around it, and the fifth fixing screw 37 can be tightened again to fix the inner flap guiding member 22 to the base support 21 in a desired angular position. The mentioned second through hole 46 is aligned with a second axis E2, such that these fifth fixing and guiding means allow adjusting the angular position of the inner flap guiding member 22 with respect to said second axis E2. In the illustrated embodiment, the second axis E2 is parallel to the second direction D2.

[0032] Figure 5 separately shows a pressing unit 55 which also forms part of the corner shaping assembly 60 shown in Figures 1 and 2. The mentioned pressing unit 55 serves to press an outer flap of the cardboard box against other parts thereof, which have been previously glued, to attach them by sticking. To that end, the pressing unit 55 includes a dynamic fluid cylinder 26 having a mobile stem 26a and a casing 26b supported in an auxiliary support 24. An anchoring clamp 27 is screwed at a distal end of said stem 26a and a pushing plate 28 is fixed to said anchoring clamp, for example by means of fixing screws (not shown). The pressing unit 55 further comprises a plurality of pressure plates 29 of different shapes and sizes adapted to cardboard boxes of different formats, which are interchangeable. These pressure plates 29 are preferably made of a plastic material. Each pressure plate 29 can be detachably fixed to said pushing plate 28 by means of fixing screws 39.

[0033] By means of the activation of the dynamic fluid cylinder 26 the pressure plate 29 is linearly moved between an inactive position, in which it is separated from the cardboard box, and an active position, in which it is pressed against a portion of the cardboard box supported by an element of the plunger acting as a dolly.

[0034] The auxiliary support 24 has the form of a horizontal plate and the dynamic fluid cylinder 26 is arranged adjacent to a lower face of the auxiliary support 24. The mentioned casing 26b of the dynamic fluid cylinder 26 has an end opposite to the stem 26a fixed to the auxiliary support 24 by means of a fixing screw 33, whereas a portion of the casing 26a close to its other end adjacent to the stem 26a is secured by a securing member 25

fixed to the auxiliary support 24 by means of fixing screws 48. This securing member 25 has a cradle-shaped cut 25a surrounding said portion of the casing 26a at the bottom and at the sides, such that the casing is retained and supported in the cradle-shaped cut 25a, there being a clearance between the casing 26a and the cradle-shaped cut 25a.

[0035] The auxiliary support 24 is fixed to the main support 1 by sixth fixing and guiding means comprising an angle bracket 23 having a vertical wall 23a and a horizontal wall 23b. In the mentioned vertical wall 23a of the angle bracket 23 there are formed third through holes through which sixth fixing screws 34 are inserted, which screws are screwed in corresponding threaded holes formed in the main support 1 (see Figure 1). In said horizontal wall 23b of the angle bracket 23 there are formed at least two fourth elongated grooves 47 mutually parallel and parallel to the direction of the movement of the stem 26a. Through these fourth elongated grooves 47 there are inserted seventh fixing screws 38 screwed in corresponding threaded holes formed in the auxiliary support 24.

[0036] When the mentioned seventh fixing screws 38 are loosened, the auxiliary support 24 can slide linearly along the fourth elongated grooves 47, and the seventh fixing screws 38 can be tightened again to fix the auxiliary support 24 to the angle bracket 23 in a desired linear position. The securing member 25 has appendages 25b which project laterally upwards with respect to an upper surface of the auxiliary support, and which cooperates with side surfaces of the horizontal wall 23b of the angle bracket 23 for the linear guiding thereof. Thus, said sixth fixing and guiding means allow adjusting the linear position of the auxiliary support 24 and of the dynamic fluid cylinder 26 supported thereon with respect to the angle bracket 23, and consequently with respect to the main support 1, in a direction parallel to the direction of the movement of the stem 26a and of the pressure plate 29. This involves a variation in the position of the dynamic fluid cylinder 26 with respect to the cardboard box which is being formed in the molding cavity, and in the intensity of the pressing that the pressure plate 29 will exert against the cardboard box. In the illustrated example, the dynamic fluid cylinder 26 is arranged such that the direction of the movement of the stem 26a is parallel to the third direction D3.

