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ABSTRACT

The present invention relates to an insulation spacer assembly. The assembly includes insulation spacers. Each spacer includes a top for supporting a roof; and one or more legs depending from the top. The assembly further includes one or more connection means for connecting the spacers together to define spaces in which insulation can be located or spaces adjacent insulation. Preferably, the connection means is removable from the spacers. Even more preferably, the connection means includes removable inserts for being received in the top and/or legs, and that can be easily be removed, or changed in lengths or different leg heights when required.

Figure 8

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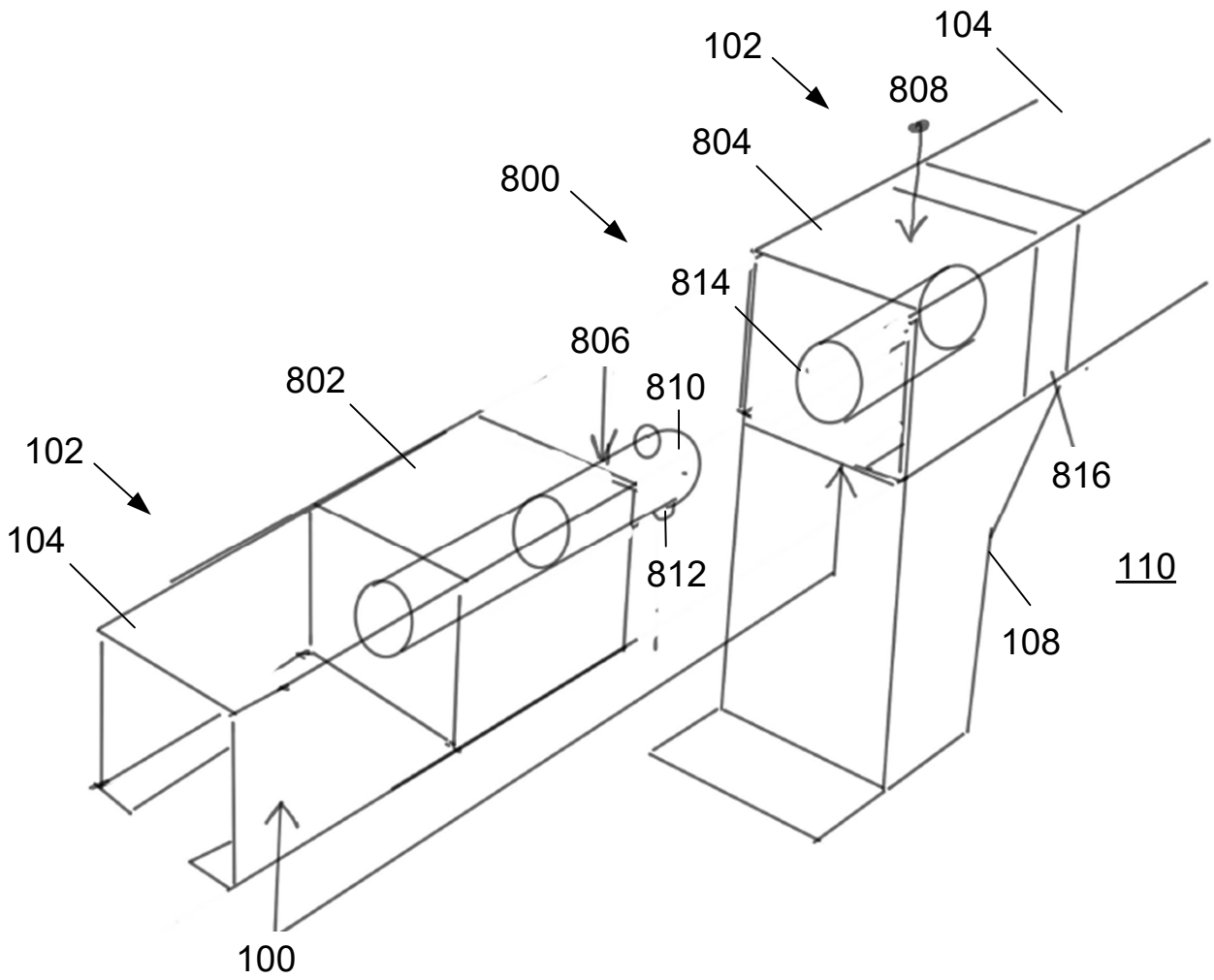

FIG. 8

AN INSULATION SPACER ASSEMBLY

RELATED APPLICATIONS

The present application is a patent of addition from AU2020203268, and a divisional from AU2023204195, the contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0001] The present invention relates to insulation spacers. The present invention has particular, although not exclusive application to insulation spacers used in roofing of industrial building such as factories.

BACKGROUND

[0002] The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

[0003] A known factory roof includes purlins supporting mesh. Insulation is supported by the mesh, and roof sheeting is fastened to the purlins. In practice, the insulation is undesirably squashed and compacted between the roof sheeting and the purlins.

[0004] Roof spacers can be provided between the purlins and the roofing sheets to impede compaction of the insulation. Each spacer includes a top for supporting the roof, and legs depending from the top. The legs define spaces in which insulation can be located.

[0005] AU2020203268 shows connecting the spacers using a single tongue 200 in Figure 2. AU2023204195 shows connecting the spacers using a double tongue 200’ in Figure 4. Manufacturing the integral tongues and the associated slotted legs is a complicated process using laser cutters, turret punches, dies, press equipment, and also has significant labour steps which require a high degree of accuracy.

[0006] The product can also be also susceptible to damage in transit and is also hard to modify when changes to specifications are required.

[0007] The applicant has perceived a need for an alternative connection means for connecting the spacers together.

SUMMARY OF THE INVENTION

[0008] According to one aspect of the present invention, there is provided an insulation spacer assembly including:

insulation spacers, each spacer including:

a top for supporting a roof; and

one or more legs depending from the top; and

one or more connection means for connecting the spacers together to define spaces in which insulation can be located or spaces adjacent insulation.

