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(54) **A SAFETY SCREEN**

(57) A safety screen for a climbing screen system, the safety screen comprising:
at least one fixed panel comprising at least one horizontal frame member, the horizontal frame member comprising:
a mounting plate securable to a screen support member in use;
a frame plate spaced from the mounting plate;
a base plate extending between the mounting plate and frame plate, wherein the mounting plate, the base plate and frame plate together define a channel for slidably receiving a movable panel therein; and
at least one bearing plate provided on the mounting plate and/or the frame plate and facing towards the channel, to provide a bearing surface for the movable panel.

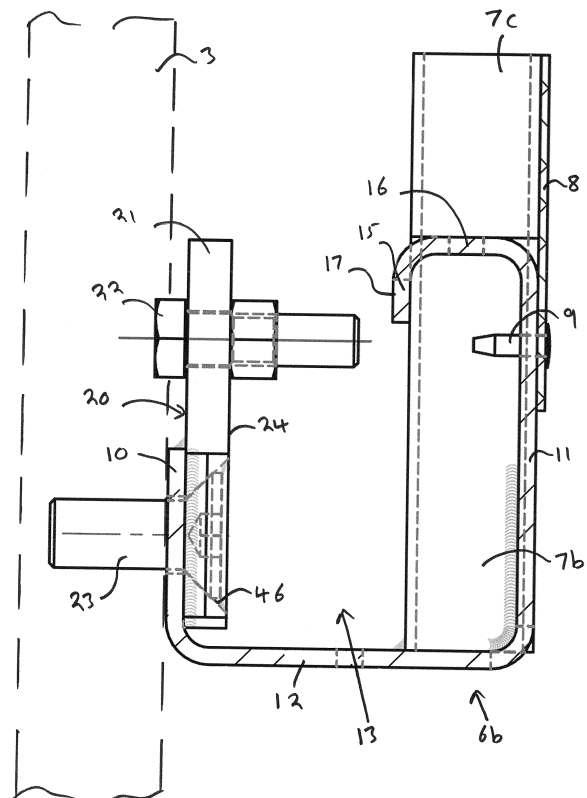


Figure 1

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Description

[0001] THE PRESENT INVENTION relates to a safety screen and to a climbing screen system incorporating the safety screen.

[0002] When building a construction which has a central structure formed by precast concrete, it is known to use a climbing screen system, which encloses the perimeter of at least a part of the construction. The climbing screen system provides an access platform around the perimeter of the construction, and sometimes to support or protect formwork for use in forming the next level of the construction and to provide a useful work space for construction workers. The system includes a safety screen, to safeguard workers from adverse weather conditions and to ensure a safe working environment. As each floor of the construction is formed, the climbing screen moves up the construction, exposing the previously formed floors beneath.

[0003] Before installing the climbing screen system, it is necessary first to transport the climbing screen system, comprising climbing screen platforms and a climbing screen support structure, to the site from a remote location. Transporting the climbing screen system pre-assembled means that the system can be installed more quickly. However, the width of any pre-assembled climbing screen is limited by handling considerations, such as the need to transport the screen by road and the need for ready access to a construction site.

[0004] Accordingly, it is known to provide safety screens which comprise a plurality of fixed panels and movable panels, which are configurable between a retracted state (suitable for transportation) and an extended state (for mounting on a construction). Such systems are known from EP2503074 and GB2510881. Not only is the retractable nature of the safety screen of benefit when transporting the safety screen; but it also allows for adjustment of the width of the safety screen when mounted to a construction, and/or allows for the delivery or removal of materials to/from the construction in use.

[0005] It is beneficial to ensure the smooth extension/retraction of the movable panel relative to the fixed panel. With the arrangement disclosed in GB2510881, the fixed panel is supported by a panel support member, and the movable panel is received in the space between the screen support member and the fixed panel (see figure 3 of GB2510881). In use, because the movable panel is only supported by the lower surface of the horizontal member engaging against the surface of the panel support member, the movable panel is loosely retained and can tend to move towards or away from the fixed panel. Moreover, there is a risk that the movable panel may impinge against the bolt used to secure the panel support member to the screen support member. The arrangement of GB2510881 may suffer from the movable panel jamming within the space between the screen support member and the fixed panel.

[0006] Accordingly, the present invention provides a

safety screen for a climbing screen system, the safety screen comprising:

5 at least one fixed panel comprising at least one horizontal frame member, the horizontal frame member comprising:

a mounting plate securable to a screen support member in use;

10 a frame plate spaced from the mounting plate; a base plate extending between the mounting plate and frame plate, wherein the mounting plate, the base plate and frame plate together define a channel for slidably receiving a movable panel therein; and

15 at least one bearing plate provided on the mounting plate and/or the frame plate and facing towards the channel, to provide a bearing surface for the movable panel.

20 **[0007]** Preferably, the safety screen further comprises a movable panel slidably received in the channel.

[0008] Preferably, the safety screen further comprises a bearing return plate extending between the bearing plate and the respective mounting plate and/or frame plate, to space the bearing plate from the respective mounting plate and/or frame plate.

[0009] Preferably, the safety screen further comprises:

30 a first bearing return plate extending inwardly from the frame plate towards the channel; and a first bearing plate provided on the first bearing return plate.

35 **[0010]** Preferably, the safety screen further comprises:

40 a second bearing return plate extending inwardly from the mounting plate towards the channel; and a second bearing plate provided on the second bearing return plate.

[0011] Preferably, the first bearing plate and the second bearing plate are substantially parallel to one another.