[0037] To prevent the pressure plate 29 from being able to rotate around the axis of the stem 26a, an anti-rotation rod 30, which is fixed to the pushing plate 28 and supported in cantilever in a direction parallel to the direction of the movement of the stem 26a, is inserted in a sliding manner through a through hole 49 formed in the vertical wall 23a of the angle bracket 23 and through a corresponding through hole formed in the main support 1 (not shown).

[0038] Modifications and variations to the embodiments shown and described will occur to a person skilled in the art without departing from the scope of the present invention as it is defined in the attached claims.

Claims

1. A corner shaping assembly for a cardboard box forming machine, said machine comprising four of said corner shaping assemblies (60) which are symmetrically configured and arranged delimiting therebetween a molding cavity which cooperates with a downward plunger to fold a die-cut cardboard sheet and form a box therefrom, wherein each corner shaping assembly (60) comprises a main support (1) configured to be fixed to a structure of the machine and a plurality of shaping members and units arranged to interact with different parts of said die-cut cardboard sheet during the action of said plunger,
characterized in that it comprises an elongated inner flap guiding member (22), supported in cantilever and fixed to said main support (1) by means of an adjustable support unit (50) including;
a first support element (18) fixed to the main support (1) by first fixing and guiding means which allow adjusting its relative linear position in a first direction (D1);
a second support element (19) fixed to said first support element (18) by second fixing and guiding means which allow adjusting its relative linear position in a second direction (D2); and
a third support element (20) fixed to said second support element (19) by third fixing and guiding means which allow adjusting its relative linear position in a third direction (D3),
said inner flap guiding member (22) being fixed to said third support element (20), whereby the position of the inner flap guiding member (22) in relation to the main support (1) can be adjusted in three different directions by adjusting the positions of the first, second and third support elements (18, 19, 20).

2. The assembly according to claim 1, **characterized in that** the inner flap guiding member (22) is fixed to a base support (21), which is in turn fixed to the third support element (20) by fourth fixing and guiding means which allow adjusting its relative angular position around a first axis (E1).

3. The assembly according to claim 2, **characterized in that** the inner flap guiding member (22) is fixed to said base support (21) by fifth fixing and guiding means which allow adjusting its relative angular position around a second axis (E2).

4. The assembly according to claim 1, 2 or 3, **characterized in that** the inner flap guiding member (22) is elongated and has a fixing portion (22a) at a proximal end, and a guiding portion (22b) extending in cantilever in an inclined position from said fixing por-

tion (22a).

5. The assembly according to claim 3, **characterized in that** the inner flap guiding member (22) has a circular cross section.

6. The assembly according to claim 1, **characterized in that** said first fixing and guiding means comprise a first elongated groove (40) formed in the first support element (18) and oriented in the first direction (D1), and at least two first fixing screws (31) inserted through said first elongated groove (40) and screwed in corresponding threaded holes formed in the main support (1).

7. The assembly according to claim 1, **characterized in that** said second fixing and guiding means comprise a second elongated groove (42) formed in the second support element (19) and oriented in the second direction (D2), a second fixing screw (32) inserted through said second elongated groove (42) and screwed in a corresponding threaded hole formed in the first support element (18), and at least two first guide ribs (41) formed in the first support element (18) and arranged to make linear guiding contact in the second direction (D2) with corresponding surfaces of the second support element (19).

8. The assembly according to claim 1, **characterized in that** said third fixing and guiding means comprise a third elongated groove (44) formed in the third support element (20) and oriented in the third direction (D3), a third fixing screw (35) inserted through said third elongated groove (44) and screwed in a corresponding threaded hole formed in the second support element (19), and at least two second guide ribs (43) formed in the second support element (19) and arranged to make linear guiding contact in the third direction (D3) with corresponding surfaces of the third support element (20).

9. The assembly according to claim 2, **characterized in that** said fourth fixing and guiding means comprise a first through hole (45) formed in said base support (21), and a fourth fixing screw (36) inserted through said first through hole (45) and screwed in a corresponding threaded hole aligned with said first axis (E1) and formed in the third support element (20).

