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(54) MUSEUM SHOWCASE WITH QUADRILATERAL HINGE HAVING A HOOK FOR HOLDING THE DOOR IN A CLOSED POSITION

(57) The showcase (1) has a hinge (10) comprising a fixed element (20), associated with the container body (2), a mobile element (30), intended to be associated with the door (3), and a first connecting rod (40) and a second connecting rod (50) hinged between the fixed element (20) and the mobile element (30), so as to obtain an articulated quadrilateral adapted for causing a roto-translation of the fixed element (20) with respect to the mobile element (30) between an open position and a closed position of the hinge (10). The hinge (10) also comprises a hook (36), associated with one from the fixed element (20) and the mobile element (30) and adapted for cooperating in a releasable manner with engagement means (26) associated with the other from the fixed element (20) and the mobile element (30), so as to counteract the movement of the mobile element (30) away from the fixed element (20) when the hinge (10) is in closed position.

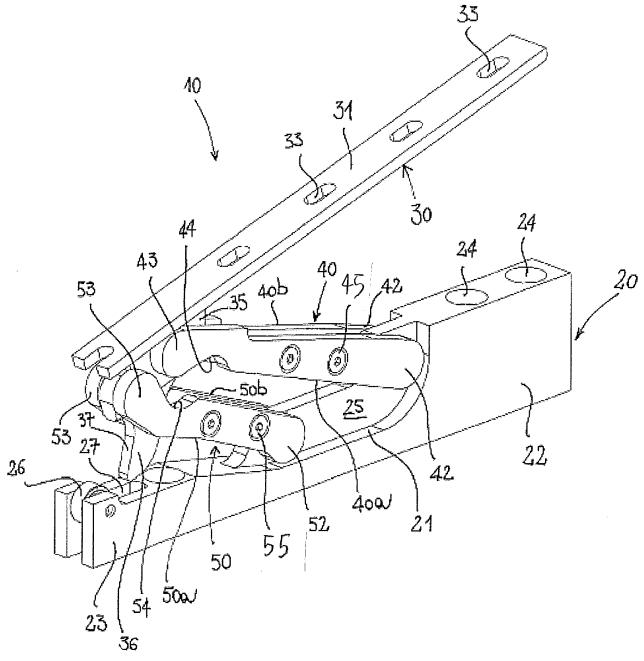


Fig. 3

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Description

[0001] The present invention concerns, in general, a museum showcase having an articulated quadrilateral hinge, in particular for a large sized door. More specifically, the object of the invention is a museum showcase with an articulated quadrilateral hinge having a hook for holding the door in closed position.

[0002] The term "museum showcase" is meant to indicate a showcase intended to be arranged in a display room such as a museum, an exhibition or similar and intended for conserving and displaying items of cultural heritage, such as works of art, historical artefacts and similar, in a protected environment. Hereinafter, sometimes for the sake of brevity just the term showcase will be used, by this in any case still meaning a museum showcase.

[0003] Here and hereinafter the term "protected environment" is meant to indicate an environment in which the atmosphere is controlled, by monitoring one or more parameters including temperature, humidity, dust content, pollutant content, in order to maintain the foreseen conservation conditions of the displayed objects, and wherein the possibility of access for unauthorised people is prevented to avoid thefts and damage to the displayed objects.

[0004] Here and hereinafter the term "door" is meant to indicate both an openable wall of a museum showcase, and a more complex openable structure, for example a case, formed from walls fixedly connected to one another so as to form a single piece.

[0005] Museum showcases with doors supported by articulated quadrilateral hinges are known and widely used in the market, said hinges comprising a fixed element anchored to a container body of the showcase, a mobile element anchored to the door and a pair of connecting rods hinged, respectively, to the fixed element and to the mobile element.

[0006] In this way, the door is articulated to the container body and moveable with respect to it, according to a roto-translation movement, between a closed position, in which it abuts on the container body, and an open position, in which it is angled with respect to the container body so as to allow access to the inside of the container body.

[0007] A drawback of known articulated quadrilateral hinges is linked to the problems encountered when it is wished to move a particularly large and heavy door (for example having width and height dimensions of a few metres).

[0008] Indeed, it has been observed that, with this type of hinge, large sized doors, when they are in closed position, due to the geometry of the quadrilateral linkage, can tend to move away from the container body under the effect of their own weight or in the presence of pushes from somebody.

[0009] This movement of the door away from the container body in closed position has been observed particularly in doors of showcases for displaying and/or conserving valuable objects, such as works of art, scientific artefacts, objects of cultural heritage and the like. Indeed, in order to protect the work from attempted theft or damage, the aforementioned showcases are normally made of shatterproof and/or bulletproof glass, which further increases the weight thereof.

[0010] The problem outlined above relative to known articulated quadrilateral hinges is particularly serious in the case of the aforementioned showcases, in which, in order to preserve the work of art, it is important to completely insulate the interior from the exterior, whereas the movement apart of the door and the container body can be such as to create an opening through which contaminating agents, for example dust, humidity and the like, can enter into the container body. Indeed, the away movement of the door can even provide a grip for possible those with malicious intent who wish to force open the showcase.