45 **[0012]** Preferably, there is a predetermined distance between the first and second bearing plates.

[0013] Preferably, the horizontal frame member is a unitary component.

[0014] Preferably, the horizontal frame member is formed from sheet metal. Alternatively, it may be extruded.

50 **[0015]** Preferably, the safety screen further comprises at least one stiffening element, secured to at least one end of the horizontal frame member, between the second bearing return plate, the mounting plate and at least part of the base plate.

[0016] Preferably, the at least one fixed panel further comprises at least one vertical frame member which is

secured, at one distal end, to the first bearing return plate of the horizontal frame member.

[0017] Preferably, at least one fixed panel comprises two horizontal frame members and two vertical frame members, joined together to define a frame.

[0018] Preferably, the safety screen further comprises a mesh screen secured to the frame.

[0019] The present invention provides a climbing screen system comprising :

a safety screen according to the invention; and
at least one screen support member to which the at least one fixed panel of the safety screen is secured.

[0020] Embodiments of the present invention will now be described, by way of non-limiting examples only, with reference to the accompanying figures, in which:

FIGURE 1 shows a cross-section of part of a fixed panel of a safety screen embodying the present invention;

FIGURE 2 shows a cross-section of part of another fixed panel of a safety screen embodying the present invention;

FIGURE 3 shows a cross-section of the horizontal frame member of the fixed panel shown in Figure 2.

FIGURE 4 shows a safety screen embodying the present invention;

FIGURE 5 shows an enlarged perspective view of part of the safety screen of Figure 4;

FIGURE 6 shows a safety screen incorporating the fixed panel of Figure 2 and having a movable panel;

FIGURE 7 shows a perspective view of the end of a horizontal frame member embodying the present invention.

[0021] Figure 4 shows a climbing screen system 1 comprising a safety screen 2 secured to two vertical screen support members 3. In the embodiment shown, the safety screen 2 comprises a fixed panel 4 and two movable panels 5 at either end of the fixed panel 4. Preferably, the fixed panel 4 is secured to the screen support members 3. The provision of two movable panels 5 is not essential. There may only be one movable panel 5 provided at one end of the fixed panel 4. There may be more than one fixed panel secured to the screen support members, arranged vertically, in the manner disclosed in GB2510881. Vertically adjacent fixed panels 4 may be secured together. Likewise, vertically adjacent movable panels 5 may be secured together. This is not essential.

[0022] The fixed panel 4 preferably comprises two horizontal frame members 6a, 6b and two vertical frame

members 7a, 7b, generally arranged to define a rectangular frame. In the arrangement shown in Figure 4, there is a third vertical frame member 7c, to provide additional rigidity. The horizontal frame members 6a, 6b and vertical frame members, 7a, 7b (7c) are preferably arranged such that they present a substantially planar frame surface against which a mesh screen 8 may be secured in use (see Figure 1). Other types of (non-mesh) screen may be adopted.

[0023] The mesh screen 8 is preferably secured to the frame using a plurality of rivets 9 (see Figure 1).

[0024] The present invention is directed to the form of the horizontal frame members 6a, 6b. As will be apparent from the following description and figures, the two horizontal frame members 6a, 6b generally correspond to one another. The figures and description focus on the lower horizontal frame member 6b but it will be appreciated that the upper horizontal frame member 6a will have corresponding features, albeit mirrored about a horizontal plane.

[0025] With reference to figure 1, the lower horizontal frame member 6b comprises a mounting plate 10 securable to a screen support member 3 in use; a frame plate 11 spaced from the mounting plate 10; and a base plate 12 extending between the mounting plate 10 and frame plate 11.

[0026] The mounting plate 10, the base plate 12 and frame plate 11 together define a channel 13 therebetween for slidably receiving a movable panel 5 therein, illustrated in Figures 4 to 6.

[0027] The horizontal frame member 6b shown in Figure 1 further comprises a first bearing plate 15 provided on the frame plate 11 and facing towards the channel 13, to provide a bearing surface for the movable panel 5 in use. The first bearing plate 15 is spaced from the frame plate 11 by a first bearing return plate 16.

[0028] The first bearing plate 15 is preferably parallel to the frame plate 11 and presents a bearing surface 17 against which the movable panel 5 can bear in use.

[0029] Preferably, the first bearing plate 15 is arranged substantially vertically. Preferably, the frame plate 11 is arranged substantially vertically. Preferably, the first bearing return plate 16 is arranged substantially horizontally. Preferably, the first bearing plate 15 is arranged substantially perpendicularly to the first bearing return plate 16. Preferably, the first bearing return plate 16 is arranged substantially perpendicularly to the frame plate 11. Preferably the base plate 12 is arranged substantially horizontally. Preferably, the base plate 12 is arranged substantially perpendicularly to the frame plate 11. Preferably, the mounting plate 10 is arranged substantially vertically. Preferably, the mounting plate 10 is arranged substantially perpendicularly to the base plate 10. Preferably, the mounting plate 10 and the frame plate 11 are arranged substantially parallel to one another. Preferably, the height of the frame plate 11 is larger than the height of the mounting plate 10.

[0030] In the arrangement shown in figure 1, a guide

member 20 is provided, which comprises a plate with an upstanding boss 21, on which a mechanical stop is provided. The mechanical stop comprises a bolt 22 secured in an aperture passing through the boss 21. The bolt 22 engages with either the vertical frame member 57a, 57b of a movable panel 5 or a retention bolt 29 provided on the lower horizontal frame member 56b of the movable panel 5 in use, to prevent undesired separation of the movable panel 5 from the fixed panel 4. A locking bolt 28 is also preferably provided on the lower horizontal frame member of the movable panel 5. In use, the movable panel 5 can be substantially locked in place, relative to the fixed panel 4, by tightening the locking bolt 28 such that it protrudes from the lower horizontal frame member 56b of the movable panel 5 and engages with the base plate 12.

