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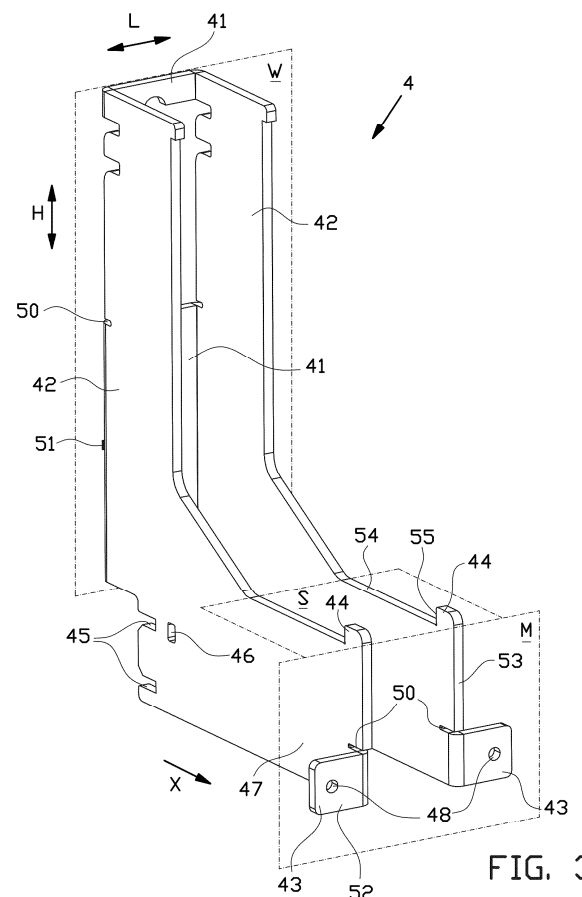
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(54) **SUPPORT SYSTEM FOR SUPPORTING A FACADE, CONSOLE FOR USE IN SAID SUPPORT SYSTEM AND BUILDING COMPRISING THE SUPPORT SYSTEM**

(57) The invention relates to a support system for supporting a facade element relative to a wall, wherein the support system comprises a facade support for supporting the facade element in a support plane and one or more consoles for mounting the facade support relative to the wall, wherein the facade support is substantially Z-shaped and comprises a central part, and a support flange and a seating flange that project away from the central part at opposite sides of the central part, wherein the facade support is provided with a plurality of receiving slots that extend through the seating flange, wherein each of the one or more consoles comprises one or more hooks that protrude in a direction normal to the seating plane, and wherein each hook is arranged to be received in a respective one of the receiving slots for retaining the seating flange in the projection direction.

**FIG. 3****EP 4 772 706 A1**

Description

BACKGROUND

[0001] The invention relates to a support system for supporting a facade. The invention further relates to a console for use in said support system. The invention further relates to a building comprising the support system.

[0002] US2022/0243480A1 discloses a facade support system for supporting a veneer on a structure including a bracket configured to be attached to the structure. The bracket includes a back panel having opposite front and rear faces and a connecting member extending from the back panel in a generally forward direction. The connecting member defines a recess adjacent a front end of the connecting member. The bracket includes a support attachment member at least partially disposed within the recess. The facade support system includes a veneer support constructed to be attached to the bracket by the support attachment member. The veneer support is constructed to be disposed in a mortar bed joint of the veneer.

SUMMARY OF THE INVENTION

[0003] A disadvantage of the facade support system of US2022/0243480A1 is that the entire weight of the veneer and the veneer supports is supported in the vertical direction by the support attachment members only. Additionally, the support attachment members have to counter the moment imposed on the veneer support by the weight of the veneer. Accordingly, the support attachment members are subjected to stresses in multiple directions and are prone to mechanical failure. Hence, the support attachment members have to be dimensioned to withstand said stresses.

[0004] As a consequence, the support attachment member protrudes relative to the mounting flange of the veneer support. Accordingly, the veneer cannot be placed flush with the mounting flange. In other words, the veneer has to be placed at a distance from the mounting flange. Hence, the moment imposed on the veneer support by the weight of the veneer is increased. Thus, a stronger veneer support and/or stronger support attachment members are required in order to support the weight of the veneer.

[0005] A further disadvantage of the known facade support systems is that the veneer support and the brackets have to be assembled on the building site. More particularly, the veneer support can only be attached to the hooks of the brackets after said brackets have been mounted to the wall. Accordingly, an accurate placement of the brackets is required to prevent misalignments relative to the veneer support. The accurate placement of the brackets can be time consuming and expensive. Additionally, inaccurate placement of the brackets can lead to deformations and/or failure of the veneer support.

[0006] It is an object of the present invention to over-

come one or more of the abovementioned disadvantages.

[0007] According to a first aspect, the present invention provides a support system for supporting a facade element relative to a structural element of a building, wherein the support system comprises a facade support for supporting the facade element in a support plane, wherein the facade support extends in a first direction parallel to said support plane, wherein the support system further comprises one or more consoles for mounting the facade support relative to the structural element, wherein the one or more consoles are distributed along the facade support in the first direction, wherein the consoles are arranged to be mounted to the structural element in a first mounting plane that is spanned by first direction and a second direction perpendicular to the first direction, wherein each console extends in a projection direction normal to the first mounting plane, wherein the facade support comprises a central part that extends in the first direction wherein the facade support further comprises a support flange and a seating flange that both extend in the first direction and project away from the central part at opposite sides of the central part, wherein the support flange protrudes from the central part in the projection direction, wherein the support flange comprises a support surface that extends in the support plane for supporting the facade element, wherein the seating flange projects from the central part in a direction opposite to the projection direction, wherein the seating flange comprises a seating surface that is arranged to be supported on the one or more consoles in a seating plane, wherein the central part comprises a mounting surface for abutting the one or more consoles in a second mounting plane that intersects with the support plane along the first direction, wherein the facade support is provided with a plurality of receiving slots that extend through the seating flange, wherein each of the one or more consoles comprises one or more hooks that protrude in a direction normal to the seating plane, wherein each hook is arranged to be received in a respective one of the receiving slots for retaining the seating flange in the projection direction.

[0008] Hence the one or more consoles can support the weight of the facade by supporting the seating flange in the seating plane. Additionally, the hooks can counter the moment imposed on the facade support by the weight of the facade without having to counter the weight of the facade itself. Accordingly, the hooks are less prone to mechanical failure.

[0009] In an embodiment thereof, the one or more hooks are arranged between the first mounting plane and the second mounting plane in the projection direction. In other words, the hooks do not protrude from the second mounting plane in the projection direction. Hence, the central part of the facade support can be mounted flush to the console in the second mounting plane. Accordingly, the facade can be placed on the facade support closer to the console. Hence, the moment

imposed on the facade support by the weight of the facade can be reduced. Hence, the facade support is less prone to mechanical failure.

[0010] In a further embodiment, the one or more hooks each comprise an abutment surface facing towards the projection direction for abutting a part of the seating flange in the projection direction. Preferably, the abutment surface is spaced apart from the second mounting plane in the projection direction over a distance of at least five millimeters, preferably over a distance of five to twenty millimeters, such as twelve millimeter.

[0011] In a further embodiment thereof, the abutment surface extends parallel or substantially parallel to the second mounting plane.

[0012] In a further embodiment, the second mounting plane extends parallel or substantially parallel to the first mounting plane.

[0013] In a further embodiment, the seating plane extends parallel or substantially parallel to the support plane. Accordingly, forces applied normal to the support plane, e.g. the weight of the facade, can be applied normal to the seating plane as well.

[0014] In a further embodiment, the support plane extends normal to the first mounting plane. Preferably, the support plane is a horizontal or substantially horizontal plane. Accordingly, the first mounting plane is a vertical or substantially vertical plane.

[0015] In a further embodiment, the facade support comprises a Z-shaped or substantially Z-shaped cross section along the first direction. Preferably, the seating flange and the support flange are parallel or substantially parallel. The support flange can project from the central part at a bottom region, preferably at the bottom, of the central part. Accordingly, the seating flange can project from an upper region, preferably the top, of the central part. Hence, a distance between the seating flange and the support flange can be increased. Hence, a force on the hook resulting from the moment imposed by the weight of the facade on the support flange can be reduced.

[0016] In a further embodiment, the console comprises a back plate having a first mounting surface that extends in the first mounting plane for abutting the structural element, and one or more legs that extend away from the back plate in the projection direction, wherein each of the one or more hooks is provided at an end portion of a respective one of said one or more legs in the projection direction. Preferably, the console is produced or manufactured by cutting a sheet of metal and bending said sheet of metal, e.g. in a U-shape. More preferably, the consoles are produced or manufactured by cutting a single plano from a single sheet of metal and bending said plano into shape. In other words, the consoles can be produced without the necessity of putting different parts together. Accordingly, the production process of the consoles can be simplified. Moreover, warping and/or deformations as a result of welding different part together can be prevented. Hence, the consoles can be manu-

factured more precisely and/or accurately. Additionally, weld defects can be prevented. Hence, the quality of the consoles can be more consistent.

[0017] Preferably, the legs are parallel or substantially parallel.

[0018] In a further embodiment, each end portion of the one or more legs comprises an upper edge that faces upwards in the second direction, wherein said upper edge defines at least a part of the seating plane for supporting the seating flange. In other words, the seating flange can rest on the upper edges of the legs. Hence, the legs can support the seating flange and, as a consequence, the weight of the facade.

[0019] In a further embodiment thereof, each end portion terminates in a front edge in the projection direction, wherein said front edge defines at least a part of the second mounting plane. In other words, the front end of the legs can support the central part of the facade support in the second mounting plane.

[0020] In a further embodiment, that can also be applied independently, the console further comprises one or more securing flanges that each comprise a second mounting surface for abutting the facade support for temporarily and/or releasably securing the console to the facade support. In other words, the one or more consoles and the facade support can be pre-assembled before mounting the support system to a building. Accordingly, the support system can be mounted to the building as a single unit. Hence, misalignments and/or deformations within the support system can be prevented. Hence, the support system can be mounted to the building more accurately and/or precisely. Thus, the support system can more reliably support the facade.

[0021] By temporarily and/or releasably mounting the one or more consoles to the facade support, disassembly of the support system can be facilitated. Moreover, as opposed to welding the consoles to the facade support, no thermal stresses and/or deformations are introduced in the consoles and the facade support. Hence, the resulting support system can be assembled more reliably.

[0022] In an embodiment thereof, the one or more second mounting surfaces are arranged to extend in the second mounting plane and/or in the seating plane. Hence, the second mounting surfaces can abut the seating surface and/or the mounting surface, respectively, of the facade support.

[0023] In a further embodiment thereof, each securing flange is provided with one or more securing apertures that extend through the securing flange in a direction normal to the second mounting surface, wherein the facade support is provided with a plurality of securing apertures, wherein at least one of the securing apertures of the facade support is arranged to be aligned with the one or more securing apertures of a respective securing flange to allow the respective console and the facade support to be temporarily and/or releasably secured by inserting one or more fasteners through the aligned

securing apertures. The fasteners can secure the facade support relative to the consoles in the first direction or longitudinal direction. By securing the securing flanges to predefined holes in the facade support, the console can become more rigid.

[0024] In a preferred embodiment thereof, the securing apertures of console and/or the securing apertures of the facade support are elongate and/or slot shaped in the second direction. In other words, the securing apertures of the console and/or the securing apertures of the facade support are arranged to allow a movement of the facade support relative to the console in the second direction when the fasteners have been inserted in the respective securing apertures. Hence, the weight of the facade can be transferred to the console without or substantially stressing the fasteners.

[0025] According to a second aspect, the present invention relates to a console as described above for use in a support system according to the first aspect of the invention. In particular, the second aspect of the invention relates to a console for use in the support system according to the first aspect of the present invention, wherein the console comprises a back plate with a first mounting surface that extends in a first mounting plane, wherein the console further comprises two legs that extend away from the back plate in a projection direction normal or perpendicular to the first mounting plane and are spaced apart in a first direction parallel to the first mounting plane, wherein the legs each terminate in an end portion in the projection direction, wherein each end portion comprises an upper edge that faces upward in a second direction, parallel to the first mounting plane and transverse or perpendicular to the first direction, for supporting the seating flange of the facade support in a seating plane, wherein each leg further comprises a hook at the end portion that projects from the upper edge in a direction normal to the seating plane, wherein each hook is arranged to be received in a respective one of the receiving slots in the seating flange for retaining said seating flange in the projection direction, wherein each leg is further provided with a securing flange that projects away from the end portion in the first direction, wherein each securing flange comprises a second mounting surface, wherein the second mounting surface extends in a second mounting plane for supporting the central part of the facade support in the projection direction or wherein the second mounting surface extends in the seating plane for supporting the seating flange in the second direction.

[0026] The console is specifically adapted for supporting the facade support and, hence, has the same technical advantages as described above.

[0027] In an embodiment thereof, the console is obtained by cutting a single plano from a single sheet of metal and by subsequently bending said plano into shape. In other words, the consoles can be produced without the necessity of putting different parts together. Accordingly, the production process of the consoles can

be simplified. Moreover, warping and/or deformations as a result of welding different part together can be prevented. Hence, the consoles can be manufactured more precisely and/or accurately. Additionally, weld defects can be prevented. Hence, the quality of the consoles can be more consistent.

[0028] According to a third aspect, the present invention relates to a building comprising a structural element, wherein the building further comprises the support system according to the first aspect of the present invention, wherein the support system has been mounted to the structural element in the first mounting plane. Preferably, the building further comprises a facade, wherein the facade is at least partially supported by the support system.

