

PATENTS EXAMINATION BOARD

Subject: The Drafting of Patent Specifications - Paper 1

Date: June 2021

Time: 09h00 -13h00 (although candidates requiring extra time are entitled to an additional two hours)

Examiners: L Cilliers
V Williams

Moderator: J D Whittaker

Question 1:

Your client hands you the following description and drawings of his new invention.

“My invention relates to a mechanism for determining the wear of an apex seal on a rotor of a Wankel rotary internal combustion engine without dismantling the engine.

The mechanism according to my invention is described below with reference to the attached drawings, in which FIG. 1 shows a partially sectioned, perspective view of a portion of a rotor and surrounding housing of a rotary internal combustion engine; FIG. 2 shows a longitudinal sectional view of the apex seal shown in FIG. 1; and FIGS. 3, 4 and 5 are views similar to FIG. 2, showing three different modifications of the apex seal.

In the drawings, numeral 10 designates a portion of a rotor housing of a Wankel rotary internal combustion engine, the housing 10 having a threaded spark plug receiving socket 11. A rotor 12 is mounted for rotation in the housing 10, and is provided with transversely disposed apex seals 14, each of which extends outwardly from a rotor apex 13. The apex seals 14 contact the inner surface of the housing 10 and serve to isolate a plurality of combustion chambers formed between successive apex seals 14 by the cooperative relationship between the rotor 12 and its surrounding housing 10.

The ‘wiping engagement’ between the rotor apex seals 14 and the rotor housing 10 causes the seals 14 to become worn, in use, and eventually it is

necessary to replace these seals. Currently, there is no way of determining the seal wear without a costly dismantling of the engine.

My invention provides a mechanism which enables a car owner to determine the accumulated wear on the seals 14 relatively quickly, and to determine the remaining life of these seals without resorting to a dismantling of the engine.

One way of accomplishing this is to provide the seals 14 with one or more openings 15 across the top thereof (see FIGS. 1 and 2 of the drawings). If more than one opening 15 is provided, the openings are arranged to extend to different depths from the seal wearing surface. For example, the depths may differ by increments of 0.02 inch or 0.04 inch. If only one opening 15 is provided, it may extend to the maximum permissible wear depth from the wearing surface such as, for example, to 0.1 inch. Preferably, the opening or openings 15 are filled with a suitable filler material 16 which is compatible with the material of the seal 14, and which is of a different colour to the colour of the seal 14, thereby to be readily visible. Such a filler material 16 may be a plastics material.

With such an arrangement, all that needs to be done to determine accumulated seal wear is to remove one of the spark plugs from the socket 11, align one of the apex seals 14 with the spark plug socket 11, and observe, through the socket 11, the number of openings 15 remaining. For example, if the seal 14 originally had five filled openings 15 varying in depth by 0.02 inch, i.e. a total permissible wear of 0.1 inch, and only one filled opening 15 remains, this will indicate that the seal 14 has already worn by at least 0.08 inch and less than 0.02 inch of wear remains before the replacement of the seal 14 will be necessary.

In FIG. 3, the apex seal 14 is provided with a tapered opening 17 which becomes transversely longer with increased depth, with the maximum depth corresponding to the maximum permissible wear. The opening 17 may be provided with a filler material 18, which may be of a different colour to the material of the seal 14. As the seal 14 wears, the visible insert of filler material 18 will become wider until it disappears at the maximum permissible wear.

Alternatively, as shown in FIG. 4, the apex seal 14 may be provided with a tapered opening 19 which becomes transversely shorter with increased depth, with less and less of a filler material 20 being observable with increasing wear.

A further version of my invention is shown in FIG. 5, in which the apex seal 14 is provided with a transversely disposed rectangular opening 21, into which three rectangular inserts 22, 23 and 24 are stacked. These inserts may be of different colours, for example, green at the top, yellow in the centre and red at the bottom. The colour of the observable inserts 22, 23 or 24 will indicate the degree of wear, with the maximum permissible wear being reached when the bottom insert 24 has disappeared."

Your client tells you that he can envisage using his invention to indicate wear on various different seals.