[0031] A securing bolt 23 is provided through the guide member 20 to secure the horizontal frame member 6b to the vertical screen support member 3 in use. The securing bolt 23 is preferably received through a bore 45 in the horizontal frame member (figure 5) and through a corresponding bore of the vertical screen support member 3. A countersunk bore 46 is provided in the guide member 20, in which the head of the securing bolt 23 is received. Consequently, the guide member 20 provides a substantially planar bearing surface 24 facing the channel 13.

[0032] Accordingly, when a movable panel 5 is received in the channel 13, it can bear against the bearing surface 24 presented by the guide member 20, the inner surface of the base plate 12 and/or the bearing surface 17 of the first bearing plate 15. Preferably, the width of the movable panel 5 received in the channel 13 is less than the width between the bearing surface 24 of the guide member 20 and the bearing surface 17 of the first bearing plate 15. Any or all of the bearing surfaces 24, 12, 17, or the engaging surfaces of the movable panel 5, may be coated with or comprise a friction-reducing material.

[0033] A benefit of the horizontal frame member 6b illustrated in Figure 1 is that the first bearing plate 15 presents a uniform bearing surface 17 against which the movable panel 5 can, and is intended to, bear. This promotes the smooth relative sliding movement of the movable panel 5 with respect to the fixed panel 4. With reference to Figure 1, the first bearing plate 15 is vertically spaced from the base plate 12, serving to better support the movable panel 5 and maintain it in a substantially vertical orientation. Preferably, the first bearing plate 15 is configured such that it is the only item against which the corresponding surface of the movable panel 5 bears in use. This reduces the risk of any bolts, mesh screen or any other protrusions from engaging with the movable panel 5, which could potentially cause the arrangement to jam/lock or create undesired friction.

[0034] Figures 2 and 3 shows another horizontal frame member 106b embodying the present invention. The horizontal frame member 106b of figures 2 and 3 adopts

many of the features of the horizontal frame member 6b of Figure 1, with like features correspondingly numbered (increased by 100, where appropriate).

[0035] Accordingly, the horizontal frame member 106b illustrated in figures 2 and 3 comprises a mounting plate 110, a frame plate 111 and a base plate 112 extending between the mounting plate 110 and frame plate 111. The horizontal frame member 106b further comprises a first bearing plate 115 and a first bearing return plate 116 corresponding to the first bearing plate 15 and first bearing return plate 16 of figure 1.

[0036] Additionally, the horizontal frame member 106b illustrated in figures 2 and 3 further comprises a second bearing plate 130 provided on the mounting plate 110 and facing towards the channel 13. The second bearing plate 130 is spaced from the mounting plate 110 by a second bearing return plate 131. The second bearing plate 130 presents a second bearing surface 132 against which the movable panel 5 can bear in use.

[0037] The first bearing surface 117 faces the second bearing surface 132. Preferably, the horizontal distance between the two surfaces 117, 132, is greater than or equal to the width of the movable panel 5 which is receivable in the channel 13.

[0038] Figure 2 additionally shows a guide member 120, which aids in the attachment of the horizontal frame member 106b to a vertical screen support member 3 (not shown in figure 2). It will be noted that the head of the securing bolt 123 protrudes from the guide member 120 but is concealed by the second bearing plate 130 and second bearing return plate 131, such that the movable panel 5 does not impinge on the securing bolt 123 when the movable panel 5 slides within the channel. The movable panel 5 is thus protected from impacting the bolt 123 in normal use.

[0039] The second bearing plate 130 presents a uniform bearing surface 132 against which the movable panel 5 can, and is intended to, bear.

[0040] Additionally, a boss 121 is secured (by welding or other means) to the top surface of the second bearing return plate 131 and is similar in form to the boss 21 illustrated in figure 1. The top surface of the second bearing return plate 131 conveniently provides a horizontal surface to which to secure the boss 121.

[0041] The movable panel 5 comprises an upper horizontal frame member 56a; an lower horizontal frame member 56b (shown in cross-section in figure 6); and first 57a and second 57b vertical frame members, arranged to form a frame. Preferably, the frame members 56a, 56b, 57a, 57b of the movable panel 5 comprise a box-section profile. The movable panel 5 preferably further includes a mesh panel 58 which is secured to the frame of the movable panel 5, e.g. with rivets.

[0042] Figure 7 illustrates how the vertical frame member 7b, 107b of the fixed panel 4 may be secured to the lower horizontal frame member 6b, 106b. At one axial end of the lower horizontal frame member 6b, 106b, a predetermined section of the first bearing return plate 16,

116 and the frame plate 11, 111, is removed. Preferably, the length of the removed section is equal to or greater than the width of the vertical frame member 7b. Preferably, the width of the first bearing return plate 16, 116 is substantially equal to the depth of the vertical frame member 7b. As a consequence of the removed sections, the first bearing plate extends to form a finger 60. The finger 60 is not essential. A weld may be formed at any or all of the intersections of the vertical frame member 7b and the horizontal frame member 6b, 106b, to secure the horizontal frame member 6b, 106b to the vertical frame member 7b, 107b.

