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(54) Title: DOOR HINGE

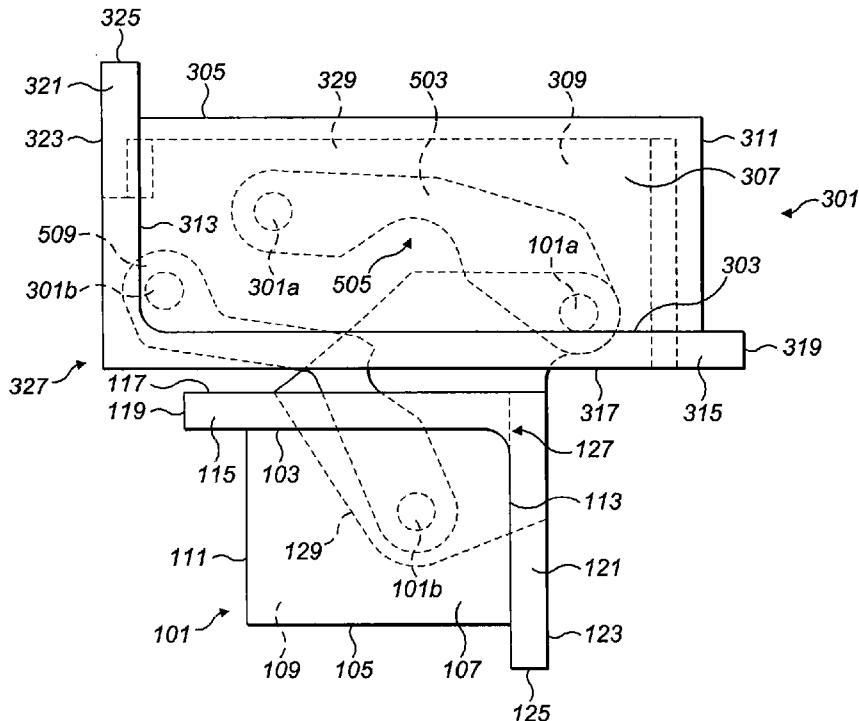


FIG. 2a

[Continued on next page]



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DOOR HINGE

The present invention relates to door hinges. The invention is particularly applicable to throw hinges for large or heavy doors.

A wide variety of throw hinges is available for doors fitted to cabinets, 5 cupboards, wardrobes, and the like. One commonly used type is the European hinge, or "cup hinge", which comprises two parts: a cup part, which is attached to the interior of the cabinet side wall; and a mounting plate, which includes a pivot arm connected to the cup part and is attached to the inside of the cabinet door.

10 When the door is closed, the cup part and the mounting plate are at right angles to each other, and the pivot arm is received in the cup part. In the closed configuration, the hinge is hidden from view, thereby enhancing the aesthetic appearance of the cabinet. As the door is opened, the pivot arm moves out from the cup part to throw the door outwardly away from the 15 cabinet. In the fully open configuration, the cup part and the mounting plate are inline with each other. That is, the opened door has been rotated outwardly through 90 degrees, thereby providing access to the inside of the cabinet.

However, the European hinge is not suitable for use with large or heavy 20 doors because the narrow section of the pivot arm is subjected to great stress under high vertical loads, leading to distortion of the hinge which causes misalignment of the door with the cabinet and difficulty in opening and closing the door. If the loads are high enough then structural failure of the hinge may occur.

25 It is an aim of the present invention to provide an improved hinge for supporting large or heavy doors.

According to a first aspect of the present invention there is provided a door hinge, comprising: a body part for attaching to a door jamb, the body part including a jamb face; a door part for attaching to a door, the door part 30 including a door face; and a pivot coupling which pivotally connects the door

part to the body part about a displaceable pivot axis, wherein the door face faces in a first direction towards the jamb face when the hinge is in a closed configuration and in a second direction when the hinge is in an open configuration.

- 5 An arrangement wherein the door face faces towards the jamb face when the hinge is in a closed configuration means that the body part of the hinge can be fitted to the front, rather than to the side, of the carcass of the cabinet (or cupboard, wardrobe, or the like). This is particularly advantageous because the hinge does not intrude into the interior space of
- 10 the cabinet, thereby providing improved storage capacity and access.

According to a second aspect of the present invention there is provided a door hinge, comprising: a body part for attaching to a door jamb, the body part including a jamb face; a door part for attaching to a door; and a pivot coupling which pivotally connects the door part to the body part about a displaceable pivot axis, wherein the displaceable pivot axis is displaced from a first location when the hinge is in a closed configuration to a second location along and away from the jamb face when the hinge is in an open configuration.

- 15

Movement of the displaceable pivot axis along and away from the jamb face advantageously enables a thick door, to which the hinge may be attached, to be thrown outwardly of a cabinet door jamb, from a closed position to an open position.

- 20

Embodiments of the present invention will now be described by way of example, with reference to the accompanying figures in which:

- 25 Figure 1a shows a perspective view of two door hinges according to the invention, wherein the hinges are installed in respective doors and door jambs of a cabinet.

Figure 1b shows a plan view of the installed hinges of Figure 1a, wherein the hinges are in a closed configuration.

Figure 1c shows a plan view of the installed hinges of Figure 1a, wherein the hinges are in a partly open configuration.

Figure 1d shows a plan view of the installed hinges of Figure 1a, wherein the hinges are in a fully open configuration.

5 Figure 2a shows a plan view of a hinge according to the invention, wherein the hinge is in a closed configuration.

Figure 2b shows a plan view of the hinge of Figure 2a, wherein the hinge is in a partly open configuration.

10 Figure 2c shows a plan view of the hinge of Figure 2a, wherein the hinge is in a fully open configuration.

Figure 3 shows an isometric view of the hinge of Figure 2a, wherein the hinge is in a fully open configuration.

Referring to Figures 1a to 1d, a pair of throw hinges are installed in a respective pair of door jambs 10a, 10b and doors 30a, 30b of a cabinet, and 15 are operable to move the doors from a closed position to an open position. In this embodiment, the hinges are mortised in the door jambs 10a, 10b and doors 30a, 30b.

Referring now to Figure 2a, a door hinge of the type shown in Figures 1a to 1d comprises a jamb body part 101 for attaching to a door jamb, a door 20 part 301 for attaching to a door, and a pivot coupling 501 which pivotally connects the door part 301 to the jamb body part 101.