[0029] According to a fourth, unclaimed, aspect, the present invention relates to a support system for supporting a facade element relative to a structural element of a building, wherein the support system comprises a facade support for supporting the facade element in a support plane, wherein the facade support extends in a first direction parallel to said support plane, wherein the support system further comprises one or more consoles for mounting the facade support relative to the structural element, wherein the one or more consoles are distributed along the facade support in the first direction, wherein the consoles are arranged to be mounted to the structural element in a first mounting plane that is spanned by first direction and a second direction perpendicular to the first direction, wherein each console extends in a projection direction normal to the first mounting plane, wherein the facade support comprises a central part or mounting flange that extends in the first direction wherein the facade support further comprises a support flange that extends in the first direction and protrudes from the central part in the projection direction, wherein the support flange comprises a support surface that extends in the support plane for supporting the facade element, wherein the mounting flange comprises a mounting surface for abutting the one or more consoles in a second mounting plane that intersects with the support plane along the first direction, wherein the facade support is provided with a plurality of receiving slots, wherein each of the one or more consoles comprises one or more hooks that protrude upward with respect to the console, wherein each hook is arranged to be received in a respective one of the receiving slots for retaining facade support in the projection direction, wherein the console further comprises one or more securing flanges that each comprise a second mounting surface, preferably extending in the second mounting plane, for abutting the facade support for temporarily and/or releasably securing the console to the facade support.

[0030] In other words, the one or more consoles and the facade support can be pre-assembled before mounting the support system to a building. Accordingly, the support system can be mounted to the building as a single unit. Hence, misalignments and/or deformations

within the support system can be prevented. Hence, the support system can be mounted to the building more accurately and/or precisely. Thus, the support system can more reliably support the facade. By temporarily and/or releasably mounting the one or more consoles to the facade support, disassembly of the support system can be facilitated. Moreover, as opposed to welding the consoles to the facade support, no thermal stresses and/or deformations are introduced in the consoles and the facade support. Hence, the resulting support system can be assembled more reliably.

[0031] In an embodiment thereof, each securing flange is provided with one or more securing apertures that extend through the securing flange in a direction normal to the second mounting surface, wherein the facade support is provided with a plurality of securing apertures, wherein at least one of the securing apertures of the facade support is arranged to be aligned with the one or more securing apertures of a respective securing flange to allow the respective console and the facade support to be temporarily and/or releasably secured by inserting one or more fasteners through the aligned securing apertures. The fasteners can secure the facade support relative to the consoles in the first direction or longitudinal direction. By securing the securing flanges to predefined holes in the facade support, the console can become more rigid.

[0032] In a preferred embodiment thereof, the securing apertures of console and/or the securing apertures of the facade support are elongate and/or slot shaped in the second direction. In other words, the securing apertures of the console and/or the securing apertures of the facade support are arranged to allow a movement of the facade support relative to the console in the second direction when the fasteners have been inserted in the respective securing apertures. Hence, the weight of the facade can be transferred to the console without or substantially stressing the fasteners.

[0033] According to a fifth, unclaimed, aspect, the present invention relates to a method for mounting a facade element to a building with the use of the support system according to the fourth aspect of the present invention, wherein the method comprises the steps of:

- a) preassembling the one or more consoles to the facade support; and, subsequently,
- b) mounting the support system to the building.

[0034] In an embodiment thereof, the method further comprises the step of placing one or more facade elements on the support flange of the facade support after the support system has been mounted to the building.

[0035] The various aspects and features described and shown in the specification can be applied, individually, wherever possible. These individual aspects, in particular the aspects and features described in the attached dependent claims, can be made subject of divisional patent applications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The invention will be elucidated on the basis of an exemplary embodiment shown in the attached schematic drawings, in which:

Figure 1 shows an isometric view of a support system according to a first embodiment of the present invention;

Figure 2 shows a side view of the support system of figure 1 while supporting a facade relative to a wall;

Figure 3 shows an isometric view of a console of the support system of figure 1;

Figure 4 shows a plano for forming the console of figure 3;

Figure 5 shows an isometric view of an abutment member of the support system of figure 1;

Figure 6 shows an assembly of the console of figure 3 and the abutment member of figure 5;

Figures 7A and 7B show section views according to the line VII-VII in figure 6 during exemplary steps of a method of assembling the console and the abutment member;

Figure 8 shows an isometric view of an alternative console according to a second embodiment of the present invention;

Figure 9 shows an isometric view of a further alternative console according to a third embodiment of the present invention;

Figure 10 shows an alternative support system according to a fourth embodiment of the present invention;

Figure 11 shows an isometric view of another a console of the support system of figure 10;

Figures 12A-12C show a section view according to the line XII-XII in figure 10;

Figure 13 shows a detail in side view according to the circle XIII in figure 10; and

Figure 14 shows an isometric view of a further alternative console according to a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0037] Figures 1 and 2 show a support system 1 according to a first embodiment of the present invention.

The support system 1 is arranged to be mounted to a structural element 8 of a building 10, such as a wall, a beam or a flooring, for supporting a veneer, a facade 9 or a facade element 91 relative to said building 10. The structural element 8 may for example comprise concrete, steel and/or wood.

[0038] As is shown in figure 1, the support system 1 comprises a facade support 2 for supporting the facade element 91 in a support plane P. Preferably, said support plane P is horizontal or substantially horizontal when the support system 1 is mounted to the building 10. The facade support 2 extends in a first direction L or longitudinal direction parallel to the support plane P. The support system 1 further comprises a plurality of consoles 4 for mounting the facade support 2 to the structural element 8. The consoles 4 are distributed over the facade support 2 along said first direction L. Preferably, the consoles are evenly spaced along the first direction L.

[0039] The consoles 4 are mounted to the structural element 8 in a first mounting plane W. The first mounting plane W is spanned by the first direction L and a second direction H or height direction perpendicular to the first direction L. In the embodiment as shown, the first mounting plane W is a vertical or substantially vertical plane. In other words, the second direction H is vertical or substantially vertical. The consoles 4 project from the first mounting plane W in a projection direction X or projection direction normal or perpendicular to said first mounting plane W. The facade support 2 is mounted to the structural element 8 by the consoles 4. The facade support 2 is mounted at a distance, i.e. a non-zero distance, with respect to the first mounting plane W in the projection direction X. Preferably, the first direction L extends parallel to the first mounting plane W.

[0040] As is further shown in figures 1 and 2, the facade support 2 comprises a Z-shaped or substantially Z-shaped cross section in the first direction L. More particularly, the facade support 2 comprises a central web, central plate or central part 22 that extends in the first direction L. The facade support 2 further comprises a support flange 21 and a seating flange 23 that both extend in the first direction L and project away from the central part 22 at opposite sides of the central part 22.

[0041] The support flange 21 projects from the central part 22 in the projection direction X. In other words, the support flange 21 extends away from the central part 22 in a direction with at least a vector component in the projection direction X. Preferably, the support flange 21 projects from the central part 22 at a bottom region of said central part 22. Preferably, the support flange 21 is connected to the central part 22 at a right or substantially right angle. The support flange 21 comprises a support surface 31 that extends in the support plane P for supporting the facade element 91. In other words, the support plane P is defined by the support surface 31. The support surface 31 faces upward in the second direction H.

[0042] The central part 22 comprises a mounting surface 32 for resting against or abutting the consoles 4 in a

second mounting plane M. The mounting surface 32 faces away from the support flange 21. The second mounting plane M is spanned by the first direction L and a direction transverse or perpendicular to the first direction L. Preferably, the mounting surface 32 extends in the second mounting plane M. In other words, the second mounting plane M is defined by the mounting surface 32. The second mounting plane M intersects with the support plane P along the first direction L. Preferably, the second mounting plane M extends normal to the support plane P. In other words, the second mounting plane M extends in or substantially in the second direction H when mounted relative to the structural element 8. Accordingly, the second mounting plane M extends parallel to the first mounting plane W.

[0043] The seating flange 23 projects from the central part 22 in a direction opposite to the projection direction X. In other words, the seating flange 23 extends away from the central part 22 in a direction with at least a vector component in the direction opposite to the projection direction X. Preferably, the seating flange 23 projects from the central part at an upper region of said central part 22 in the second direction H. Preferably, the seating flange 23 and the support flange 22 are arranged at opposite regions of the central part 22 in the second direction H. The seating flange 23 comprises a resting surface or seating surface 33 for resting on the console 4 in a seating plane S. Preferably, the seating plane S extends parallel or substantially parallel to the support plane P.

[0044] As is best shown in figures 1, 2, 3 and 5, the console 4 comprises a back plate 41 with a first mounting surface 51. Said first mounting surface 51 extends in the first mounting plane W for mounting or abutting the console 4 against an outer surface 80 of the structural element 8. In other words, the first mounting plane M is defined by the first mounting surface 51. Preferably, the back plate 41 comprises mounting points and/or mounting points for receiving one or more fasteners 95 to mount the back plate 41 to the structural element 8.

[0045] The console 4 further comprises two legs 42 that extend away from the back plate 41 in the projection direction X. Preferably, the legs 42 of the console 42 are parallel or substantially parallel. The legs 42 each terminate or end in a terminal portion or end portion 47 in the projection direction X. Each end portion 47 comprises an upper edge 54 for supporting the seating flange 23 of the facade support 2. The upper edges 54 face upward in the second direction H. Preferably, the upper edges 54 extend at least partially in the seating plane P. The upper edge 54 may support the facade support 2 in the second direction H. In other words, the upper edge 54 may support at least a part of the weight of the facade 9 in the second direction H.

[0046] As can further be seen in figures 2, 3 and 5, each end portion 47 terminates in a terminal edge or front edge 53 in the projection direction X. Preferably, said front edges 53 extend at least partly in the second mounting

plane M for resting against the mounting surface 32 of the facade support 2.

[0047] As is further shown in figures 1-3 and 5, the console 4 comprises a protuberance, tooth, projection or hook 44 at the end portion 47 of each leg 42 for retaining the facade support 2 in the projection direction X. The hook 44 is located between the second mounting plane M and the first mounting plane W. The hook 44 projects from the upper edge 54 and/or the seating plane S in a direction normal or perpendicular to the seating plane S. The hook 44 projects upwards from the upper edge 54 in the second direction H.

[0048] As is shown in figures 1 and 2, the facade support 2 comprises a plurality of slots 29 that extend through the seating flange 23. Each one of the slots 29 is arranged to receive a hook 44 of a corresponding console 4. In the embodiment as shown, the slots 29 are arranged in pairs such that each pair of slots 29 is arranged to receive the hooks 44 of a single console 4.

[0049] As is best seen in figures 2, 3 and 5, the hooks 44 are provided with an abutment surface 55 that faces towards the projection direction X. As can further be seen in figures 1 and 2, the slots 29 are closed in the projection direction X. Accordingly, a portion of the seating flange 23 is arranged to rest against the abutment surface 55 when the hook 44 has been received in the corresponding slot 29. Accordingly, the abutment surface 55 may retain the seating flange 23 in the projection direction X. Hence, the abutment surface 55 may counteract a moment that is imposed on the facade support 2 by the weight of the facade 9.

[0050] Preferably the abutment surface 55 extends parallel or substantially parallel to the second mounting plane M. Preferably, the abutment surface 55 is arranged at a distance of at least five millimeters from the second mounting plane M in the projection direction X. More preferably, the abutment surface 55 is placed at a distance between five and twenty millimeters, for example twelve millimeters, with respect to the second mounting plane M.

[0051] As is further shown in figures 2, 3 and 5, the console is provided with a securing flange 43 at the end portion 47 of each leg 42. The securing flanges 43 project away from the respective end portions 47 in the first direction L. The securing flanges 43 each comprise a second mounting surface 52 that extend in the second mounting plane M for supporting the central part 22 of the facade support 2 in the projection direction X. Additionally or alternatively, securing flanges may be arranged having a second mounting surface in the seating plane S (not shown) for supporting the seating flange 23 of the facade support 2 in the second direction H.

[0052] As is best shown in figures 3 and 5, each securing flange 43 comprises a securing aperture 48. The securing aperture 48 extends through the securing flange 43 in a direction perpendicular to the second mounting plane M.

[0053] As is further shown in figures 1 and 2, the facade

support 2 securing apertures 28 corresponding to the securing apertures 48 of the console 4. In particular, the securing apertures 28 of the facade support 2 extends through the central part 22. The securing apertures 28 of the facade support 2 are arranged to be aligned with the securing apertures 48 of the console. Preferably, the support system 1 further comprises fasteners 94, such as rivets or bolts and nuts, to be inserted to the securing apertures 28, 48 for at least temporally securing a respective console 4 to the facade support 2. Preferably, the securing apertures 28 of the facade support 2 and/or the securing apertures 48 of the console 4 are slot shaped to allow a relative displacement between the console 4 and the facade support 4 in the second direction H. Alternatively, a respective console 4 may be welded to the facade support 2 at the securing flanges 43 and/or the front edges 53.

[0054] As is further shown in figures 1, 2 and 5, the support system 1 further comprises for each console 4 an abutment member 6 for supporting, strutting, shoring or propping the console 4 with respect to the structural element 8. The abutment member 6 comprises an extension member 7 with an abutment surface 71 that is movable relative to the abutment member 6 in the projection direction X for abutting the outer surface 80 of the structural element 8. By displacing the abutment surface 71 relative to the first mounting surface 51 of the back plate 41, an angle between the first mounting surface 51 and the outer surface 80 of the structural element 8 may be adjusted about the first direction. Accordingly, an angle of the support plane P relative to the outer surface 80 of the structural element 8 may be adjusted. Preferably, the abutment member 6 is a distinct or separate member that is attachable to the console 4.

[0055] As is shown in figure 4, 6A and 6B, the abutment member 6 comprises a central part 61 and a top part 62 and bottom part 63 that project from the central part 61 in the projection direction X. Preferably, the top part 62 and bottom part 63 are parallel. More preferably, the abutment member 6 has a U-shaped or substantially U-shaped cross section in the first direction L. The central part comprises a treaded opening 60 that is arranged to cooperate with an external tread 72 of the extension member 7 to move or displace the abutment surface 71 in the extension direction X. Optionally, the central part 61 may at the location of the treaded opening 60 be provided with a protrusion 66 that extends in a direction opposite to the projection direction X.