[0009] The connection means may be removable from the spacers. Advantageously, the connection means may include removable inserts for being received in the top and/or legs that can be easily be removed, or changed in lengths or different leg heights when required. The inserts may be 3D printed or molded, making them easier to manufacture and more robust for transport than tongues.

[00010] The connection means may include a plug and socket arrangement with a plug that is received in a socket. The plug may be axially received in the socket in line with the connected spacers. In use, each connection means connects adjacent spacers which can be serially arranged. The plug may include a sole pin which significantly enhances strength to the connection joint compared with known sheet metal tongues that are often subject to tearing under load. The pin may be metal, preferably solid steel to withstand greater loads than tongues. The plug may have an enlarged end. The enlarged end may be resilient. The enlarged end may include one or more protrusions or balls borne by the pin. The socket may include a passage for receiving the plug. The socket may include a terminus in which a free end of the plug is received. The terminus may be shaped to form a complementary fit with the plug. The socket may include a magnet.

[00011] Each top may include a top channel. The plug may include a top insert for being inserted in the top channel, and a pin extending from the insert. The top insert may be inserted in an end of the top channel, the end being distal a leg at the other end. Each leg may include a leg channel. Each socket may include a leg insert for being inserted in the leg channel, and defining a passage for receiving the plug. The leg insert may be further inserted into a top channel of the top. The leg insert may define one or more recesses for receiving respective lips of the top channel.

[00012] The connection means may include a lock for locking the plug and socket together. The lock may include an enlarged end of the plug for engaging in the socket to impede withdrawal of the plug from the socket. The enlarged end may be resilient. Th enlarged end may include one or more protrusions or balls of the plug. The protrusions or balls may be borne by a pin. The lock may include a magnet to impede withdrawal of the plug from the socket. The socket may include the magnet. Each spacer may include a sole leg depending from the top.

[00013] According to another aspect of the present disclosure, there is provided an insulation spacer assembly including:

a pair of insulation spacers, each spacer including:

a top for supporting a roof, and including one or more rib locators for being received in respective ribs of the roof; and

one or more legs depending from the top;

wherein the spacers include connection means for connecting the spacers together to define spaces in which insulation can be located or spaces adjacent the insulation.

[00014] The rib locators may be integrally formed with the top. The rib locators may be integrally formed with the top prior to shipping to the installation site. The rib locators may extend directly from the top, the top being a structural member. The top may include a structural beam or structural channel. Each rib locator may be U-shaped.

[00015] Each rib locator may include a clip for clipping in a respective rib. Each rib locator may include a pair of arms extending up from the top. Each arm may be resilient. Each arm may terminate in a curved free-end. Each rib may be trapezoidal.

[00016] Advantageously, the connection means may facilitate connection of the spacers together in a simple incremental manner when working at heights.

[00017] The connection means may include a tongue of one spacer for insertion in a slot of the other spacer. The tongue may be located at a free end of the spacer. The tongue may be tapered to facilitate connection. The slot may be located at an elbow of the other spacer. The spacers may be elongate and connected end to end. The connection means may be located at ends of the spacers.

[00018] Each spacer may include a body, including the top, that is integrally formed as a single piece. Each body may be formed by folding sheet material. Each body may form a channel for strength. The body may include one or more of the legs thereby providing a robust structure. Each spacer may further include another one of the legs coupled to the body. Each other leg may be U-shaped. Each other leg may be welded to the body providing a strong connection. Each top may include a fastening hole superimposed over each other leg. At least one of the legs may be tapered to facilitate insertion through the insulation.

[00019] The assembly may further include wire mesh for supporting the insulation. The insulation may be in the form of a blanket. The assembly may further include a purlin for supporting the mesh. The legs may include feet to facilitate fastening of the spacers to the purlin. The feet may include holes through which fasteners can pass.

[00020] According to another aspect of the present disclosure, there is provided an insulation spacer including:

a top for supporting a roof, and including one or more rib locators for being received in respective ribs of the roof; and

one or more legs depending from the top.

[00021] The spacer may further include connection means for connecting adjacent spacers together to define spaces in which insulation can be located or spaces adjacent the insulation.

[00022] According to another aspect of the present disclosure, there is provided an assembly method for assembling a roof using an insulation spacer, the method involving:

preforming the spacer offsite away from an installation site of the roof, the preformed spacer including a top for supporting the roof, the top including one or more rib locators for being received in respective ribs of the roof.

[00023] Advantageously, the preformed spacer may avoid the need to otherwise attach rib locators to the top when working at heights in assembling the roof.

[00024] The step of preforming may involve affixing the rib locators directly to the top. The step of affixing may involve welding, bolting or screwing. The step of preforming may involve forming one or more legs depending from the top.

[00025] The assembly method may involve fastening the preformed spacer to a purlin. The assembly method may involve locating one or more ribs of roof sheeting to receive respective rib locators of the preformed spacer. The assembly method may involve fastening the roof sheeting to the top of the preformed spacer.

[00026] Any of the features described herein can be combined in any combination with any one or more of the other features described herein within the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[00027] Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows:

[00028] Figure 1 is a side view of an assembled insulation spacer assembly;

[00029] Figure 2 is a perspective view of the unassembled insulation spacer assembly of figure 1;

[00030] Figure 3 is a perspective view of one end of a joiner spacer;

[00031] Figure 4 is a perspective view of the other end of the joiner spacer of Figure 3;

[00032] Figure 5 shows the interconnection of two joiner spacers of Figure 3;

[00033] Figure 6 is a perspective view of a partial insulation spacer;

[00034] Figure 7 shows interconnected spacers of the spacer assembly of Figure 6;

[00035] Figure 8 shows a partially assembled insulation spacer assembly in accordance with an embodiment of the present invention; and

[00036] Figure 9 shows various views of components of the insulation spacer assembly of Figure 8.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[00037] According to Figure 1, there is provided an insulation spacer assembly 100. The assembly 100 includes a pair of insulation spacers 102a, 102b. A starter spacer 102a is initially installed followed by a joiner spacer 102b that is then connected to the starter spacer 102a.