[0011] Moreover, in extreme conditions, the movement of the door away from the container body could generate undesired stresses on the components of the hinge, possibly compromising the structural and functional characteristics thereof. In this case, the hinge must be replaced.

[0012] The problem at the basis of the present invention is, therefore, to provide a museum showcase with an articulated quadrilateral hinge capable of overcoming the aforementioned drawbacks with reference to the prior art, i.e. configured so as to counteract the movement of the door away from the container body in closed position, thus ensuring perfect closure of the showcase.

[0013] Consequently, the invention concerns a museum showcase according to claim 1. Preferred characteristics are then given in the dependent claims.

[0014] In particular, a museum showcase according to the invention includes a container body, an openable door that closes the container body and at least one hinge, which hinge comprises a fixed element, associated with the container body, a mobile element, associated with the door, a first connecting rod and a second connecting rod hinged between the fixed element and the mobile element, so as to obtain an articulated quadrilateral adapted for causing a roto-translation of the mobile element with respect to the fixed element between an open position and a closed position. The showcase is characterised in that the hinge comprises a hook, associated with one from the fixed element and the mobile element and adapted for releasably cooperating with engagement means associated with the other from the fixed element and the mobile element, so as to counteract the movement of the mobile element away from the fixed element when the hinge is in closed position.

[0015] In this showcase, the problem outlined above is solved by the hook, which, by cooperating with the engagement means, keeps the hinge, and therefore the door on which the hinge is mounted, in closed position, advantageously preventing the door from moving away from the container body.

[0016] In a preferred embodiment, the hook extends from the mobile element and the releasable engagement means comprise a roller fixed to the fixed element. This advantageously facilitates the coupling between the hook and the roller.

[0017] Preferably, the roller is housed in a longitudinal cavity formed in an end portion of the fixed element; the hook, in closed position of the hinge, is housed in such a longitudinal cavity. As a result, advantageously, there is greater stability of coupling between roller and hook.

[0018] Preferably, the hook is formed in a single body with the mobile element.

[0019] Preferably, the first connecting rod and the second connecting rod have a rounded head by which they are hinged to the mobile element and a substantially semi-circular seat close to the rounded head.

[0020] Preferably, the seat of the first connecting rod faces towards the second connecting rod and is adapted for housing the head of the second connecting rod, in completely open position of the hinge. This advantageously makes it possible to maximise the opening angle of the door.

[0021] Preferably, the seat of the second connecting rod faces towards the first connecting rod and is adapted for housing the head of the first connecting rod, in closed position of the hinge. This advantageously reduces the packing hinge size in closed position.

[0022] In a preferred embodiment of the invention, the fixed element has a cavity, from which a wall projects upwards, hinged to the first connecting rod and to the second connecting rod.

[0023] Preferably, the mobile element comprises a plate, from which a wall extends, hinged to the first connecting rod and to the second connecting rod, the hook extending from such a wall, preferably in a single body with it.

[0024] Preferably, the first connecting rod and the second connecting rod each comprise a pair of rods, whose feet are hinged to the wall of the fixed element, on the opposite side with respect to it, and the heads of which are hinged to the wall of the mobile element, on the opposite side with respect to it. Such a configuration of the connecting rods advantageously gives greater stability and compactness to the hinge during the roto-translation movement.

[0025] In an alternative embodiment of the invention, the fixed element has a cavity, from which two parallel and spaced walls for hinging the first connecting rod and the second connecting rod rise up.

[0026] Preferably, the mobile element comprises a plate, from which two parallel and spaced walls projects upwards, hinged to the first connecting rod and to the second connecting rod, the hook extending from such walls.

[0027] Preferably, the first connecting rod and the second connecting rod each comprise a rod, whose feet are hinged to the walls of the fixed element, between them, and the heads of which are hinged to the walls of the mobile element, between them. This configuration of the connecting rods also advantageously gives excellent stability and compactness to the hinge during the roto-translation movement.

[0028] Further characteristics and advantages of a hinge according to the invention will become clearer from the following description of preferred embodiments thereof, made with reference to the attached drawings. In such drawings:

- figure 1 is a schematic plan view from above of a showcase according to the invention;
- figure 2 is a perspective view of the hinge of the showcase of fig. 1, according to a first embodiment of the invention, shown in completely open position;
- figure 3 is a perspective view of the hinge of figure 2, shown in partially open position; and
- figure 4 is a perspective view of the hinge of figure 2, shown in closed position;
- figure 5 is a plan view of the hinge of the showcase of fig. 1, according to a second embodiment of the invention, shown in completely open position;
- figure 6 is a plan view of the hinge of figure 5, shown in partially open position; and
- figure 7 is a perspective view of the hinge of figure 5, shown in closed position.

[0029] With particular reference to figure 1, a showcase according to the invention is wholly indicated with reference numeral 1. The showcase 1 comprises a container body 2 and an openable door 3, mounted on the container body 2 by means of at least one hinge 10; normally, two or more hinges 10 will be provided, even if in the figures only one is visible.

[0030] According to a first embodiment of the invention, illustrated in detail in figs. 2-4, the hinge 10 comprises a fixed element 20, a mobile element 30 and a first connecting rod and a second connecting rod, 40 and 50 respectively, hinged between the fixed element 20 and the mobile element 30, so as to obtain an articulated quadrilateral.