[0056] The top part 62 is further provided with two legs 62 that are spaced apart in the first direction L. The legs 62 are provided with securing hooks 65 at the terminal ends thereof in the projection direction X. The securing hooks 65 face inward in the first direction L. Additionally or alternatively, similar legs 64 with securing hooks 65 may be provided at the bottom part 63 of the abutment member 6.

[0057] As is best shown in figures 3, 6A and 6B, the legs 42 of the console 4 are provided with receiving slots

45 for receiving the top part 62 and the bottom part 63, respectively, of the abutment member 6. The receiving slots 45 are open towards the projection direction X for receiving said top part 62 and bottom part 63. The legs 42 of the console 4 are further provided with securing slots 45 for receiving the securing hooks 65 of the abutment member 6. When received in the securing slots 45, the securing hooks 65 can retain the abutment member 6 relative to the console 4 in the projection direction X.

[0058] Preferably, the console 4 is cut from a single sheet of metal, preferably steel. More preferably, as is shown in figure 4, a single plano 40 is cut from a sheet of metal and is subsequently bent to shape to form the console 3. The plano 40 comprises primary folding lines or primary bending lines F1 between the back plate 41 and the respective legs 42. The plano 40 further comprises secondary folding lines or secondary bending lines F2 between each end portion 47 and the respective securing flange 43. The plano 40 of the console 4, is provided with slits, slots or notches 50 at or near the bending lines F1, F2 to facilitate the bending of the plano 40 into the console 4 as shown in figure 3.

[0059] Each of the legs 42 is bent with respect to the back plate 41 about the primary bending line F1 to form a straight or substantially straight angle with said back plate 41. In other words, the legs 42 are bent such that the legs 42 extend in or substantially in the projection direction X.

[0060] Accordingly, each securing flange 43 is bent with respect to the end portion 47 of the respective leg 42 about the respective secondary bending line F2. Preferably, the securing flanges 43 are bent outward with respect to the back plate 41. The securing flanges 43 are bent to form a straight or substantially straight angle with respect to the legs 42. More preferably, the securing flanges 43 are bent such that the securing flanges 43 each extend in the second mounting plane M.

[0061] A method for assembling the support system 1 will be elucidated hereafter with reference to figures 1-5, 6A and 6B.

[0062] Optionally, the method first comprises the step of assembling the console 4 and the abutment member 6. As is shown in figure 3, a console 4 is provided without the abutment member 6 mounted thereon. The legs 42 of the console 4 extends parallel or substantially parallel.

[0063] Figure 6A shows the console 4 in a state in which the legs 42 of the console 4 have been pushed together in the first direction L at or near the end portion 47. More particularly, the console 4 has been elastically deformed by pushing the legs 42 together. An abutment member 6 has been provided to be mounted to the console 4. The top part 62 and the bottom part 63 of the abutment member 6 have been slot into the respective receiving slots 45 of the legs 42 of the console 4. The legs 64 of the abutment member 6 have been moved along the outer surface of the legs 42 of the console 4 in the projection direction X. More particularly, the legs 64 of the abutment member 6 have been moved towards a

position in which the securing hooks 65 slot into the respective securing slots 46.

[0064] Figures 5 and 6B show the console 4 and the abutment member 6 in an assembled state. The abutment member 6 has been moved further in the projection direction X relative to the console 4. The securing hooks 65 have been slot into the respective securing slots 46. The legs 42 of the console 42 have been released and have been moved away relative one another in the first direction L towards their original positions. In particular, the legs 42 have returned towards and or into their original positions due to the resilience of the console 4. Optionally, the extension member 7 is displaced in a direction opposite to the projection direction X into a position in which the abutment surface 71 extends in or substantially in the first mounting plane W.

[0065] The method further comprises the steps of mounting or attaching the one or more consoles 4 to the facade support 2. In other words, the method comprises the step of preassembling the consoles 4 and the facade support 2. Preferably, the consoles 4 are mounted to the facade support 2 prior to mounting the support system 1 to the structural element 8.

[0066] Figures 1 and 2, show the support system 1 in an assembled state. The hooks 44 of each console 4 have been slotted into the corresponding receiving slots 29 of the facade support 2. The seating surface 33 of the seating flange 23 rests on the console 4 in the seating plane S. More particularly, the seating surface 33 rests on the upper edges 54 of the console 4. The mounting surface 32 rests against the console in the second mounting plane M. More particularly, the mounting surface 32 rests against the front edges 53 of the legs 42. Additionally or alternatively, the mounting surface 32 rests against the second mounting surface 52 of the mounting flanges 43.

[0067] As is further shown in figures 1 and 2, the securing apertures 28 in the central part 22 of the facade support 22 have been aligned with the respective corresponding securing apertures 48 of the securing flanges 43 of the console 4. Fasteners 94 have been inserted through the aligned securing apertures 28, 48, to temporarily and/or releasably attach the console 4 to the facade support 2.

[0068] The method further comprises mounting the support system 1 to the building 10 and placing one or more facade elements 91 on the support flange 21 of the facade support 2. Figure 2 shows the building 10 with the support system mounted thereto. The consoles 4 and the facade support 2 of the support system 1 have been pre-assembled as described above. Subsequently, the consoles have been mounted to the structural element 8 in the first mounting plane W. The consoles 4 have been secured to the structural element 8 using fasteners 95. Said fasteners 95 may for example comprises wall anchors, fasteners or SHIM plates. The support plane P extends perpendicular or substantially perpendicular to the first mounting plane W.

[0069] The facade elements 91 have been placed on the support flange 21 of the facade support 2. The facade elements 91 are supported relative to the building 10 by the support system 1. The facade elements 91 are supported in the support plane P.

[0070] Figure 7 shows an alternative console 104 according to a further exemplary embodiment of the present invention. The alternative console 104 differs from the previously discussed console 4 in that the legs 142 project downward in the second direction H relative to the back plate 41. More particular, the legs 142 comprise a projection 149 extending downward in the second direction H. The end portion 147 of the legs 142 projects in the projection direction X relative to the projection 149 at a position below the back plate 41 in the second direction H. Accordingly, the hooks 44 and the securing flanges 43 are positioned below the back plate 41 as well. The seating edges 154 extend between each hook 44 and the respective corresponding projection 149 for receiving the seating flange 23 of the facade support 2. The alternative console 104 may be particularly useful when supporting the facade 9 or the facade element 91 at a distance below the structural element 8 in the second direction H, e.g. when the structural element 8 comprises a flooring or a horizontal beam.

[0071] Figure 8 shows a further alternative console 204 according to yet another exemplary embodiment of the present invention. The further alternative console 204 differs from the previously discussed consoles 4, 104 in that the legs 242 extend upward in the second direction H relative to the back plate 41. More in particular, the end portions 247 of the legs 242 extend upwards in the second direction H relative to the back plate 41. Accordingly, the hooks 44 and the securing flanges 43 are positioned in an upward position in the second direction H relative to the back plate 41 as well. In addition to the front edges 53 of the end portion 247 the legs 242 form additional front edges 253 below the securing flanges 43. Preferably, at least one of the front edges 53 and the additional front edges 253 extends in the second mounting plane M. More preferably, the front edges 53, the additional front edges 253 and the securing flanges 43 all extend in the second mounting plane.

[0072] The alternative console 204 may be particularly useful when supporting the facade 9 or the facade element 91 at a distance above the structural element 8 in the second direction H, e.g. when the structural element 8 comprises a flooring or a horizontal beam.

[0073] Figures 9, 11A-11C and 12 shows an alternative support system 301 according to a further embodiment of the present invention. The alternative support system 301 differs from the previously discussed support system 1 in that it comprises an alternative facade support 302 and an alternative console 304.

[0074] As is best shown in figure 9, the facade support 302 differs from the previously discussed facade support 2 in that that seating flange 23 has been omitted. More particularly, the facade support 302 comprises an L-

shaped or substantially L-shaped cross-section in the first direction L. Accordingly, the facade 9 may be supported closer to the structural element 8.

[0075] The facade support 302 comprises a mounting flange 322 extending in or substantially in the second mounting plane M and a support flange 321 projecting from said mounting flange 322 in the projection direction X. The support flange 321 comprises a support surface 331 that extends in the support plane P for supporting the facade 9. The mounting flange 322 comprises a first surface 332 facing in the projection direction X and a second surface 333 opposite to the first surface 332.

[0076] As can best be seen in figures 11A-11C, the facade support 302 is further provided with receiving slots 329 that extend through the mounting flange 322 in the projection direction X.

[0077] The console 304 of the alternative support system 301 comprises the same back plate 41 as the console 4 of the previously described support system 1. Accordingly, the alternative support system 301 may be mounted to a structural element 8 of a building 10 in a similar manner as described for the support system 1 in order to support the facade 9 or the facade element 91 relative to said building 10.

[0078] The legs 342 of the alternative console 304 differ from the previously discussed console 4 in that a coupling member 350 has been attached to the terminal end of said legs 342 in the projection direction X. The console 304 further comprises a third leg 349 that is attached to the coupling member 350 and projects away from said coupling member 350 in the projection direction X. In the embodiment as shown, the third leg 349 extends downwards relative to the legs 342 in the second direction H. Alternatively, the third leg 343 may remain level with the legs 342 or extend upwards relative to the legs 342 in the second direction H.

[0079] The third leg 349 is at a front end 347 thereof provided with a securing flange 343. The securing flange 343 extends away from the third leg 349 in the first direction L. Preferably, the securing flange 343 has been bent relative to the third leg 349. As is best seen in figures 11A-11C, the securing flange 343 is arranged to be inserted into the receiving slot 329 of the facade support 302. As is best shown in figure 12, the securing flange 343 comprises an upper rim 354 that defines a seating plane S for supporting the facade support thereon when the flange 343 has been received in the receiving slot 329. The securing flange 343 further defines a second mounting surface 352 for abutting the first surface 332 of the facade support 302 in the second mounting plane M.

[0080] As is further shown in figures 10 and 12, the securing flange 343 is provided with a raised portion or hook 344 for retaining the facade support 302 relative to the console 304 in the projection direction X. The hook 344 protrudes upwards from the securing flange 343 in the second direction H.

[0081] As is best shown in figures 11A-11C, the securing flange 343 is provided with two securing apertures

348 that extend through the securing flange 343 in the projection direction X. Accordingly, the facade support 302 is provided with a plurality of securing apertures 328 that extend through the mounting flange 322 in the projection direction X. The securing apertures 348 of the securing flange 343 are arranged to be aligned with the securing apertures 328 of the facade support 302 for temporally and/or releasably securing the console 304 to the facade support 302 by insertion of a fastener 94 in a manner similar to the securing of the console 4 and facade support 2 as described above.

[0082] A method for assembling the support system 301 will be elucidated hereafter with reference to figures 6A, 6B, and 9-12.

[0083] The console 304 and the abutment member 6 are assembled in a manner similar to the assembly of the console 4 and the abutment member 6 as described above. In particular, the top part 62 and the bottom part 63 of the abutment member 6 are slot into the respective receiving slots 45 of the legs 342 of the console 304. Accordingly, the legs 64 of the abutment member 6 are slid over the outer surface of the legs 342 of the console 304 until the securing hooks 65 slot into the respective securing slots 46.

[0084] Preferably, the abutment member 6 and the console 304 are assembled before the coupling member 350 is attached to the legs 342. Hence, the legs 342 of the console 304 can be pushed towards one another to facilitate the insertion of the securing hooks 65 into the respective securing slots 46. Alternatively, the abutment member 6 may be secured to the legs 342 of the console 304 before attaching the coupling member 350 to the legs 342.

[0085] The assembly of the console 304 and the facade support 302 will be elucidated using figures 11A-11C and 12.

[0086] Figure 11A shows the console 304 in the facade support 302 in a first assembly state. The console 304 has been rotated to align the securing flange 343 with receiving aperture 329. Preferably, the console 304 is rotated such that the securing flange 343 extends in or substantially in the projection direction X. The securing flange 343 has been partly inserted into the receiving aperture 329.

[0087] Figure 11B shows the console 304 and the facade support 302 in a second assembly state. The securing flange 343 has been inserted further into the receiving slot 329. Subsequently, the console 304 has been rotated into a position in which the second mounting surface 352 of the securing flange 343 abuts the first surface 332 of the mounting flange 322 of the facade support 302. The securing apertures 328 of the facade support 302 have been aligned with the securing apertures 348 of the securing flange 343.

[0088] Figures 11C and 12 show the console 304 and the facade support 302 in an assembled state. A fastener 94 has been inserted through the securing apertures 328 of the facade support 302 and the securing apertures 348

of the securing flange 343 to secure the console 304 to the facade support 302.

[0089] Figure 13 shows an alternative console 404 for use in the alternative support system 301. The alternative console 404 differs from the previously discussed console 304 in that it comprises an alternative third leg 449. The alternative third leg 449 differs from the previously discussed third leg 349 in that the securing flange 443 is arranged upstream of the third leg 449 in the projection direction. Accordingly, the second mounting surface 452 faces in the projection direction X. the second mounting surface 452 is arranged to rest against the second surface 333 of the mounting flange 322 of the facade support 302. The third leg 449 may be placed at least partly between the facade elements 91 in the first direction L.

[0090] Alternatively, the third leg 449 may be mounted to the coupling member 350 such that the third leg 449 projects towards the first mounting plane W in the projection direction X to obtain a more compact console 404.

