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(54) **A METHOD AND APPARATUS FOR TILE FIXING ON THE ROOF**

(57) An assembly system having an improved tile (1a) defining at least one nailing or screwing hole (2, 13) that is located at a predetermined distance from the left hand side/interlock portion (3) of the improved tile (1a), a second improved tile (1b) positionable in a row above the first improved tile (1a) for overlapping a portion of the lower improved tile (1a), and a device (4) for clipping the overlapping improved tile (1b) and the lower row improved tile (1a) such that when the nailing or screwing hole (2) is used for attaching the clipping device (4) to the lower improved tile (1a) and where the clipping device (4) is used for clipping a lower portion of a left hand side/interlock portion (3) of the overlapping improved tile (1b) from a row above to the lower tile (1a), the tiles are always assembled in a half bond pattern.

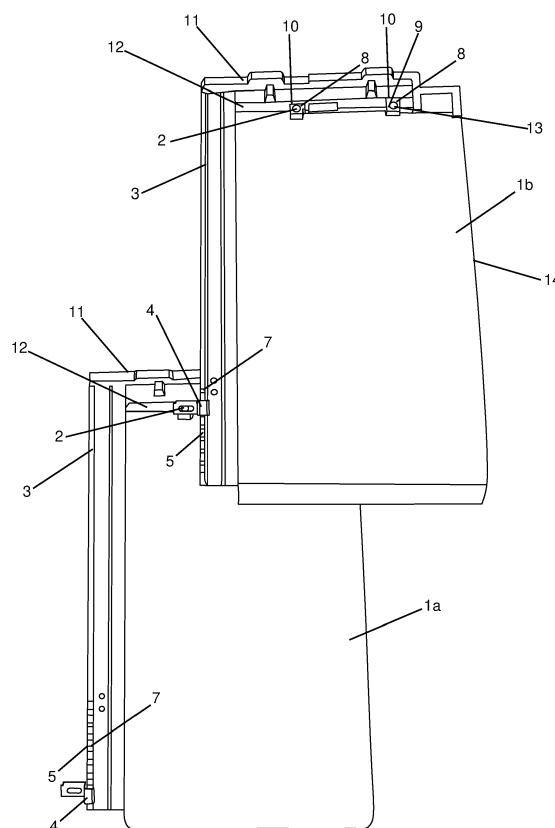


FIG. 1

Description

[0001] The present invention relates to a method and apparatus for tile fixing and, in particular, to a method and apparatus for fixing tiles in roof construction.

[0002] In the roof building field various kind of clips are known and used. In particular, according to a prior art solution, an eaves clip, that is made out of a metal sheet, is used to attach the tile at the eaves of the roof while a tile clip, that is of wire type, is hooked around the upper tile and nailed into the tile batten below or alternatively pushed into position without nailing if plastic clips are used, for example. Before the upper tile is put on, a nail is used and is driven through a hole defined in the lower tile and inserted into the batten directly below. Furthermore, there is a further similar hole on the other side of the tile and some of the tiles are nailed through both of these holes.

[0003] In particular, the eave clips are generally defined by a metal strip that is provided with a circular hole for receiving a screw for fastening the same clip to the roof; moreover, the metal strip is suitably folded so as to define a hook engaging a corresponding rib defined at the edge of the tile.

[0004] Instead, the tile clips are generally defined by a wire and are used, in addition to nailing, to ensure a secure fit of the tile made of clay, concrete or the like. In relation to clay tiles, clay is a much lighter material than concrete and any unnecessary movement of clay tiles in the roof in high winds or exposed areas could result in either chattering of said tiles or potential broken or cracked tiles.

[0005] Therefore, the known solutions for roof building require the use of two different kind of clips, one that is specifically configured for fixing the tile at the eave and another one that is specifically configured for fixing/connecting two tiles together.

[0006] It is clear that in these known systems the roof installer or tiler requires a handful of eaves clips, tile clips and nails and so there are many components to apply on each tile. More in detail, there are four components to put into each tile: an eave clip, a tile clip and two nails to be inserted into the two holes defined on the tile.

[0007] This means that the roof installers or tilers need to carry many and various pieces onto the roof and for each operation they need to choose the right one from their bag.

[0008] Furthermore, there is an issue of getting fingers pricked with clip end points when the installers put a hand into the bag containing the clips in order to extract and use one of them.

[0009] It is an object of the present invention to prevent or mitigate the above mentioned problems of having two separate/different devices for fixing a tile at eave and to another tile, thus providing a single device that at need can be used for fixing a tile at eave or to another tile.

[0010] Another object of the invention is to provide an improved tile for roof building with an alternative and im-

proved characterisation and design, in both constructional and functional terms, compared with the known ones.

[0011] Another object of the invention is to provide a device that allows to connect two tiles together and, at the same time, allows to fix the lower tile to a batten or another supporting structure of the roof.

[0012] Another object of the invention is to provide a device that eliminates any risk of tile movement once fitted.

[0013] Another object of the invention is to provide a method and apparatus that allows to speed up the overall install times by 30%.

[0014] Another object of the invention is to provide a device that gives the roof installers less fixings elements to install.

[0015] Another object of the invention is to provide a device to be used for tiles, even of large format, for their interlocking in a broken bond way

[0016] Another object of the invention is to provide an apparatus for roof fixing with an alternative and improved characterisation and design, in both constructional and functional terms, compared with the known ones.

[0017] Another object of the invention is to provide an apparatus of easy, quick and low-cost construction.

[0018] Another object of the invention is to give superior wind lift resistance.

[0019] Accordingly, all these objects, taken individually and in any combination thereof, are achieved according to the invention.

[0020] According to a first aspect of the invention, there is provided an improved tile defining at least one nailing or screwing hole that is located at a distance from the left hand side/interlock portion of the improved tile such that when the nailing or screwing hole is used for attaching a device of the type for clipping a lower portion of a left hand side/interlock portion of another improved tile from a row above to the lower tile, the tiles are always assembled in a half bond pattern.

[0021] Advantageously, the location of the nailing or screwing hole at this predetermined location from the left hand side/interlock portion of the improved tile means that the installer does not have to measure the half bond pattern but the clipping of the upper improved tile together with the lower improved tile acts as a location means for accurately positioning the upper row of tiles in a half bond pattern together with the lower row of tiles. By half bond pattern we mean that the width of the upper overlap portion of the lower tile is overlapped equally by two adjacent tiles from the row above.

[0022] Preferably, the left-hand side/interlock portion of the improved tile has a continuous rectilinear peripheral edge.

[0023] Ideally, the left-hand side/interlock portion of the improved tile has a continuous rectilinear peripheral edge running from the top of the improved tile to the bottom of the improved tile.