[0031] In the illustrated embodiment, the first connecting rod 40 and the second connecting rod 50 each consist of a pair of identical rods, 40a, 40b and 50a, 50b respectively, which, in use, are parallel and spaced apart. Preferably, between the rods 40a, 40b and 50a, 50b a spacer plate 41, 51 is arranged, screwed to them with screws 45, 55, or welded. The double rod configuration of the connecting rods 40, 50 of the articulated quadrilateral gives the hinge 10 good stability during the roto-translation movement of the mobile element 30 with respect to the fixed element 20.

[0032] The connecting rods 40, 50, specifically the respective rods 40a, 40b and 50a, 50b, have a foot 42, 52 for hinging to the fixed element 20 and a head 43, 53 for hinging to the mobile element 30.

[0033] Preferably, the feet 42, 52 and the heads 43, 53 have a rounded shape. Moreover, in each connecting

rod 40, 50, close to the head 43, 53, a substantially semicircular seat 44, 54 is formed. In particular, the seat 44 of the first connecting rod 40 faces towards the second connecting rod 50, and vice-versa.

[0034] In completely open position of the hinge 10, shown in figure 2, the head of the second connecting rod 50 is housed in the seat 44 of the first connecting rod 40. In greater detail, and with reference to the illustrated embodiment, the heads 53 of each rod 50a, 50b of the second connecting rod 50 are housed in the respective semicircular seat 44 of each rod 40a, 40b of the first connecting rod 40.

[0035] Vice-versa, in closed position of the hinge 10, shown in figure 4, the head 43 of the first connecting rod 40 is housed in the seat 54 of the second connecting rod 50. In greater detail, and with reference to the illustrated embodiment, in completely open position of the hinge 10, the heads 43 of each rod 40a, 40b of the first connecting rod 40 are housed in the respective seat 53 of each rod 50a, 50b of the second connecting rod 50.

[0036] Such a configuration of the heads 43, 53 of the connecting rods advantageously makes it possible to obtain the maximum opening of the door 3 and optimal packing of the hinge 10 in closed position.

[0037] The fixed element 20 preferably consists of a metal profile in which a cavity 21 is formed, which defines a substantially parallelepiped first end portion 22 and a substantially parallelepiped second end portion 23 having a shorter height than that of the first end portion 22.

[0038] At the end portions 22 and 23 of the fixed element, holes 24 are formed for the passage of anchoring elements, for example screws (not shown), of the fixed element 20 to the container body 2 of the showcase 1.

[0039] From the cavity 21, preferably centrally thereto, a wall 25 rises up, which acts as a support for the hinging of the feet 42, 52 of the connecting rods 40, 50. In the embodiment shown in figures 2-4, the feet 42, 52 of each rod 40a, 40b, 50a, 50b are hinged to the wall 25, on the opposite side with respect to it. Preferably, the wall 25 is made in a single body with the fixed element 20.

[0040] The fixed element 20 carries engagement means 26 at the second end portion 23. Preferably, the engagement means comprise a roller 26 housed in a longitudinal cavity 27 formed in the second end portion 23. Of course, it is possible to provide any other type of known engagement means suitable for the purpose. Moreover, without departing from the scope of protection of the invention, the engagement means 26, instead of on the fixed element 20, can be provided on the mobile element 30.

[0041] The mobile element 30 comprises a plate 31, preferably metallic, equipped with a plurality of holes 33, preferably slotted, for the passage of means for fixing to the door 3. Of course, instead of screwed, the plate 31 can be associated with the door 3 in another way, for example through welding or gluing.

[0042] A wall 35, also preferably metallic, extends from the plate 31 towards the fixed element 20, said wall 35 acting as a support for the hinging of the heads 43, 53 of the connecting rods 40, 50. In the embodiment shown in the figures, the heads 43, 53 of each rod 40a, 40b, 50a, 50b are hinged to the wall 35, on the opposite side with respect to it. Preferably, the wall 35 is made in a single body with the mobile element 30.

[0043] The wall 35 carries a hook 36, preferably made in a single body with it, with a surface 37 adapted for cooperating in a releasable manner with the engagement means 26, to counteract the movement of the mobile element 30 away from the fixed element 20 when the hinge 10, and therefore the door 3, is in closed position. Of course, without departing from the scope of protection of the invention, the hook 36 can be associated with the fixed element 20 instead of with the mobile element 30. It goes without saying that the shape and size of the hook 36 depend on the particular geometry of the quadrilateral linkage selected.

[0044] Figure 5-7 show another embodiment of the invention, which comprises a hinge 110; in the hinge 110, elements that are the same as those of the hinge 10 of the embodiment just described are not described here and in the figures they are marked with identical reference numerals, whereas elements that are different but analogous (in structure and/or in operation) are marked by numerals increased by 100.

[0045] The hinge 110 differs from the hinge 10 in that the two connecting rods 140 and 150 here are each made with a single rod, whereas instead of the single walls 25 and 35 there are pairs of walls 125 and 135, arranged parallel and spaced apart. The two connecting rods 140 and 150 are thus hinged between the pairs of walls 125 and 135, in a substantially dual manner with respect to the hinge 10. Of course, since the connecting rods 140 and 150 are in a single piece, there are no elements analogous to the spacer plates 41 and 51, as well as to the screws 45 and 55. The single rod configuration of the connecting rods 140, 150 of the articulated quadrilateral also gives the hinge 110 good stability during the roto-translation movement of the mobile element 30 with respect to the fixed element 20, thanks to the double walls 125 and 135.