[00038] Each spacer 102 includes a top 104 for supporting a metal sheeting roof 106. Legs 108a, 108b depend from the top 104 and define spaces 110 in which insulation blankets (e.g. batts) can be located. The elongate spacers 102 include a tongue-in-slot connection means 111 for connecting the spacers 102a, 102b together end-to-end.

[00039] Advantageously, the connection means 111 at ends of the spacers 102a, 102b facilitates connection of the spacers 102a, 102b together in a simple incremental manner when working at heights.

[00040] Turning to figure 2, the connection means 111 includes a tongue 200 of the joiner spacer 102b for insertion in a slot 202 of the starter spacer 102a. The downward tongue 200 is located at a free end of the joiner spacer 102b and is tapered to facilitate insertion and connection. The slot 202 is located at an elbow of the starter spacer 102a.

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[00041] Each spacer 102 includes a bent body 204 , including the top 104, that is integrally formed as a single piece by folding sheet material. Each body 204 forms a channel for strength. Each body 204 includes the legs 108a thereby providing a robust structure. Each spacer 102 further includes another central leg 108b, separately formed, and coupled to the body 204 by welding to form a strong connection. Each central leg 108b is U-shaped and tapered to facilitate piercing insertion through the insulation. Each top 104 includes a fastening hole 206 superimposed over each central leg 108b for receiving a fastener (e.g. screw).

[00042] The legs 108 include feet 208 to facilitate fastening of the spacers 102 to a metal roof purlin 112 (see figure 1). The feet 208 include fastening holes 210 through which screw fasteners 114 can pass (see figure 1).

[00043] Returning to figure 1, the assembly 100 further includes mesh 116 for supporting the blanket insulation passing through the spaces 110. The assembly 100 also includes spaced purlins 112 or other rigid support beams, supporting the mesh 116, that are aligned with the co-incident spacers 102a, 102b.

[00044] Figures 3 and 4 show respective ends of a joiner spacer 102b’ in accordance with another embodiment.

[00045] A pair of tongues 200’ of one spacer 102b’ are inserted in respective slots 202’ of another like spacer 102b’. Each tongue 200’a is hooked, tapers at the tip, and is rounded to facilitate connection.

[00046] As can be seen in Figure 5, the tapered tips of the tongues 200’ of a held spacer 102b’ are inserted and hooked in respective slots 202’ of an affixed spacer 102b’, before the held spacer 102b’ is pivoted downwards and the tongues 200’ are fully inserted in the slots 202’ for fastening of the held spacer 102b’.

[00047] The embodiment of Figures 3 to 5 provides more strength and is easier to install than the embodiment of Figures 1 to 2.

[00048] An insulation spacer assembly 100” is shown in Figure 6.

[00049] As before, each spacer 102” includes a top 104 for supporting a sheet roof 106. However, the top 104 includes rib locators 600 for being received in respective trapezoidal ribs 602 of the sheet roof 106.

[00050] The rib locators 600 are integrally formed as a prefabricated single unit with the top 104. In particular, the rib locators 600 are integrally formed with the top 104 of the preformed spacer 102”, prior to shipping to the roofing installation site. The rib locators 600 extend directly from the top 104 which ,in turn, is a structural member able to bear the considerable load of the roof 106. The top 104 includes a structural U-shaped channel or a structural box beam.

[00051] As before, legs 108 depend from the top 104. The spacers 102” may include connection means 111 for connecting the spacers 102” together to define spaces 110 in which insulation can be located or spaces 110 adjacent the insulation.

[00052] Turning to Figure 7, each rib locator 600 forms a clip for clipping in a respective roof sheet rib 602. Each rib locator 600 is formed from sheet metal, and includes a pair of arms 700 extending up from the top 104. Each arm 700 is resilient. and terminates in a curved free-end. Each rib locator 600 is generally U-shaped with the arms 700 extending from a flat base panel.

[00053] An assembly method for assembling a roof 106 using the insulation spacer assembly 100” is briefly explained.

[00054] The method involves preforming the integral spacer 102” offsite in a factory, away from an installation site of the roof 106. The preformed spacer 102” includes the top 104 integral with the rib locators 600. In the factory, the rib locators 600 are permanently affixed directly to the top 104 by way of welding, bolting or screwing, in a precise manner. The preformed spacer 102” also includes the legs 108.

[00055] Advantageously, the preformed spacer 102” with rib locators 600 avoids the need to otherwise attach rib locators 600 to the top 104 when working at heights in assembling the roof 106, thereby resulting in improved time and safety.

[00056] The assembly method further involves transporting the preformed spacer 102” to site, and then fastening the preformed spacer 102” to the purlin 112 on site.

[00057] Next, the ribs 602 of the sheeting roof 106 receive respective rib locators 600 of the preformed spacer 102".

[00058] Finally, the precisely located sheeting roof 106 is securely screw-fastened to the top 104 of the preformed spacer 102".

[00059] The foregoing method results in the precise and efficient assembly of the roof 106, requiring less steps than alternative known methods.

[00060] According to an embodiment of the present invention, there is provided an insulation spacer assembly 100 as shown in Figure 8. The assembly 100 includes serially connectable insulation spacers 102. Each spacer 102 includes a top 104 for supporting a roof 106, and one or more legs 108 depending from the top 104. One or more removable connection means 800 are provided for connecting the spacers 102 together to define spaces 110 in which insulation can be located or spaces 100 adjacent insulation.