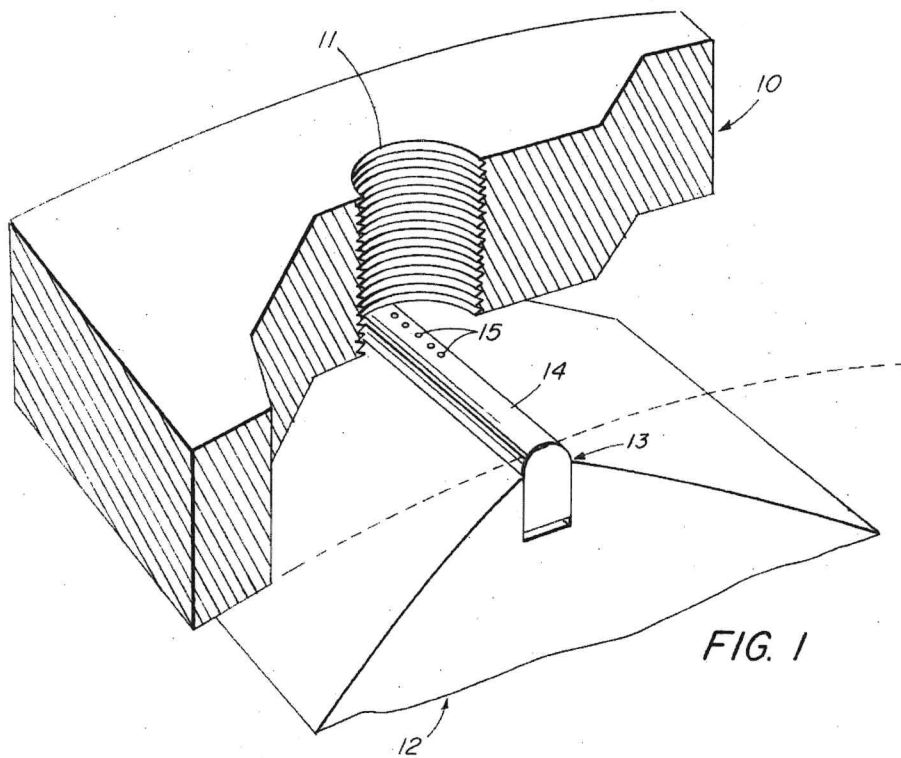


FIG. 1

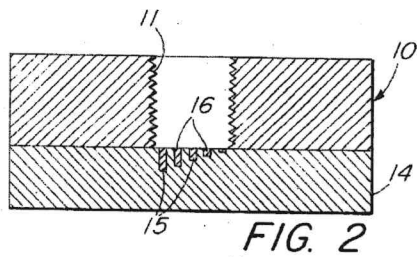


FIG. 2

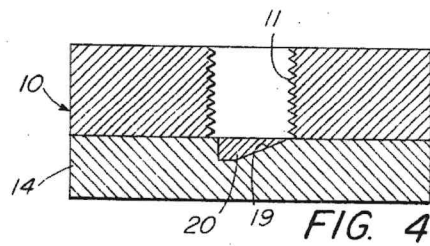


FIG. 4

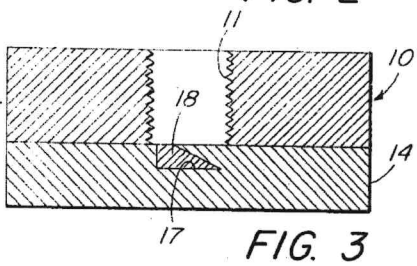


FIG. 3

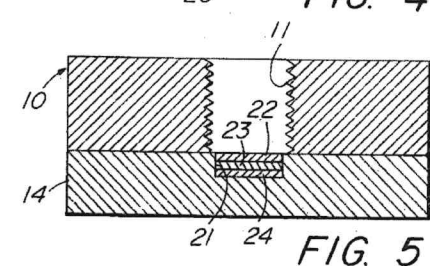


FIG. 5

The candidate is required to identify the inventive feature(s) of the invention, and to draft up to three claims to protect the invention.

Question 2:

Your client, who has filed numerous patents with you in the past, hands you the following attempt by him at drafting a description of his latest invention, and he asks you to prepare a set of claims on the basis of the description.

"BACKGROUND

Metal panels are being used to define building surfaces such as roofs and sidewalls. One type of metal panel is a standing seam panel, where portions of adjacent panels are interconnected in a manner that forms a standing seam between the panels. Standing seam panels are expensive compared to other types of metal panels. Often, it is desirable to install different types of structures on building surfaces, for example air conditioners, solar panels, ventilation equipment or a snow retention assembly. Installing structures on standing seam panels traditionally requires puncturing the panels to accommodate fasteners, such as conventional bolts and nuts. Puncturing a standing seam panel is undesirable because these panels are relatively expensive, and a puncture may serve as a localised stress raiser in the panel, and may increase the potential for leakage and/or the potential for corrosion in the surrounding area of the panel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a snow retention cross member assembly mounted on a roofing surface;

FIG. 2 is a perspective view of a mounting device according to the invention for clamping together a standing seam of two adjacent panels of a roofing system; FIG.3 is an end view of the mounting device of FIG. 2 in an open, non-clamping configuration;

FIG. 4 is an end view of a first clamping member of the mounting device of FIG. 2;

FIG. 5 is an end view of a second clamping member of the mounting device of FIG. 2;

FIG. 6 illustrates the relative positions of the first and second clamping members of FIGS. 4 and 5 in a closed, clamping configuration;

FIG. 7A is an end view of a mounting device according to another embodiment of the invention in an open, non-clamping configuration;

FIG. 7B is an end view of the mounting device of FIG. 7A in a closed, clamping configuration;

FIG. 8A is an end view of a mounting device according to a third embodiment of the invention in an open, non-clamping configuration; and

FIG. 8B is an end view of the mounting device of FIG. 8A in a closed, clamping configuration.

DETAILED DESCRIPTION

FIG. 1 illustrates a roofing system 10 which includes a cross member assembly 30 installed on a roofing surface 12 to provide a snow retention function. The roofing surface 12 slopes downwardly in the direction of the

arrow A, from an upper edge 16 to a lower edge 14. Multiple panels 18 collectively define the roofing surface 12, with each adjacent pair of panels 18 being interconnected by a "panel joint" in the form of a standing seam 20 (only schematically illustrated in FIG. 1), and with each panel 18 forming a generally planar section 22 between adjacent pairs of standing seams 20. The assembly 30 includes mounting devices 34 which are mounted to the standing seams 20 with conventional fasteners in the form of bolts and nuts. A cross member 32 extends through, and is held captive by, adapters 36 on the mounting devices 34, and is thereby firmly supported on the roofing surface 12.

In FIGS. 2 and 3 of the drawings, a roofing system 40 according to the invention includes a plurality of mounting devices 50 on a roofing panel assembly 120. Each panel joint, i.e. the interconnection of a pair of adjacent panels 122, is in the form of a standing seam 130. Typically, the roofing system 40 utilizes the plurality of mounting devices 50 to mount a structure, such as the snow retention cross member assembly 30 shown in FIG. 1, on the panel assembly 120.

Each mounting device 50 includes a first clamping member 60, a second clamping member 90, a pair of clamping fasteners 114 and an attachment fastener 52 for allowing an attachment to be fastened to the device 50.

With reference to FIGS. 2 to 4 of the drawings, the first clamping member 60 includes a mounting flange 62, a first transition section 70, and a first panel joint capture section 78. The mounting flange 62 includes an upper surface 66 and an oppositely disposed lower surface 68. Although the orientation of the mounting flange 62 shown in this embodiment may be parallel to a roofing surface defined by the panel assembly 120, it could also be disposed vertically, or at any desired angle relative to the roofing surface. An aperture 64 is provided in the mounting flange 62 for receiving the attachment fastener 52. The first transition section 70 has a pair of unthreaded holes 72 extending through a first flat section 74 (see FIG. 4), and a first registration member in the form of a shoulder projection 76. The first panel joint capture section 78 includes an upper section 80 and a sidewall section 82 which terminates in a first hook 84.