10. The assembly according to claim 3, **characterized in that** said fifth fixing and guiding means comprise a second through hole (46) aligned with said second axis (E2) and formed in said base support (21), and a fifth fixing screw (37) inserted through said second through hole (46) and screwed in a corresponding threaded hole formed in a fixing portion (22a) located at a proximal end of the inner flap guiding member (22).

11. The assembly according to claim 1, **characterized in that** the corner shaping assembly further comprises a pressing unit (55) for sticking an outer flap of the cardboard box, said pressing unit (55) including a pressure plate (29) linearly moved between an inactive position and an active position by a dynamic fluid cylinder (26) having a stem (26a) connected to said pressure plate (29) and a casing (26b) supported in an auxiliary support (24) fixed to the main support (1) by sixth fixing and guiding means which allow adjusting its relative linear position in a direction parallel to the direction of the movement of said pressure plate (29).

12. The assembly according to claim 11, **characterized in that** said sixth fixing and guiding means comprise an angle bracket (23) having a vertical wall (23a) in which there are formed third through holes through which sixth fixing screws (34) are inserted and screwed in corresponding threaded holes formed in the main support (1), and a horizontal wall (23b) in which there are formed at least two fourth elongated grooves (47) mutually parallel and parallel to the direction of the movement of the stem (26a) through which seventh fixing screws (38) are inserted and screwed in corresponding threaded holes formed in said auxiliary support (24).

13. The assembly according to claim 12, **characterized in that** an end of said casing (26b) of the dynamic fluid cylinder (26) opposite to the stem (26a) is fixed to the auxiliary support (24) by means of a fixing screw (33) and a portion of the casing (26a) close to its other end is secured and supported in a cradle-shaped cut (25a) formed in a securing member (25) fixed to the auxiliary support (24) by means of fixing screws (48), there being a clearance between the casing (26a) and said cradle-shaped cut (25a).

14. The assembly according to claim 13, **characterized in that** said pressing unit (55) comprises a plurality of said pressure plates (29) which are interchangeable, said pressure plates (29) being of different shapes and sizes adapted to cardboard boxes of different formats, each pressure plate (29) being able to be fixed by means of fixing screws (39) to a pushing plate (28) which is fixed to an anchoring clamp (27) screwed at a distal end of the stem (26a).

15. The assembly according to claim 14, **characterized in that** an anti-rotation rod (30) is fixed to said pushing plate (28) and supported in cantilever in a direction parallel to the direction of the movement of said stem (26a), and said anti-rotation rod (30) is inserted in a sliding manner through a through hole (49) formed in said vertical wall (23a) of the angle bracket (23) and a corresponding through hole formed in the main support (1) to prevent the rotation of the push-

ing plate (28) around the axis of the stem (26a).