[00061] Advantageously, the connection means 800 includes removable inserts 802, 804 for being snugly received in the top 104 and legs 108 and that can be easily be removed, or changed in lengths or different leg heights when required. The inserts 802, 804 are 3D printed or molded, making them easier to manufacture and more robust for transport than the tongues 200, 200'.

[00062] The connection means 800 includes a plug and socket arrangement with a plug 806 that is received in a socket 808. The plug 806 is axially received in the socket 808 in line with the connected elongate spacers 102. In use, each connection means 800 connects adjacent spacers 102 which are serially arranged.

[00063] The plug 806 includes a sole pin 810 which significantly enhances strength to the connection joint compared with the sheet metal tongues 200, 200' that are often subject to tearing under load. The pin 810 is metal, and preferably solid steel to withstand greater loads than tongues 200, 200'. The plug 806 has an enlarged and resilient insertion end by virtue of a pair of protrusions or balls 812 borne by the pin 810.

[00064] The socket 808 includes a passage 814 for receiving the plug 806. The socket 808 also includes the insert 804 and an adjacent magnet 816.

[00065] Turning to Figure 9, the socket 808 defines an internal terminus 900 in which a free end of the pin 810 of the plug 806 is received. The terminus 900 is clover-shaped to form a complementary fit with the resilient insertion end of the plug 806 which is enlarged relative to the pin 810.

[00066] Each top 104 includes a top channel, preferably formed of metal. The plug 806 includes the top insert 802 for being inserted in the top channel, and the pin 810 extending from the insert 802. The pin 802 is received in a hole 902 defined by the top insert 802. The top insert 802 is inserted in an end of the top channel, distal a leg 108 at the other end.

[00067] Each leg 108 also includes a leg channel, preferably formed of metal. Each socket 808 includes the leg insert 804 for being inserted in the leg channel and the top channel, and defining the passage 814 for receiving the plug 806.

[00068] The leg insert 804 defines a pair of recesses 904 for receiving respective inward lips 906 of the top channel.

[00069] The connection means 800 includes a lock 910 for locking the plug 806 and socket 808 together. The lock 910 includes the enlarged insertion end of the plug 806 for engaging in the clover-shaped terminus 900 of the socket 808 to impede withdrawal of the plug 806 from the socket 808. The enlarged end is resilient and includes the protrusions or balls 812 of the plug 806 for snugly fitting in the clover-shaped terminus 900. The metal protrusions or balls 812 are borne by the metal pin 810, and the lock includes the attracting magnet 816 of the socket 808 to further impede withdrawal of the plug 806 from the socket 808.

[00070] The connection means 800 is faster to fit together by a worker onsite by simply pushing the pin 810 into the socket 808 using the ball locking insert design. Also, to secure the pin 810 in position, is the magnet 816 to ensure the pin 810 is locked in place so the worker knows the spacers 102 are in the correct position.

[00071] A person skilled in the art will appreciate that many embodiments and variations can be made without departing from the ambit of the present invention.

[00072] The dimensions in figure 2 are all shown in millimetres. A person skilled in the art will realise that these dimensions can be readily changed for purpose.

[00073] The spaces 110 can also be located adjacent the insulation with the insulation spacer assembly 100 preventing the roof 106 from crushing the insulation.

[00074] In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect.

[00075] Reference throughout this specification to ‘one embodiment’ or ‘an embodiment’ means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases ‘in one embodiment’ or ‘in an embodiment’ in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.

The claims defining the invention are as follows

1. An insulation spacer assembly including:
insulation spacers, each spacer including:
a top for supporting a roof; and
one or more legs depending from the top; and
one or more connection means for connecting the spacers together to define spaces in which insulation can be located or spaces adjacent insulation.

2. An insulation spacer assembly as claimed in claim 1, wherein the connection means is removable from the spacers.

3. An insulation spacer assembly as claimed in claim 2, wherein the connection means includes removable inserts for being received in the top and/or legs, and that can be easily be removed, or changed in lengths or different leg heights when required.

4. An insulation spacer assembly as claimed in in claim 1, wherein the connection means includes a plug and socket arrangement with a plug that is received in a socket.

5. An insulation spacer assembly as claimed in in claim 4, wherein the plug may be axially received in the socket in line with the connected spacers.

6. An insulation spacer assembly as claimed in in claim 4, wherein the plug includes a sole pin which significantly enhances strength to the connection joint compared with known sheet metal tongues that are often subject to tearing under load.

7. An insulation spacer assembly as claimed in in claim 6, wherein the pin is metal, preferably solid steel, to withstand greater loads than tongues.

8. An insulation spacer assembly as claimed in in claim 4, wherein the plug has an enlarged end, the enlarged end preferably being resilient.

9. An insulation spacer assembly as claimed in in claim 4, wherein the socket defines a passage for receiving the plug and a terminus in which a free end of the plug is received.

10. An insulation spacer assembly as claimed in in claim 9, wherein the terminus is shaped to form a complementary fit with the plug.

11. An insulation spacer assembly as claimed in in claim 4, wherein the socket includes a magnet.

12. An insulation spacer assembly as claimed in in claim 4, wherein each top includes a top channel, the plug including a top insert for being inserted in the top channel, and a pin extending from the insert.

13. An insulation spacer assembly as claimed in in claim 12, wherein the top insert is inserted in an end of the top channel, the end being distal a leg at the other end.

14. An insulation spacer assembly as claimed in in claim 4, wherein each leg includes a leg channel, the socket including a leg insert for being inserted in the leg channel, and defining a passage for receiving the plug.

15. An insulation spacer assembly as claimed in in claim 14, wherein the leg insert is further inserted into a top channel of the top and defines one or more recesses for receiving respective lips of the top.

16. An insulation spacer assembly as claimed in in claim 4, wherein the connection means includes a lock for locking the plug and socket together.

17. An insulation spacer assembly as claimed in in claim 16, wherein the lock includes an enlarged end of the plug for engaging in the socket to impede withdrawal of the plug from the socket.