Referring now to FIGS. 2, 3, 5 and 6, the second clamping member 90 includes a second transition section 92 and a second panel joint capture section 102. The second transition section 92 has a second flat section 96 and a stepped recess 100 which are configured to be received in register by the first flat section 74 and the shoulder projection 76, respectively, in a clamping condition which is shown in FIGS. 2 and 6. A threaded hole 94 (see FIG. 3) is defined in the second flat section 96 for receiving a threaded shaft 116b of the clamping fastener 114 to permit the first and second clamping members 60 and 90 to be urged towards the clamping condition when a head 116a of the fastener 114 is tightened. The second transition section 92 further includes an upper flat section 98 that mates with the bottom surface 68 of the mounting flange 62 in the clamping condition. The second panel joint capture section 102 includes a first curved section 104 and a sidewall section 106 which terminates in a second hook 108.

The standing seam 130 is formed by interconnecting, in nesting fashion, right and left seam sections 124 and 126 of adjacent panels 122 (see FIG. 3). A first sidewall 132a, an upper section 136, and second sidewall 132b collectively define an open space 138 within an interior of the standing seam 130. The first sidewall 132a includes an indentation or recess 134a on an exterior of the seam 130, and the second sidewall 132b includes an indentation or recess 134b on the exterior of the seam 130. The indentations 134a and 134b are disposed at different elevations along the height of the seam 130.

In preparation for installing the mounting device 50 on the seam 130 of the panel assembly 120, the clamp fasteners 114 are rotated about their respective axes 118 to increase a space 110 (see FIG. 6) defined between the first and second panel joint capture sections 78 and 102 so that the device 50 can receive an upper bulbous portion of the seam 130, extending between the recesses 134a and 134b, as shown in FIG. 3. Securing the mounting device 50 in position on the seam 130 to allow a structure to be mounted on the roof is achieved by rotating the clamp fasteners 114 in a clamping direction which serves to bring the first and second clamping members 60 and 90 towards one another, until a clamping condition is reached in which the first and second panel joint capture sections 78 and 102 clamp and retain the upper bulbous portion of the seam 130, with the hooks 84 and 108 snugly received within the recesses 134a and 134b, respectively.

The specific shape of the upper bulbous portion of the seam 130 may vary, and the mounting device 50 does not necessarily need the hooks 84 and 108. For example, FIGS. 7A and 7B illustrate a mounting device 50' including first and second panel joint capture sections 78' and 102' which are shaped to capture an upper bulbous portion of a seam 140 with only one hook 108'. Also, FIGS. 8A and 8B illustrate a mounting device 50'' including first and second panel joint capture sections 78'' and 102'' which are arcuate-shaped to capture an upper bulbous portion of a seam 142 without any hooks."

FIGS. 1 to 8B of the drawings appear on pages 7 to 16 below.

The candidate is required to identify the inventive feature(s) of the invention, and to draft up to three claims to protect the invention.