[0091] In summary, the invention relates to a support system 1 for supporting a facade element 91 relative to a structural element 8, wherein the support system 1 comprises a facade support 2 for supporting the facade element in a support plane P and one or more consoles 4, 104, 204 for mounting the facade support 2 relative to the structural element 8,

wherein the facade support 2 is substantially Z-shaped and comprises a central part 22, and a support flange 21 and a seating flange 23 that project away from the central part 22 at opposite sides of the central part 22, wherein the one or more consoles 4, 104, 204 are arranged to support the seating flange 23 in a seating plane S and to support the central part 22 in a second mounting plane M, wherein the facade support 2 is provided with a plurality of receiving slots 29 that extend through the seating flange 23, wherein each of the one or more consoles 4, 104, 204 comprises one or more hooks 44 that protrude in a direction normal to the seating plane S, and wherein each hook 44 is arranged to be received in a respective one of the receiving slots 29 for retaining the seating flange 23 in the projection direction X.

[0092] It is to be understood that the above description is included to illustrate the operation of the preferred embodiments and is not meant to limit the scope of the invention. From the above discussion, many variations will be apparent to one skilled in the art that would yet be encompassed by the scope of the present invention.

REFERENCE NUMERALS

[0093]

- | | |
|---|----------------|
| 1 | support system |
| 2 | facade support |

21 support flange
 22 central part
 23 seating flange
 28 securing aperture
 29 receiving slot
 31 support surface
 32 mounting surface
 33 seating surface
 4 console
 40 plano
 41 back plate
 42 leg
 43 securing flange
 44 hook
 45 receiving slot
 46 securing slot
 47 end portion
 48 securing aperture
 49 mounting aperture
 50 notch
 51 first mounting surface
 52 second mounting surface
 53 front edge
 54 seating edge
 55 abutment surface
 6 abutment member
 60 treaded opening
 61 central part
 62 top part
 63 bottom part
 64 leg
 65 securing hook
 66 protrusion
 7 extension member
 71 abutment surface
 72 outer tread
 8 structural element
 80 outer surface
 9 facade
 91 facade element
 94 fastener
 95 fastener
 10 building

 104 console
 142 leg
 147 end portion
 154 seating edge

 204 console
 242 leg
 247 end portion
 253 front edge
 254 seating edge

 301 alternative support system
 302 alternative facade support
 321 support flange

322 mounting flange
 329 receiving slot
 331 support surface
 332 first surface
 5 333 second surface
 304 alternative console
 342 leg
 343 securing flange
 344 hook
 10 347 end portion
 348 securing apertures
 349 third leg
 350 coupling member
 352 second mounting surface
 15 353 front edge
 354 seating edge

 404 alternative console
 443 securing flange
 20 447 end portion
 449 third leg
 452 second mounting surface
 453 rear edge
 454 seating edge

 25 F1 primary folding line
 F2 secondary folding line
 H second direction
 L first direction
 30 M second mounting plane
 P support plane
 S seating plane
 W first mounting plane
 X projection direction
 35

Claims

1. Support system (1) for supporting a facade element (91) relative to a structural element (8) of a building (10), wherein the support system (1) comprises a
 40 facade support (2) for supporting the facade element (91) in a support plane (P), wherein the facade support (2) extends in a first direction (L) parallel to said support plane (P), wherein the support system (1)
 45 further comprises one or more consoles (4, 104, 204) for mounting the facade support (2) relative to the structural element (8), wherein the one or more consoles (4, 104, 204) are distributed along the facade support (2) in the first direction (L), wherein
 50 the consoles (4, 104, 204) are arranged to be mounted to the structural element (8) in a first mounting plane (W) that is spanned by first direction (L) and a second direction (H) perpendicular to the first direction (L), wherein each console (4, 104, 204)
 55 extends in a projection direction (X) normal to the first mounting plane (W),

wherein the facade support (2) comprises a

- central part (22) that extends in the first direction (L), wherein the facade support (2) further comprises a support flange (21) and a seating flange (23) that both extend in the first direction (L) and project away from the central part (22) at opposite sides of the central part (22), wherein the support flange (21) protrudes from the central part (22) in the projection direction (X), wherein the support flange (21) comprises a support surface (31) that extends in the support plane (P) for supporting the facade element (91), wherein the seating flange (23) protrudes from the central part (22) in a direction opposite to the projection direction, wherein the seating flange comprises a seating surface that is arranged to be supported on the one or more consoles (4, 104, 204) in a seating plane (S), wherein the central part (22) comprises a mounting surface (32) for abutting the one or more consoles (4, 104, 204) in a second mounting plane (M) that intersects with the support plane (P) along the first direction (L), wherein the facade support (2) is provided with a plurality of receiving slots (29) that extend through the seating flange (23), wherein each of the one or more consoles (4, 104, 204) comprises one or more hooks (44) that protrude in a direction normal to the seating plane (S), wherein each hook (44) is arranged to be received in a respective one of the receiving slots (29) for retaining the seating flange (23) in the projection direction (X).
2. Support system (1) according to claim 1, wherein the one or more hooks (44) are arranged between the first mounting plane (W) and the second mounting plane (M) in the projection direction (X).
 3. Support system (1) according to claim 1 or 2, wherein the one or more hooks (44) each comprise an abutment surface (55) facing towards the projection direction (X) for abutting a part of the seating flange (23) in the projection direction (X), preferably wherein the abutment surface (55) is spaced apart from the second mounting plane (M) in the projection direction (X) over a distance of at least five millimeters, preferably over a distance of five to twenty millimeters, such as twelve millimeter, and/or wherein the abutment surface (55) extends parallel or substantially parallel to the second mounting plane (M).
 4. Support system (1) according to any one of the preceding claims, wherein the second mounting plane (M) extends parallel or substantially parallel to the first mounting plane (W), and/or wherein the seating plane (S) extends parallel or substantially parallel to the support plane (P), and/or wherein the support plane (P) extends normal to the first mounting plane (W).
 5. Support system (1) according to any one of the preceding claims, wherein the facade support (2) comprises a Z-shaped or substantially Z-shaped cross section along the first direction (L).
 6. Support system (1) according to any one of the preceding claims, wherein the console (4, 104, 204) comprises a back plate (41) having a first mounting surface (51) that extends in the first mounting plane (W) for abutting the structural element (8), and one or more legs (42, 142, 242) that extend away from the back plate (41) in the projection direction (X), wherein each of the one or more hooks is provided at an end portion (47, 147, 247) of a respective one of said one or more legs (42, 142, 242) in the projection direction (X), preferably wherein the legs (42, 142, 242) are parallel or substantially parallel.
 7. Support system (1) according to claim 6, wherein each end portion (47, 147, 247) of the one or more legs (42, 142, 242) comprises an upper edge (54, 154, 254) that faces upwards in the second direction (H), wherein said upper edge (54, 154, 254) defines at least a part of the seating plane (S) for supporting the seating flange (23).
 8. Support system (1) according to claim 6 or 7, wherein each end portion (47, 147, 247) terminates in a front edge (53) in the projection direction (X), wherein said front edge (53) defines at least a part of the second mounting plane (M).
 9. Support system (1) according to any one of the preceding claims, wherein the console (4, 104, 204) further comprises one or more securing flanges (43) that each comprise a second mounting surface (52) for abutting the facade support (2) for temporarily and/or releasably securing the console (4, 104, 204) to the facade support (2), preferably wherein the one or more second mounting surfaces (52) are arranged to extend in the second mounting plane (M) and/or in the seating plane (S).
 10. Support system (1) according to claim 9, wherein each securing flange (43) is provided with one or more securing apertures (48) that extend through the securing flange (43) in a direction normal to the second mounting surface (52), wherein the facade support (2) is provided with a plurality of securing apertures (28), wherein at least one of the securing apertures (28) of the facade support (2) is arranged to be aligned with the one or more securing apertures (48) of a respective securing flange (43) to allow the respective console (4, 104, 204) and the facade support (2) to be temporarily and/or releasably secured by inserting one or more fasteners (94).

through the aligned securing apertures (28, 48).

11. Console (4, 104, 204) for use in a support system(1) according to any one of the preceding claims,

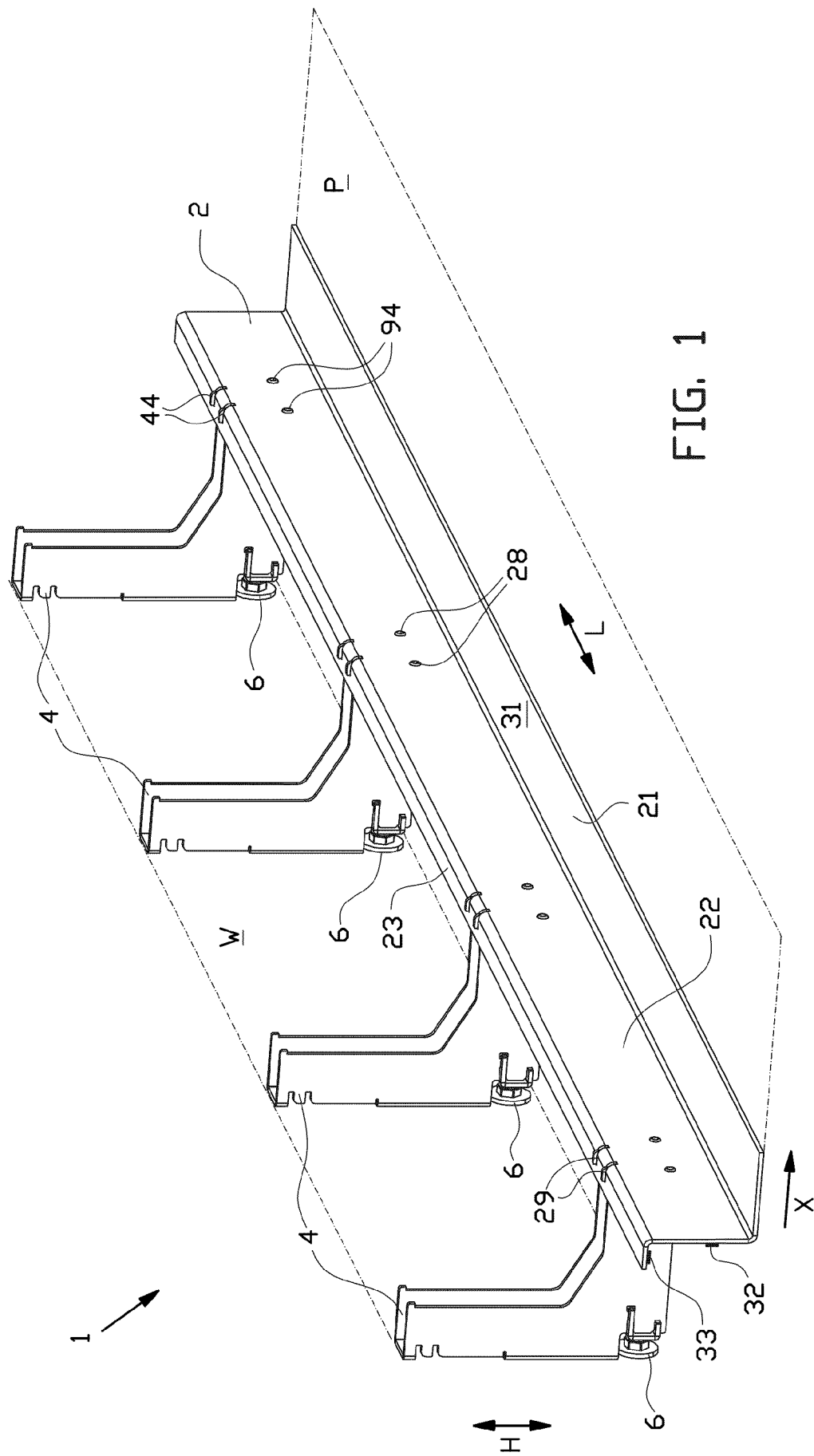
wherein the console (4, 104, 204) comprises a back plate (41) with a first mounting surface (51) that extends in a first mounting plane (W), wherein the console (4, 104, 204) further comprises two legs (42, 142, 242) that extend away from the back plate (41) in a projection direction (X) normal or perpendicular to the first mounting plane (W) and are spaced apart in a first direction (L) parallel to the first mounting plane (W), wherein the legs (42, 142, 242) each terminate in an end portion (47, 147, 247) in the projection direction (X), wherein each end portion (47, 147, 247) comprises an upper edge (54, 154, 254) that faces upward in a second direction (H) parallel to the first mounting plane (W) and transverse or perpendicular to the first direction (L), for supporting the seating flange (23) of the facade support (2) in a seating plane (S), wherein each leg (42, 142, 242) further comprises a hook (44) at the end portion (47, 147, 247) that projects from the upper edge (54, 154, 254) in a direction normal to the seating plane (S), wherein each hook (44) is arranged to be received in a respective one of the receiving slots (29) in the seating flange (23) for retaining said seating flange (23) in the projection direction (X), wherein each leg (42, 142, 242) is further provided with a securing flange (43) that projects away from the end portion (47, 147, 247) in the first direction (L), wherein each securing flange (43) comprises a second mounting surface (52), wherein the second mounting surface (52) extends in a second mounting plane (M) for supporting the central part (21) of the facade support (2) in the projection direction (X) or wherein the second mounting surface (52) extends in the seating plane (S) for supporting the seating flange (23) in the second direction (H).

12. Console (4, 104, 204) according to claim 11, wherein the console (4, 104, 204) is obtained by cutting a single plano from a single sheet of metal and by subsequently bending said plano into shape.