18. An insulation spacer assembly as claimed in in claim 17, wherein the enlarged end is resilient, and/or includes one or more protrusions or balls of the plug.

19. An insulation spacer assembly as claimed in in claim 16, wherein the lock includes a magnet to impede withdrawal of the plug from the socket.

20. An insulation spacer assembly as claimed in in claim 4, wherein the socket includes a magnet.

21. An insulation spacer assembly as claimed in claim 1, wherein each spacer includes a sole leg depending from the top.

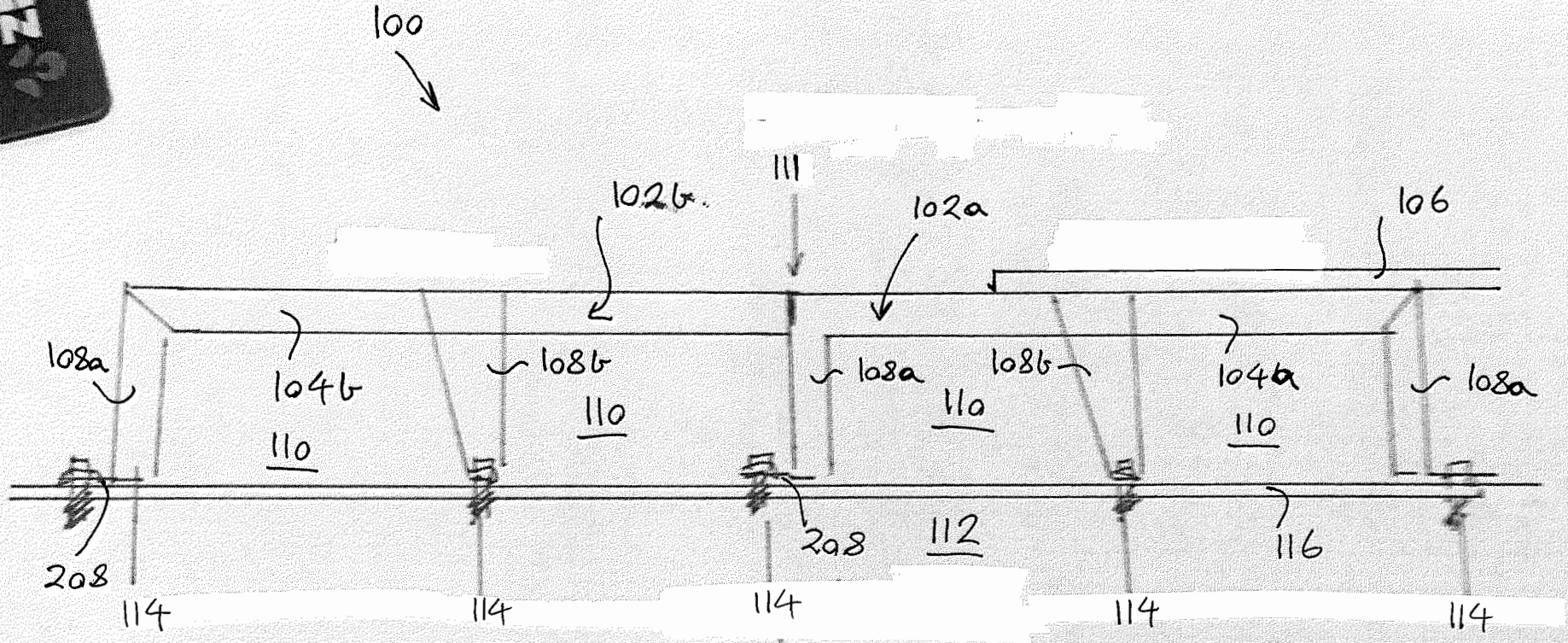
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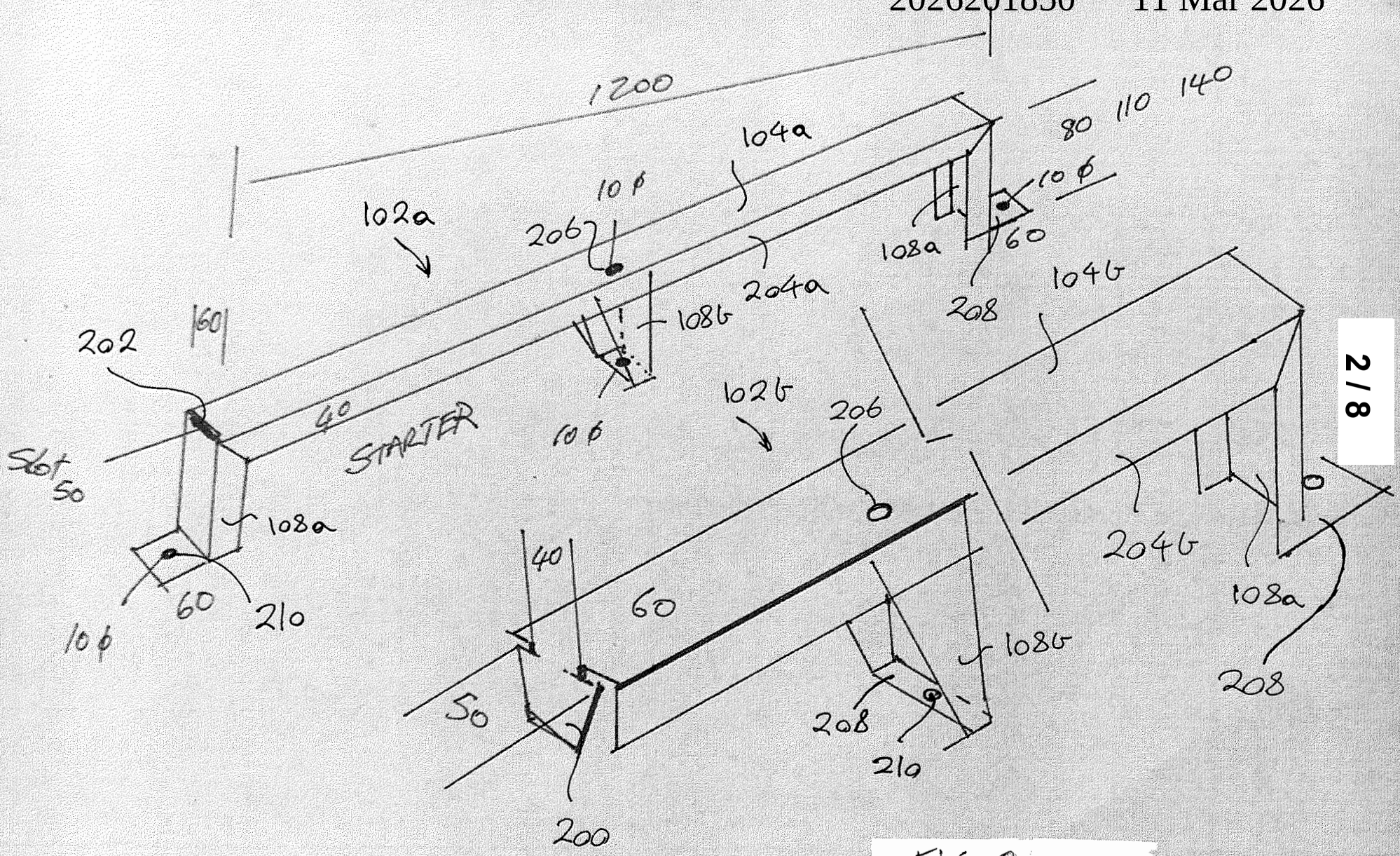
FIG. 1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140
10ϕ
108a
60
208
104b
102b
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FIG. 2