[0024] Preferably, the left-hand side/interlock portion of the improved tile has a continuous rectilinear periph-

eral edge extending along the entire side of the left-hand side/interlock portion of the improved tile.

[0025] Ideally, the improved tile has a peripheral raised ridge extending along the left-hand side/interlock portion of the improved tile.

[0026] Preferably, the peripheral raised ridge comprises an elongate rectilinear ridge running from the top left hand side of the improved tile to the bottom left hand side of the improved tile.

[0027] Ideally, the elongate rectilinear ridge extends along the entire side of the left-hand side/interlock portion of the improved tile.

[0028] Preferably, the elongate rectilinear ridge extending along the entire side of the left-hand side/interlock portion of the improved tile is suitable for receiving a clip of the type for clipping a lower portion of a left hand side/interlock portion of another improved tile from a row above to the lower improved tile.

[0029] Ideally, the overlap upper portion of the improved tile provides a component for defining the screwing or nailing hole.

[0030] Ideally, the overlap upper portion of the improved tile provides a boss for the screwing or nailing hole.

[0031] Ideally, the nailing or screwing hole component has a top surface coplanar with a main surface of the tile defining the nailing or screwing hole.

[0032] Preferably, the nailing or screwing hole component has an upper projecting surface extending from the upper edge of the top surface back towards the tile and being adapted for engaging with a corresponding portion of a device clip for holding the device clip in position during improved tile installation, prior to fixing the device to the tile using fasteners.

[0033] Ideally, the upper projecting surface inclines from the upper edge of the top surface of the nailing or screwing hole component down towards the tile at an angle of incline.

[0034] Preferably, the improved tile has an overlap upper portion having a peripheral ridge extending along all or part of the upper surface of the improved tile.

[0035] Ideally, the improved tile having a peripheral ridge extending along all or part of the upper surface of the improved tile.

[0036] Preferably, the improved tile has an internal ridge spaced below the peripheral ridge.

[0037] Ideally, the internal ridge extending along all or a part of the same extent of the upper surface of the improved tile as the peripheral ridge.

[0038] Preferably, the nailing or screwing hole component is located along the length of the internal ridge spaced below the peripheral ridge of the improved tile.

[0039] A typical tile of this type has the at least one nailing or screwing hole in a range of 35 to 185mm away from the left hand side/interlock end of the tile, most preferably in the range of 80mm to 120mm.

[0040] Ideally, the improved tile is made of clay but other materials including concrete for example could be

used.

[0041] Ideally, the improved tile comprises at least two nailing or screwing holes that are aligned horizontally along the length of the internal ridge spaced below the peripheral ridge of the overlap upper portion of the improved tile.

[0042] Preferably, the distance between said two nailing or screwing holes substantially corresponds to the distance of one of said holes from the left hand side/overlapping portion edge of the improved tile.

[0043] Ideally, the improved tile has the left hand side hole in a range of 80mm to 125mm from the left hand side edge of the improved tile, the right hand side hole is 80mm to 125mm from the left hand side hole and the right hand side hole is 60mm to 80mm from the right hand side edge of the improved tile.

[0044] Ideally, the improved tile has the left hand side hole 103mm from the left hand side edge of the improved tile, the right hand side hole is 103mm from the left hand side hole and the right hand side hole is 74 mm from the right hand side edge of the improved tile.

[0045] Preferably, the distance between said two nailing or screwing holes is substantially greater than the distance of the right hand side nailing or screwing hole from the corresponding right hand side edge of the improved tile.

[0046] Accordingly, the present invention provides at least one device for tile fixing, the at least one device for tile fixing consists of a bracket comprising a first portion that is configured to be placed at need:

- on a batten, or roof supporting structure, for fastening said first portion directly to said batten, or roof supporting structure,
- on a lower improved tile for fastening said first portion to said lower tile,

and said bracket further comprises a second portion configured for engaging an improved tile that is placed, at least partially, over said batten, or roof supporting structure, or over said lower improved tile.

[0047] Preferably, said first portion is configured to be placed on the lower improved tile for fastening said first portion both to said lower improved tile and to the batten, or roof supporting structure, on which said lower improved tile rests.

[0048] Preferably, the same bracket for clipping two improved tiles together is configured to act as a clip for fixing an improved tile at the eaves. Preferably, said same bracket is configured to act as a clip for fixing an upper improved tile to a lower improved tile. Preferably, said bracket is configured to receive a fastener for fixing the lower improved tile to the batten, or roof supporting structure.

[0049] Ideally, said bracket is configured to act both as a clip for tile fixing at the eave and as a clip for fixing an upper improved tile to a lower improved tile.

[0050] Ideally, said bracket is configured to act both as

a clip for tile fixing at the eave and as a clip for fixing an upper tile to a lower tile, and is also configured for receiving a fastener for fixing the lower tile to the batten, or roof supporting structure through the nailing or screwing hole.

[0051] Advantageously, said bracket comprises of a piece of metal sheet.

[0052] Preferably, the bracket comprises of a metal strip that is suitably bent, pressed, cut and/or punched.

[0053] Preferably the bracket is made of metal or metal alloy.

[0054] Ideally, the bracket is made of stainless steel.

[0055] Alternatively, the bracket is made of a metal comprising surfaces coated of zinc-aluminum alloy.

[0056] Alternatively, the bracket is galvanized.

[0057] Advantageously, said first portion comprises a through hole for receiving a fastener.

[0058] Preferably, said first portion comprises an elongated portion.

[0059] Advantageously, said elongated portion comprises a folded lateral portion or wing. Preferably, said folded lateral portion or wing is obtained by providing a short transversal cut out portion at the connection of the first portion with the second portion so as to define in the first portion a lateral portion or strip.

[0060] Ideally, the lateral portion is then folded at almost 90° in respect of the remaining main part of the first portion.

[0061] Ideally, the lateral portion and the remaining main part of the first portion create an obtuse included angle therebetween.

[0062] Ideally, the lateral portion and the remaining main part of the first portion create an include angle of between 95° and 145° therebetween.

[0063] Ideally, in use, when the bracket is mounted on the roof structure or tile, the folded lateral portion is on the upper side of the first portion.

[0064] Ideally, said folded lateral portion or wing is configured to abut at an upper corner of a batten or at an upper corner of a component for defining the screwing or nailing hole.

[0065] Ideally, said folded lateral portion or wing is configured to abut at an upper corner of a batten or at an upper corner of the internal ridge spaced below the peripheral ridge of the overlap upper portion of the improved tile.

[0066] Preferably, said first portion has a width corresponding to the width of the internal ridge spaced below the peripheral ridge of the overlap upper portion of the improved tile.

[0067] Preferably, said fastener comprises a nail or screw or riveted bolt. Advantageously, said fastener comprises a shaft with at least a threaded portion. Preferably, the shaft is entirely threaded. Preferably, the shaft comprises at least a self-tapping portion with tap-like flute in the leading threads. Preferably, the shaft comprises a drill-like fluted tip.