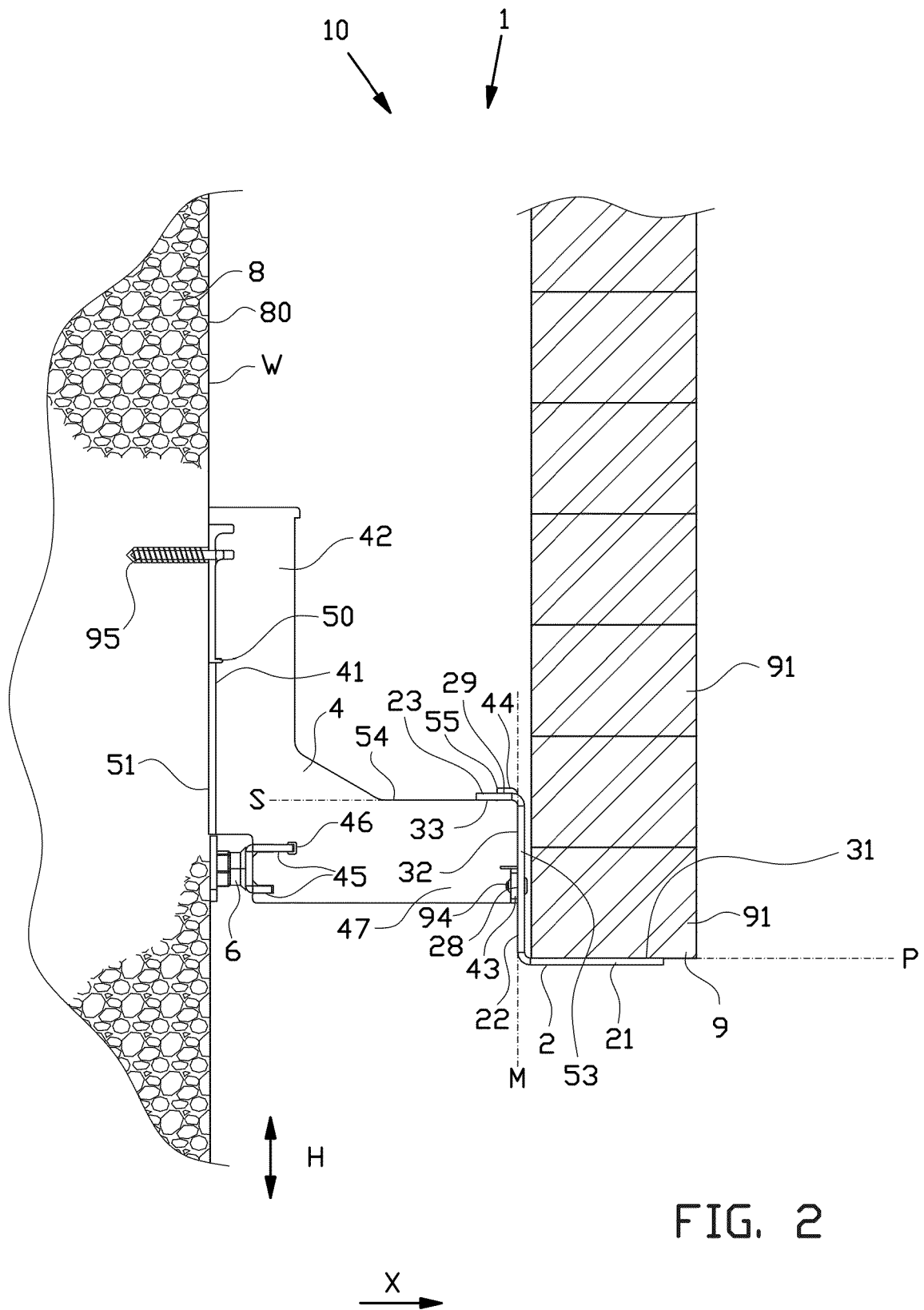
13. Building (10) comprising a structural element (8), wherein the building (10) further comprises the support system (1) according to any one of the claims 1-10, wherein the support system (1) has been mounted to the structural element (8) in the first mounting plane (W).

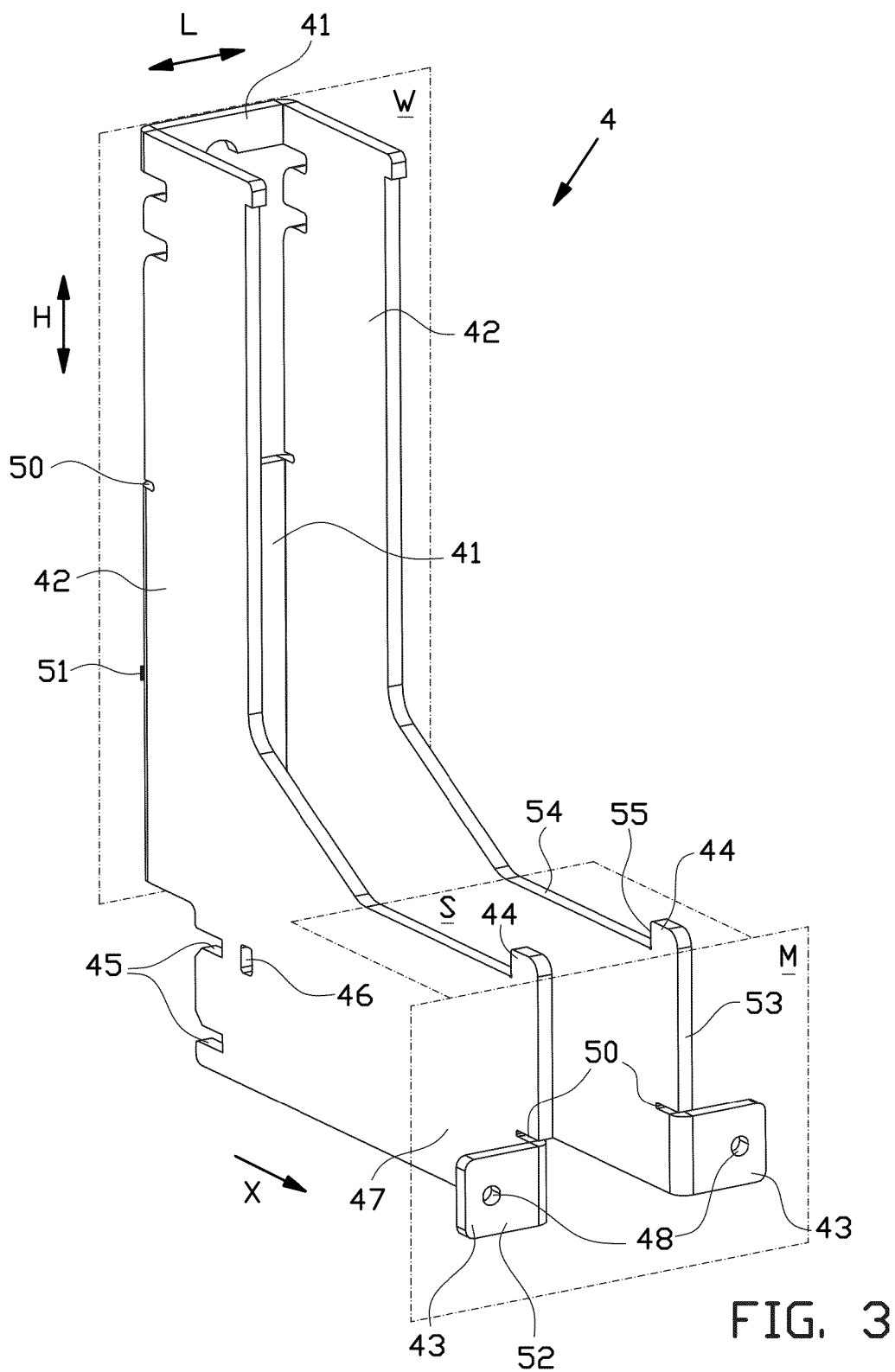
14. Building (10) according to claim 13, wherein the

building (10) further comprises a facade (9), wherein the facade (9) is at least partially supported by the support system (1).



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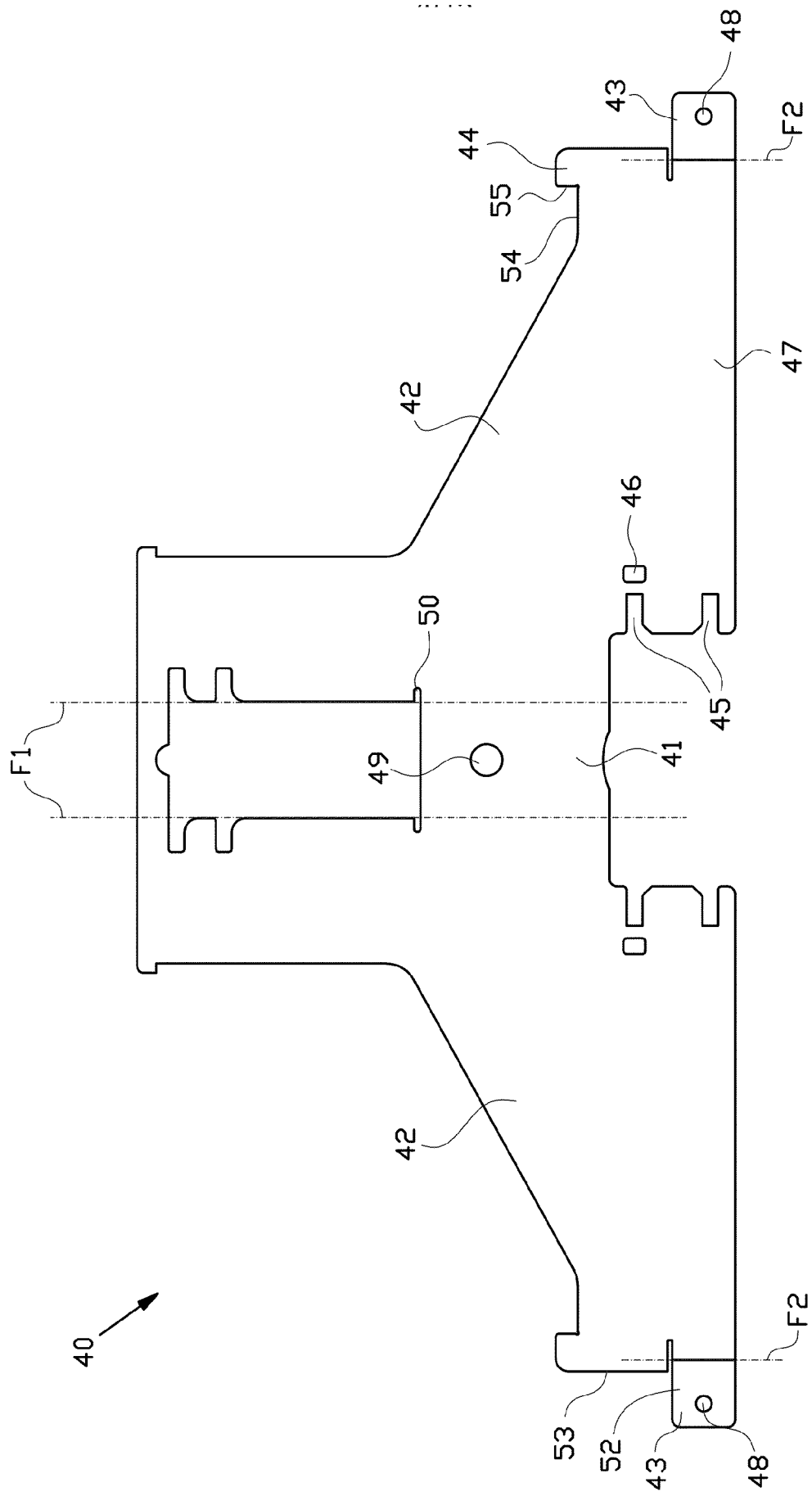