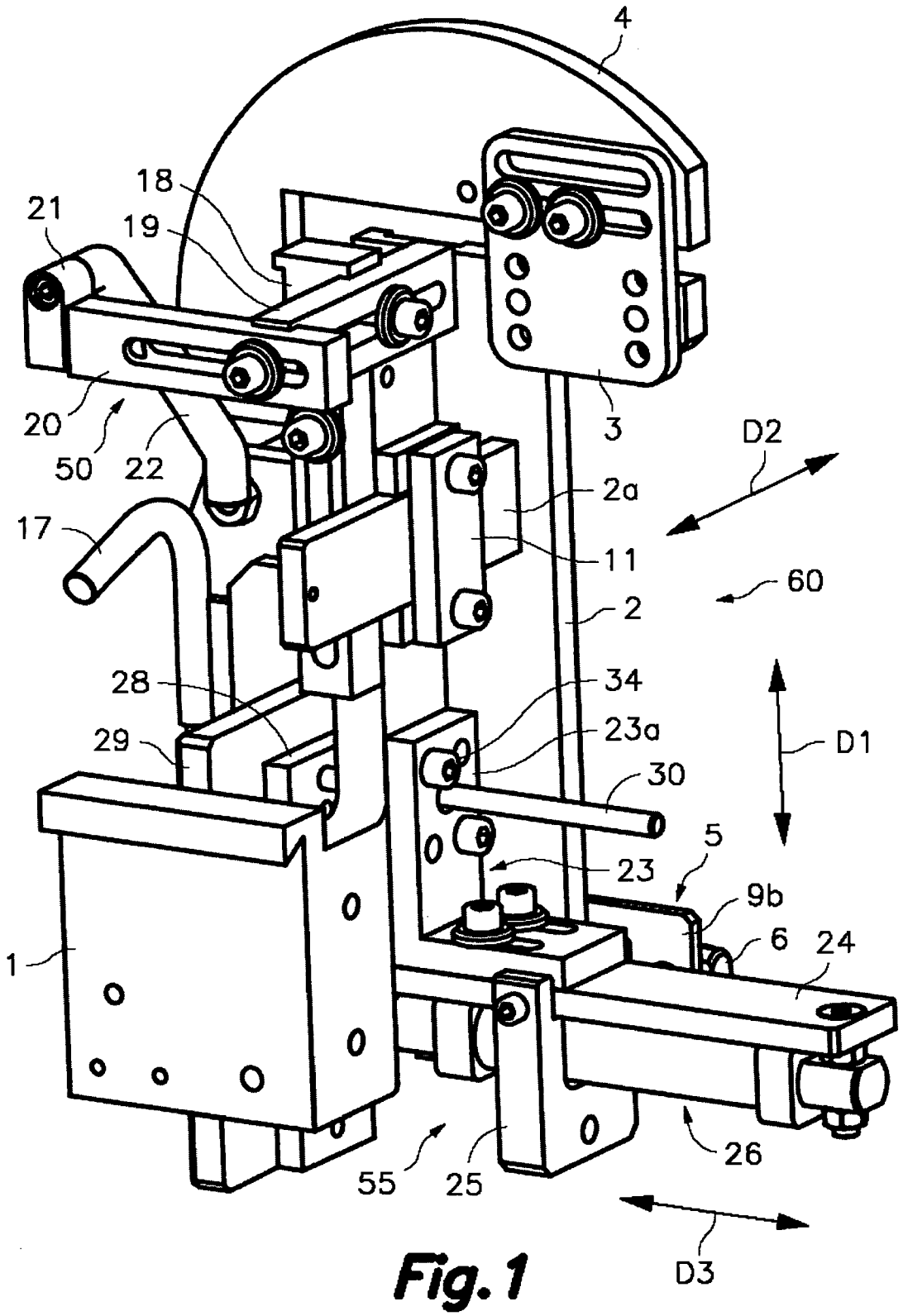
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