[0068] Advantageously, said through hole comprises an elongated slot.

[0069] Preferably, said elongated slot is defined substantially in the middle of the first portion.

[0070] Ideally, the elongate slot is centred relative to the longitudinal axis of the first portion and between the longitudinal ends thereof.

[0071] Preferably, the elongate slot is centred relative to the width of the first portion and between the lateral ends thereof.

[0072] Ideally, the elongate slot has a length of between 10mm and 20 mm, most preferably 15mm.

[0073] Preferably, the slot has a width of between 2mm and 8mm, most preferably 5mm.

[0074] Ideally, the length of the first portion is between 15mm and 35mm, most preferably 25mm.

[0075] Ideally, the width of the first portion is between 7mm and 13mm, most preferably 10mm.

[0076] Conveniently, the elongated slot is configured so that the shaft of a fastener can be moved and slid along the longitudinal extension of said slot.

[0077] Preferably, the elongated slot has a width (i.e. the extension perpendicular to its longitudinal development) that substantially corresponds or is slightly larger than the diameter of the hole defined on the lower tile.

[0078] Ideally the elongated slot has rounded ends.

Advantageously, the elongated slot is configured to be positioned over the hole defined on a lower improved tile, preferably over the hole defined on the internal ridge spaced below the peripheral ridge of the overlap upper portion of the improved tile. Conveniently, the elongated slot is pre-punched on a metal strip defining said bracket.

[0079] Ideally, the second portion of the bracket extends upwardly out of the main plane of the first portion proximal to one end of the elongated slot.

[0080] Preferably, the second portion of the bracket extends upwardly out of the main plane of the first portion spaced apart a distance within a range of 2mm - 8mm from one end of the elongated slot.

[0081] Ideally, the second portion of the bracket extends upwardly out of the main plane of the first portion spaced apart a distance within a range of 3mm - 7mm and most preferably 5mm from one end of the elongated slot.

[0082] Advantageously, this provides a significant advantage in preventing the damaging effects of wind lift resulting in tile clattering and damage or breakage to tiles in heavy winds or storm conditions. The proximity of the fixing such as the nail or screw to the second portion which is directly clipped to the improved tile above reduces the amount of the bracket there is for bending or flexing away from the fastener thereby reducing the amount of room there is for play and eliminating the opportunity for gaps to form during heavy wind or storms. In addition to the bracket being compact, the fact that the second portion of the bracket clips directly onto the elongate rectilinear ridge which extends along the entire side of the left-hand side/interlock portion of the improved tile further reduces the distance between the fastening and the left hand side edge of the improved tile in the row

above.

[0083] Preferably, the second portion of the bracket extends vertically upwardly out of the main plane of the first portion proximal to one end of the elongated slot.

[0084] Preferably, the second portion of the bracket extends vertically upwardly out of the main plane of the first portion to a height within a range of 10mm to 2mm, most preferably 12mm.

[0085] Ideally, said second portion is configured for engaging by clipping the improved tile.

[0086] Preferably, said second portion comprises a hook end portion configured to engage the elongate rectilinear ridge which extends along the entire side of the left-hand side/interlock portion of the improved tile, preferably in correspondence of a toothed or serrated profile of said edge portion.

[0087] Preferably, the first portion and the second portion have substantially the same width. Preferably, the second portion has a width that is larger than the one of the first portion.

[0088] Advantageously, said hook end portion is obtained by folded sections.

[0089] Preferably, the sections are folded at about 90° in respect of the adjacent one/ones.

[0090] Preferably, the second portion of the bracket configured for engaging said tile comprises a first section that is folded upright at about 90° in respect of the first portion of the bracket, a second section that is folded so as to be substantially parallel to the first portion and a third section that is folded downward (i.e. toward the first portion) so as to define an angle wider of 90°, preferably of 90°-130°, in respect of the second section.

[0091] Preferably, the first section of the second portion is directly connected to the first portion of the bracket.

[0092] Preferably, the second section is connected and interposed between the first section and the third section.

[0093] Advantageously, the hook end portion is defined by the combination of said first, second and third sections.

[0094] Preferably, the distance between the first and third sections, that face each other, corresponds substantially to the elongate rectilinear ridge defined on the improved tile to be fixed by the second portion.

[0095] Preferably, the distance between the first and third sections, that face each other, corresponds substantially to the width of the elongate rectilinear ridge of the improved tile to be fixed.

[0096] Ideally, the overall length of the device, the overall length of the elongated slot and/or the distance that the nailing or screwing hole is located from the left hand side/interlock portion of the improved tile are adjustable relative to the overall width of the improved tile to ensure that the improved tiles are always assembled in a half bond pattern when clipped by the device.

[0097] According to a further aspect of the invention, there is provided an assembly system comprising an improved tile defining at least one nailing or screwing hole

that is located at a predetermined distance from the left hand side/interlock portion of the improved tile, a second improved tile positionable in a row above the first improved tile for overlapping a portion of the lower improved tile, and a device for clipping the overlapping improved tile and the lower row improved tile such that when the nailing or screwing hole is used for attaching the clipping device to the lower improved tile and where the clipping device is used for clipping a lower portion of a left hand side/interlock portion of the overlapping improved tile from a row above to the lower tile, the tiles are always assembled in a half bond pattern.

[0098] Advantageously, the location of the nailing or screwing hole at this predetermined location from the left hand side/interlock portion of the improved tile means that the installer does not have to measure the half bond pattern but the clipping of the upper improved tile together with the lower improved tile acts as a location means for accurately positioning the upper row of tiles in a half bond pattern together with the lower row of tiles.

[0099] According to a further aspect of the invention, there is provided an assembly system comprising a combination of at least one improved tile with one or more of the above features and at least one device for tile fixing.

[0100] Advantageously, the assembly system comprises a fastener that is insertable through both the elongated slot of the device and the hole in the tile, for inserting them into the batten, while the hook end portion engages an upper tile.

[0101] Advantageously, the assembly system comprises a fastener that is insertable through the elongated slot of the device for inserting then directly into the batten or another roof supporting structure, while the hook end portion engages a tile at the eave.

[0102] Ideally, said fastener comprises a nail or screw or riveted bolt.

[0103] According to a further aspect of the invention, there is provided an improved kit for building a roof covering that comprises a plurality of fasteners, a plurality of devices with one or more of the above features, and a plurality of improved tiles with one or more of the above features.

[0104] According to a further aspect of the invention, there is provided a method for fixing at need, by a device with one or more of the features above, a tile at the eave of the roof or to a lower tile or to screw or nail a lower tile to the battens or to another roof supporting structure.