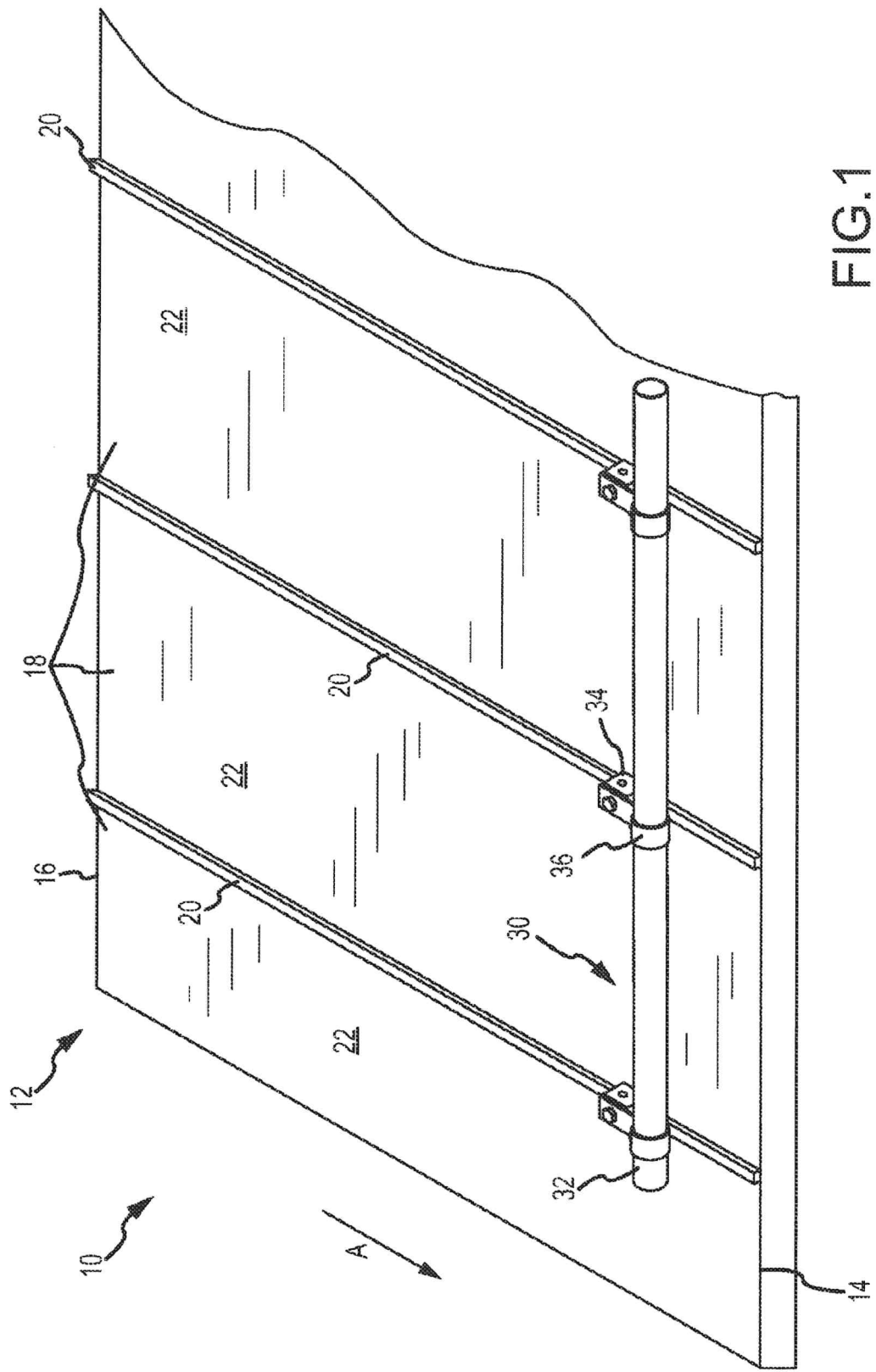


FIG.1

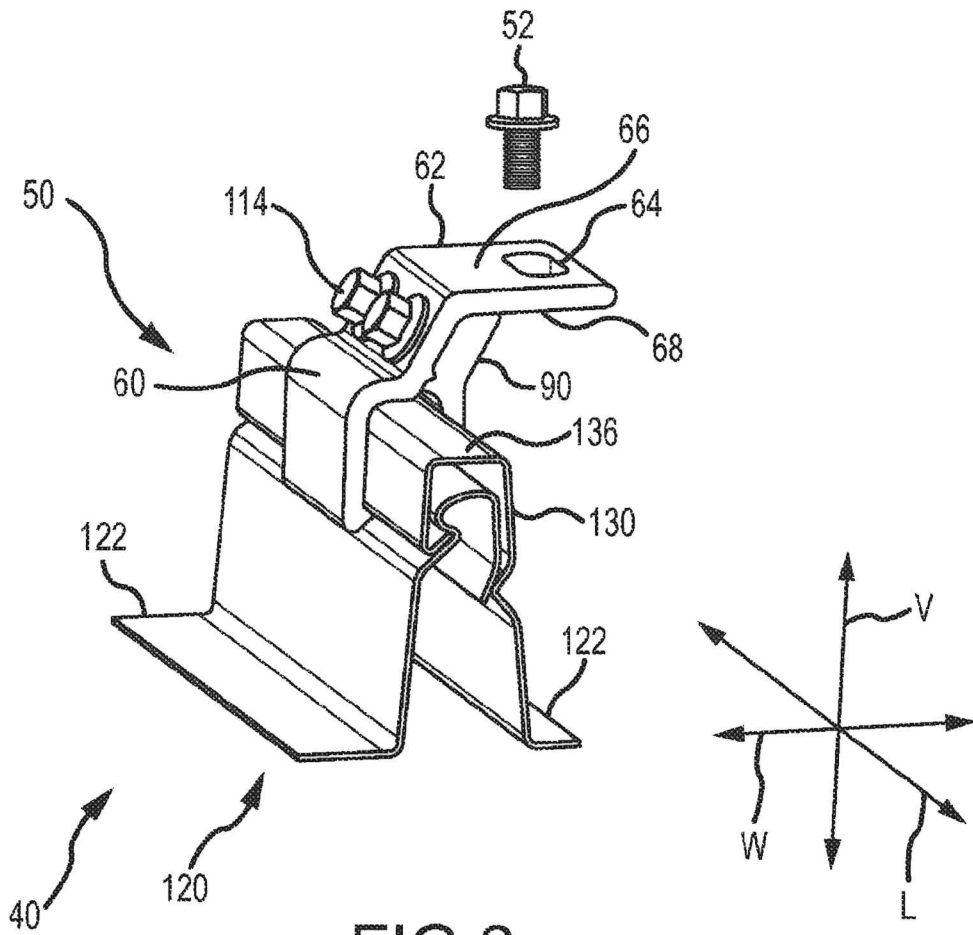


FIG. 2