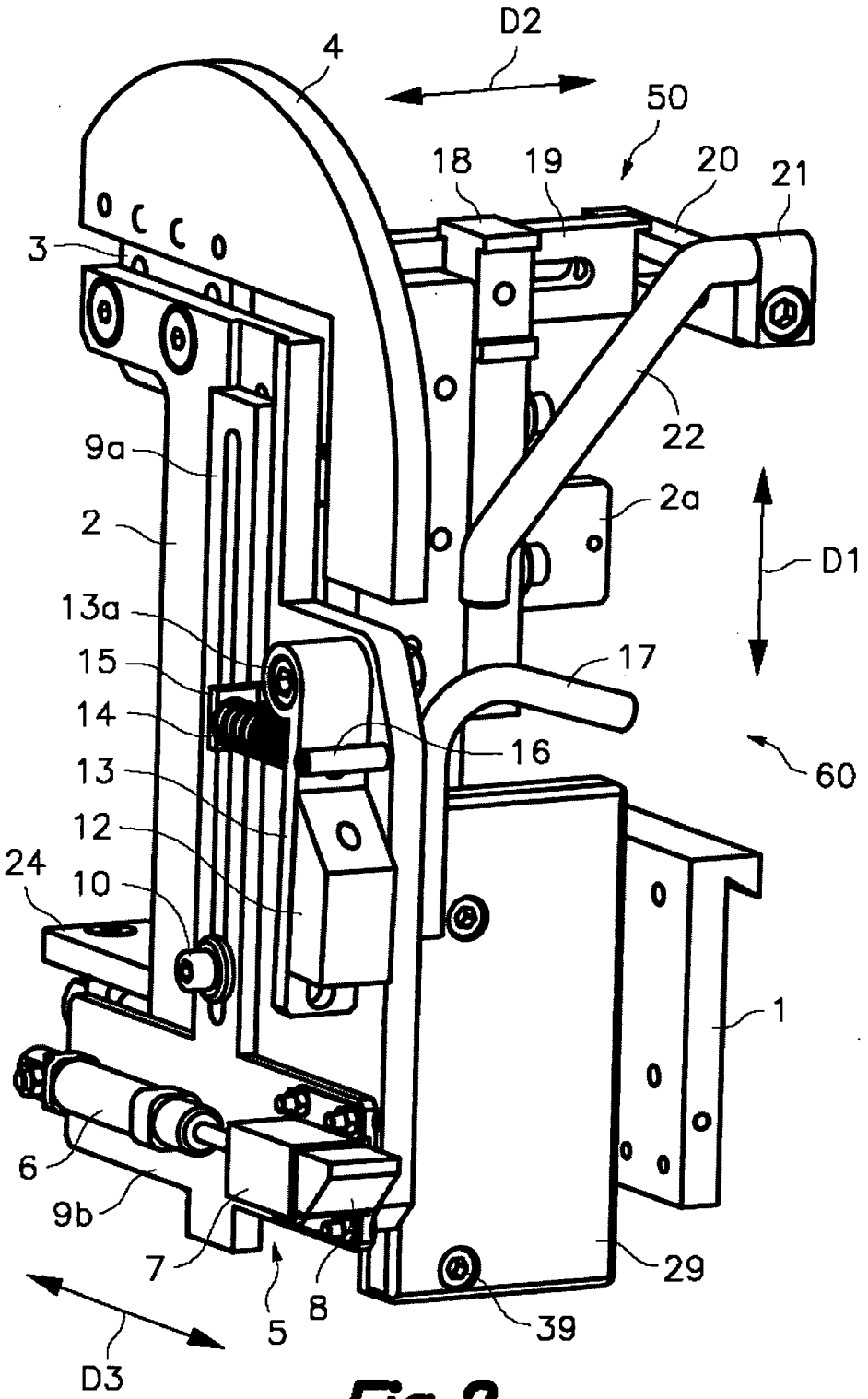
Fig. 1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24
10
1
6
9b
7
8
29
5
39
D3