FIG. 4

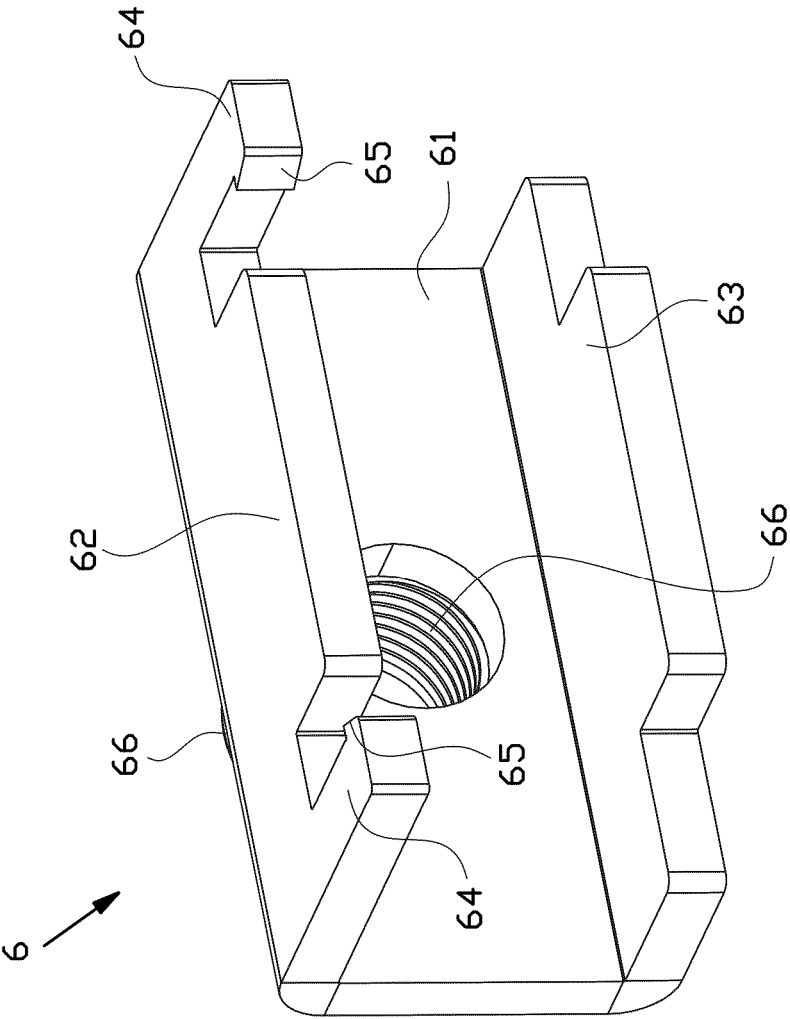
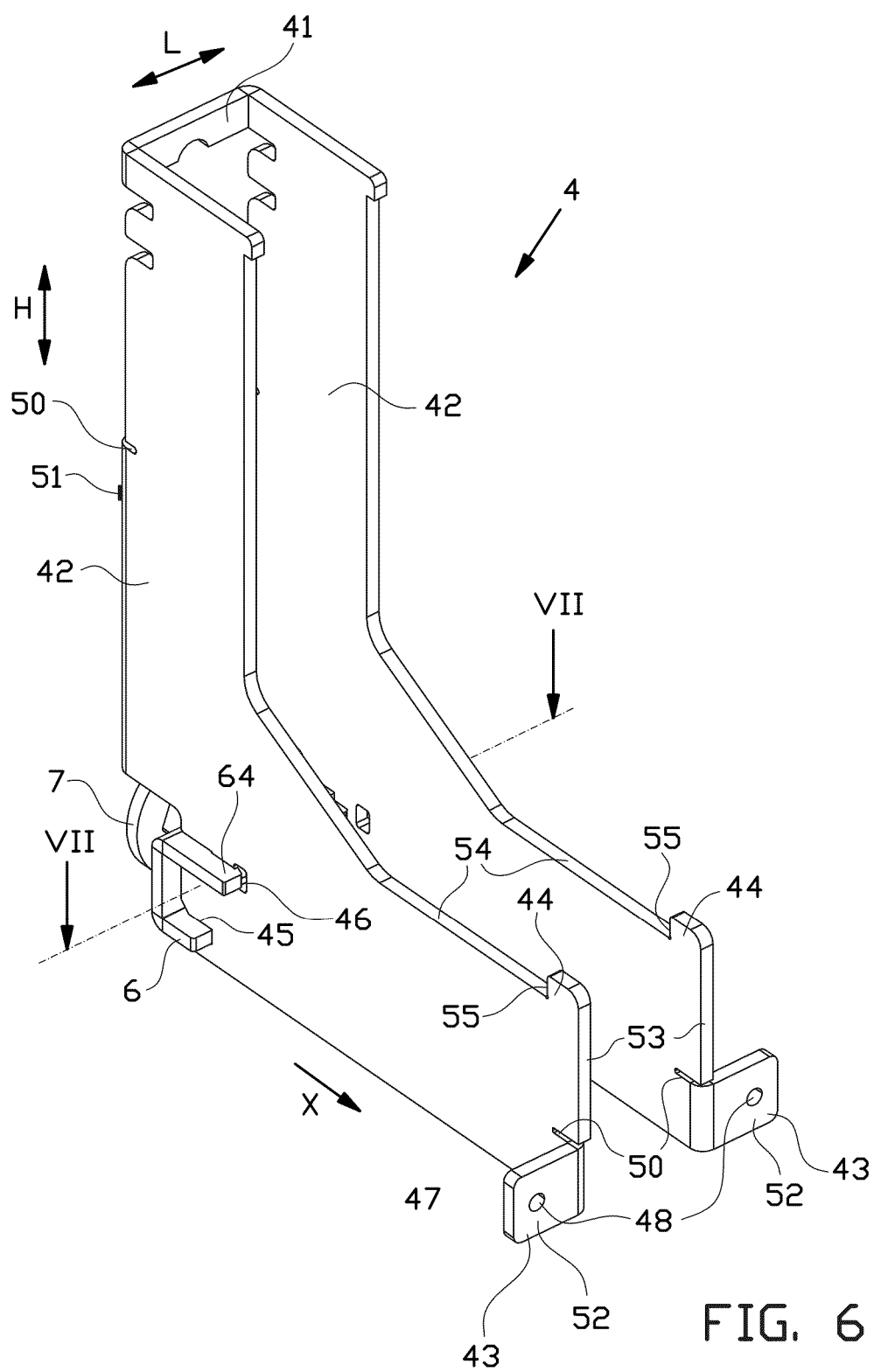
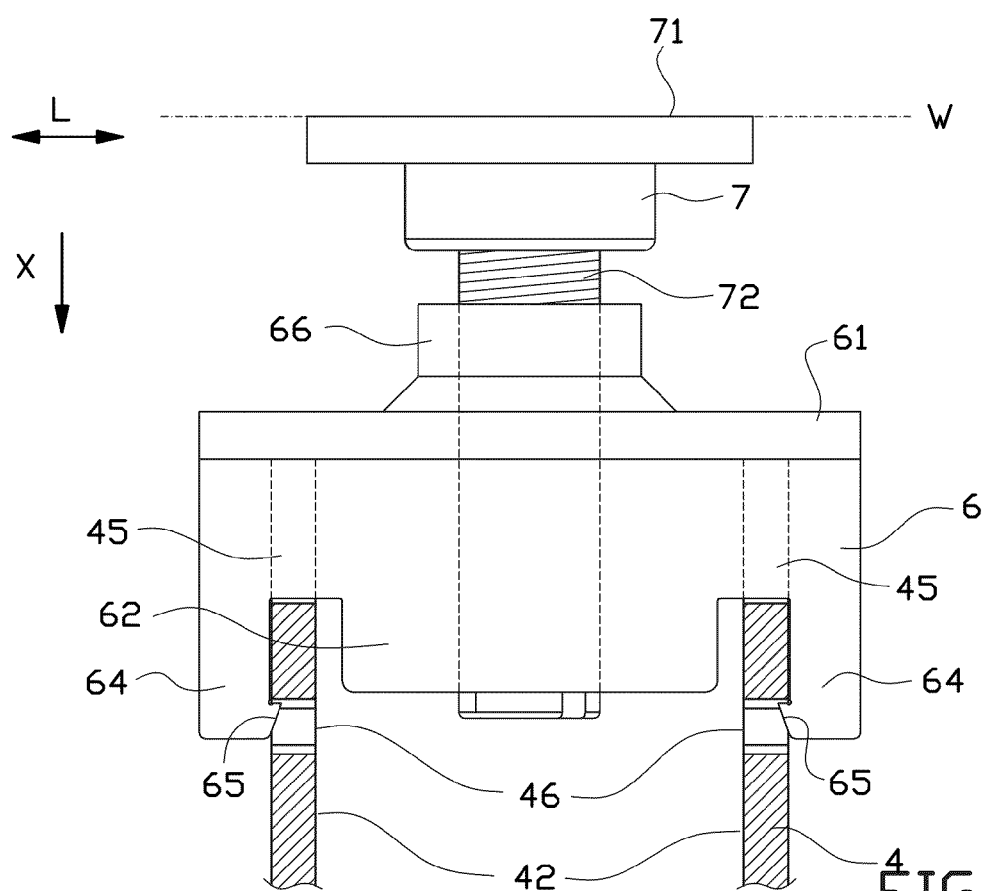
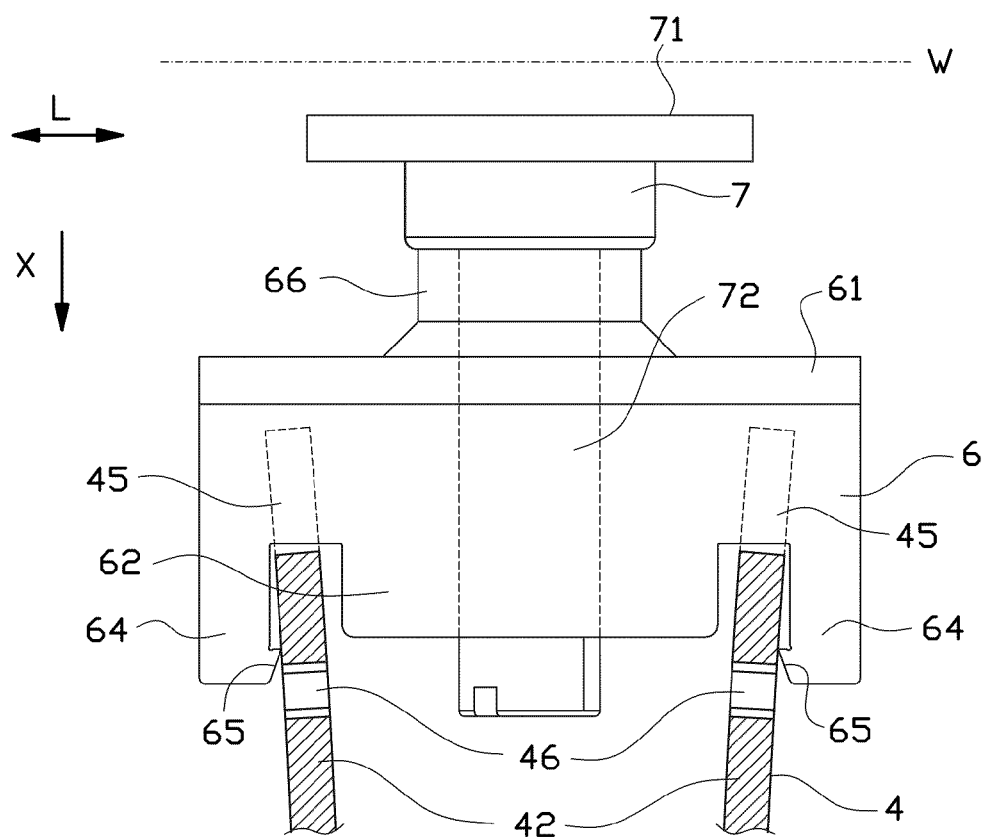
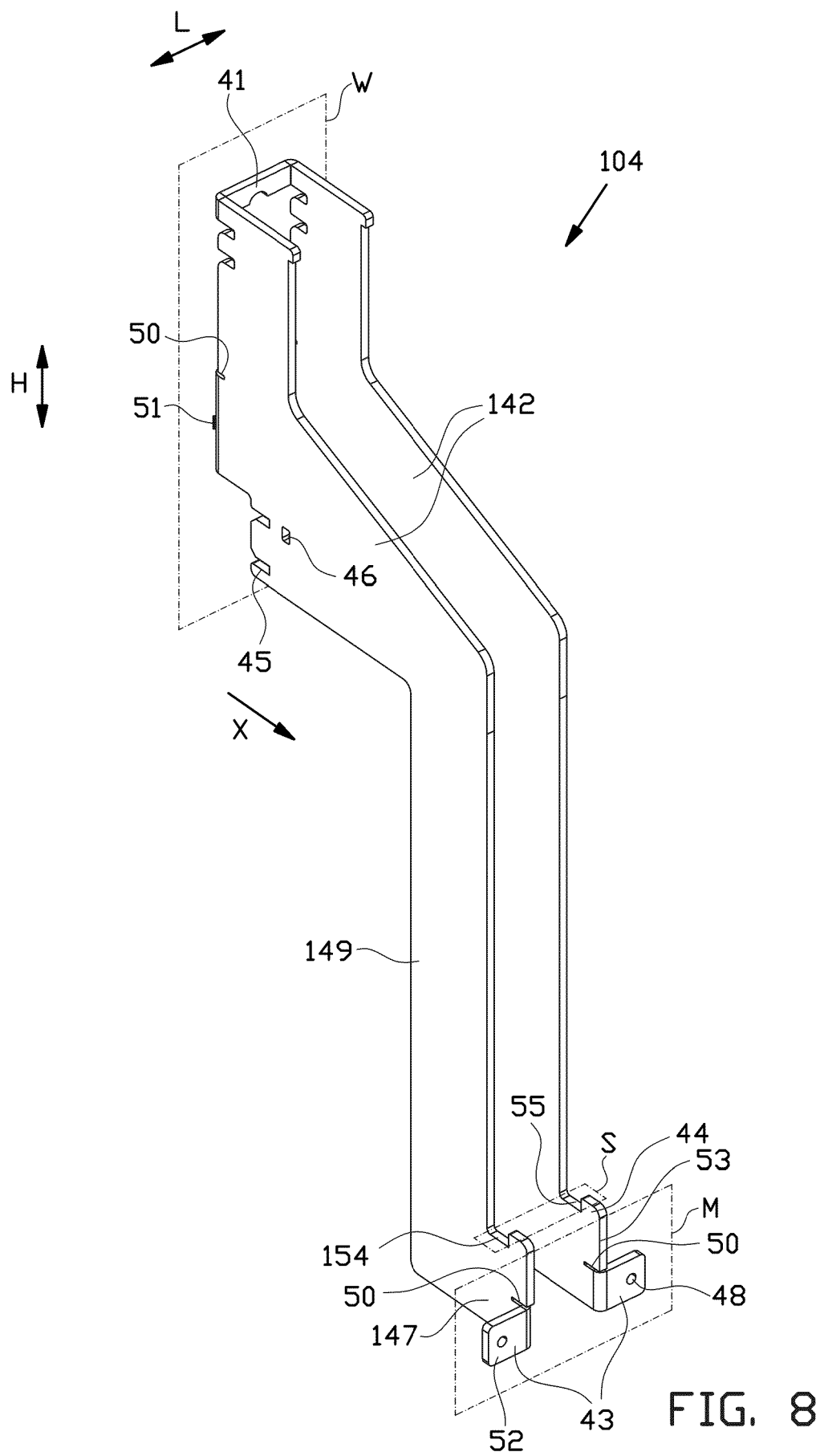
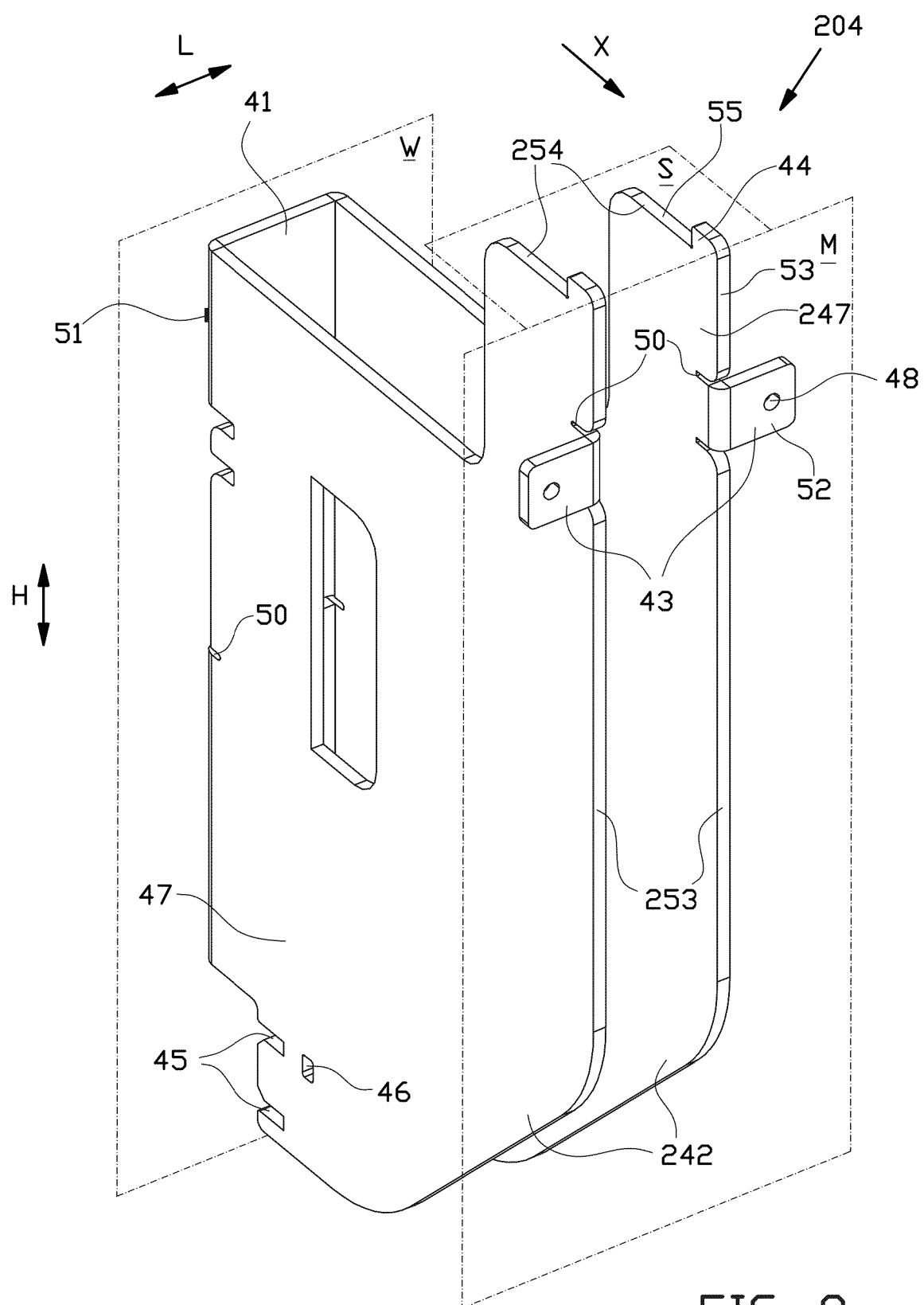