FIG. 3

FIG. 4

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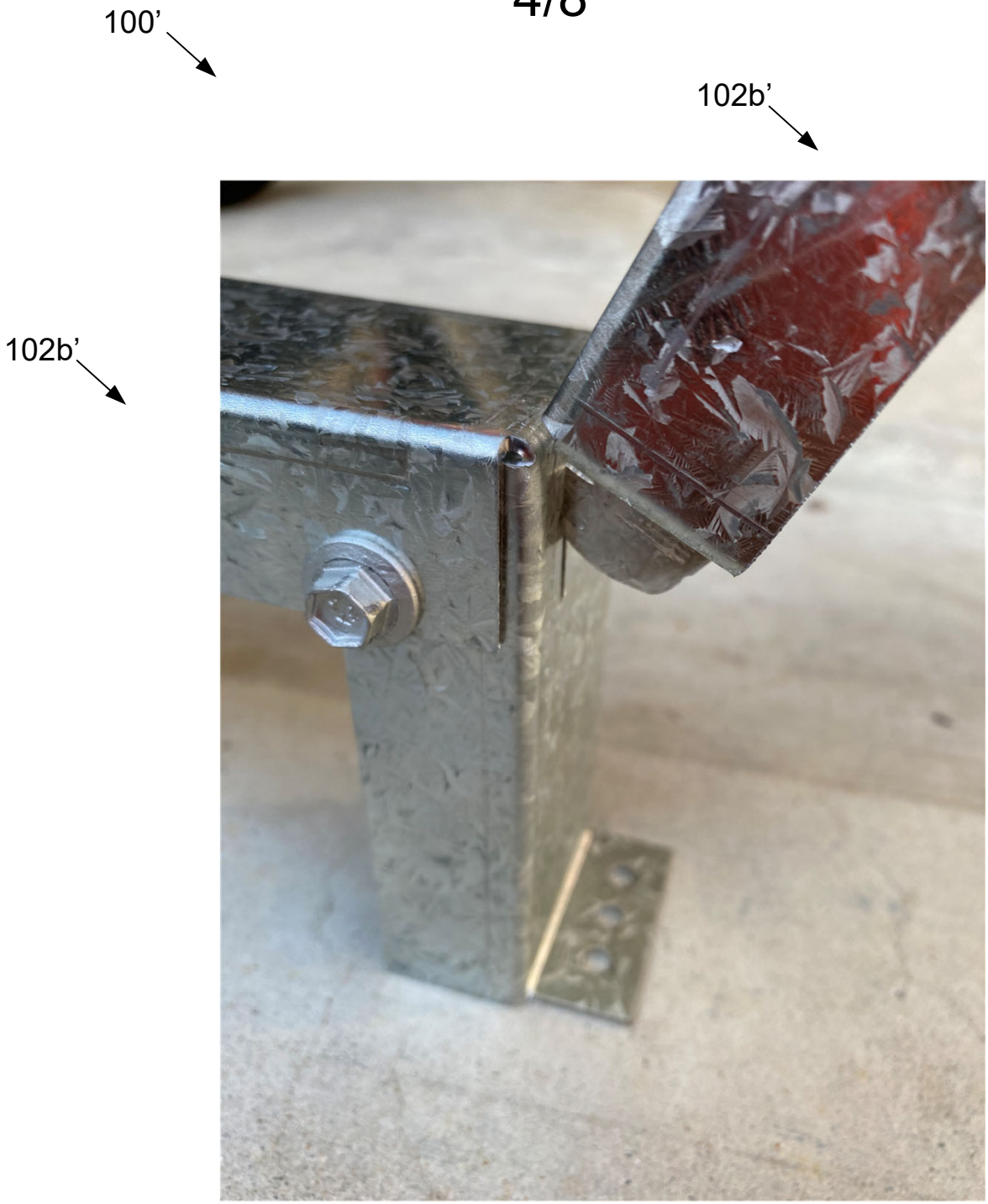