Fig.2

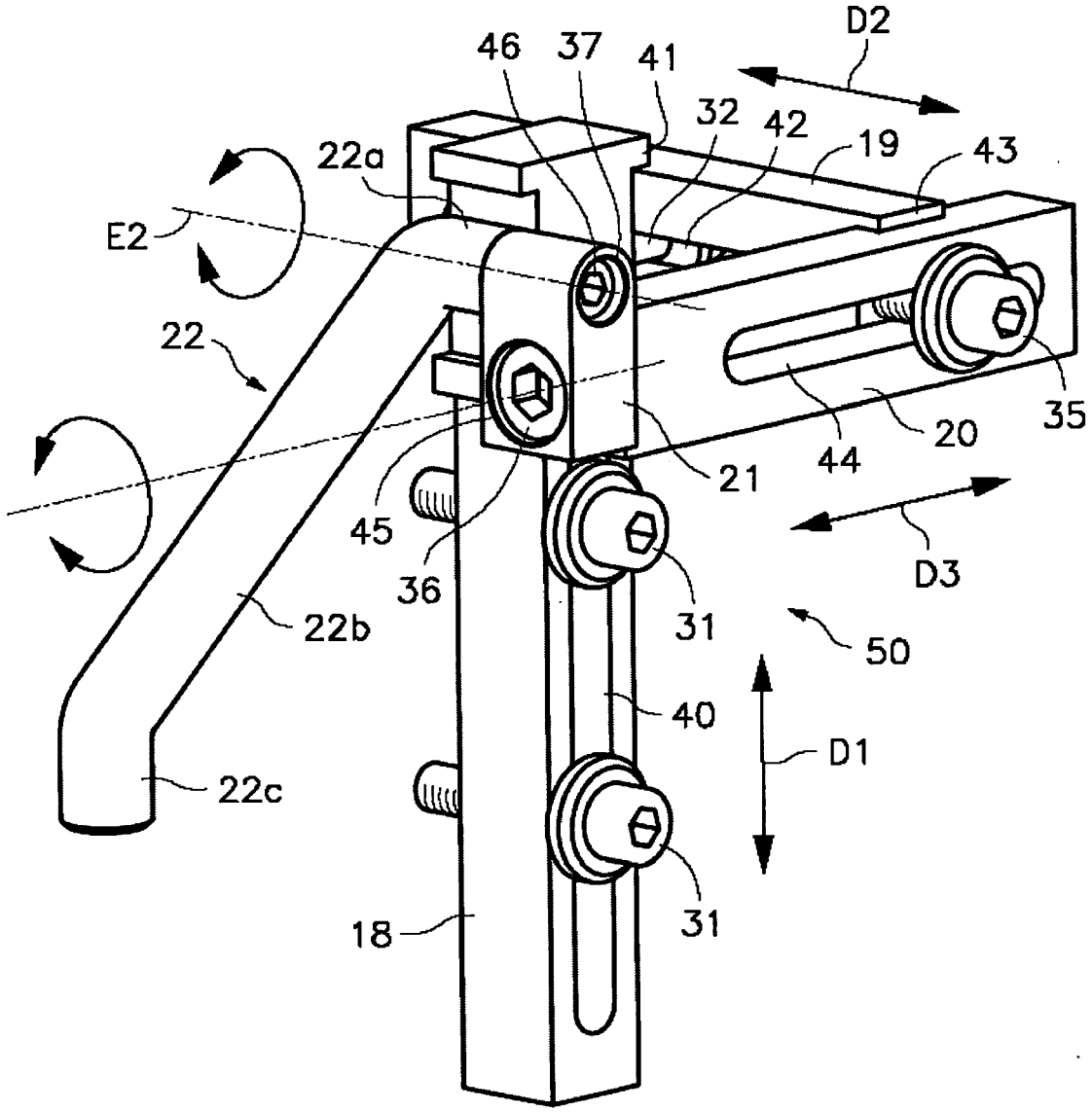
D2
46
37
41
32
42
19
43
22a
E2
22
35
20
44
21
45
36
D3
31
22b
50
40
D1
22c
31
18