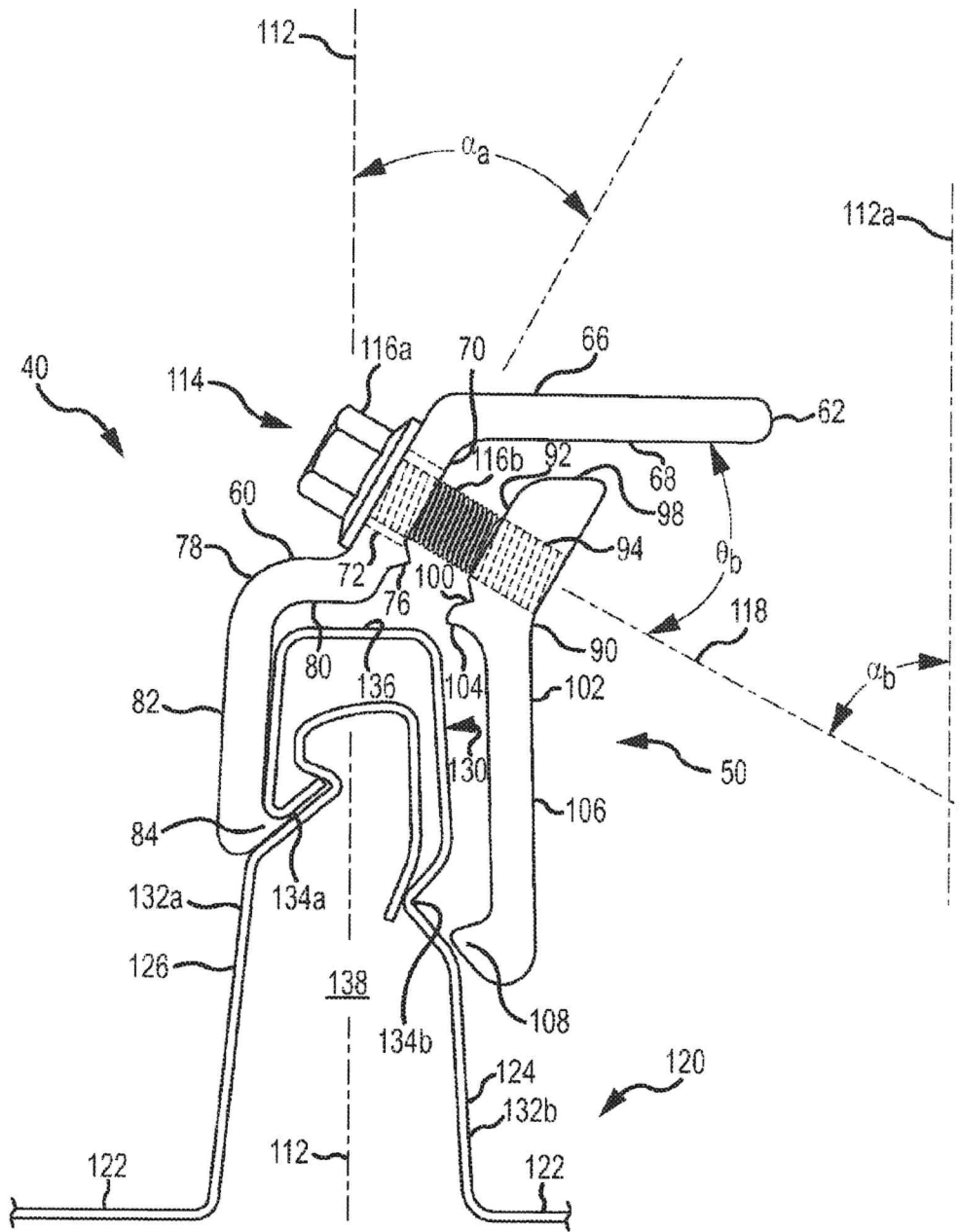


FIG. 3

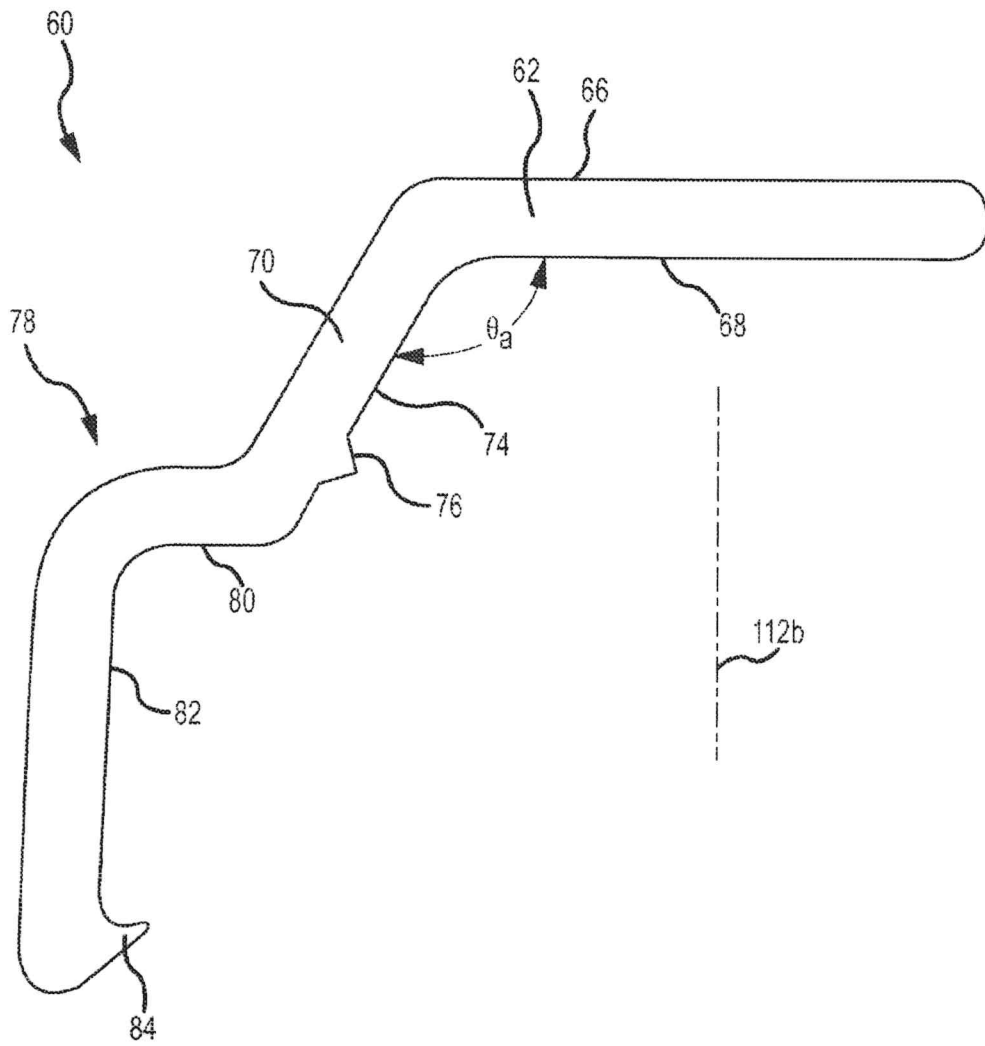


FIG. 4