[0105] The skilled man will appreciate that all preferred or optional features of the invention described with reference to only some aspects or embodiments of the invention may be applied to all aspects of the invention.

[0106] It will be appreciated that optional features applicable to one aspect of the invention can be used in any combination, and in any number. Moreover, they can also be used with any of the other aspects of the invention in any combination and in any number. This includes, but is not limited to, the dependent claims from any claim being used as dependent claims for any other claim in

the claims of this application.

[0107] The invention will now be described with reference to the accompanying drawings which show by way of example only one embodiment of a device in accordance with the invention.

[0108] In the drawings:

Figure 1 is an image of an assembly system according to the present invention;

Figure 2 is an image of the use of the assembly system according to the present invention for fixing a tile to a batten at the eave;

Figure 3 is an image of the use of the assembly system according to the invention for fixing an upper tile to a lower tile;

Figure 4 is an image of an improved tile according to the present invention;

Figure 5 is an image of the device for tile fixing according to the invention;

Figure 6 is another image of the device for tile fixing according to the invention;

Figure 7 is another image of the device for tile fixing according to the invention.

[0109] Referring to figures 1-4, there is provided an improved tile 1/1a/1b defining at least one nailing or screwing hole 2 that is located at a distance from the left hand side/interlock portion 3 of the improved tile 1 such that when the nailing or screwing hole 2 is used for attaching a device of the type for clipping a lower portion 5 of a left hand side/interlock portion 3 of another improved tile 1b from a row above to the lower tile 1a, the tiles are always assembled in a half bond pattern. In this embodiment, the device of the type for clipping a lower portion 5 is indicated by reference numeral 4. The location of the nailing or screwing hole 2 at this predetermined location from the left hand side/interlock portion 3 of the improved tile 1 means that the installer does not have to measure the half bond pattern but the clipping of the upper improved tile 1b together with the lower improved tile 1a acts as a location means for accurately positioning the upper row of tiles in a half bond pattern together with the lower row of tiles.

[0110] The left-hand side/interlock portion 3 of the improved tile 1 has a continuous rectilinear peripheral edge. The left-hand side/interlock portion 3 of the improved tile 1 has a continuous rectilinear peripheral edge running from the top of the improved tile to the bottom of the improved tile. The left-hand side/interlock portion 3 of the improved tile 1 has a continuous rectilinear peripheral edge extending along the entire side of the left-hand side/interlock portion 3 of the improved tile 1. The improved tile 1 has a peripheral raised ridge extending along the left-hand side/interlock portion 3 of the improved tile 1. In this embodiment, the peripheral raised ridge has an elongate rectilinear ridge 7 running from the top of the improved tile 1 to the bottom of the improved tile 1. The elongate rectilinear ridge 7 extends along the

entire side of the left-hand side/interlock portion 3 of the improved tile 1. The elongate rectilinear ridge 7 extending along the entire side of the left-hand side/interlock portion 3 of the improved tile 1 is suitable for receiving a clip 4 of the type for clipping a lower portion of a left hand side/interlock portion 3 of another improved tile 1b from a row above to the lower improved tile 1a.

[0111] The overlap upper portion of the improved tile 1 provides a component 8 for defining the screwing or nailing hole 2, 13. In this embodiment, the overlap upper portion of the improved tile 1 provides a boss 8 for the screwing or nailing hole 2, 13. The nailing or screwing hole component 8 has an upper surface formed for engaging with a corresponding portion of a clip 4 for holding the clip in position during improved tile 1 installation. The nailing or screwing hole component 8 has a top surface 9 coplanar with a main surface defining the tile defining the nailing or screwing hole. The nailing or screwing hole component 9 has an upper projecting surface 10 extending from the upper edge of the top surface 9 back towards the tile 1 and being adapted for engaging with a corresponding portion of a clip 4 for holding the clip in position during improved tile 1 installation. The upper projecting surface 10 inclines from the upper edge of the top surface 9 of the nailing or screwing hole component 8 down towards the tile 1 at an angle of incline.

[0112] The improved tile 1 has an overlap upper portion having a peripheral ridge 11 extending along all or part of the upper surface of the improved tile 1. The improved tile 1 has an internal ridge 12 spaced below the peripheral ridge 11. The internal ridge 12 extending along all or a part of the same extent of the upper surface of the improved tile 1 as the peripheral ridge 11. The nailing or screwing hole component 8 is located along the length of the internal ridge 12 spaced below the peripheral ridge 11 of the overlap upper portion of the improved tile 1.

[0113] A typical tile of this type has the at least one nailing or screwing hole in a range of 35 to 185mm away from the left hand side/interlock end of the tile, most preferably in the range of 80mm to 120mm.

[0114] The improved tile 1 is made of clay but other materials including concrete for example could be used. The improved tile 1 has at least two nailing or screwing holes 2, 13 that are aligned horizontally along the length of the internal ridge 12 spaced below the peripheral ridge 11 of the overlap upper portion of the improved tile 1. The distance A between said two nailing or screwing holes 2, 13 substantially corresponds to the distance B of one of said holes 2 from the left hand side 3/overlapping portion edge of the improved tile 1. In one embodiment, the improved tile 1 has the left hand side hole 2 in a range of 80mm to 125mm from the left hand side edge 3 of the improved tile 1, the right hand side hole 13 is 80mm to 125mm from the left hand side hole 2 and the right hand side hole 12 is 60mm to 80mm from the right hand side edge 14 of the improved tile 1. Ideally, the improved tile has the left hand side hole 103mm from the left hand side edge of the improved tile, the right hand side hole is

103mm from the left hand side hole and the right hand side hole is 74 mm from the right hand side edge of the improved tile. The distance A between said two nailing or screwing holes 2, 13 is substantially greater than the distance C of the right hand side nailing or screwing hole 13 from the corresponding right hand side edge 14 of the improved tile 1.

[0115] Referring to figures 1 - 7, there is illustrated a device 4 for tile fixing, the device 4 for tile fixing consists of a bracket 4 having a first portion 15 that is configured to be placed at need:

- on a batten 6, or roof supporting structure, for fastening said first portion 15 directly to said batten 6, or roof supporting structure,
- on a lower improved tile 1a for fastening said first portion 15 to said lower tile 1a,

and said bracket 4 further has a second portion 16 configured for engaging an improved tile 1/1b that is placed, at least partially, over said batten 6, or roof supporting structure, or over said lower improved tile 1a. The first portion 15 is configured to be placed on the lower improved tile 1a for fastening said first portion 15 both to said lower improved tile 1a and to the batten 6, or roof supporting structure, on which said lower improved tile 1a rests. The same bracket 4 for clipping two improved tiles 1a, 1b together is configured to act as a clip for fixing an improved tile 1 at the eaves. The same bracket 4 is configured to act as a clip for fixing an upper improved tile 1b to a lower improved tile 1a. The bracket 4 is configured to receive a fastener for fixing the lower improved tile 1a to the batten 6, or roof supporting structure. The bracket 4 is configured to act both as a clip for tile fixing at the eave and as a clip for fixing an upper improved tile 1b to a lower improved tile 1a. The bracket 4 is configured to act both as a clip for tile fixing at the eave and as a clip for fixing an upper tile 1b to a lower tile 1a, and is also configured for receiving a fastener for fixing the lower tile 1a to the batten 6, or roof supporting structure through the nailing or screwing hole 2. In this embodiment, the bracket 4 is formed of a metal strip that is suitably bent, pressed, cut and/or punched. However, the bracket may be formed by any other suitable material or means. In this embodiment, the bracket 4 is made of metal or metal alloy such as stainless steel. However, the bracket may be formed of any other suitable material including, but not limited to, metal comprising surfaces coated of zinc-aluminum alloy. Alternatively, the bracket is galvanized.