[0043] The horizontal frame member 6, 106 is preferably a unitary component, preferably formed from sheet metal, which can be bent into the profile illustrated. Preferably, the horizontal frame member 6, 106 is made of steel or aluminium. Preferably, all of the frame members of the fixed and movable panels are made of steel or aluminium. Preferably, at least one of the frame members is galvanized. Preferably, the frame members comprise at least one aperture to aid hot dip galvanizing. Preferably, the mesh panels comprise aluminium.

[0044] A benefit of the invention is that the movable and fixed panels are lighter than known panels, allowing more and/or larger fixed and movable panels to be provided on a safety screen for the same overall weight.

[0045] Preferably, the fixed panel 6b, 106b further comprises at least one stiffening element (not shown), secured to at least one end of the horizontal frame member, between the second bearing return plate, the mounting plate and at least part of the base plate. This stiffening element serves to strengthen the second bearing plate 132 and the second bearing return plate 131.

[0046] Preferably, the safety screen according to embodiments of the present invention forms part of a climbing screen system, comprising at least one screen support member to which the at least one fixed panel of the safety screen is secured.

[0047] The feature of the upper horizontal frame member 6a, 106a correspond to those of the lower horizontal frame member 6b, 106b, albeit vertically mirrored. Accordingly, the channel 13 of the upper horizontal frame member 6a, 106a will open downwardly. Accordingly, the movable panel 5 is retained in the respective channels 13 of each of the upper 6a, 106a and lower 6b, 106b horizontal frame members.

[0048] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

[0049] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse

forms thereof.

Claims

1. A safety screen for a climbing screen system, the safety screen comprising:

at least one fixed panel comprising at least one horizontal frame member, the horizontal frame member comprising:

a mounting plate securable to a screen support member in use;
a frame plate spaced from the mounting plate;
a base plate extending between the mounting plate and frame plate, wherein the mounting plate, the base plate and frame plate together define a channel for slidably receiving a movable panel therein; and
at least one bearing plate provided on the mounting plate and/or the frame plate and facing towards the channel, to provide a bearing surface for the movable panel.

2. A safety screen according to claim 1, further comprising a movable panel slidably received in the channel.

3. A safety screen according to any preceding claim, further comprising a bearing return plate extending between the bearing plate and the respective mounting plate and/or frame plate, to space the bearing plate from the respective mounting plate and/or frame plate.

4. A safety screen according to any preceding claim, comprising:

a first bearing return plate extending inwardly from the frame plate towards the channel; and
a first bearing plate provided on the first bearing return plate.

5. A safety screen according to claim 4, further comprising:

a second bearing return plate extending inwardly from the mounting plate towards the channel; and
a second bearing plate provided on the second bearing return plate.

6. A safety screen according to claim 5, wherein the first bearing plate and the second bearing plate are substantially parallel to one another.

7. A safety screen according to any of claims 5 and 6,
wherein there is a predetermined distance between
the first and second bearing plates.
8. A safety screen according to any preceding claim, 5
wherein the horizontal frame member is a unitary
component.
9. A safety screen according to any preceding claim,
wherein the horizontal frame member is formed from 10
sheet metal.
10. A safety screen according to claim 5, further com-
prising at least one stiffening element, secured to at
least one end of the horizontal frame member, be- 15
tween the second bearing return plate, the mounting
plate and at least part of the base plate.
11. A safety screen according to claim 4, wherein the at
least one fixed panel further comprises at least one 20
vertical frame member which is secured, at one distal
end, to the first bearing return plate of the horizontal
frame member.
12. A safety screen according to any preceding claim, 25
wherein the at least one fixed panel comprises two
horizontal frame members and two vertical frame
members, joined together to define a frame.
13. A safety screen according to claim 12, further com- 30
prising a mesh screen secured to the frame.
14. A climbing screen system comprising :

a safety screen according to any preceding 35
claim; and
at least one screen support member to which
the at least one fixed panel of the safety screen
is secured.