[0046] According to an alternative embodiment not shown in the figures, the hook 36, at the surface 37 thereof adapted for cooperating with the engagement means 26, can have a projection intended to engage in a matching cavity formed in the engagement means 26. This advantageously represents a further impediment to the pure translation of the mobile element 30 with respect to the fixed element 20.

[0047] When the hinge 10 (or 110) is closed, the hook 36 is housed in the longitudinal cavity 27 formed in the fixed element 20, engaged with the roller 26. In this way, a possible movement of the mobile element 30 away from the fixed element 20 is prevented, so that the door is perfectly closed on the container body of the showcase. As a result, amongst other things, there is perfect insulation between interior and exterior, which advanta-

geously prevents contaminating agents from entering inside the showcase.

[0048] It is clear that modifications, replacements and additions can be brought to the embodiments described above, without however departing from the scope of protection of the invention as defined by the following claims.

Claims

1. Museum showcase including a container body (2), an openable door (3) that closes the container body (2) and at least one hinge (10), which hinge comprises a fixed element (20), associated with the container body (2), a mobile element (30), associated with the door (3), a first connecting rod (40; 140) and a second connecting rod (50; 150) hinged between the fixed element (20) and the mobile element (30) so as to obtain an articulated quadrilateral adapted for causing a roto-translation of the mobile element (30) with respect to the fixed element (20) between an open position and a closed position, **characterised in that** the hinge (10) comprises a hook (36), associated with one from the fixed element (20) and the mobile element (30) and adapted for cooperating in a releasable manner with engagement means (26) associated with the other from the fixed element (20) and the mobile element (30), so as to counteract the movement of the mobile element (30) away from the fixed element (20) when the hinge (10) is in closed position.

2. Museum showcase according to claim 1, wherein the hook (36) extends from the mobile element (30) and the engagement means comprise a roller (26) fixed to the fixed element (20).

3. Museum showcase according to claim 2, wherein the roller (26) is housed in a longitudinal cavity (27) formed in an end portion (23) of the fixed element (20), in which, in closed position of the hinge (10), the hook (36) is housed.

4. Museum showcase according to any of claims 1 to 3, wherein the hook (36) is formed in a single body with the mobile element (30).

5. Museum showcase according to any of the previous claims, wherein the first connecting rod (40; 140) and the second connecting rod (50; 150) have a rounded head (43, 53) by which they are hinged to the mobile element (30) and a substantially semi-circular seat (44, 54) close to the head (43, 53).

6. Museum showcase according to claim 5, wherein the seat (44) of the first connecting rod (40; 140) faces towards the second connecting rod (50; 150) and is adapted for housing the head (53) of the second connecting rod (50; 150), in completely open position of the hinge (10).

7. Museum showcase according to claim 5 or 6, wherein the seat (54) of the second connecting rod (50; 150) faces towards the first connecting rod (40; 140) and is adapted for housing the head (43) of the first connecting rod (40; 140), in closed position of the hinge (10).

8. Museum showcase according to any of the previous claims, wherein the fixed element (20) has a cavity (21) from which a wall (25) projects upwards, hinged to the first connecting rod (40) and to the second connecting rod (50).

9. Museum showcase according to claim 8, wherein the mobile element (30) comprises a plate (31) from which a wall (35) extends, hinged to the first connecting rod (40) and to the second connecting rod (50), the hook (36) extending from said wall (35).

10. Museum showcase according to claim 9, wherein the first connecting rod (40) and the second connecting rod (50) each comprise a pair of rods (40a, 40b; 50a, 50b) whose feet (42, 52) are hinged to the wall (25) of the fixed element (20), on the opposite side with respect to it, and whose heads (43, 53) are hinged to the wall (35) of the mobile element (30) on the opposite side with respect to it.

11. Museum showcase according to any of claims 1 to 7, wherein the fixed element (20) has a cavity (21) from which two parallel and spaced walls (125) projects upwards, hinged to the first connecting rod (140) and to the second connecting rod (150).

12. Museum showcase according to claim 11, wherein the mobile element (30) comprises a plate (31) from which two parallel and spaced walls (135) extend, hinged to the first connecting rod (140) and to the second connecting rod (150), the hook (36) extending from said walls (135).

13. Museum showcase according to claim 12, wherein the first connecting rod (140) and the second connecting rod (150) each comprise a rod whose feet (142, 152) are hinged to the walls (125) of the fixed element (20), between them, and whose heads (43, 53) are hinged to the walls (135) of the mobile element (130), between them.