Fig.3

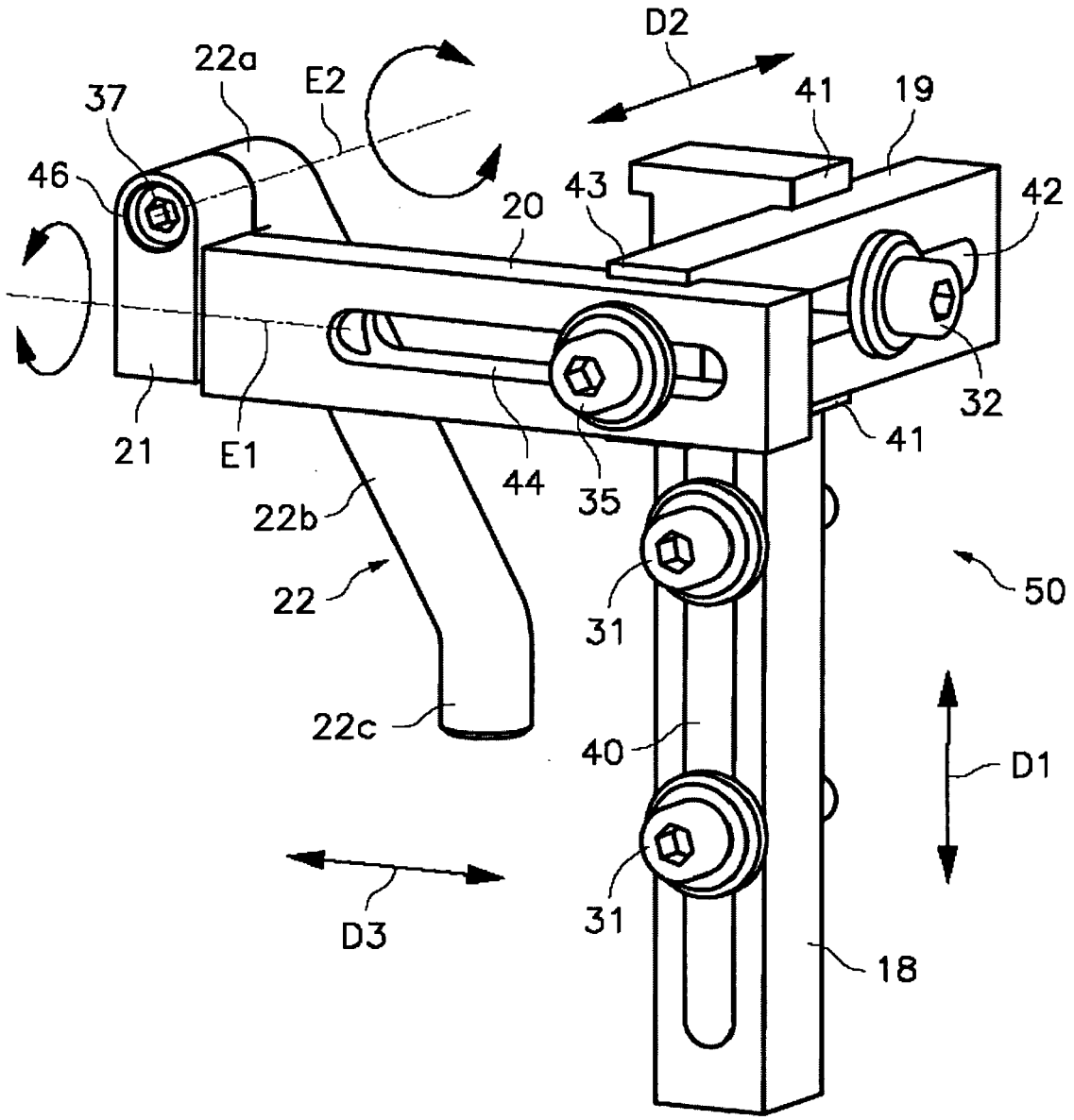
D2
22a
E2
37
41
19
46
43
42
20
32
41
21
E1
44
35
22b
22
50
31
22c
40
D1
31
D3
18