The jamb body part 101 comprises a cuboid, or block-shaped, member comprising a front side 103, a rear side 105, a top 107, a bottom 109, a left end 111, and a right end 113. A first flange wall 115 extends from the front 25 side 103 to form a jamb front, or major, face 117 of the jamb body part 101. In this embodiment, the first flange wall 115 extends leftward beyond the left end 111 to form an extended left edge 119 of the jamb front face 117. Also in this embodiment, a second flange wall 121 extends from the right end 113 to form a jamb end face 123 of the jamb body part 101. In

this embodiment, the second flange wall 121 extends rearward beyond the rear side 105 to form an extended rear edge 125 of the jamb end face 123. The first and second flange walls 115, 121 intercept to form a jamb body part corner 127 between the jamb front face 117 and the jamb end face 123.

5

The cuboid shape of the jamb body part 101 is suitable to be mortised into a door jamb to provide a strong and robust anchor to the hinge. In this embodiment, the first and second flange walls 115, 121 include holes (not shown) for receiving screws or the like for attaching the jamb body part 101

10 to the door jamb.

In this embodiment, the jamb body part 101 further comprises a support member 129 which projects outwardly from the front side 103 and comprises upper and lower surfaces which are coplanar with the top and bottom sides 107, 109. Above and below the support member 129, a pair of

15 open slots 131 extend into the jamb body part 101 from the front side 103.

The door part 301 comprises a cuboid, or block-shaped, member comprising a front side 303, a rear side 305, a top 307, a bottom 309, a right end 311, and a left end 313. A first flange wall 315 extends from the front side 303 to form a door front, or major, face 317 of the door part 301. In this embodiment, the first flange wall 315 extends rightward beyond the right end 311 to form an extended right edge 319 of the door front face 317. Also in this embodiment, a second flange wall 321 extends from the left end 313 to form a door end face 323 of the door part 301. In this embodiment, the second flange wall 321 extends rearward beyond the rear side 305 to form

20 an extended rear edge 325 of the door end face 323. The first and second flange walls 315, 321 intercept to form a door part corner 327 between the door front face 317 and the door end face 323.

25 The cuboid shape of the door part 301 is suitable to be mortised into a door to provide a strong and robust support to the door. In this embodiment, the first and second flange walls 315, 321 include holes (not shown) for receiving screws or the like for attaching the door part 301 to the door.

The door part 301 is open at the front side 303 and left end 313 to define a channel 329 which extends rightward along the door part 301 to approximately 90 per cent of the way to the right end 311, and rearward across the door part 301 to approximately 75 per cent of the way to the 5 rear side 305. The channel 329 is configured to receive the pivot coupling 501 and the support member 129 when the hinge is in the closed position.

The pivot coupling 501 comprises a first arm 503 which, in this embodiment, includes a recess 505. Also in this embodiment, one end of the first arm 503 comprises a pair of lugs 507 which are disposed spaced 10 apart by the support member 129 in substantially parallel relationship and pivotally connected to a distal end of the support member 129 by a pin extending therethrough, thereby providing a first jamb body part fixed pivot axis 101a. That is, the pivotal connection between the first arm 503 and the support member 129 is fixed in space with respect to the jamb body part 15 101. In this embodiment, the pin is fixed with respect to the first arm 503 and is rotatable with respect to the support member 129.

The other end of the first arm 503 is pivotally connected between the top and bottom sides 307, 309 of the door part 301 by a pin extending therethrough, thereby providing a first door part displaceable pivot axis 20 301a. That is, the pivotal connection between the first arm 503 and the door part 301 is movable in space with respect to the jamb body part 101. Furthermore, the door part 301 is free to rotate about the first door part displaceable pivot axis 301a with respect to the first arm 503. In this embodiment, the pivotal connection is located at about 30 per cent of the 25 way from the left end 313 to the right end 311, and about 60 per cent of the way from the front side 303 to the rear side 305, of the door part 301. Also in this embodiment, the pin is fixed with respect to the first arm 503 and the door part 301.

In this embodiment, the pivot coupling further comprises a second arm 509 30 which comprises two substantially identical members, disposed spaced apart by the support member 129 in substantially parallel relationship. At

one end of the second arm 509, the elongate members extend into the slots 131 of the jamb body part 101 wherein they are pivotally connected to a proximate end of the support member 129 by a pin extending therethrough, thereby providing a second jamb body part fixed pivot axis 101b. That is, 5 the pivotal connection between the second arm 509 and the jamb body part 101 is fixed in space with respect to the jamb body part 101. In this embodiment, the pin also extends through the top and bottom sides 107, 109 of the jamb body part 101. In this embodiment, the pivotal connection is located at about 70 per cent of the way from the left end 111 to the right 10 end 113, and about 50 per cent of the way from the front side 103 to the rear side 105, of the jamb body part 101. Also in this embodiment, the pin is fixed with respect to the jamb part body 101 and the second arm 509.

The other end of the second arm 509 is pivotally connected between the top and bottom sides 307, 309 of the door part 301 by a pin extending 15 therethrough, thereby providing a second door part displaceable pivot axis 301b. That is, the pivotal connection between the second arm 509 and the door part 301 is movable in space with respect to the jamb body part 101. In this embodiment, the pivotal connection is located at about 5 per cent of the way from the left end 313 to the right end 311, and about 10 per cent 20 of the way from the front side 303 to the rear side 305, of the door part 301, that is, near the door part corner 327. Also in this embodiment, the pin is fixed with respect to the second arm 509 and the door part 301.

In this embodiment, the jamb body part 101, the door part 301, and the pivot coupling 501, are formed of stainless steel. Also in this embodiment, 25 the jamb body part 101 and the door part 301 are of unitary construction.

In the closed configuration shown in Figure 2a, the door front face 317 is opposed to and parallel with the jamb front face 117. The first door part displaceable pivot axis 301a is at a first location which, in this embodiment, is within the projected length of the jamb front face 117. The second door 30 part displaceable pivot axis 301b is at a first location which, in this embodiment, is beyond the projected length of the jamb front face 117. The

pivot coupling 501 and the projecting portion of the support member 129 are received in the channel 129.

Turning now to aspects related to the operation of the hinge, and referring to Figure 2b, a force F which is applied to open the door, for example by an operative pulling a door handle, is transmitted to the pivotal connection between the first arm 503 and the door part 301, thereby initiating rotation of the first arm 503 about the first jamb body part fixed pivot axis 101a. As the pulling force F continues to be applied, the first door part displaceable pivot axis 301a describes a path of travel along and away from the jamb front face 117, thereby throwing the door part 301 outwardly away from the jamb body part 101 into an open configuration.

