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(54) **Roof bracket**

(57) A roof bracket (20, 120) for a roof structure (10) including a superstructure (11), a plurality of brackets (20, 120) secured to the superstructure (11), and roofing panels (12a, 12b) which are supported above the superstructure (11) by the brackets (20, 120), and wherein the bracket (20, 120) includes a first part (22, 122) which is adapted to be secured to the superstructure (11), a second part 30, 130) which is adapted to support the roofing panels (12a, 12b) and a part (32, 132) intermediate the first (22, 122) and second (30, 130) parts, the intermediate part (32, 132) having a low thermal conductivity.

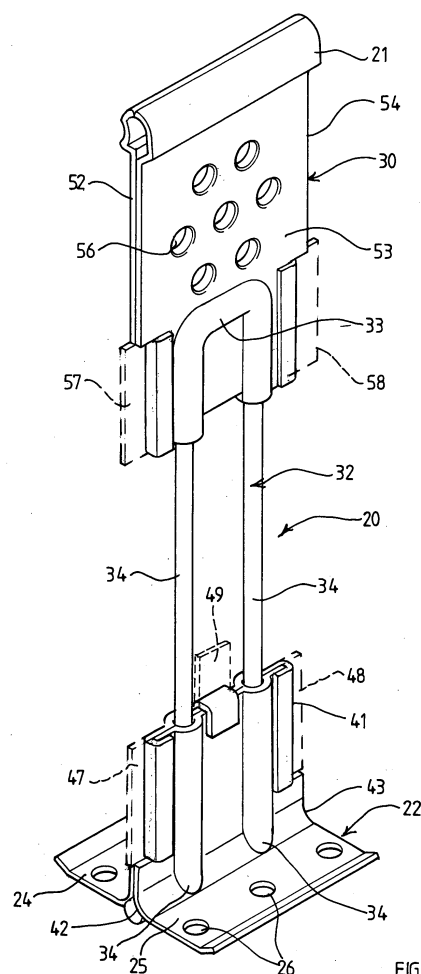


FIG. 2

Description

[0001] This invention relates to a roof bracket and more particularly to a roof bracket of the kind which is connected between roof panels, such as aluminium roofing panels, and a superstructure beneath.

[0002] It is known to provide roof brackets on beams of a roof structure, such brackets each including a body typically of aluminium having at a lower end, a flange by which the bracket may be secured e.g. by fasteners, to the beam of the superstructure, and at the upper end, a head around which the edges of aluminium roofing panels may be seamed.

[0003] Such brackets with aluminium bodies, are light, and resistant to corrosion, but have a high thermal conductivity. Thus such brackets with aluminium bodies are responsible for a high transmission of heat from the interior of a building through the roof structure.

[0004] According to one aspect of the invention we provide a roof bracket for a roof structure including a superstructure, a plurality of brackets secured to the superstructure, and roofing panels which are supported above the superstructure by the brackets, and wherein the bracket includes a first part which is adapted to be secured to the superstructure, a second part which is adapted to support the roofing panels and a part intermediate the first and second parts, the intermediate part including a rod which has a significantly lower thermal conductivity than aluminium mild steel.

[0005] Thus a bracket in accordance with the invention provides for less heat to be lost through the bracket from the interior of the building through the roof structure.

[0006] The rod may have a generally circular transverse cross-section.

[0007] In one embodiment, the first part of the bracket may be made of aluminium or preferably steel sheet, and may be adapted to be secured to the superstructure by having one or preferably a pair of out-turned flanges with openings to receive fasteners.

[0008] The second part may be made of aluminium and may include a head around which the edges of an adjacent pair of roofing panels may be seamed.

[0009] Desirably, the intermediate part is of generally inverted U-shape, the bend of the U being secured to the second part of the bracket, and the limbs of the U being secured to the first part of the bracket.

[0010] In this case, the intermediate part may further include two reinforcing parts which each envelope at least a portion of the limbs of the U-shaped rod.

[0011] The first part of the bracket may include a pair of members which may be secured together and to the intermediate part, by a pressing/folding operation. For example the two members of the first part may each provide part of a recess and at least one of the parts may include a foldable tab, the two members being brought together about the intermediate part which is received in the recess and then the tab or tabs folded over to se-

cure the two members and the intermediate part together.

[0012] The second part of the bracket may also include a pair of members which provide a recess, with at least one of the members including at least one tab which may be folded over to secure the pair of members together and to the intermediate part.