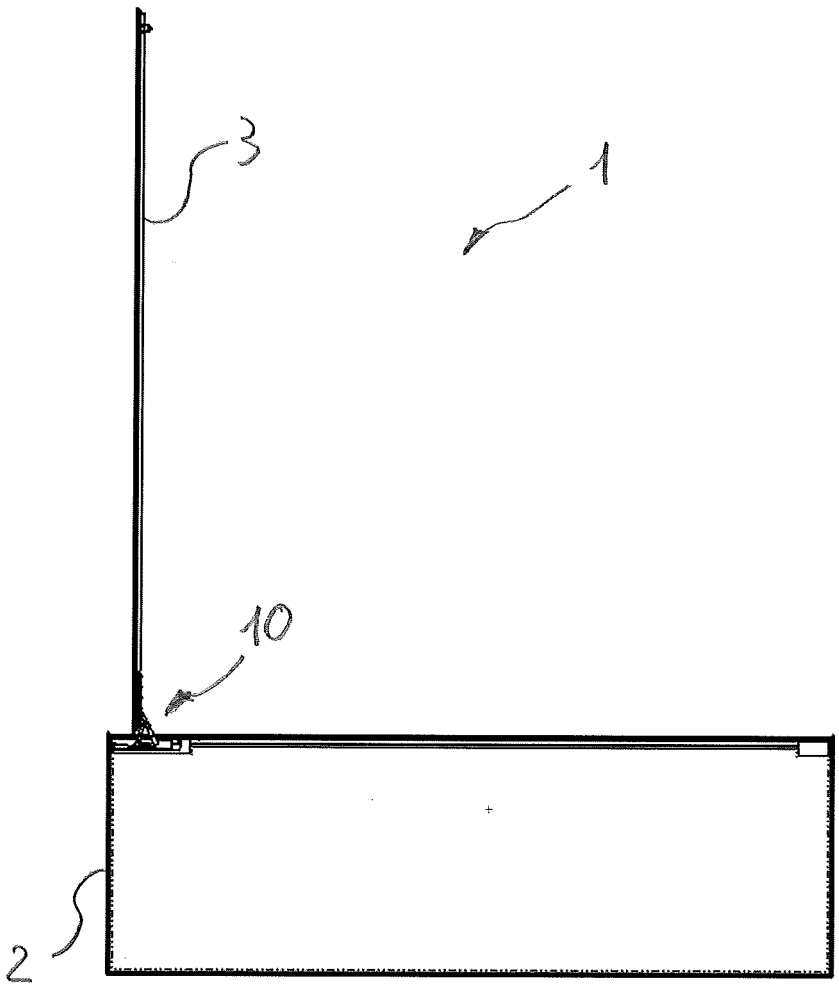


Fig. 1

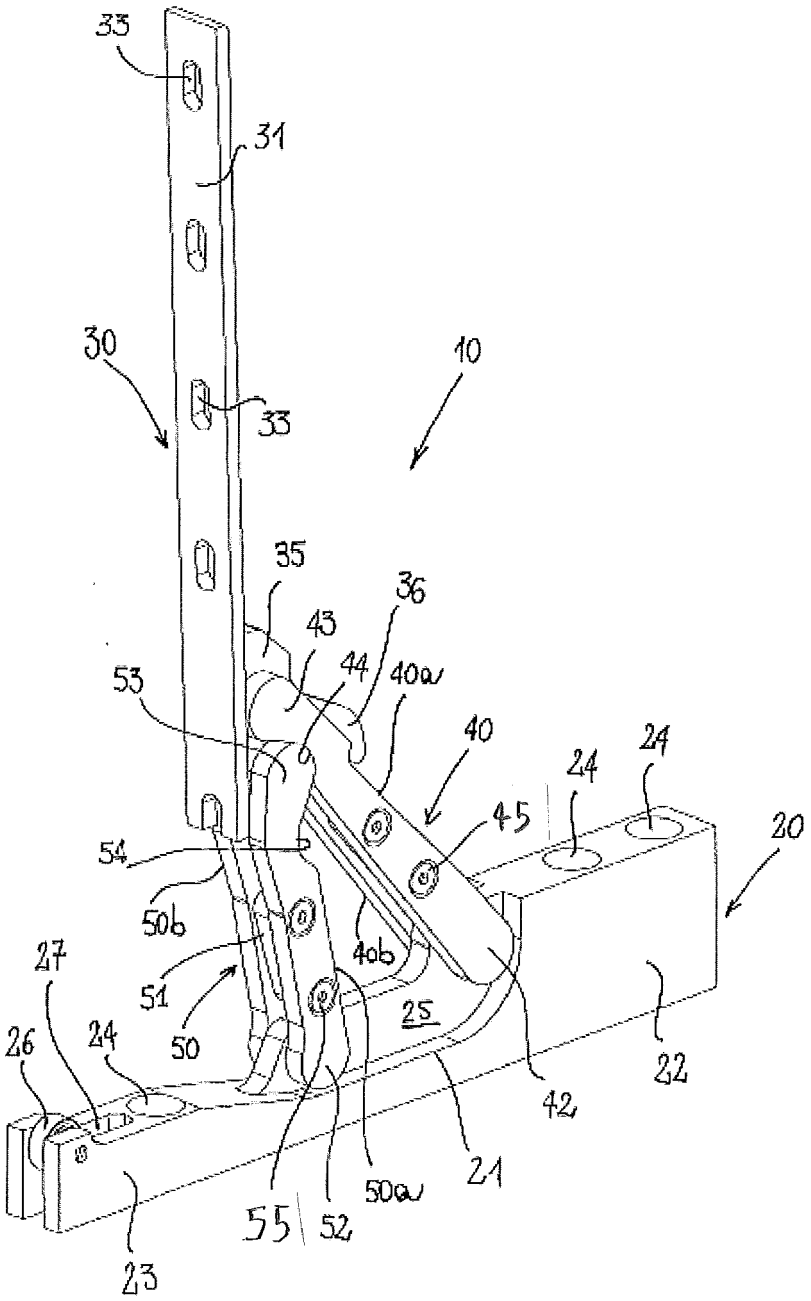

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Fig. 2

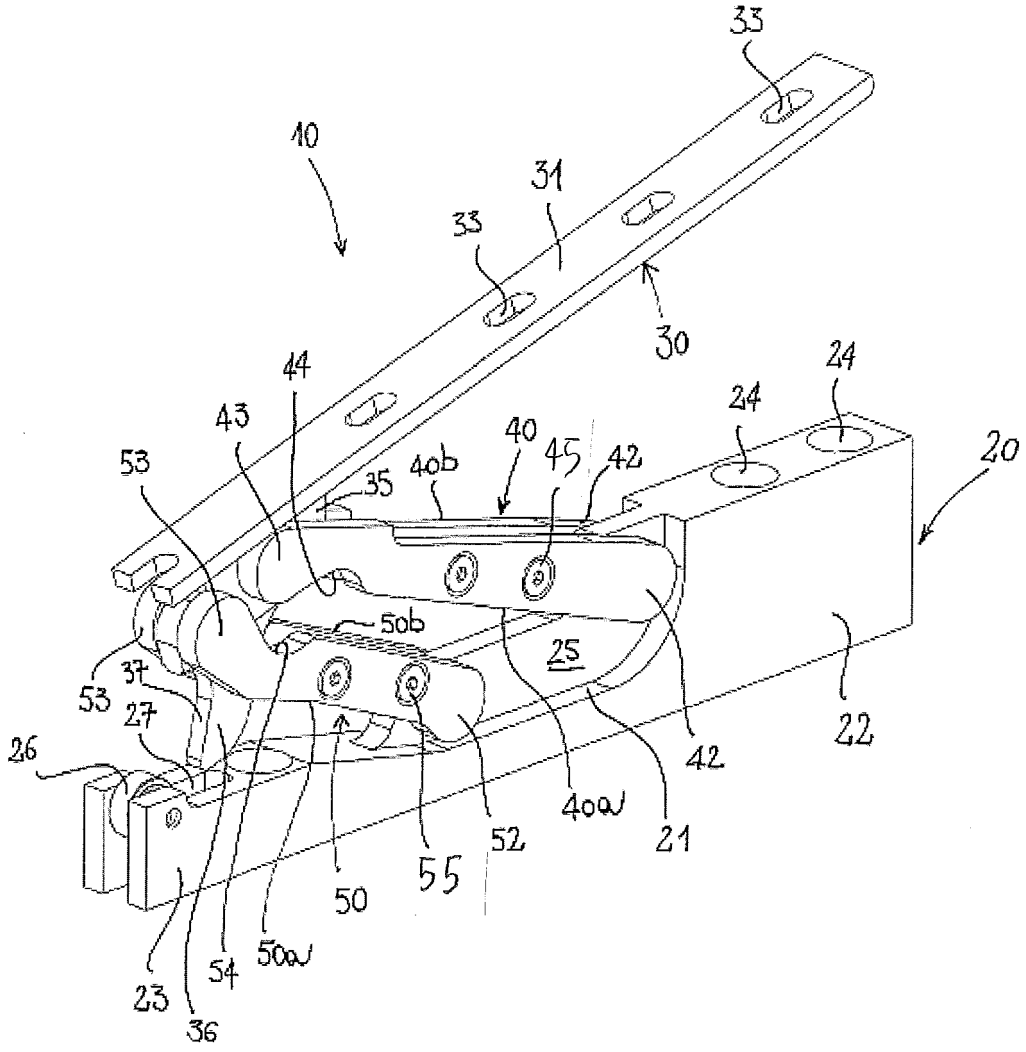

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Fig. 3

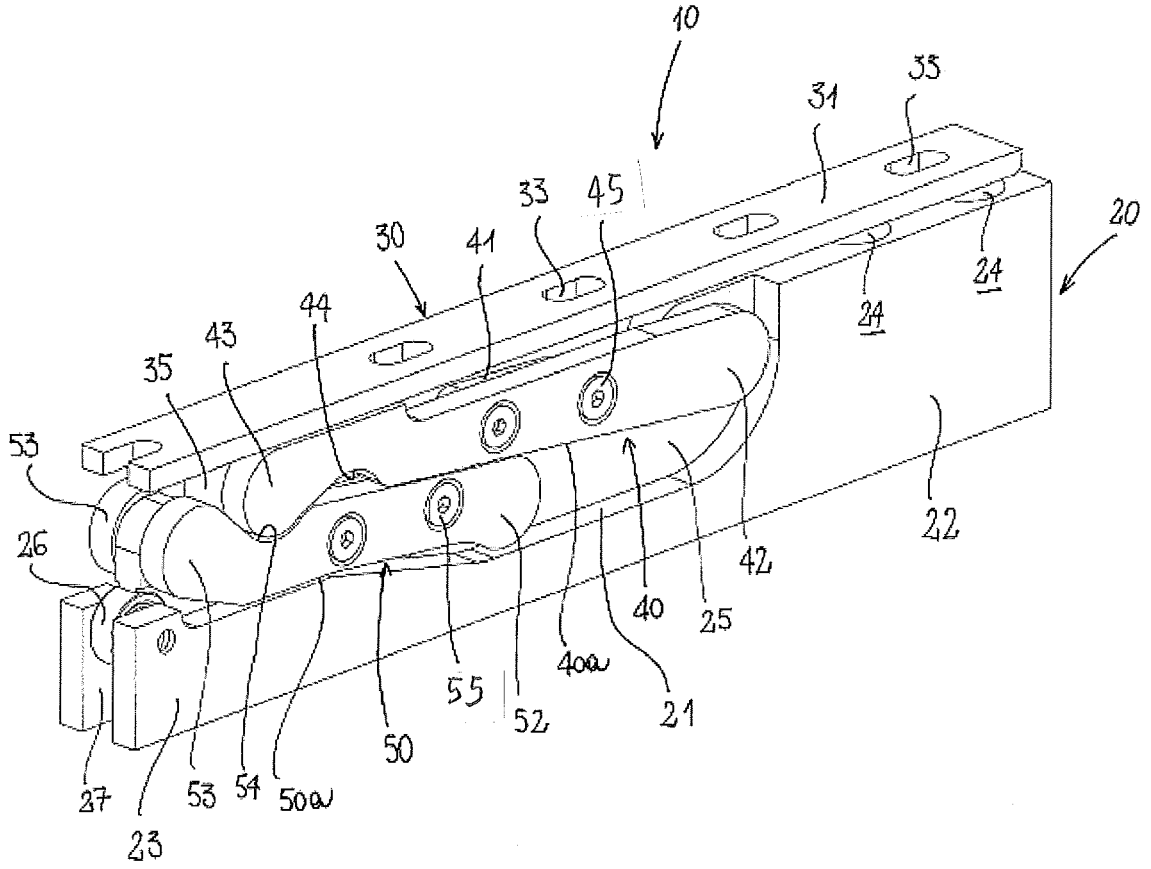

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Fig. 4