At the same time, the applied pulling force F is also transmitted, in this embodiment, to the pivotal connection between the second arm 509 and the door part 301, thereby causing rotation of the second arm 509 about the second jamb body part fixed pivot axis 101b. As the pulling force F continues, the second door part displaceable pivot axis 301b describes a path of travel along and away from the jamb front face 117, thereby guiding the door part 301 toward a fully open configuration. The second arm 509 advantageously provides improved control of the path of the door part 301 by guiding the door part end face 323 into opposition with the jamb front face 117, thereby bringing the door front face 317 neatly inline with the jamb end face 123 in a fully open configuration.

Referring now to Figure 2c, when the hinge is in the fully open configuration, the first door part displaceable pivot axis 301a is at a second location which is along and away from the jamb front face 117. In this embodiment, the second location is within the projected length of the jamb front face 117. Furthermore, the second door part displaceable pivot axis 301b is at a second location which is along and away from the jamb front face 117. In this embodiment, the second location is within the projected length of the jamb front face 117. In this embodiment, the second door part

displaceable pivot axis 301b is moved further along the jamb front face 117 than is the first door part displaceable pivot axis 301a.

In the fully open configuration, the door front face 317 is orthogonal to the jamb front face 117. In this embodiment, the door front face 317 is also 5 inline with the jamb end face 123. Furthermore, the door part end face 323 is opposed to the jamb front face 117. Also, a portion of the second arm 509 is received by the recess 505 of the first arm 503.

In one embodiment, the hinge has the following approximate dimensions: h11 = 53mm, h12 = 33mm, l1 = 47mm, d1 = 35mm, t1 = 3mm, h21 = 10 53mm, h22 = 33mm, l2 = 80mm, d2 = 26mm, t2 = 3mm, as illustrated in Figure 3. By way of example, this embodiment would be suitable for supporting a door which is about 4m high and 54mm thick.

Thus, the hinge of the present invention provides a strong and robust support for large or heavy doors. Furthermore, unlike the prior art hinge 15 discussed above, the hinge advantageously does not intrude into the interior space of the cabinet because the jamb front face 117 and the door front face 317 are arranged in parallel, rather than orthogonal, relationship when the hinge is in a closed configuration.

In an embodiment of the invention, the second arm 509 is omitted.

20 In an embodiment of the invention, the pivot coupling 501 includes friction-reducing members, for example nylon bushes.

In an embodiment of the invention, any or all of the jamb body part 101, the door part 301, and the pivot coupling 501 are formed of stainless steel, aluminium, brass, or plastics.

25 It will be understood that the present invention has been described in relation to its preferred embodiments and may be modified in many different ways without departing from the scope of the invention as defined by the accompanying claims.

CLAIMS

1. A door hinge, comprising:
a body part for attaching to a door jamb, the body part including a jamb face;
5 a door part for attaching to a door, the door part including a door face; and
a pivot coupling which pivotally connects the door part to the body part about a displaceable pivot axis,
wherein the door face faces in a first direction towards the jamb face
10 when the hinge is in a closed configuration and in a second direction when the hinge is in an open configuration.
2. A door hinge according to claim 1, wherein the door face is generally parallel to the jamb face when the hinge is in the closed configuration.
15
3. A door hinge according to claim 1 or 2, wherein the door face is generally orthogonal to the jamb face when the hinge is in the open configuration.
20
4. A door hinge according to any of claims 1 to 3, wherein the door face is juxtaposed outwardly and laterally beyond an inner edge of the jamb face.
25
5. A door hinge according to any of claims 1 to 4, wherein the body part includes a further jamb face which is generally orthogonal to the first jamb face.
6. A door hinge according to any of claims 1 to 5, wherein the displaceable pivot axis is displaced from a first location when the hinge is in the closed configuration to a second location along and away from the jamb face when the hinge is in the open configuration.
30

7. A door hinge according to claim 6, wherein the displaceable pivot axis is displaced within the projected length of the jamb face.
8. A door hinge according to any of claims 1 to 7, wherein the pivot coupling comprises:
5 a first arm which is coupled to the body part about a first fixed pivot axis and to the door part about the displaceable pivot axis.
9. A door hinge according to claim 8, wherein the first fixed pivot axis is
10 located outwardly of the jamb face.
10. A door hinge according to any of claims 1 to 9, wherein the door part is further pivotally connected to the body part about a second displaceable pivot axis.
15
11. A door hinge according to claim 10, wherein the second displaceable pivot axis is displaced from a first location when the hinge is in the closed configuration to a second location along and away from the jamb face when the hinge is in the open configuration.
20
12. A door hinge according to claim 10 or 11, wherein the second displaceable pivot axis is located beyond the lateral extent of the jamb face when the hinge is in the closed configuration.
- 25 13. A door hinge according to any of claims 10 to 12, wherein the second displaceable pivot axis is displaced within the projected length of the jamb face.
14. A door hinge according to any of claims 11 to 13, wherein the second displaceable pivot axis is displaced further along the jamb face than
30 is the first displaceable pivot axis.

15. A door hinge according to any of claims 10 to 14, wherein the second displaceable pivot axis is located outwardly of the first displaceable pivot axis when in the open and closed configurations.
- 5 16. A door hinge according to any of claims 10 to 15 when dependent on claim 8, wherein the pivot coupling further comprises: a second arm which is coupled to the body part about a second fixed pivot axis and to the door part about the second displaceable pivot axis.
- 10 17. A door hinge according to claim 16, wherein the second fixed pivot axis of the second arm is located inside the body part.
- 15 18. A door hinge according to claim 16 or 17, wherein the first arm includes a recess for partially receiving the second arm when the hinge is in the open configuration.
- 20 19. A door hinge according to any of claims 1 to 18, wherein the door part includes a channel for receiving the pivot coupling when the hinge is in the closed configuration.
- 25 20. A door hinge according to any of claims 1 to 19, formed of metal or plastics.
21. A door hinge according to any of claims 1 to 20, wherein the hinge is configured to be mortised or concealed in a door/door jamb.
22. A door, comprising:
a door hinge according to any of claims 1 to 21.
- 30 23. A door hinge, comprising:
a body part for attaching to a door jamb, the body part including a jamb face;

a door part for attaching to a door; and
a pivot coupling which pivotally connects the door part to the body part about a displaceable pivot axis,
wherein the displaceable pivot axis is displaced from a first location
5 when the hinge is in a closed configuration to a second location along and away from the jamb face when the hinge is in an open configuration.