Fig.4

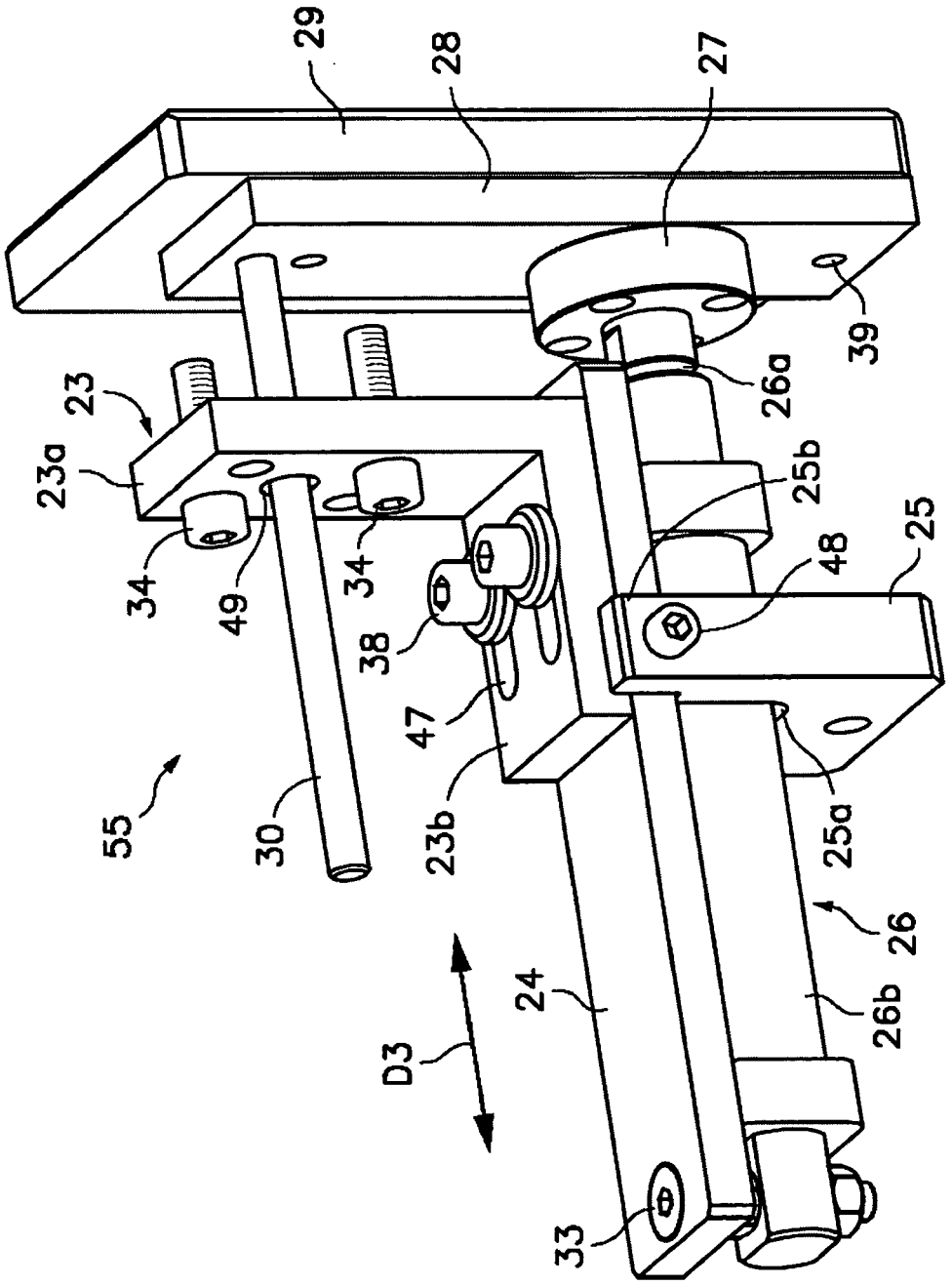
29
28
27
39
26a
23
23a
25b
25
48
34
49
34
38
47
55
30
23b
25a
26
24
26b
D3
33

Fig.5

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EUROPEAN SEARCH REPORT

Application Number
EP 10 38 0013

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	US 2006/100079 A1 (GRAHAM THOMAS D [US] ET AL) 11 May 2006 (2006-05-11) * paragraphs [0023], [0024]; figure 5 * -----	1-10	INV. B31B3/44 B31B1/48 B31B3/46
A	US 2003/119640 A1 (JAEN JOSE BOIX [ES]) 26 June 2003 (2003-06-26) * paragraph [0028]; figure 1 * -----	1	
A	US 3 626 819 A (HOYRUP SIGURD J) 14 December 1971 (1971-12-14) * column 4, line 11 - column 4, line 17; figure 5 * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

B31B

1 ~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	13 July 2010	Farizon, Pascal

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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Application Number
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-10

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 10 38 0013

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10

   Adjustment of angular position of inner flap guiding member around a second axis

   ---

2. claims: 11-15

   Pressing unit

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 38 0013

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-07-2010

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US 2003119640 A1	26-06-2003	CA 2413815 A1	05-06-2003
		ES 2189680 A1	01-07-2003
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82