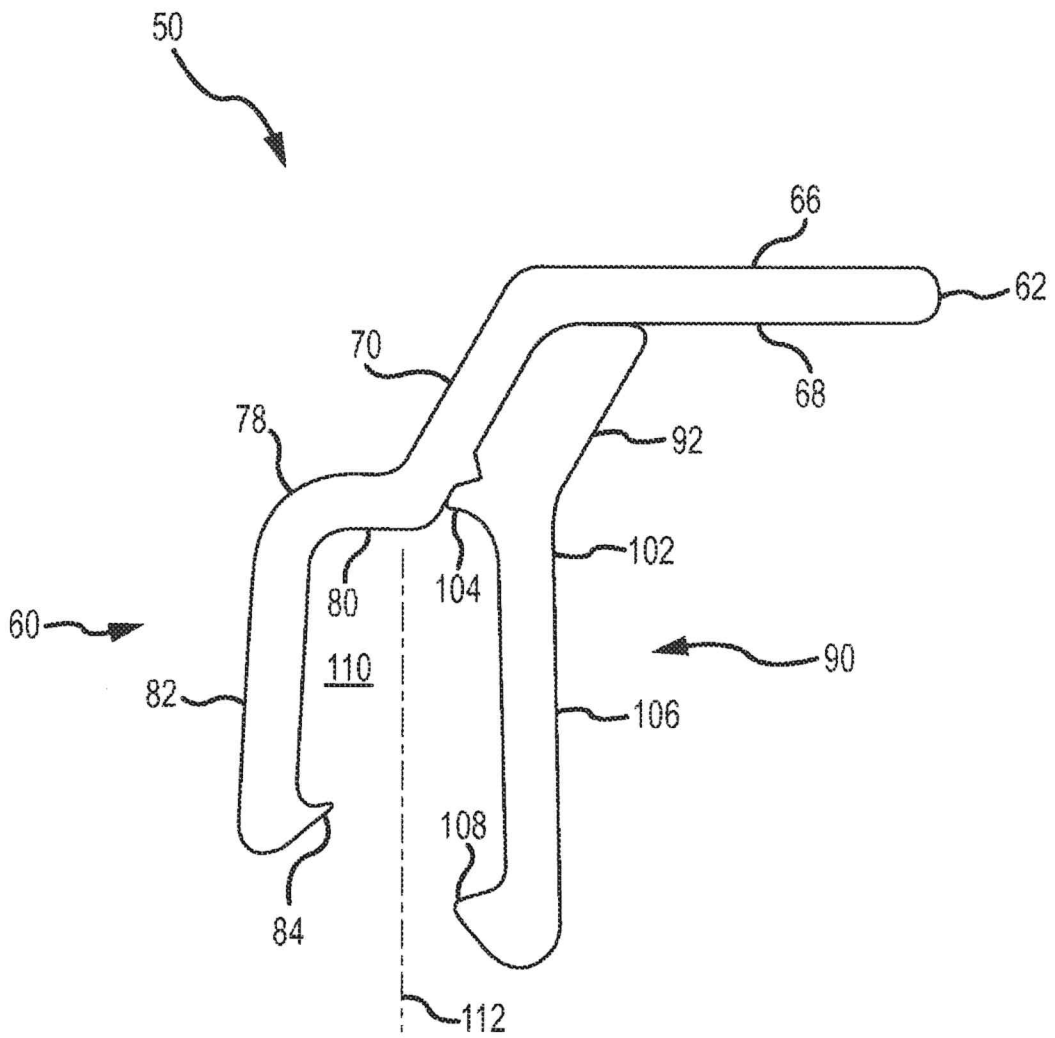


FIG. 6

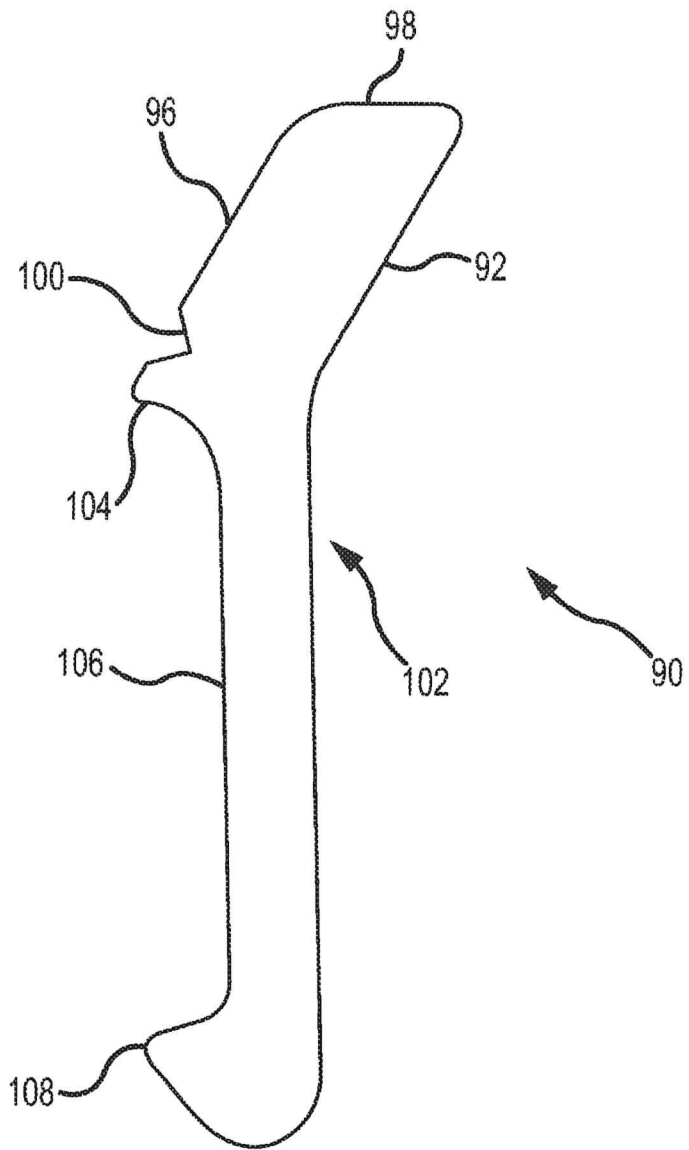


FIG. 5