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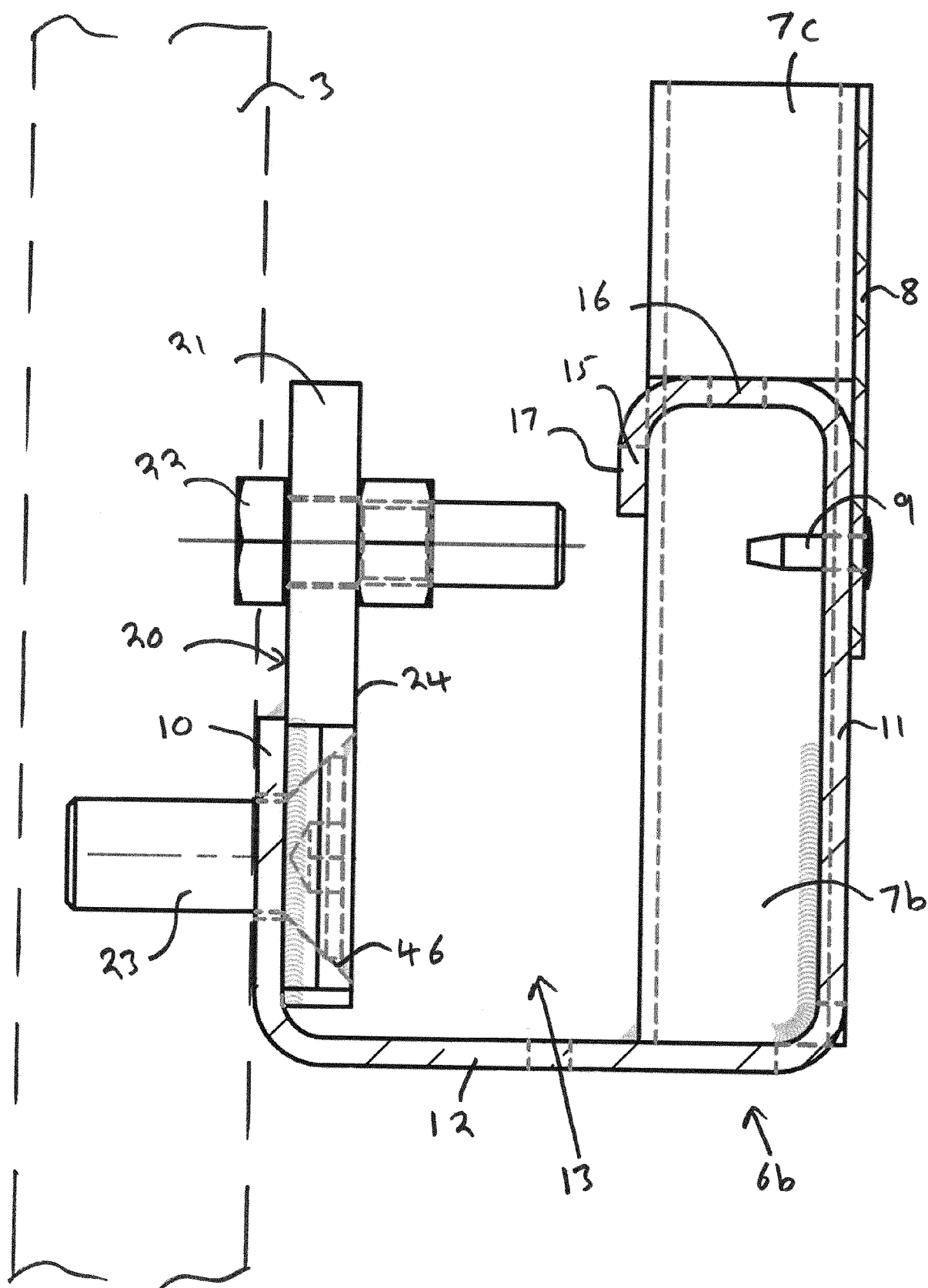