24. A door hinge according to claim 23, wherein the displaceable pivot axis is displaced within the projected length of the jamb face.
10

25. A door hinge according to claims 23 or 24, wherein the door part includes a door face which faces in a first direction towards the jamb face when the hinge is in the closed configuration and in a second direction when the hinge is in the open configuration.
15

26. A door hinge according to claim 25, wherein the door face is generally parallel to the jamb face when the hinge is in the closed configuration.
20

27. A door hinge according to claim 25 or 26, wherein the door face is generally orthogonal to the jamb face when the hinge is in the open configuration.

25 28. A door hinge according to any of claims 25 to 27, wherein the door face is juxtaposed outwardly and laterally beyond an inner edge of the jamb face.
30

29. A door hinge according to any of claims 23 to 28, wherein the body part includes a further jamb face which is generally orthogonal to the first jamb face.

30. A door hinge according to any of claims 23 to 29, wherein the pivot coupling comprises:

a first arm which is coupled to the body part about a first fixed pivot axis and to the door part about the displaceable pivot axis.

5

31. A door hinge according to claim 30, wherein the first fixed pivot axis is located outwardly of the jamb face.

32. A door hinge according to any of claims 23 to 31, wherein the door

10 part is further pivotally connected to the body part about a second displaceable pivot axis.

15 33. A door hinge according to claim 32, wherein the second displaceable pivot axis is displaced from a first location when the hinge is in the closed configuration to a second location along and away from the jamb face when the hinge is in the open configuration.

20 34. A door hinge according to claim 32 or 33, wherein the second displaceable pivot axis is located beyond the lateral extent of the jamb face when the hinge is in the closed configuration.

35. A door hinge according to any of claims 32 to 34, wherein the second displaceable pivot axis is displaced within the projected length of the jamb face.

25

36. A door hinge according to any of claims 33 to 35, wherein the second displaceable pivot axis is displaced further along the jamb face than is the first displaceable pivot axis.

30 37. A door hinge according to any of claims 32 to 36, wherein the second displaceable pivot axis is located outwardly of the first displaceable pivot axis when in the open and closed configurations.

38. A door hinge according to any of claims 30 to 37 when dependent on claim 30, wherein the pivot coupling further comprises:
 - 5 a second arm which is coupled to the body part about a second fixed pivot axis and to the door part about the second displaceable pivot axis.
39. A door hinge according to claim 38, wherein the second fixed pivot axis of the second arm is located within the body part.
- 10 40. A door hinge according to claim 38 or 39, wherein the first arm includes a recess for partially receiving the second arm when the hinge is in the open configuration.
- 15 41. A door hinge according to any of claims 23 to 40, wherein the door part includes a channel for receiving the pivot coupling when the hinge is in the closed configuration.
- 20 42. A door hinge according to any of claims 23 to 41, formed of metal or plastics.
43. A door hinge according to any of claims 23 to 42, wherein the hinge is configured to be mortised or concealed in a door/door jamb.
- 25 44. A door, comprising:
 - a door hinge according to any of claims 23 to 43.
45. A door hinge, constructed and arranged substantially as herein described with reference to the accompanying drawings.

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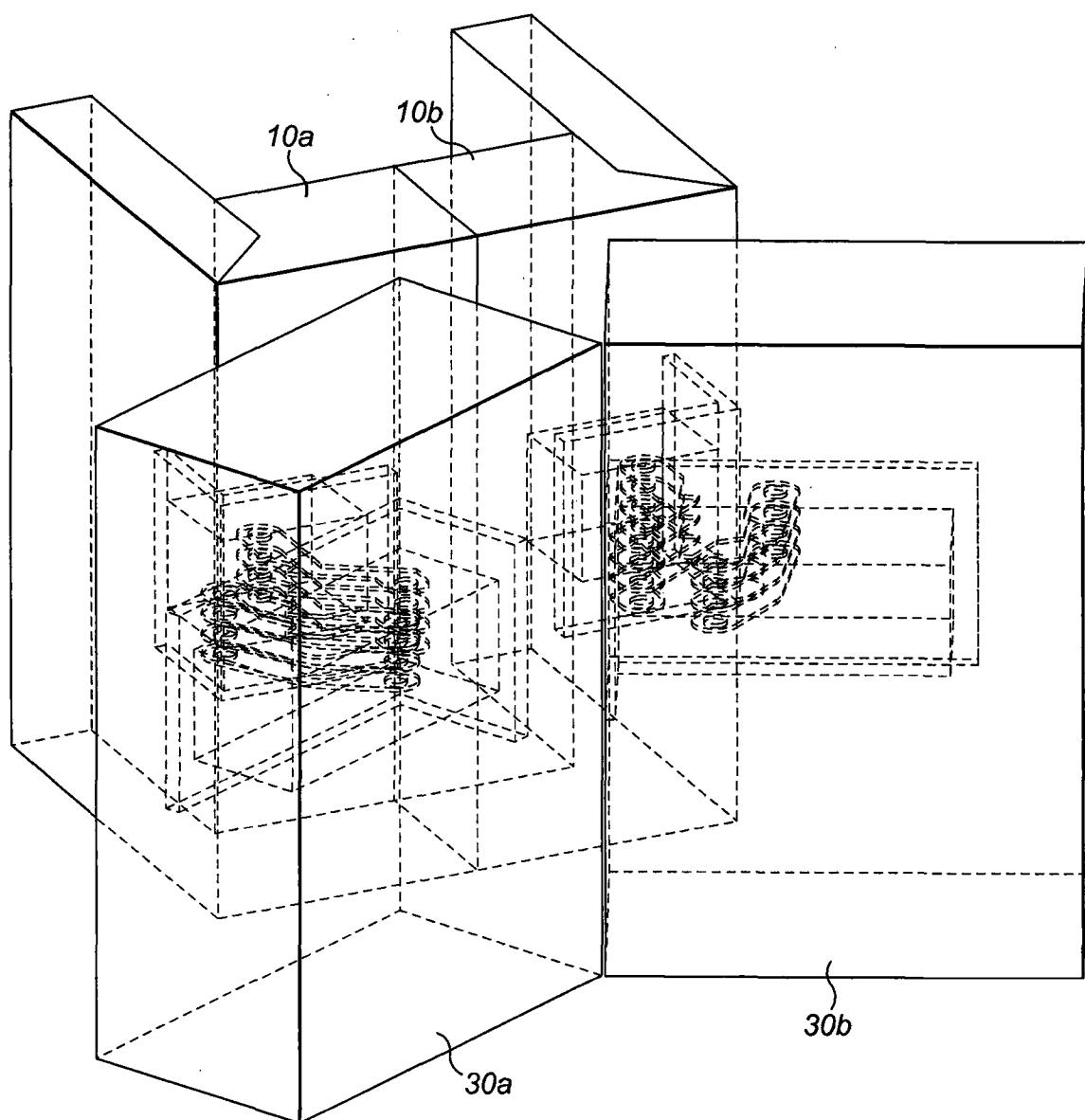