[0116] The first portion 15 has a through hole 17 for receiving a fastener. The first portion 15 has an elongated portion 18. The elongated portion 18 has a folded lateral portion or wing 19. The folded lateral portion or wing 19 is obtained by providing a short transversal cut out portion at the connection of the first portion 15 with the second portion 16 so as to define in the first portion 15 a lateral portion or strip. The lateral portion 19 is then folded at almost 90° in respect of the remaining main part 18 of

the first portion 15. Alternatively, the folded lateral portion or wing 19 may be obtained by any other suitable means. The lateral portion 19 and the remaining main part 18 of the first portion 15 create an obtuse included angle therebetween. The lateral portion 19 and the remaining main part 18 of the first portion 15 create an included angle of between 95° and 145° therebetween. In use, when the bracket 4 is mounted on the roof structure or tile 1, the folded lateral portion 19 is on the upper side of the first portion 15. The folded lateral portion or wing 19 is configured to abut at an upper corner of a batten 6 or at an upper corner of a component for defining the screwing or nailing hole. The folded lateral portion or wing 19 is configured to abut at an upper corner of a batten 6 or at an upper corner of the internal ridge 12 spaced below the peripheral ridge 11 of the overlap upper portion of the improved tile 1. The first portion 15 has a width corresponding to the width of the internal ridge 12 spaced below the peripheral ridge 11 of the overlap upper portion of the improved tile 1. The fastener (not shown) is a nail or screw or riveted bolt. The fastener has a shaft with at least a threaded portion. The shaft is entirely threaded. The shaft has at least a self-tapping portion with tap-like flute in the leading threads. The shaft has a drill-like fluted tip.

[0117] In the embodiment shown, the through hole 17 is an elongated slot. The elongated slot is defined substantially in the middle of the first portion 15. The elongate slot is centred relative to the longitudinal axis of the first portion 15 and between the longitudinal ends thereof. The elongate slot is centred relative to the width of the first portion 15 and between the lateral ends thereof. The elongate slot has a length of between 10mm and 20 mm, most preferably 15mm. The slot has a width of between 2mm and 8mm, most preferably 5mm. The length of the first portion 15 is between 15mm and 35mm, most preferably 25mm. The width of the first portion 15 is between 7mm and 13mm, most preferably 10mm. The elongated slot is configured so that the shaft of a fastener can be moved and slid along the longitudinal extension of said slot. The elongated slot has a width (i.e. the extension perpendicular to its longitudinal development) that substantially corresponds or is slightly larger than the diameter of the hole 2, 13 defined on the lower tile 1a. The elongated slot has rounded ends. The elongated slot is configured to be positioned over the hole 2, 13 defined on a lower improved tile 1a, preferably over the hole defined on the internal ridge 12 spaced below the peripheral ridge 11 of the overlap upper portion of the improved tile. The elongated slot is pre-punched on a metal strip defining said bracket 4.

[0118] The second portion 16 of the bracket 4 extends upwardly out of the main plane of the first portion 15 proximal to one end of the elongated slot. The second portion 16 of the bracket 4 extends upwardly out of the main plane of the first portion 15 spaced apart a distance within a range of 2mm - 8mm from one end of the elongated slot. The second portion of the bracket 4 extends upward-

ly out of the main plane of the first portion 15 spaced apart a distance within a range of 3mm - 7mm and most preferably 5mm from one end of the elongated slot. This provides a significant advantage in preventing the damaging effects of wind lift resulting in tile clattering and damage or breakage to tiles in heavy winds or storm conditions. The proximity of the fixing such as the nail or screw to the second portion 16 which is directly clipped to the improved tile above 1 b reduces the amount of the bracket 4 there is for bending or flexing away from the fastener thereby reducing the amount of room there is for play and eliminating the opportunity for gaps to form during heavy wind or storms. In addition to the bracket being compact, the fact that the second portion 16 of the bracket 4 clips directly onto the elongate rectilinear ridge 7 which extends along the entire side of the left-hand side/interlock portion 3 of the improved tile 1/1b further reduces the distance between the fastening and the left hand side edge 3 of the improved tile 1b in the row above. The second portion 16 of the bracket 4 extends vertically upwardly out of the main plane of the first portion 15 proximal to one end of the elongated slot. The second portion 16 is configured for engaging by clipping the improved tile 1. The second portion 16 has a hook end portion 20 configured to engage the elongate rectilinear ridge 7 which extends along the entire side of the left-hand side/interlock portion 3 of the improved tile 1, preferably in correspondence of a toothed or serrated profile of said edge portion.

[0119] The first portion 15 and the second portion 16 have substantially the same width. Alternatively, the second portion 16 has a width that is larger than the one of the first portion 15. The hook end portion 20 is obtained by folded sections 21, 22, 23. The sections are folded at about 90° in respect of the adjacent one/ones. The second portion 16 of the bracket configured for engaging said tile has a first section 21 that is folded upright at about 90° in respect of the first portion 15 of the bracket 4, a second section 22 that is folded so as to be substantially parallel to the first portion 15 and a third section 23 that is folded downward (i.e. toward the first portion 15) so as to define an angle wider of 90°, preferably of 90°-130°, in respect of the second section 22. The first section 21 of the second portion 16 is directly connected to the first portion 15 of the bracket 4. The second section 22 is connected and interposed between the first section 21 and the third section 23. The hook end portion 20 is defined by the combination of said first 21, second 22 and third sections 23. The distance between the first 21 and third sections 23, that face each other, corresponds substantially to the elongate rectilinear ridge 7 defined on the improved tile 1 to be fixed by the second portion 16. The distance between the first 21 and third sections 23, that face each other, corresponds substantially to the width of the elongate rectilinear ridge 7 of the improved tile 1 to be fixed.