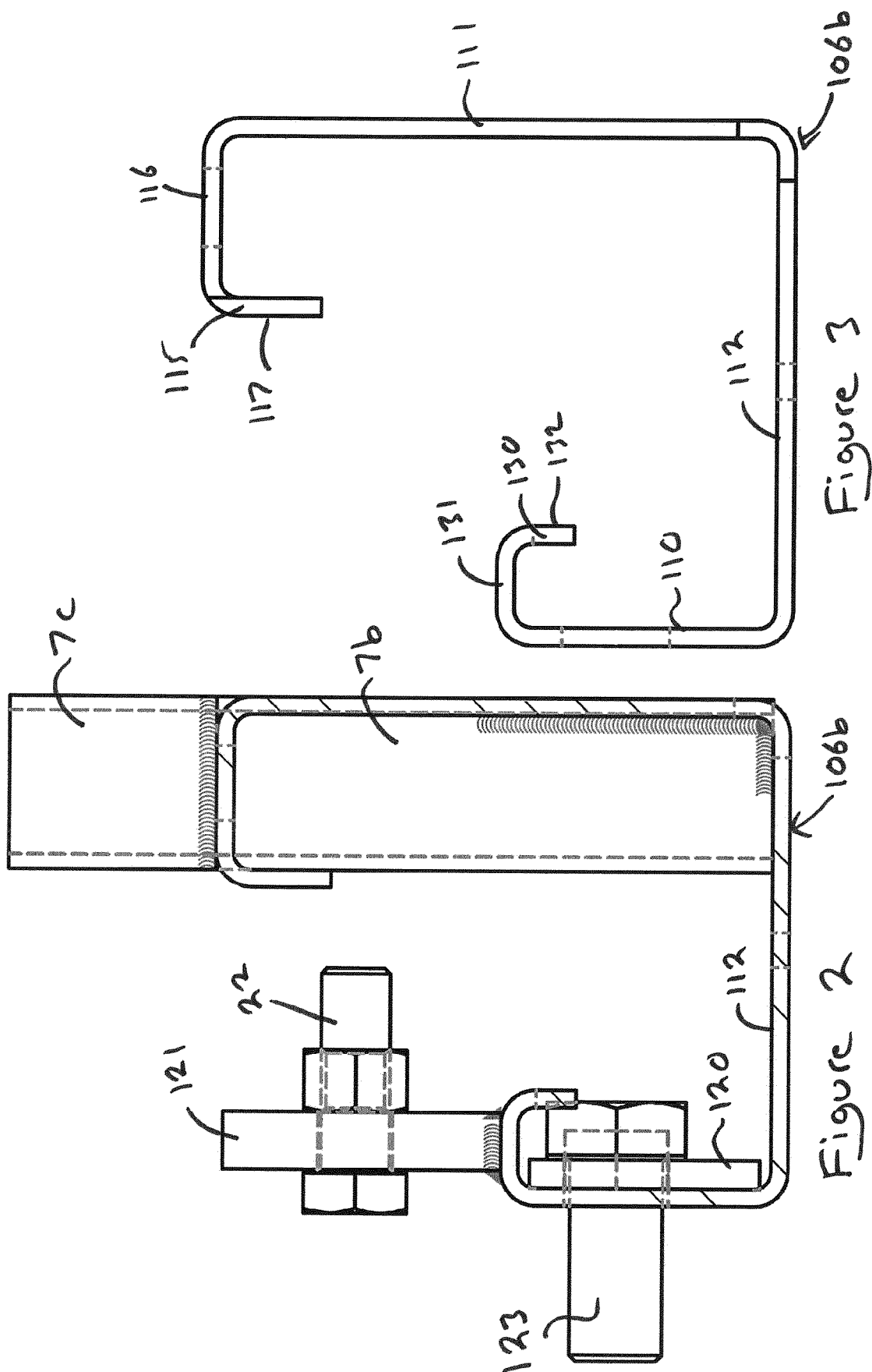
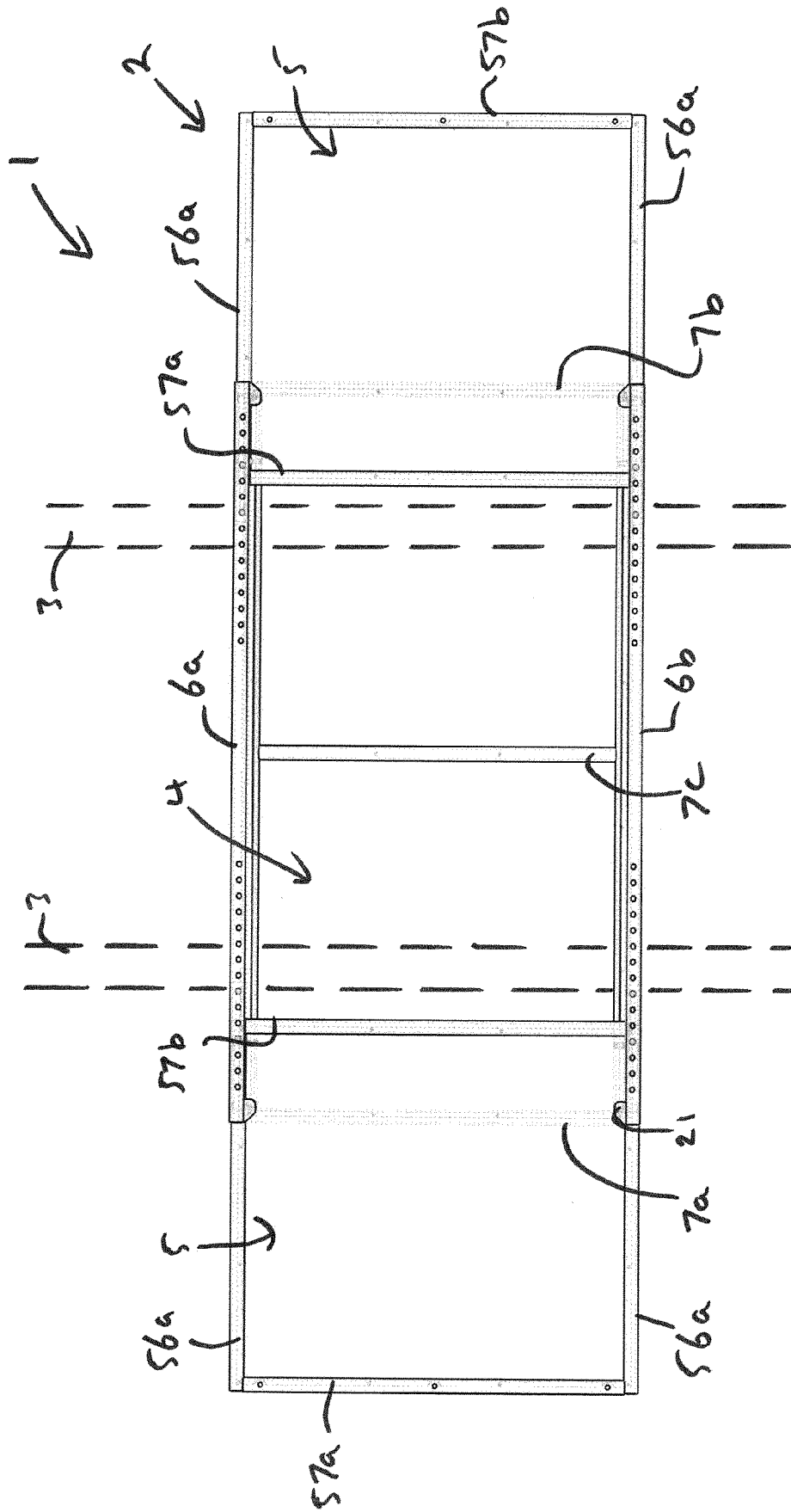