FIG. 1a

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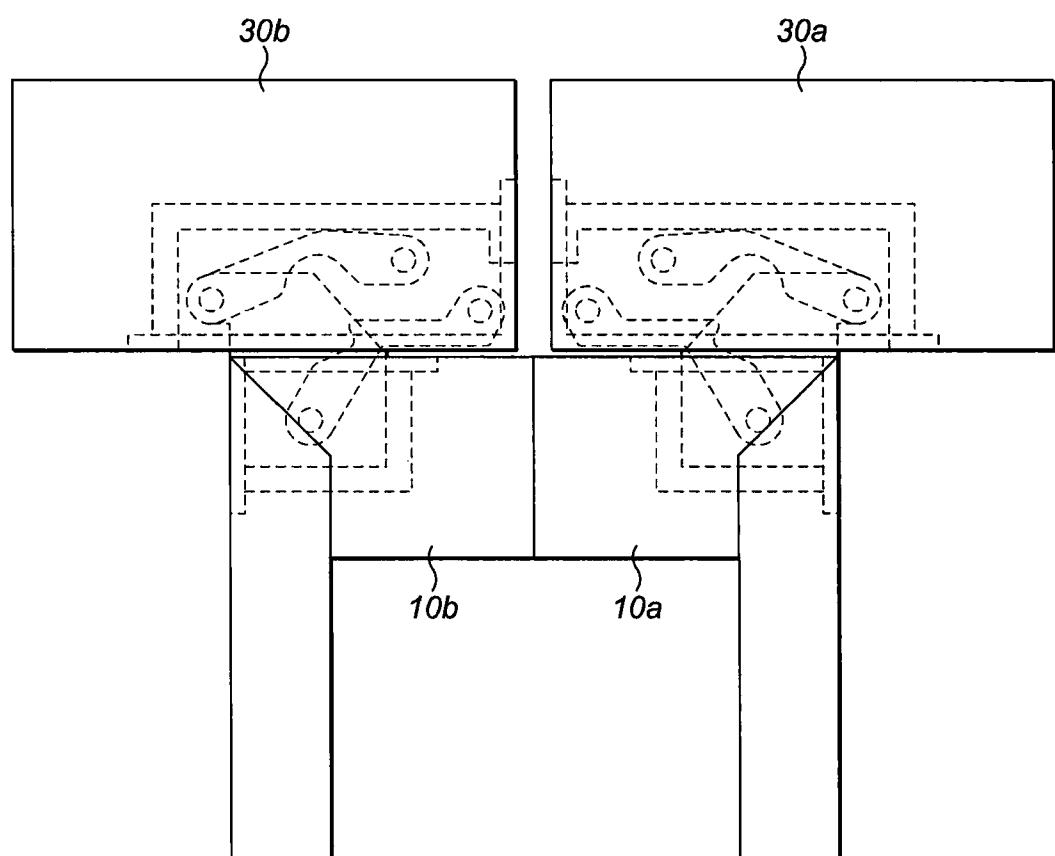


FIG. 1b

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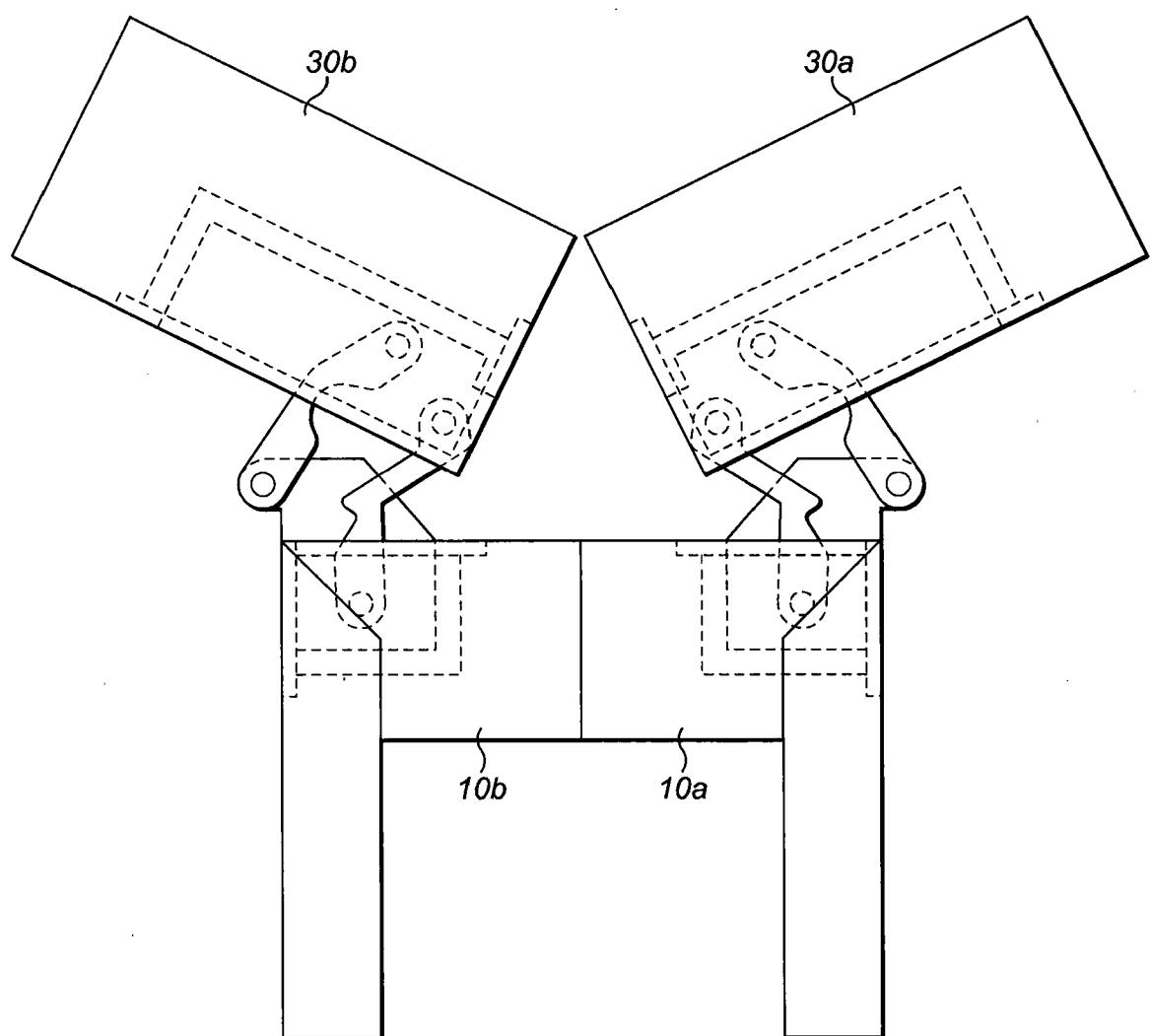