[0120] In relation to the detailed description of the different embodiments of the invention, it will be understood

that one or more technical features of one embodiment can be used in combination with one or more technical features of any other embodiment where the transferred use of the one or more technical features would be immediately apparent to a person of ordinary skill in the art to carry out a similar function in a similar way on the other embodiment.

[0121] In the preceding discussion of the invention, unless stated to the contrary, the disclosure of alternative values for the upper or lower limit of the permitted range of a parameter, coupled with an indication that one of the said values is more highly preferred than the other, is to be construed as an implied statement that each intermediate value of said parameter, lying between the more preferred and the less preferred of said alternatives, is itself preferred to said less preferred value and also to each value lying between said less preferred value and said intermediate value.

[0122] The features disclosed in the foregoing description or the following drawings, expressed in their specific forms or in terms of a means for performing a disclosed function, or a method or a process of attaining the disclosed result, as appropriate, may separately, or in any combination of such features be utilised for realising the invention in diverse forms thereof as defined in the appended claims.

Claims

1. An assembly system comprising an improved tile defining at least one nailing or screwing hole that is located at a predetermined distance from the left hand side/interlock portion of the improved tile, a second improved tile positionable in a row above the first improved tile for overlapping a portion of the lower improved tile, and a device for clipping the overlapping improved tile and the lower row improved tile such that when the nailing or screwing hole is used for attaching the clipping device to the lower improved tile and where the clipping device is used for clipping a lower portion of a left hand side/interlock portion of the overlapping improved tile from a row above to the lower tile, the tiles are always assembled in a half bond pattern.
2. An assembly as claimed in claim 1, wherein the improved tile has a peripheral raised ridge comprising an elongate rectilinear ridge extending along the entire left-hand side/interlock portion of the improved tile.
3. An assembly as claimed in claim 2, wherein the elongate rectilinear ridge extending along the entire left-hand side/interlock portion of the improved tile is formed for receiving the device for clipping a lower portion of a left hand side/interlock portion of another improved tile from a row above to the lower improved

tile.

4. An assembly as claimed in any one of claims 1 to 4, wherein an overlap upper portion of the improved tile provides a component for defining the screwing or nailing hole, the nailing or screwing hole component has a top surface coplanar with a main surface of the tile defining the nailing or screwing hole, the nailing or screwing hole component having an upper projecting surface extending from the upper edge of the top surface back down towards the tile and being adapted for engaging with a corresponding portion of a device for holding the device in position during improved tile installation.
5. An assembly as claimed in claim 4, wherein the upper projecting surface inclines from the upper edge of the top surface of the nailing or screwing hole component down towards the tile at an angle of incline.
6. An assembly as claimed in any one of the preceding claims, wherein the improved tile has a peripheral ridge extending along all or part of the upper surface of the improved tile, the improved tile has an internal ridge spaced below the peripheral ridge wherein the nailing or screwing hole component is located along the length of the internal ridge spaced below the peripheral ridge of the improved tile.
7. An assembly as claimed in any one of the preceding claims, wherein the at least one device for tile fixing consists of a bracket comprising a first portion that is configured to be placed at either on a batten, or roof supporting structure, for fastening said first portion directly to said batten, or roof supporting structure, or on a lower improved tile for fastening said first portion to said lower tile, and said bracket further comprises a second portion configured for engaging an improved tile that is placed, at least partially, over said batten, or roof supporting structure, or over said lower improved tile.
8. An assembly as claimed in claim 7, wherein said first portion is configured to be placed on the lower improved tile for fastening said first portion both to said lower improved tile and to the batten, or roof supporting structure, on which said lower improved tile rests.
9. An assembly as claimed in claim 7 or claim 8, wherein said first portion comprises an elongated portion having a folded lateral wing, whereby in use, when the bracket is mounted on the roof structure or improved tile, the folded lateral portion is on the upper side of the first portion so as to abut at an upper corner of a batten or at an upper corner of a component for defining the screwing or nailing hole.
10. An assembly as claimed in any one of the claims 7 to 9, wherein the first portion has an aperture comprising an elongated slot and wherein the second portion of the bracket extends upwardly out of the main plane of the first portion proximal to one end of the elongated slot.
11. An assembly as claimed in claim 10, wherein the second portion of the bracket extends upwardly out of the main plane of the first portion spaced apart a distance within a range of 2mm to 8mm, preferably 3mm to 7mm and most preferably 5mm from one end of the elongated slot.
12. An assembly as claimed in any one of the preceding claims wherein the overall length of the device, the overall length of the elongated slot and/or the distance that the nailing or screwing hole is located from the left hand side/interlock portion of the improved tile are all individually or in any combination adjustable relative to the overall width of the improved tile to ensure that the improved tiles are always assembled in a half bond pattern when clipped by the device.
13. An assembly as claimed in claim 4 and claim 9, wherein the folded lateral wing of the device is formed for engaging the upper projecting surface of the nailing or screwing hole component for holding the device on the tile temporarily prior to fixing the device to the tile using nails or screws.
14. A method for clipping an improved tile to a batten, roof structure or improved lower tile, the method comprising providing an improved tile having at least one nailing or screwing hole that is located at a predetermined distance from the left hand side/interlock portion of the improved tile, providing a second improved tile positioned in a row above the first improved tile for overlapping a portion of the lower improved tile, and providing a device for clipping the overlapping improved tile and the lower row improved tile, placing a nail or screw in the nailing or screwing hole of the lower improved tile via an aperture of the clipping device for attaching the clipping device to the lower improved tile and attaching the clipping device to a lower portion of a left hand side/interlock portion of the overlapping improved tile from a row above to the lower tile in such a way that the improved tiles are always assembled in a half bond pattern.
15. An improved tile defining at least one nailing or screwing hole that is located at a distance from the left hand side/interlock portion of the improved tile such that when the nailing or screwing hole is used for attaching a device of the type for clipping a lower portion of a left hand side/interlock portion of another

improved tile from a row above to the lower improved tile, the improved tiles are always assembled in a half bond pattern.