FIG. 5

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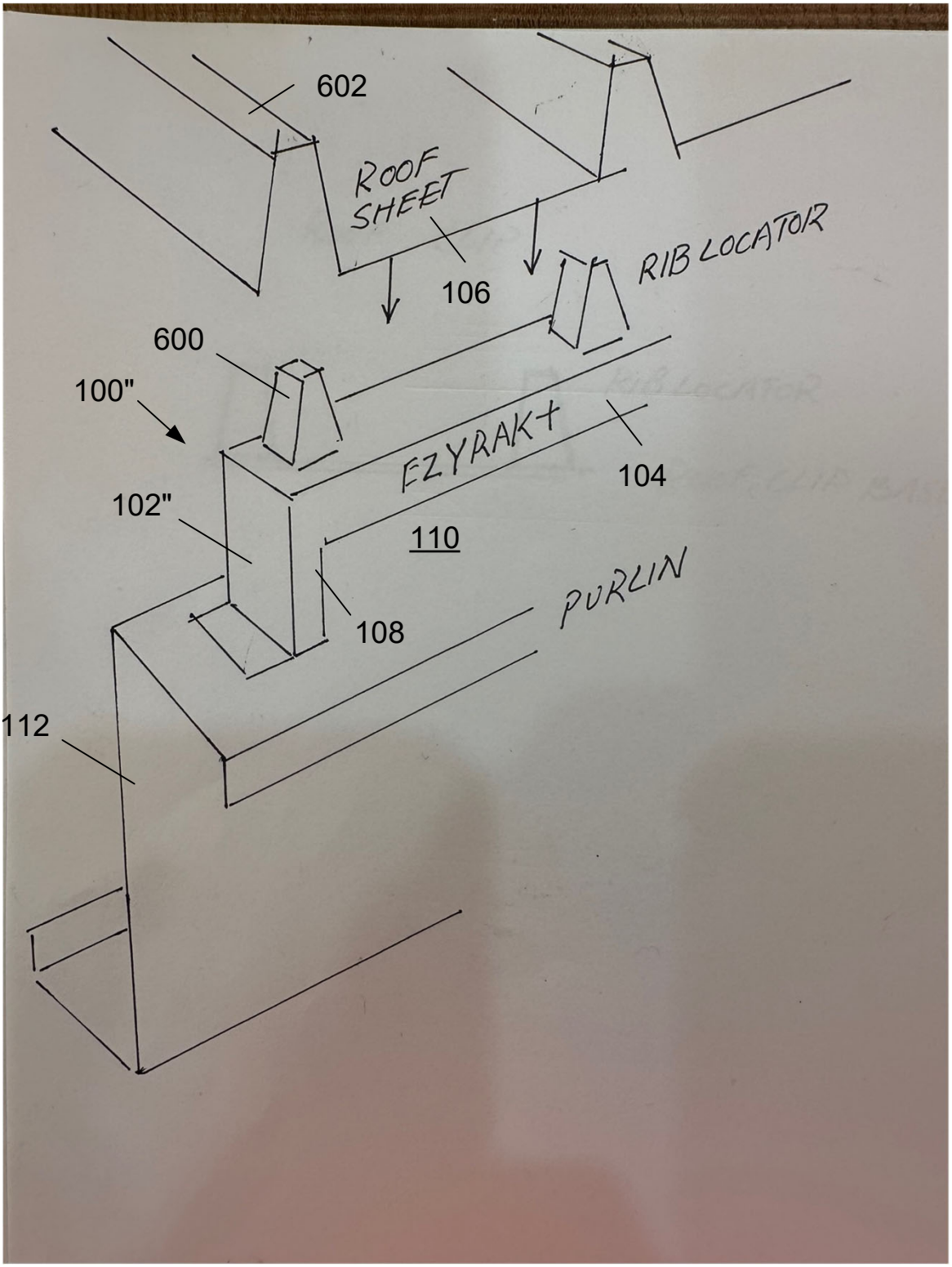

FIG. 6

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FIG. 7

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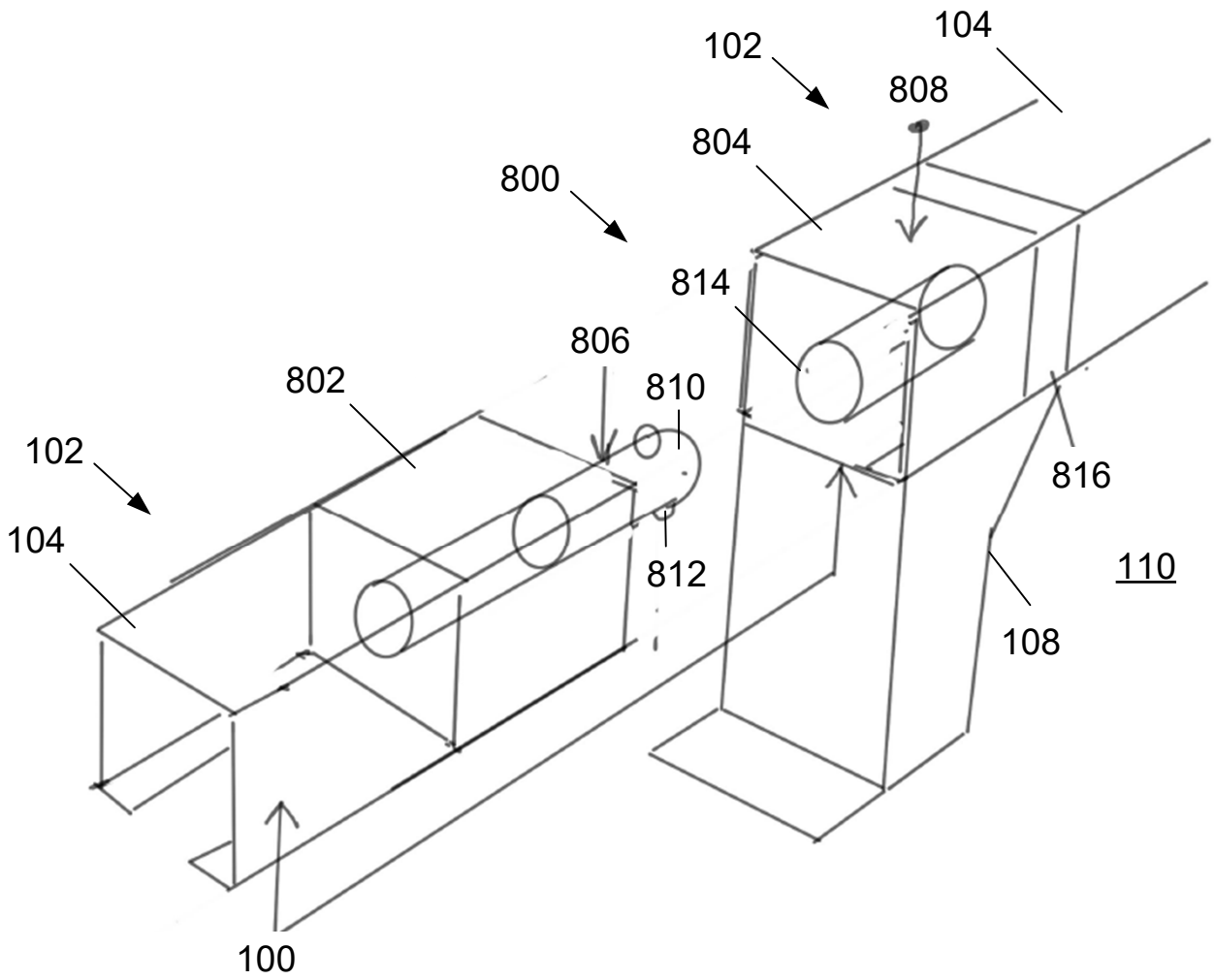