FIG. 5









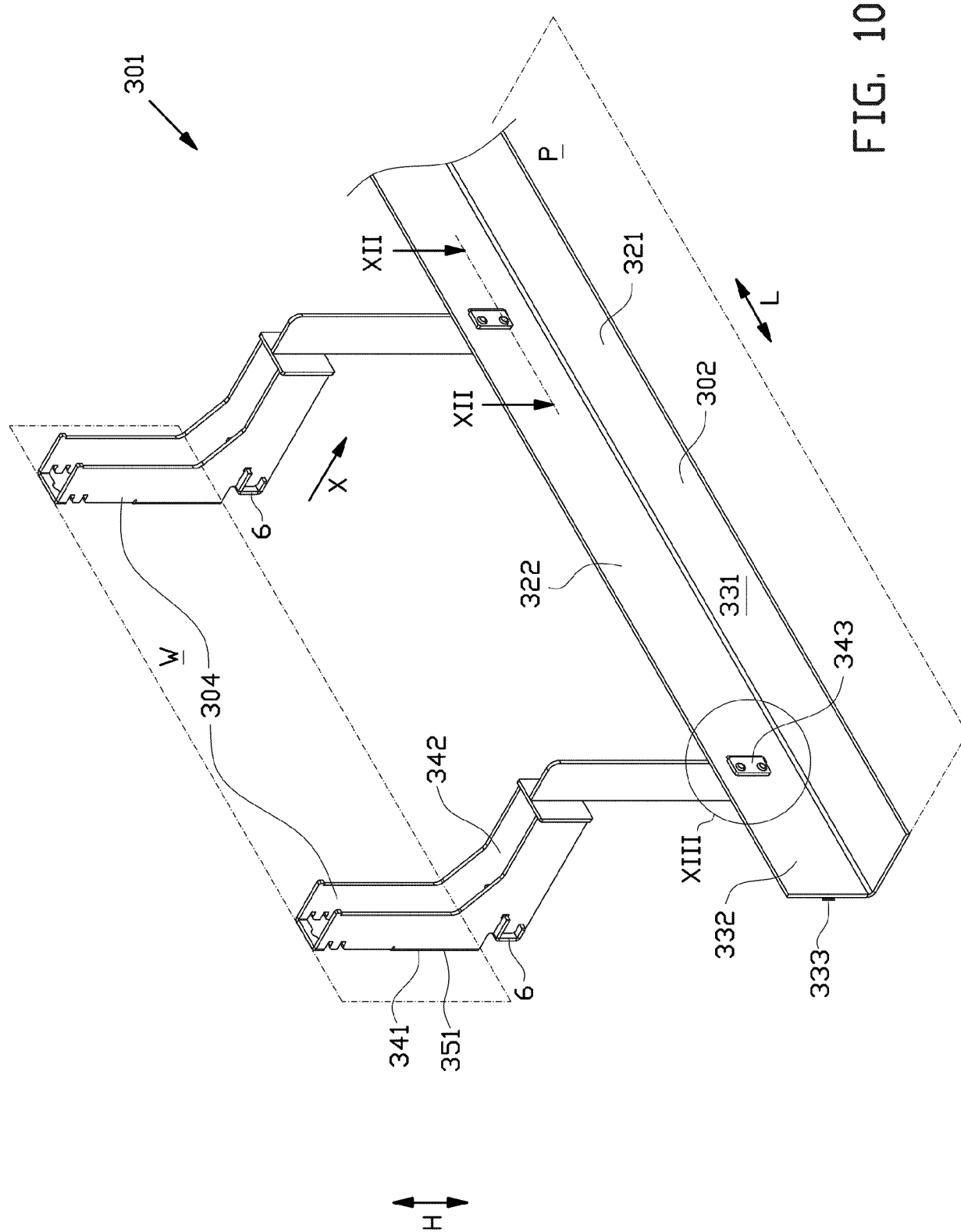
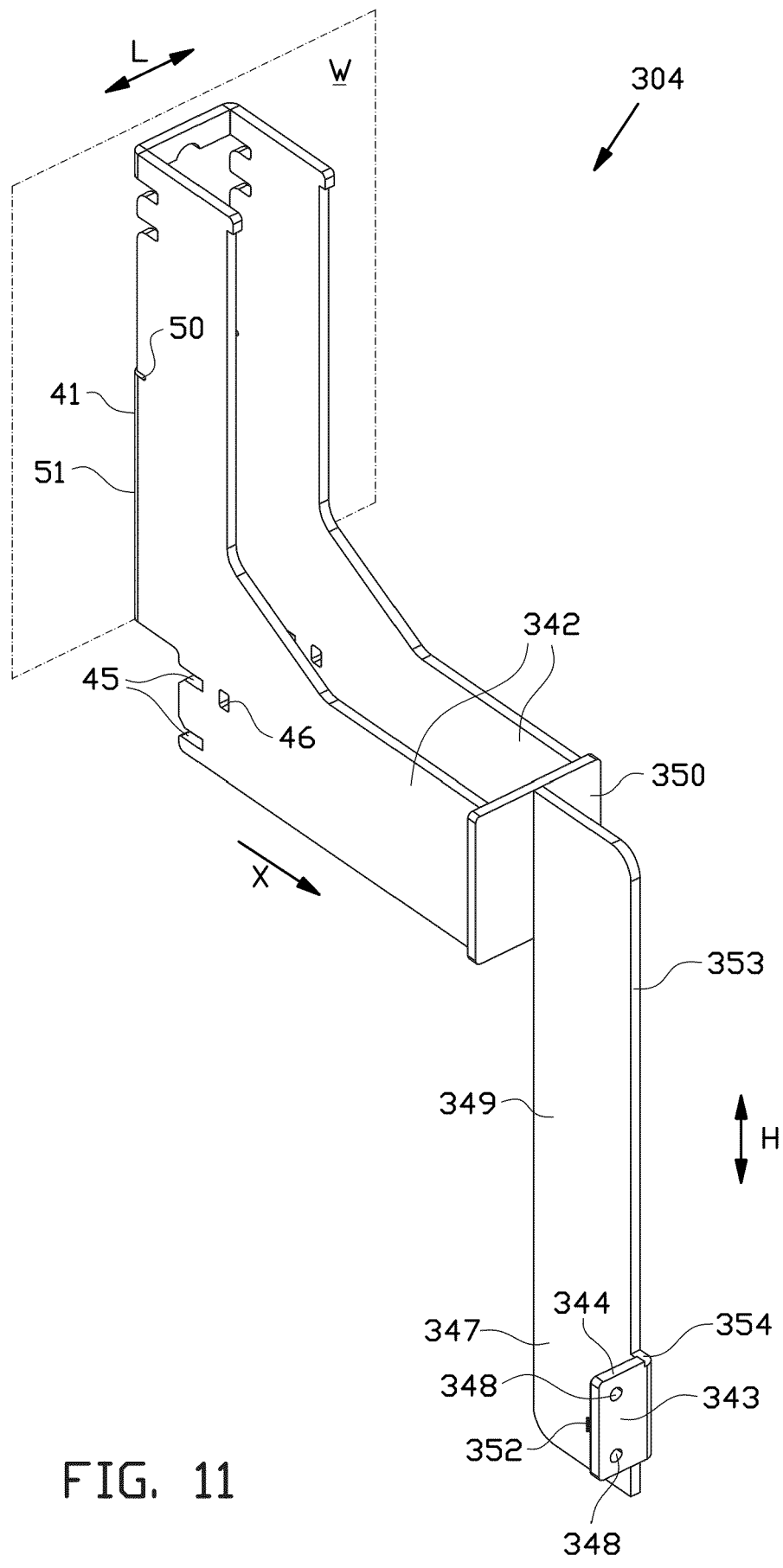