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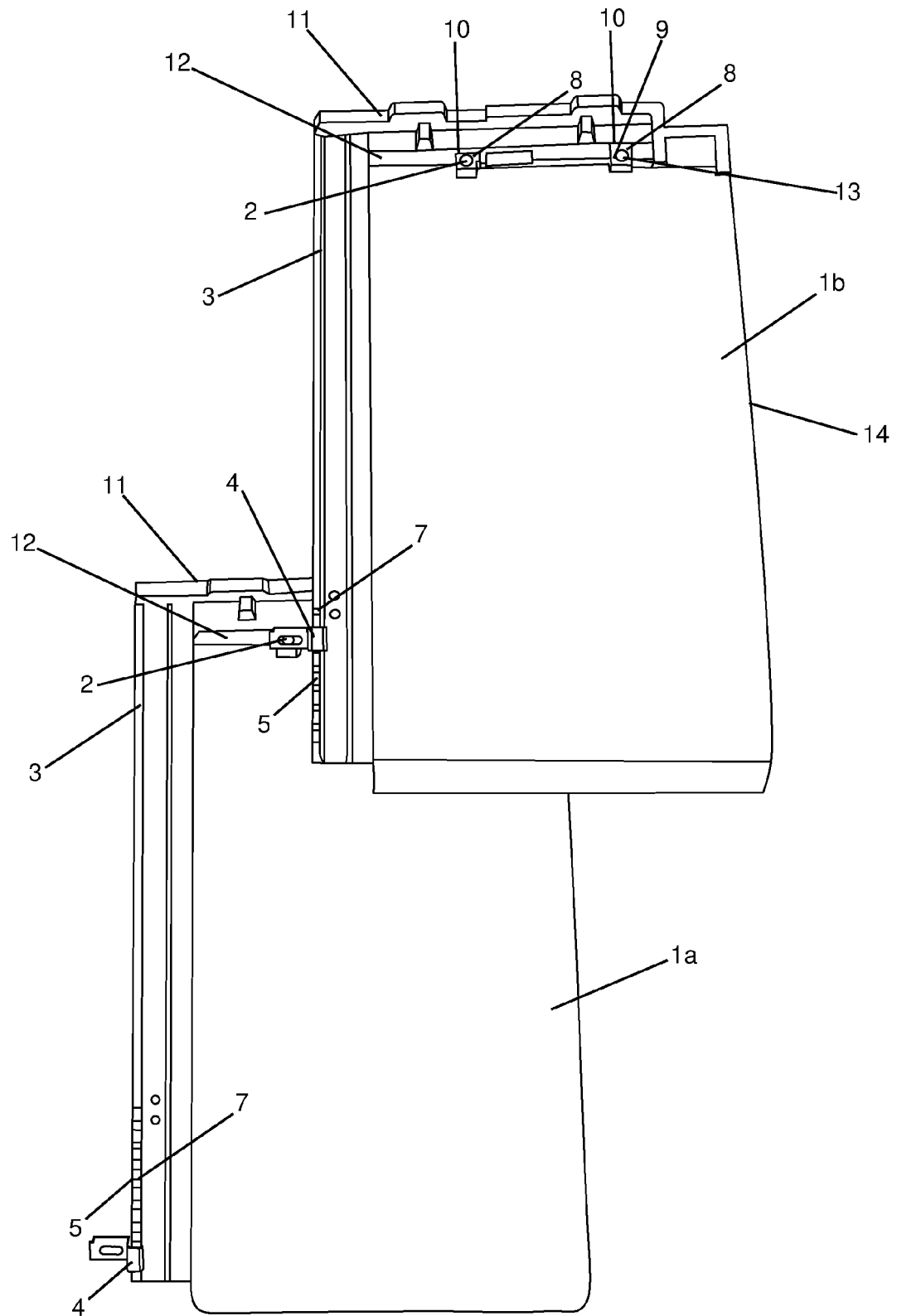