FIG. 1c

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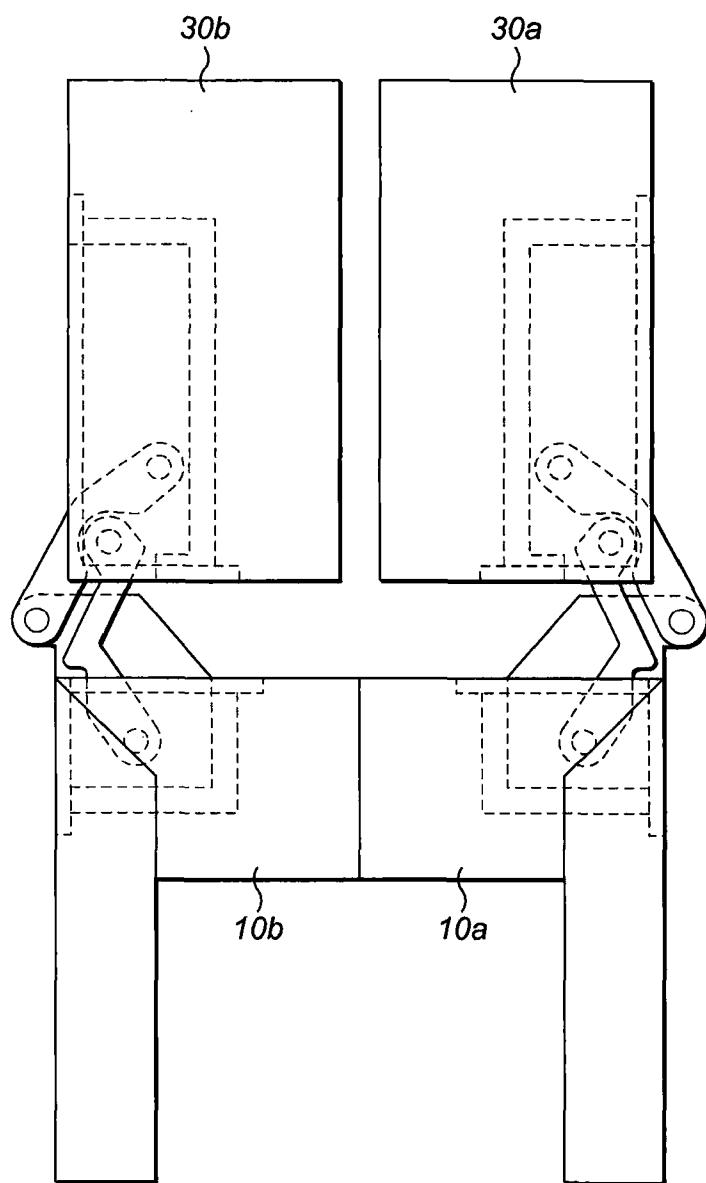