Figure 1





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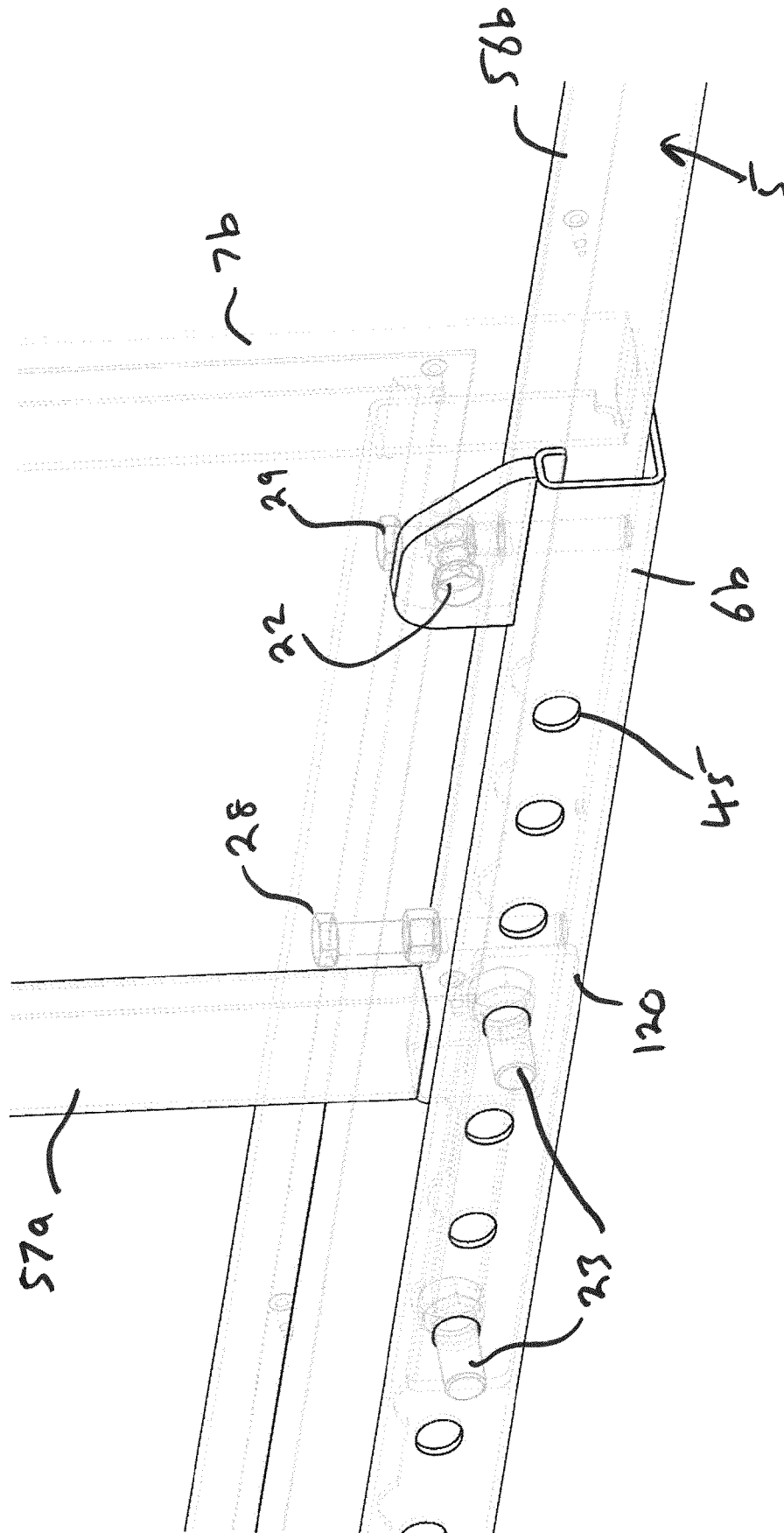