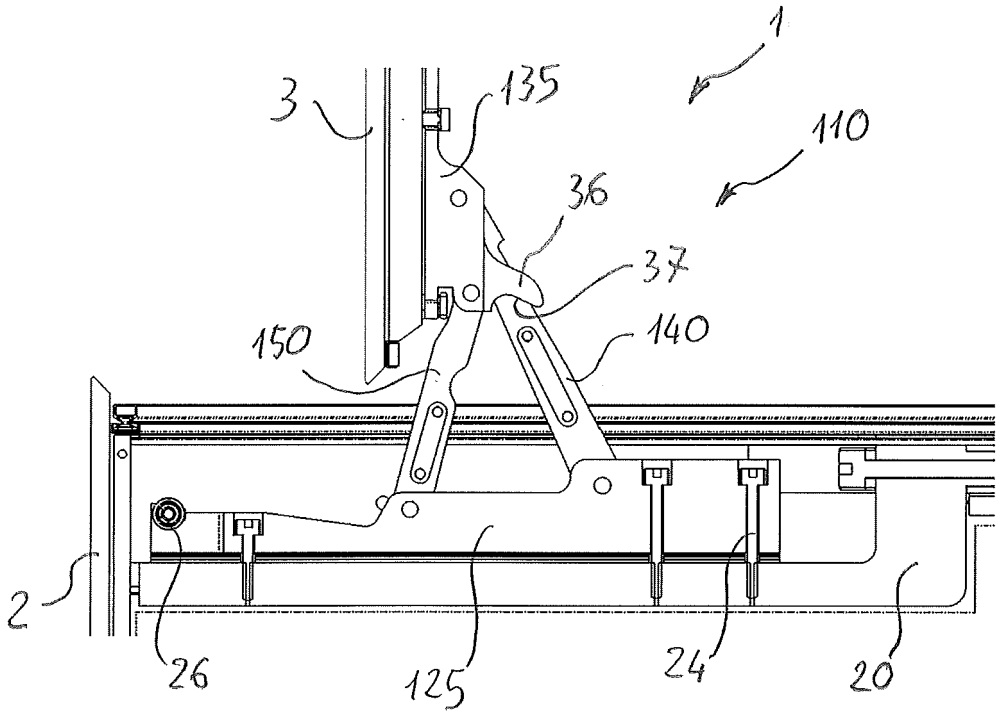

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Fig. 5

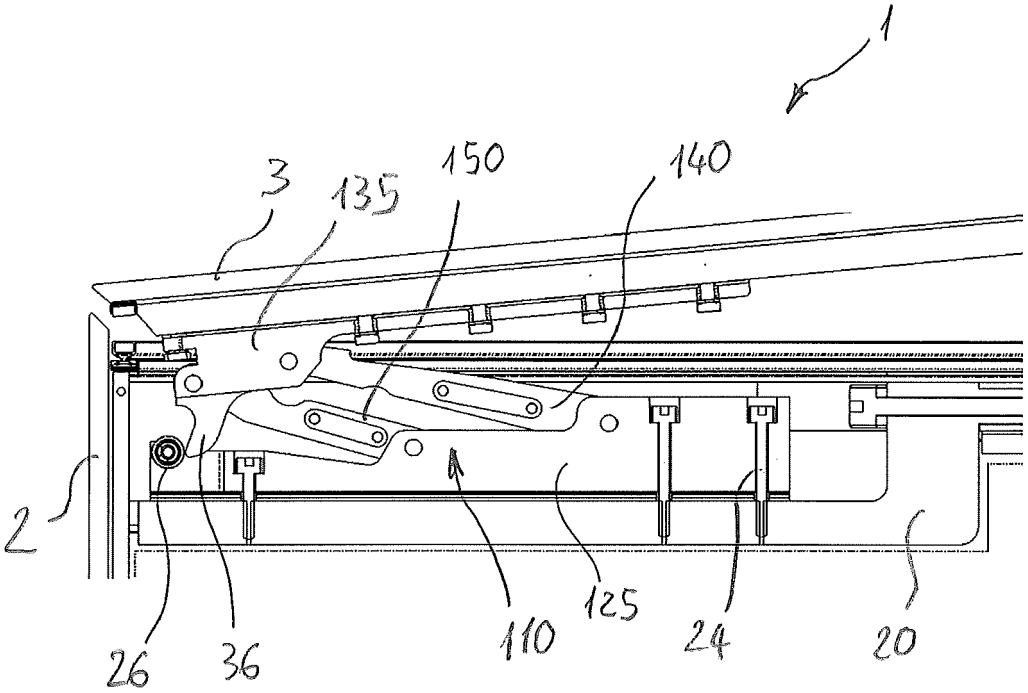

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Fig. 6

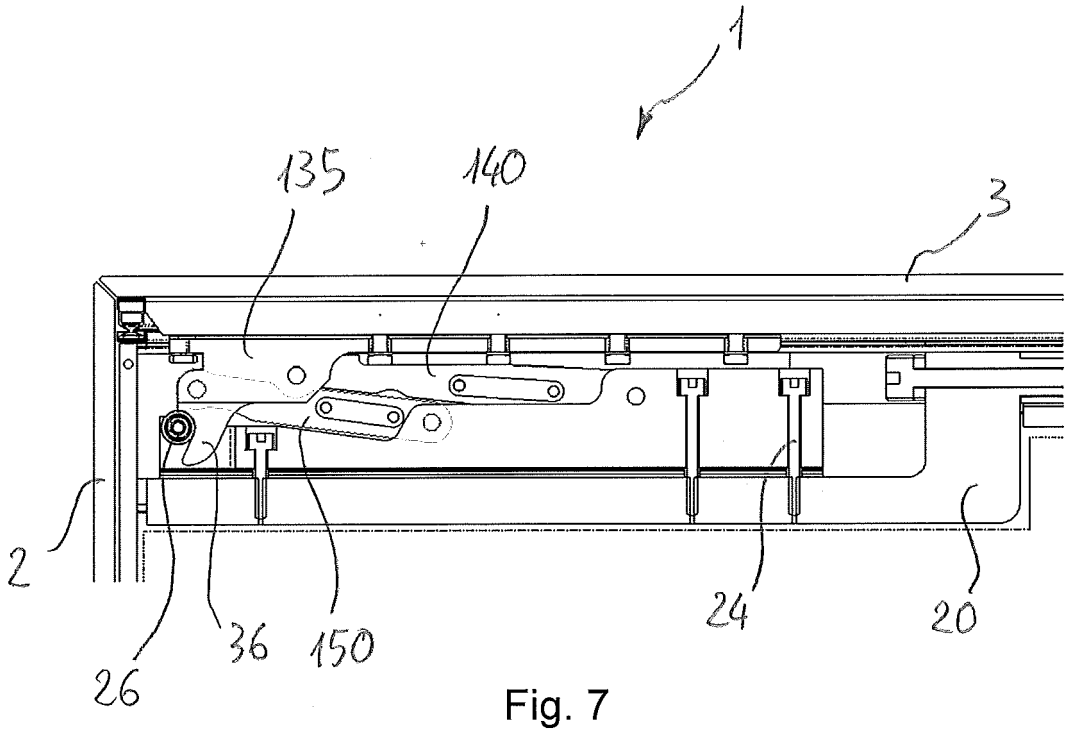


Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 1457

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	DE 23 30 228 A1 (KUNSTSTOFF GMBH) 2 January 1975 (1975-01-02) * page 1, line 27 - page 4, line 29; figures 1-4 *	1,4	INV. E05D11/10
A	DE 297 18 056 U1 (HETTICH HETAL WERKE [DE]) 27 November 1997 (1997-11-27) * the whole document *	1-13	
A	GB 2 221 721 A (BUCKLEY JOHN EDWARD) 14 February 1990 (1990-02-14) * the whole document *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)
E05D
A47B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 November 2017	Kohler, Pierre

CATEGORY OF CITED DOCUMENTS

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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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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82