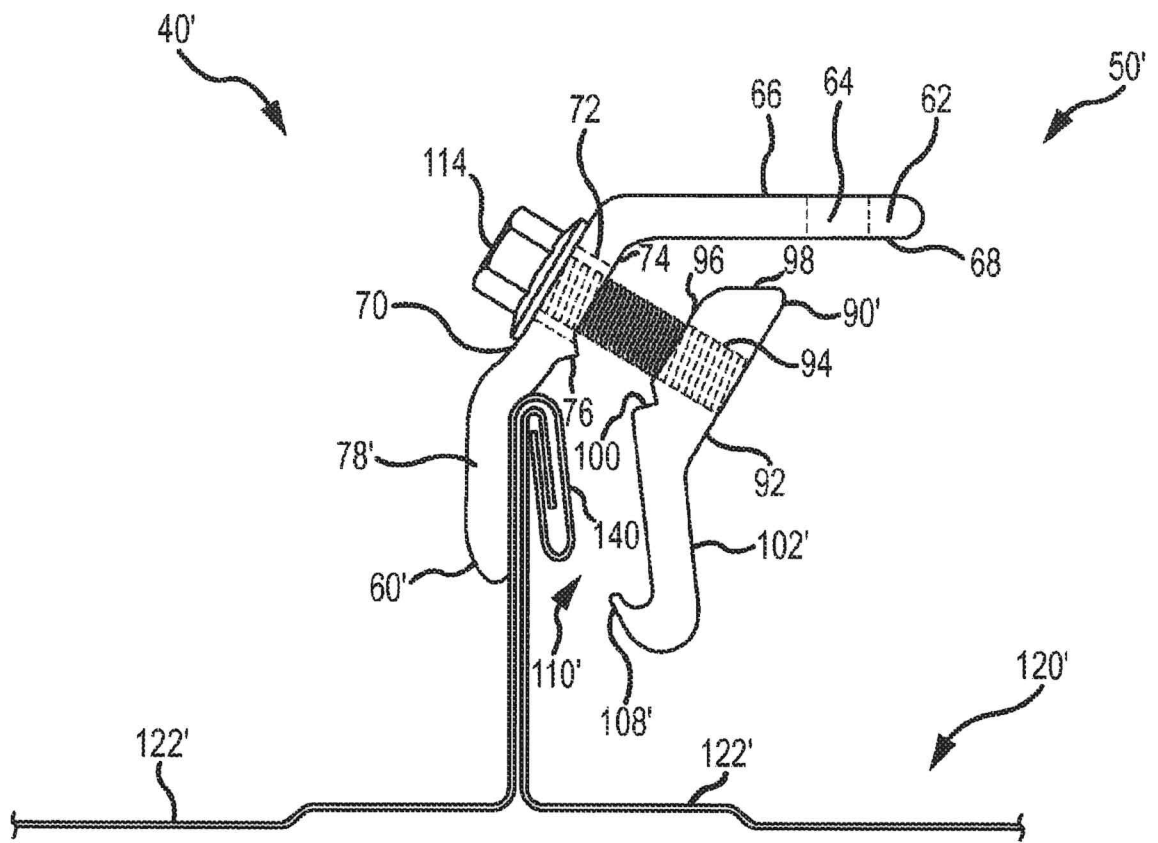


FIG. 7A

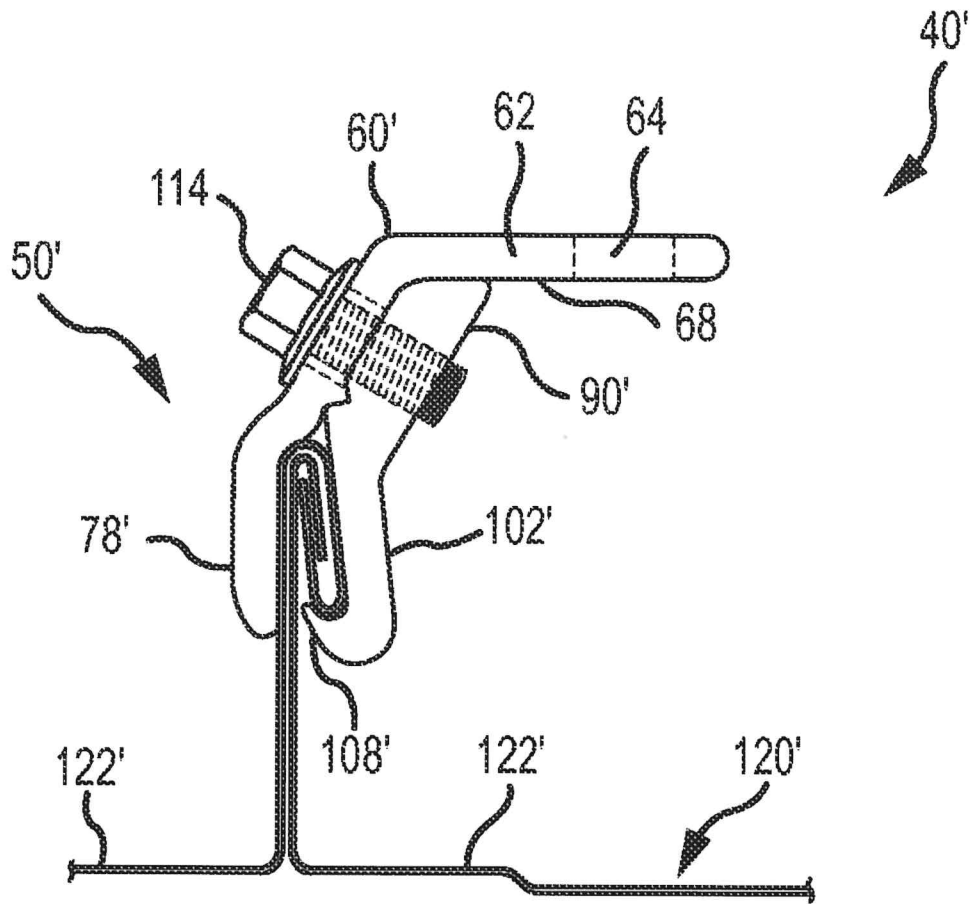


FIG. 7B