FIG. 1

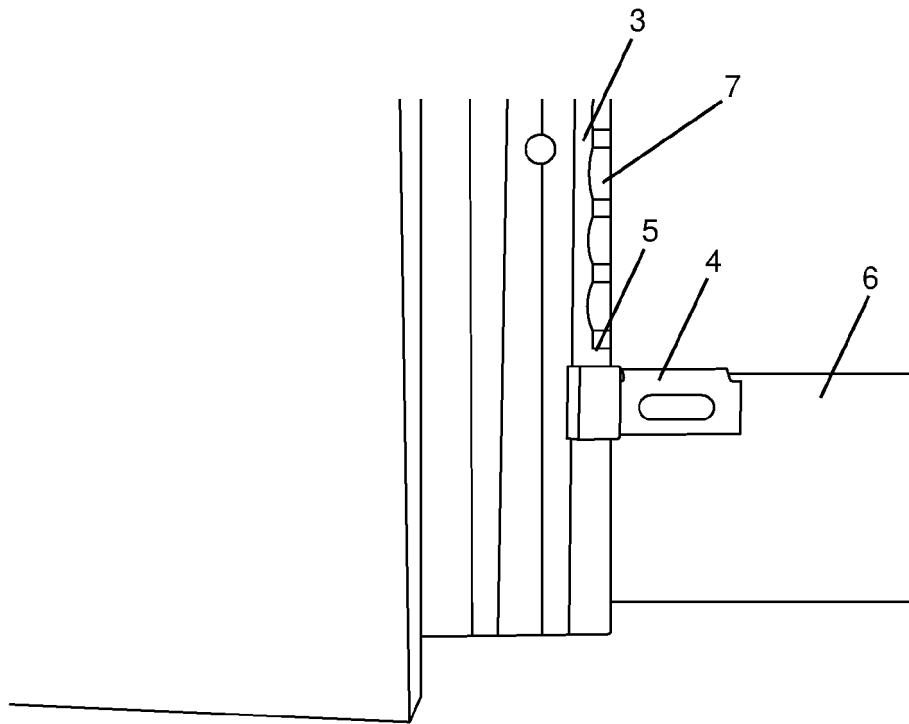


FIG. 2

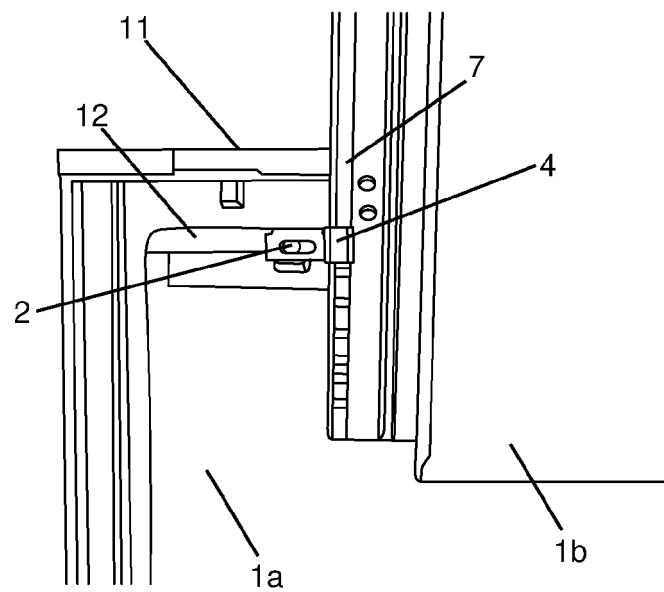


FIG. 3

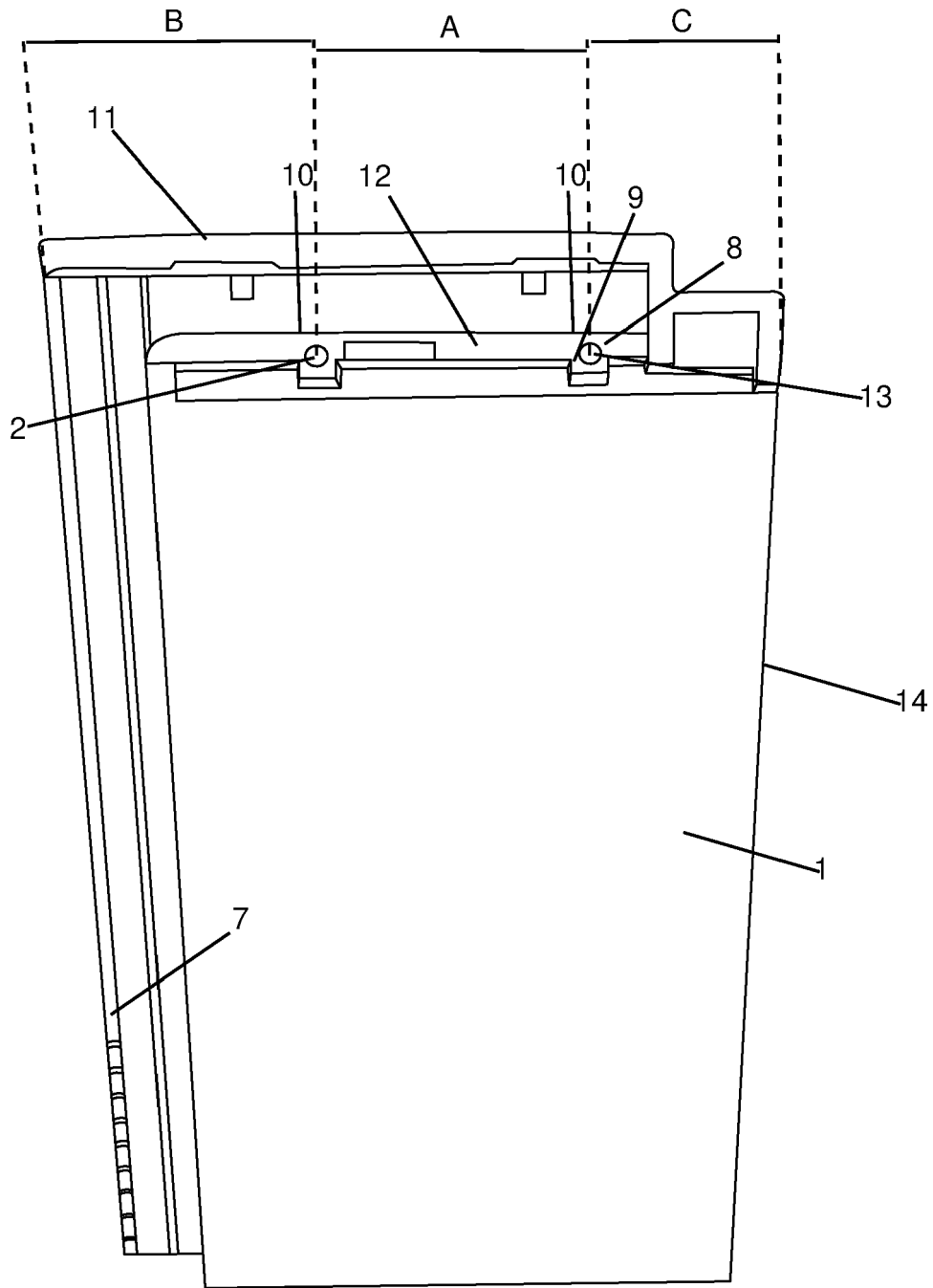


FIG. 4

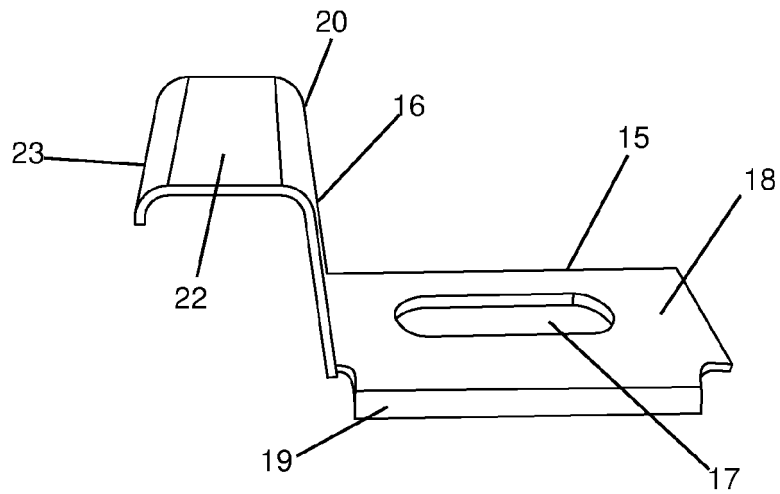


FIG. 5

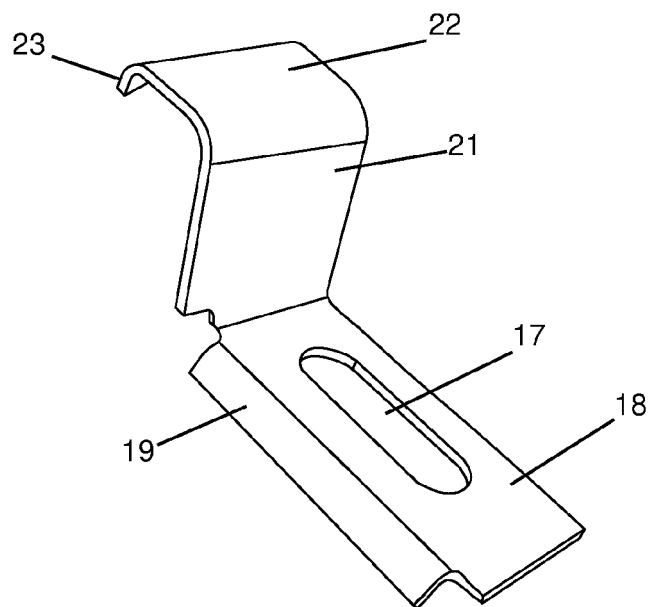


FIG. 6

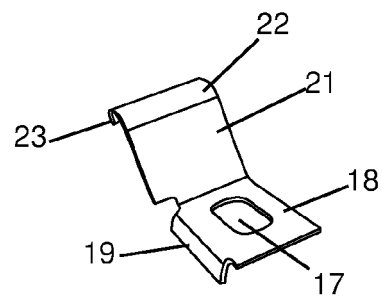


FIG. 7



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 Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 February 2021	Examiner Tran, Kim Lien
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