FIG. 1d

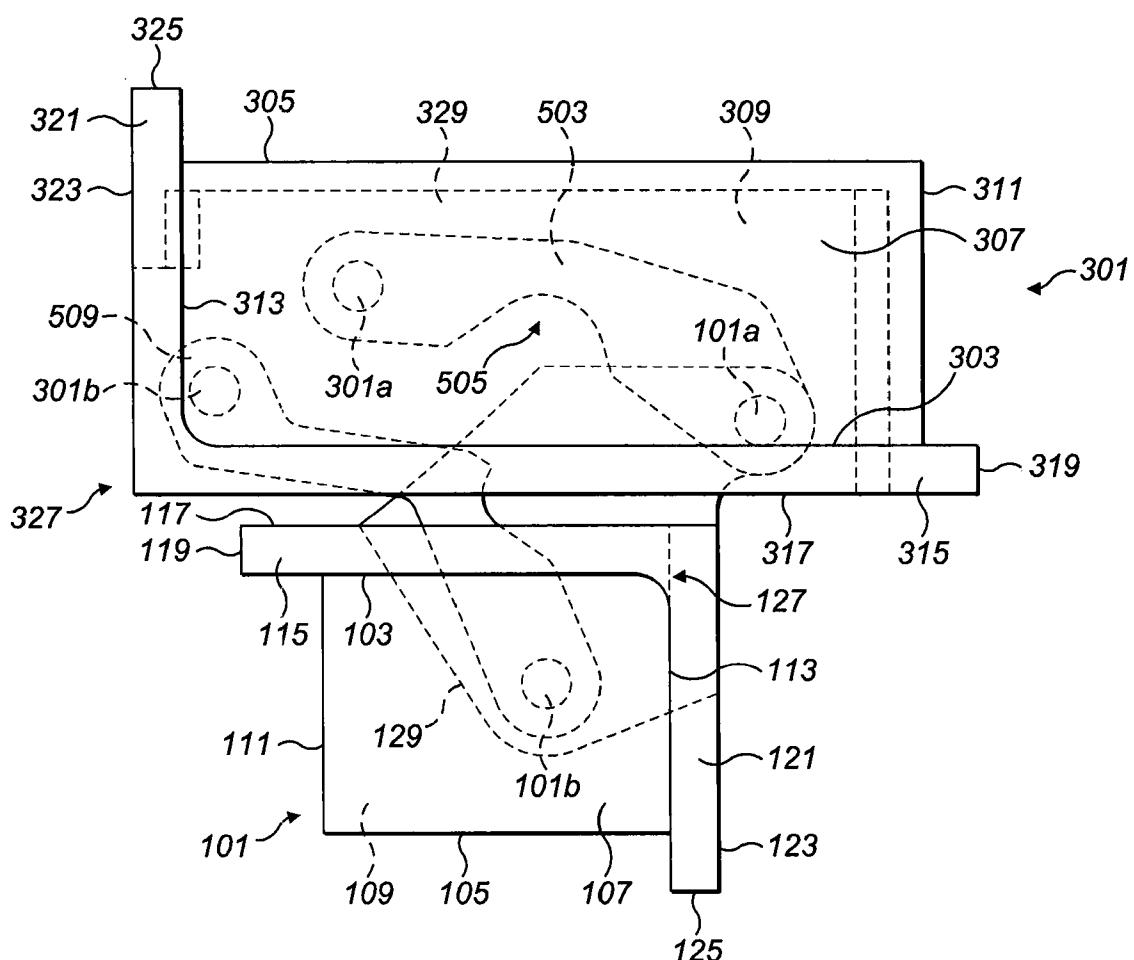


FIG. 2a

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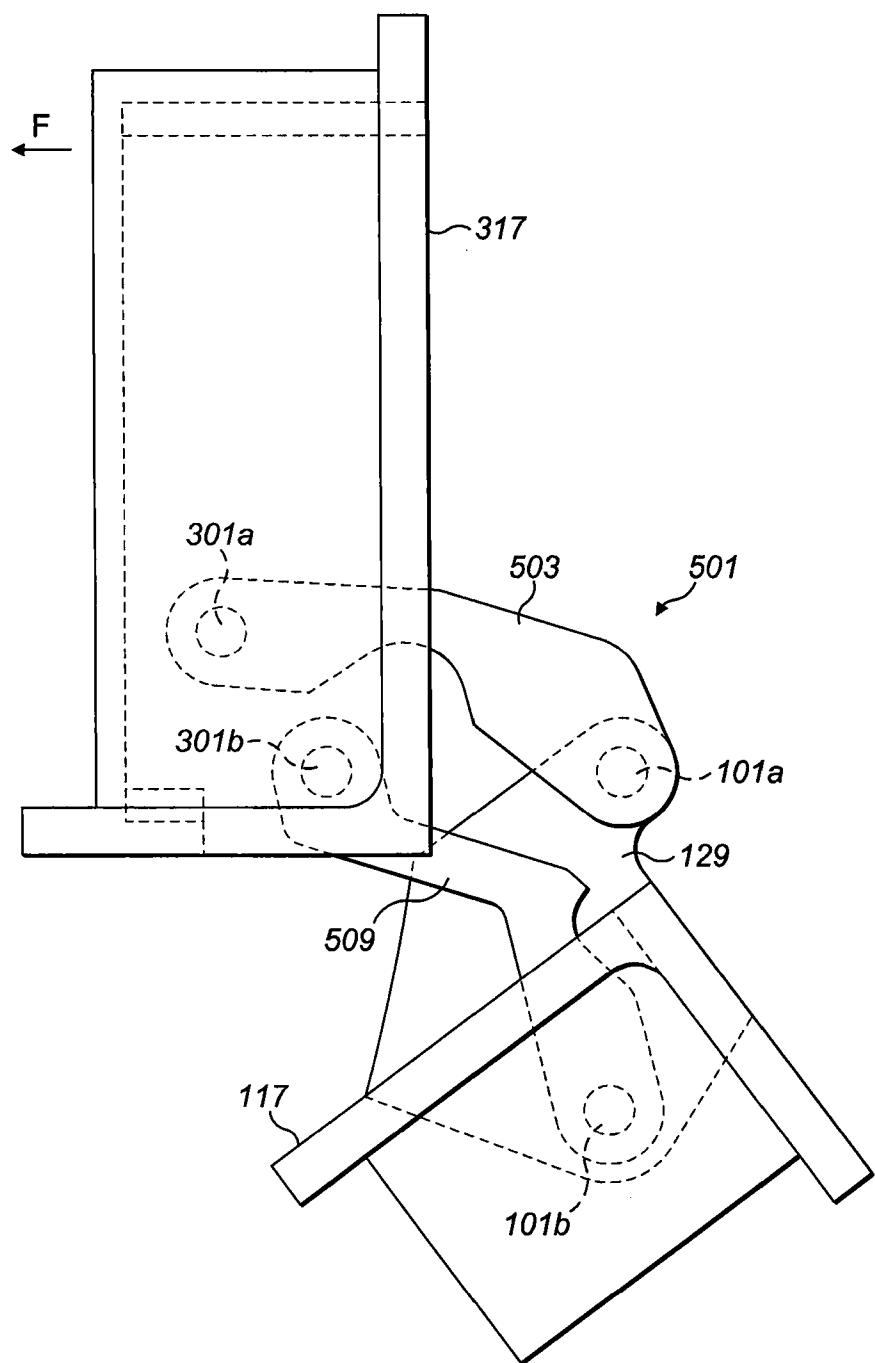