FIG. 8

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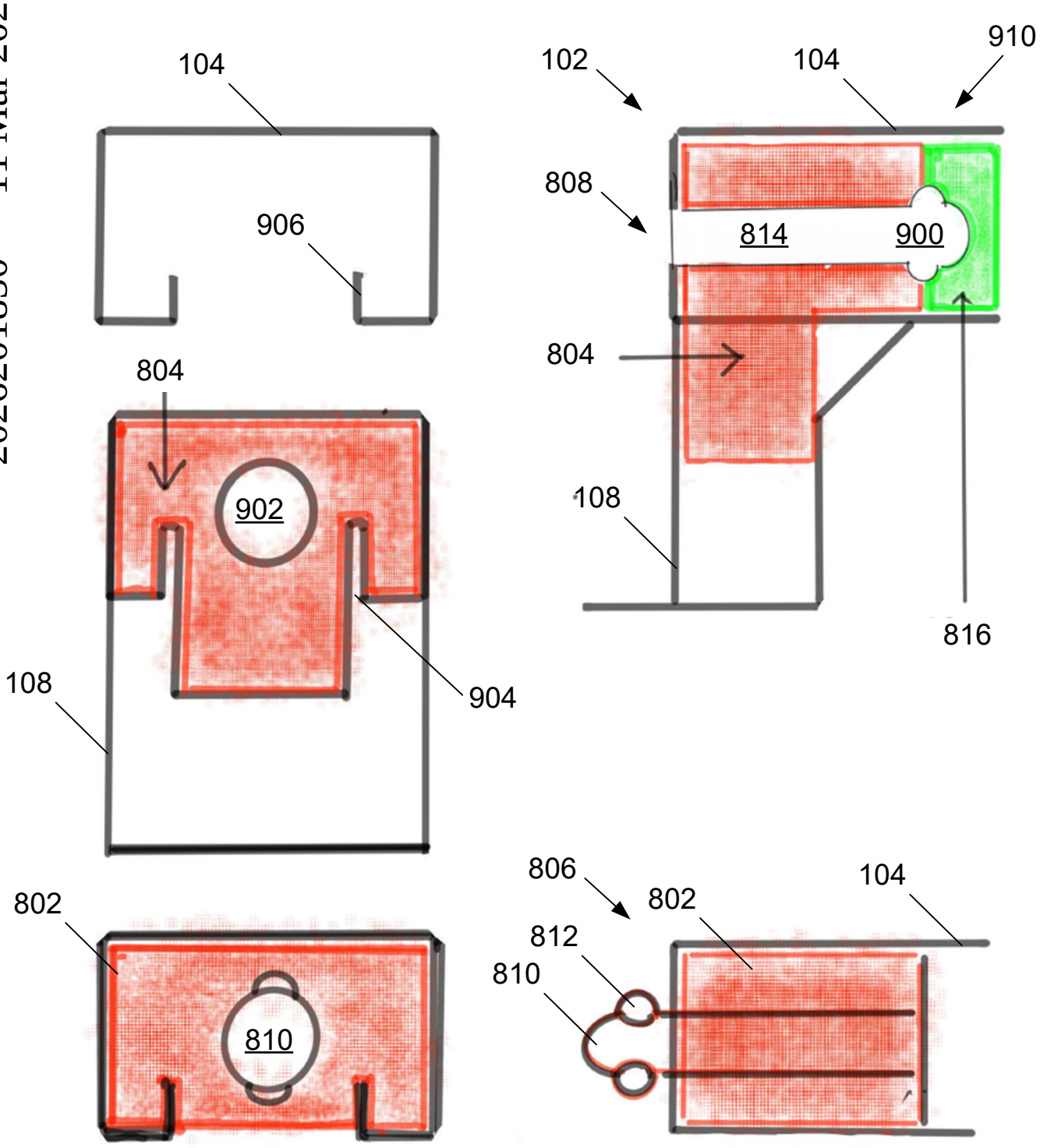

FIG. 9