Figure 5

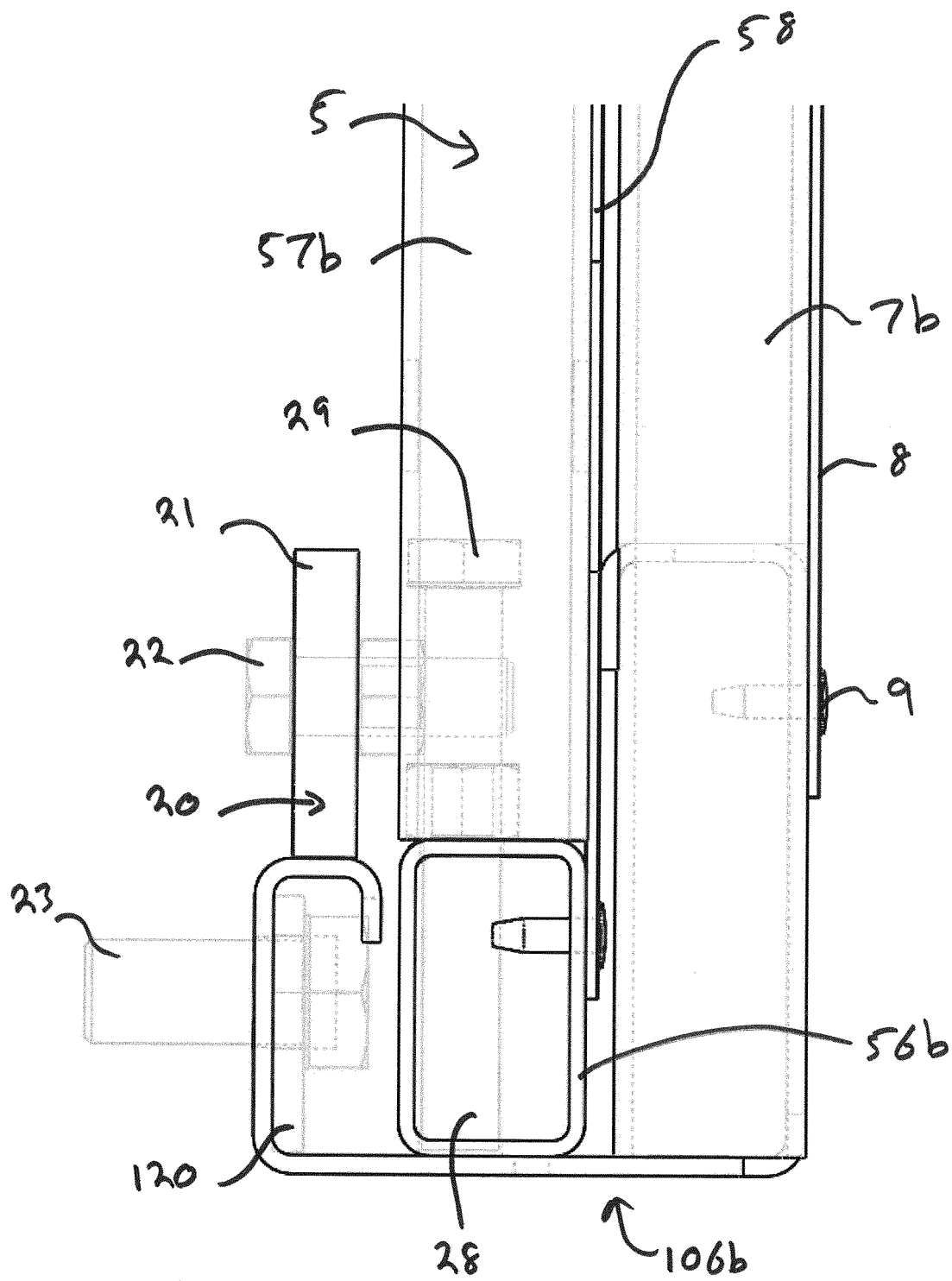


Figure 6

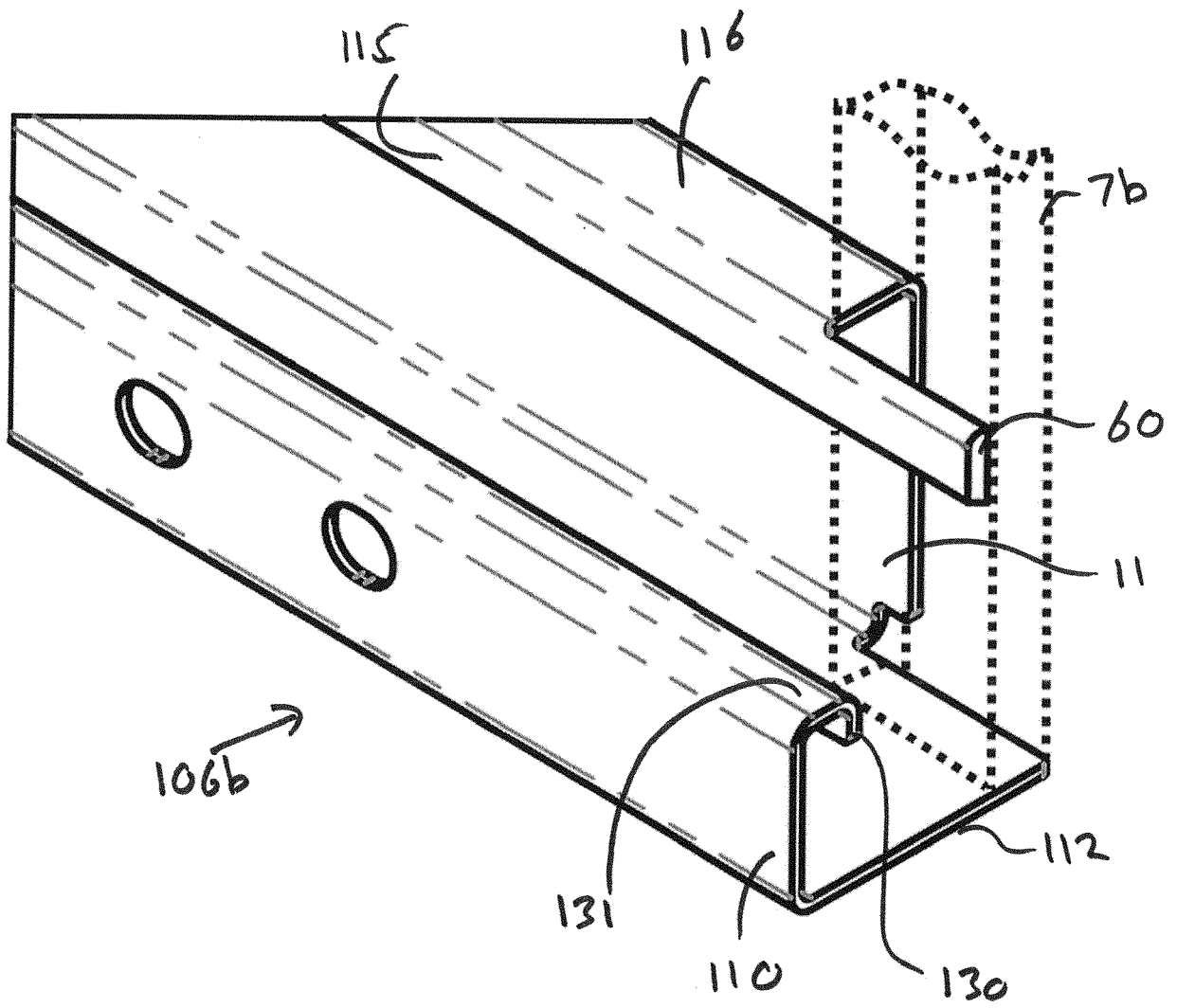


Figure 7



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Application Number
EP 17 19 9596

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) E04G E04F E04H E05D E04B
Place of search The Hague		Date of completion of the search 1 March 2018	Examiner Baumgärtel, Tim
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			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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