FIG. 10



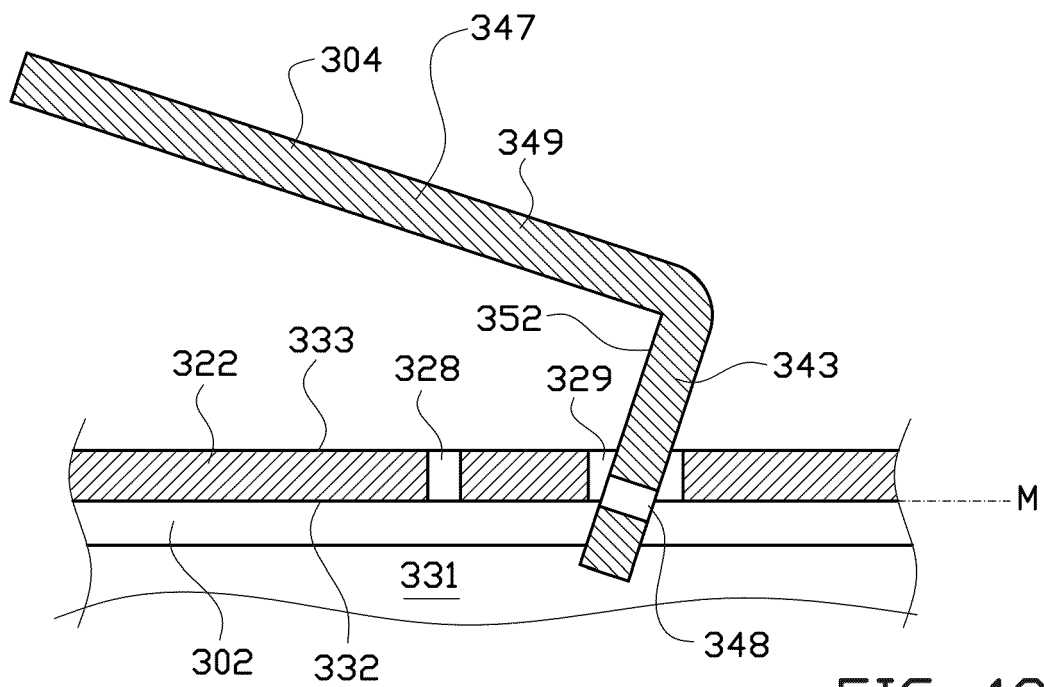


FIG. 12A

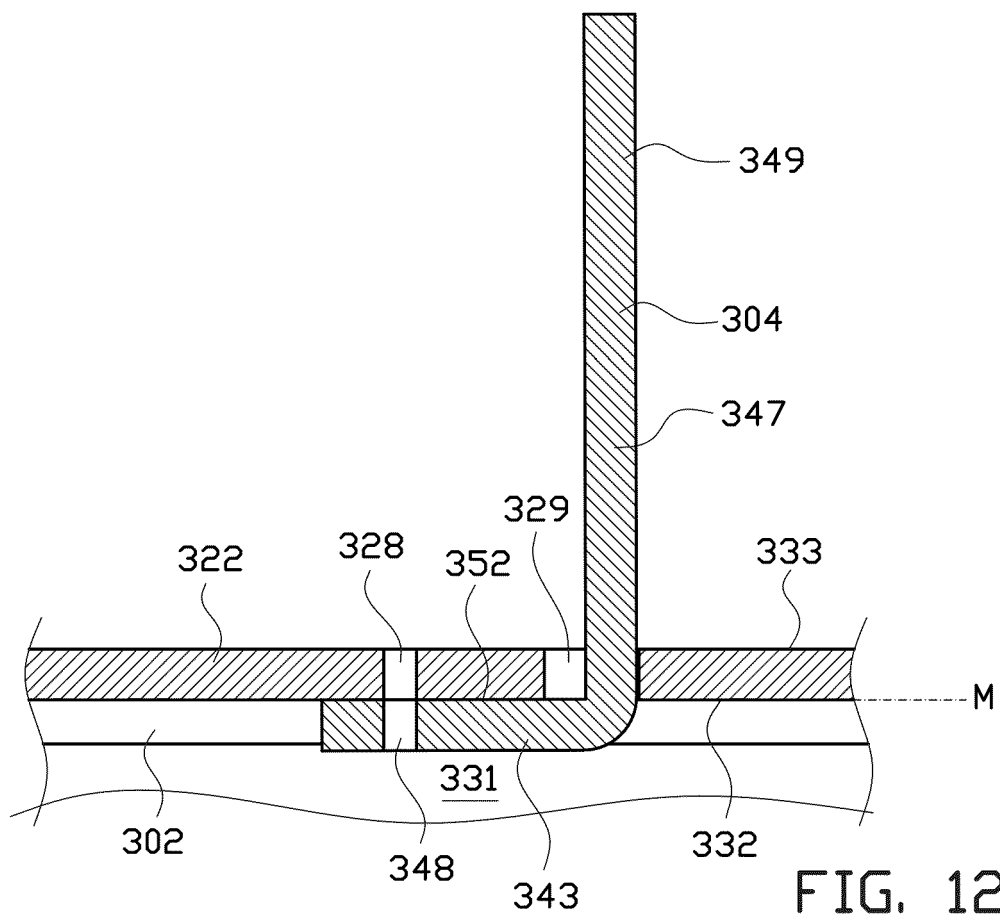


FIG. 12B

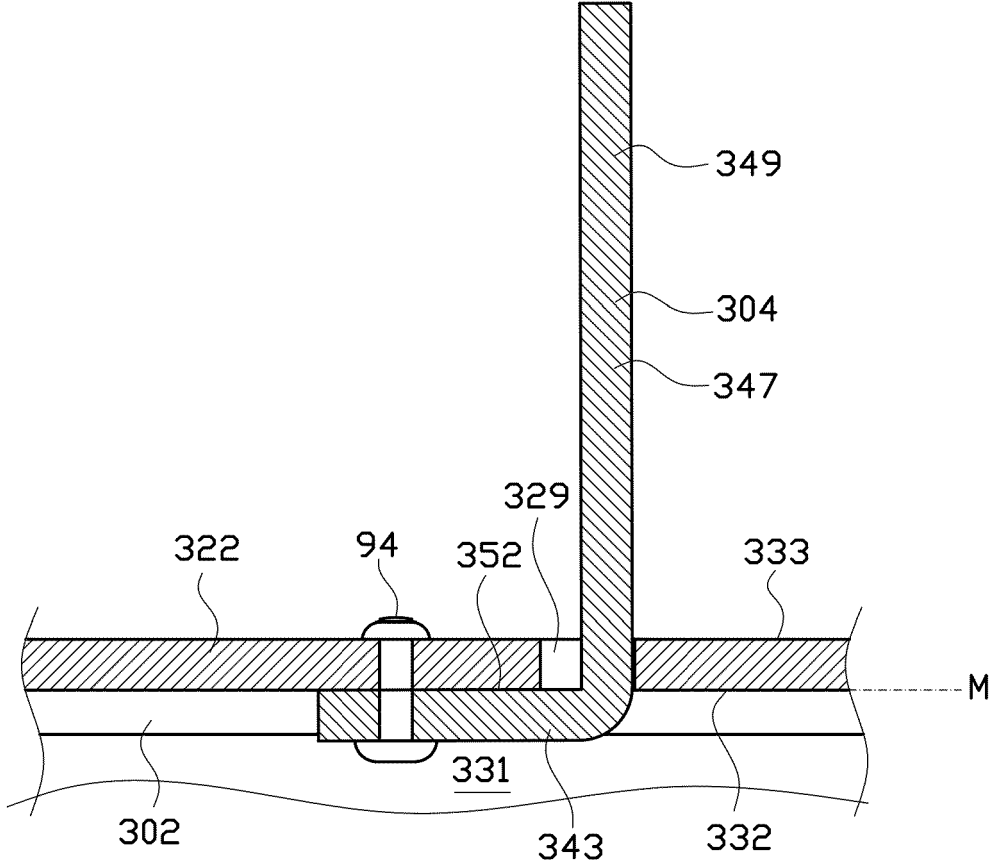


FIG. 12C

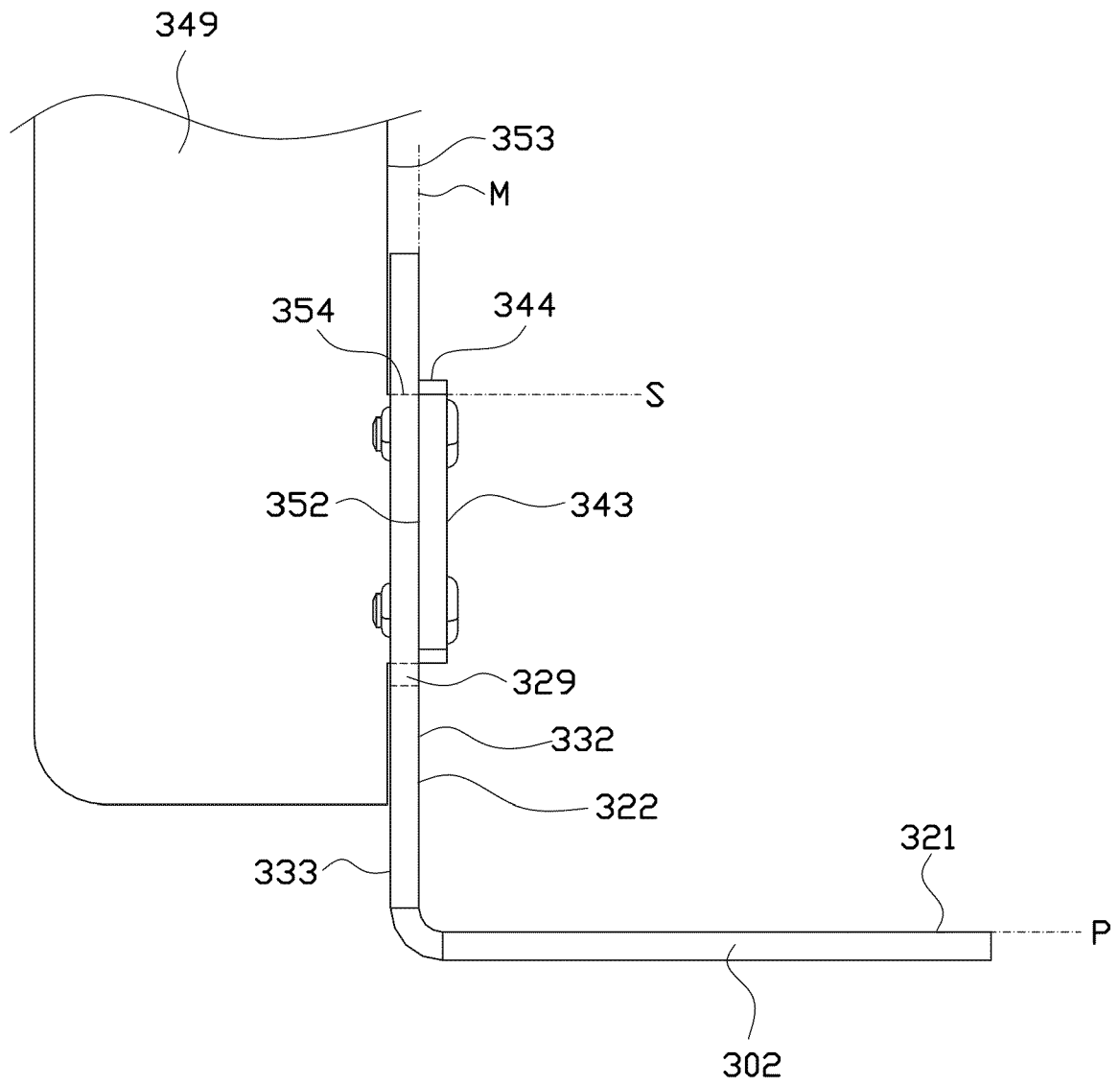
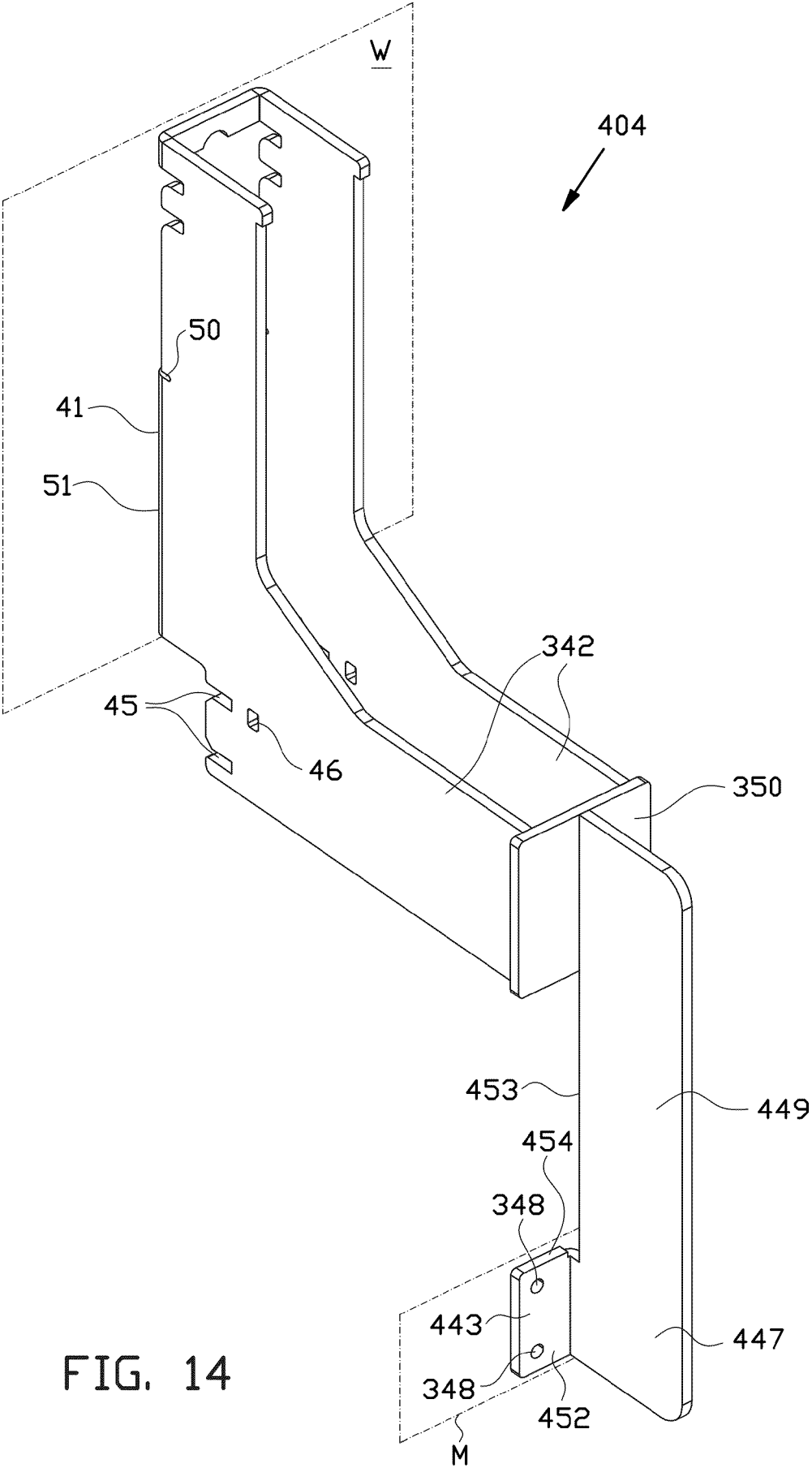


FIG. 13





EUROPEAN SEARCH REPORT

Application Number

EP 26 15 0361

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 395 497 A (WINCRO METAL IND LTD [GB]) 26 May 2004 (2004-05-26) * figure 1 *	1-14	INV. E04F13/08 E04F13/22
A	BE 1 021 473 B1 (VAN AELST KOEN [BE]) 27 November 2015 (2015-11-27) * figure 12 *	1-14	ADD. E04F13/14
A	GB 2 602 980 A (WILLIAM MAURICE BROWN [GB]) 27 July 2022 (2022-07-27) * figure 1 *	1-14	
A	GB 2 263 918 A (WELLS MICHAEL JOHN [GB]; WELLS MICHAEL J) 11 August 1993 (1993-08-11) * figures 1, 2 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		18 May 2026	Fournier, Thomas
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