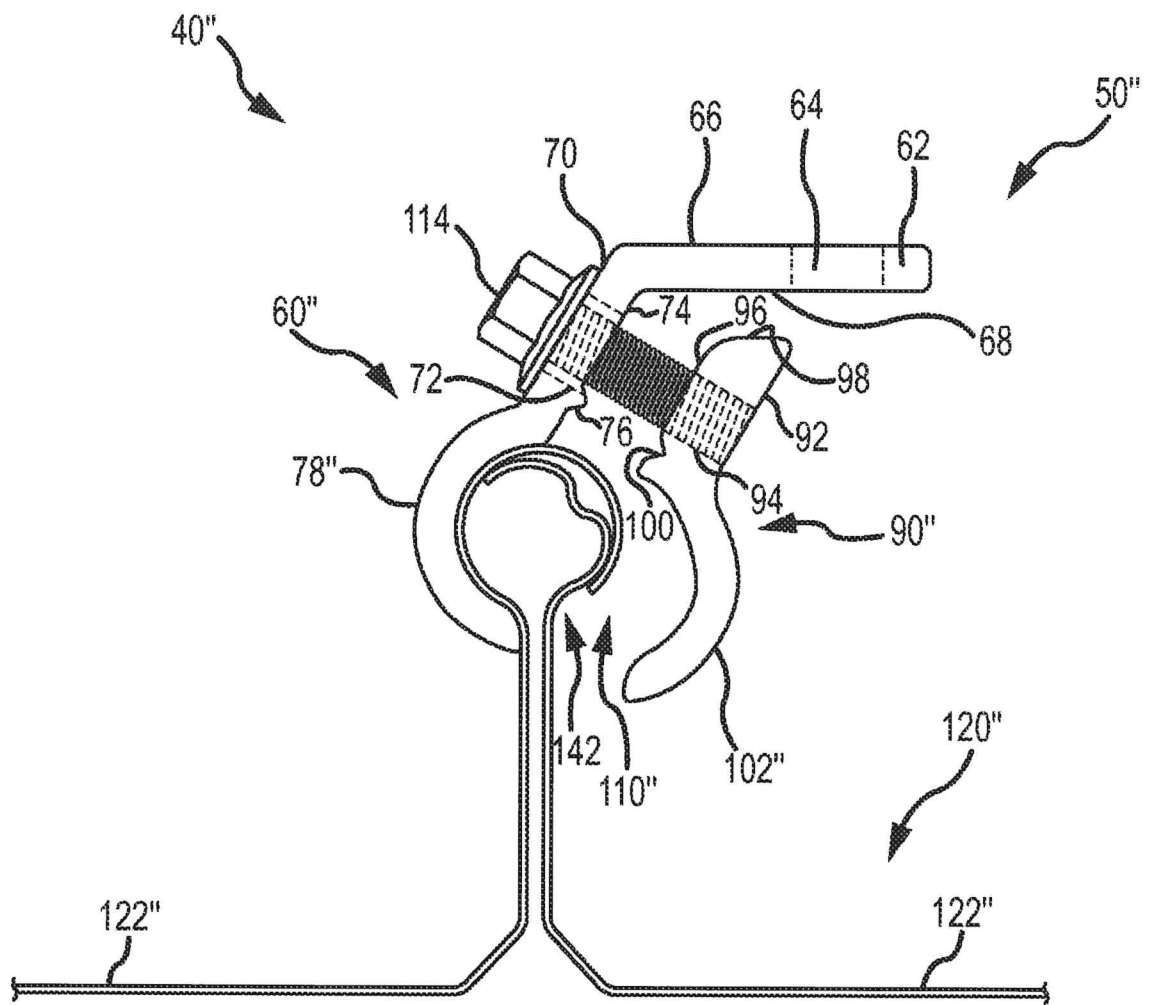


FIG. 8A

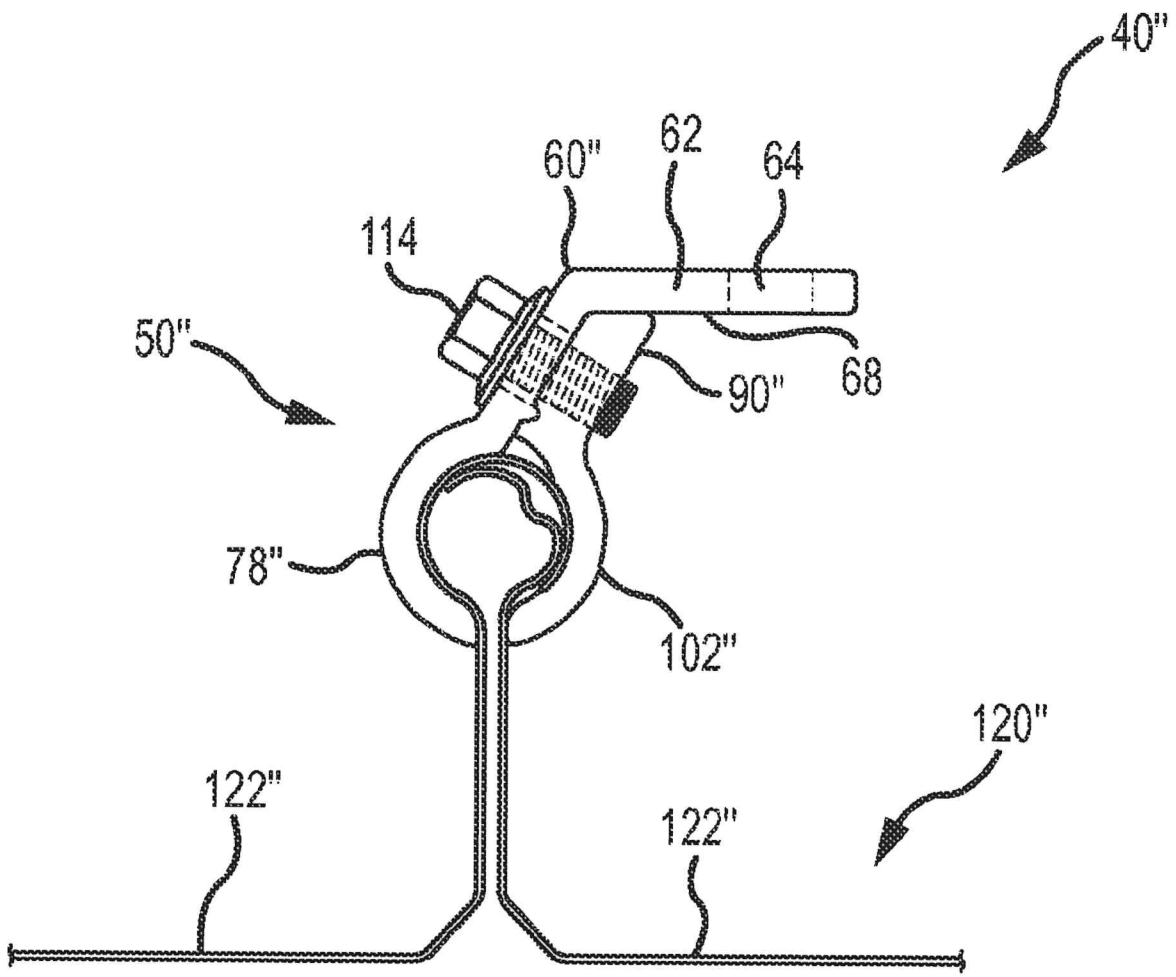


FIG. 8B