FIG. 2b

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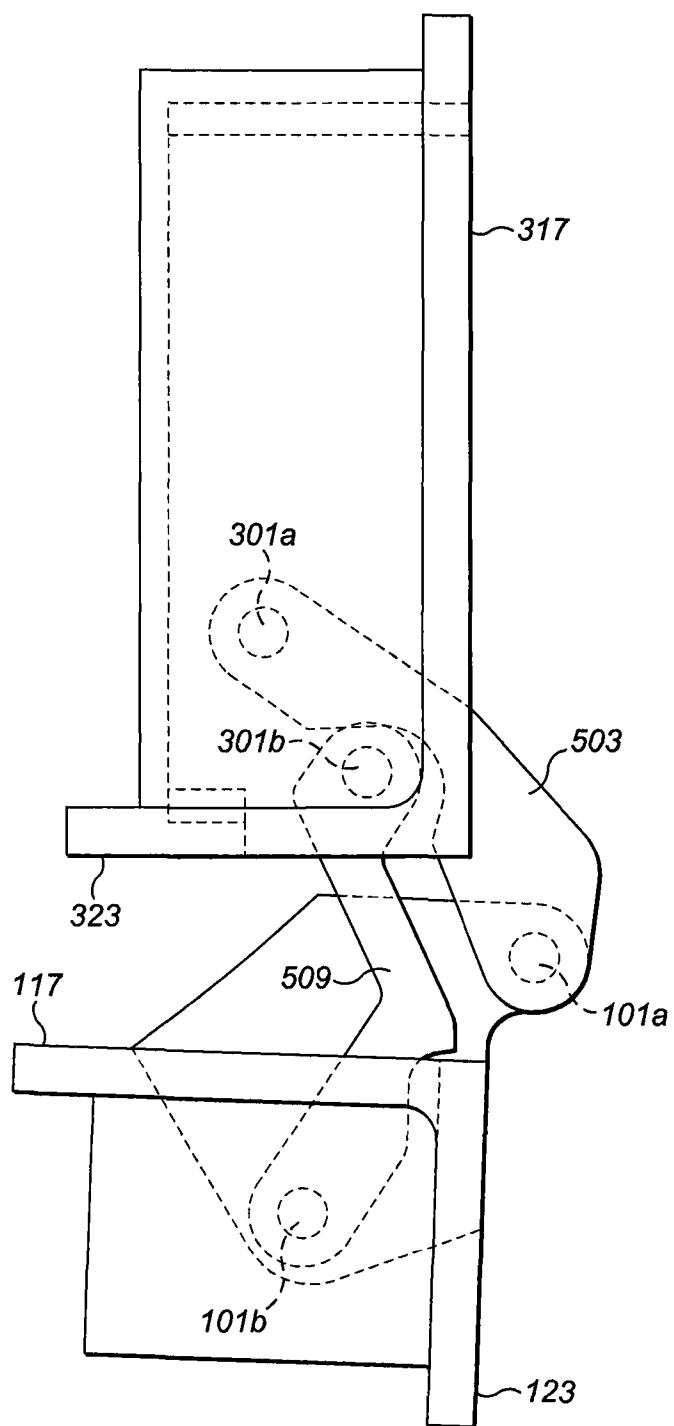


FIG. 2c

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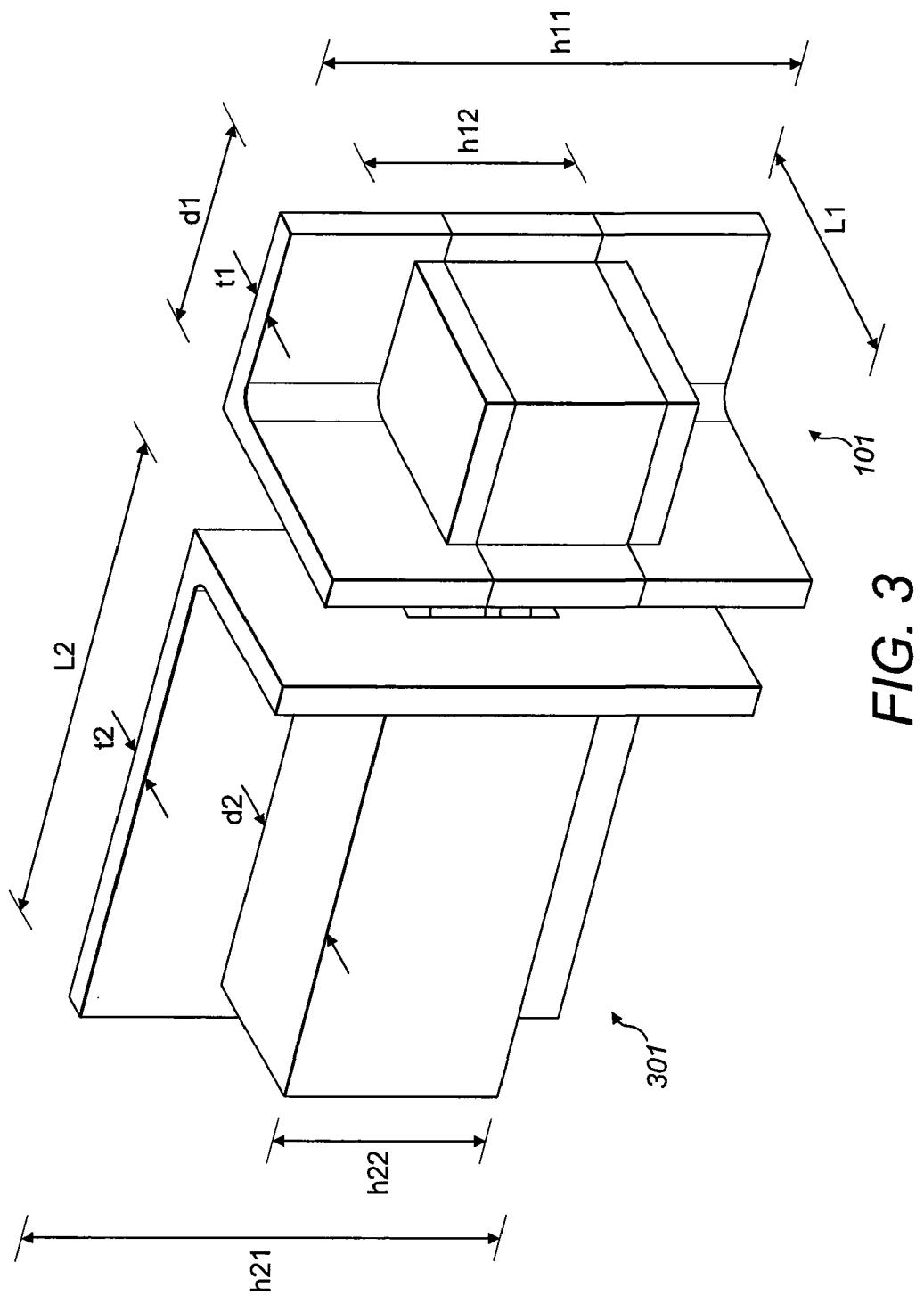


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2013/000323

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05D3/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 205 089 A5 (DRIEU RENE [FR]) 24 May 1974 (1974-05-24) page 2, line 38 - page 4, line 21; figures 3-10 ----- X DE 31 08 224 A1 (LAUTENSCHLAEGER KG KARL [DE]) 16 September 1982 (1982-09-16) abstract; figures 1,2,4 ----- X DE 23 53 043 A1 (BLUM GMBH JULIUS) 20 June 1974 (1974-06-20) figures 1-4 ----- X DE 21 55 950 A1 (HEINZE FA R) 23 August 1973 (1973-08-23) the whole document -----	1-45 1-45 1-45 1-45



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

Date of mailing of the international search report

7 October 2013

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Fax: (+31-70) 340-3016

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Berote, Marc

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2013/000323

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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