[0013] If desired, the second part of the bracket may include a generally planer body having a plurality of through openings, the openings being formed by punching whereby upon forming the openings material from the first member interferes with material of the second member to assist in securing the first and second members of the first part of the bracket together.

[0014] According to a second aspect of the invention we provide a roof structure including a plurality of brackets according to the first aspect of the invention.

[0015] The invention will now be described with reference to the accompanying drawings in which;

Figure 1 is an illustrative view of a roof structure of the kind of which the present invention is concerned,

Figure 2 is an illustrative view in perspective of a first embodiment of roof bracket which may be used in a roof structure of the kind shown in Figure 1,

Figure 3 is an illustrative view in perspective of a second embodiment of roof bracket which may be used in a roof structure of the kind shown in Figure 1.

[0016] Referring to Figure 1, there is shown a roof structure 10 which includes superstructure 11 which in this example includes a plurality of rafters, and/or purlins or other beams which may span other supporting components of the roof structure. The structure 10 further includes a plurality of roof panels 12a, 12b which in this example, are aluminium panels, adjacent edges of the panels 12a and 12b being seamed as indicated at 13 to provide a weatherproof joint between the adjacent roofing panels 12a, 12b.

[0017] Beneath the roofing panels 12a and 12b there is provided a layer of insulation 14 which is supported from beneath, on a liner 16 which is also supported on the superstructure 11.

[0018] The roofing panels 12a and 12b are spaced from the superstructure 11 by a plurality of brackets 20. In Figure 1, a prior art kind of bracket 20 is shown which includes an aluminium body having at an upper end thereof, a head 21 about which the edges of the adjacent roofing panels 12a and 12b are seamed to form the joint 13, and at a lower end of the body of the bracket 20, there are provided a pair of out-turned flanges 24 and 25 which have openings which receive fasteners 26 by which the bracket 20 is secured to the superstructure 11.

[0019] Such a roof structure 10 is well known and further description is not considered necessary.

[0020] Referring now to Figure 2, a first embodiment

of bracket 20 in accordance with the invention is shown. The bracket 20 has a first part 22 which includes a pair of out-turned flanges 24 and 25, provided with openings 26 to receive fasteners by means of which the bracket 20 may be secured to the superstructure 11 of the roof structure 10.

[0021] The bracket 20 further includes a second part 30 which is provided with a head 21 about which the adjacent edges of the roofing panels 12a and 12b may be seamed in exactly the same manner as shown in Figure 1. However the first 22 and second 30 parts of the bracket 20 are separated by an intermediate part including in this example a generally inverted U-shaped stainless steel rod 32. The base 33 of the inverted U-shaped rod 32 is secured to the second bracket part 30, whilst each of the limbs 34 of the inverted U-shaped rod 32 are secured to the first bracket part 22, such that the first 22 and second 30 parts of the bracket 20 are spaced apart to a desired extent, to suit the roof structure 10 to which the bracket 20 is applied. Thus the limbs 34 of the U-shaped bracket 32 may be of any desired length to achieve a bracket 20 of a desired height dimension.

[0022] Although the limbs 34 may be secured to the first part 22 of the bracket 20 by any desired means, in a preferred arrangement, the first part 22 of the bracket 20 includes a pair of members 40 and 41 which may be connected together by a web of material or provided a separate members as desired. In each case, the two members 40 and 41 each provide recess parts which together provide recesses to receive the ends of the limbs 34 of the intermediate part 32. In this example, each limb 34 of the intermediate parts 32 includes an out turned portion 42, 43 which extend generally along the beam of the superstructure 11 in use.

[0023] One of the members, member 40 of the first bracket part 22 includes a pair of side tabs 47, 48, and a top tab 49. When the pair of members 40 and 41 are brought together about the limbs 34 of the intermediate part 32, the tabs 47, 48, 49 extend from the respective side and top edges of the one member 40 as indicated in dotted lines in the drawings. When the pairs of members 40 and 41 are engaged about the limbs 34 of the intermediate part 32, the tabs 47 and 48, and the top tab 49, are folded over as shown, to secure the pair of members 40 and 41 together and to the intermediate part 32.

[0024] Similarly, the second part 30 of the bracket 20 includes a pair of members 52 and 53 which provide part recesses so that the members 52 and 53 may be brought together to entrap the base 33 of the intermediate part 32, between the pair of members 52 and 53. Again one of the members, member 52 may include a pair of side tabs 57 and 58 which are shown in unfolded conditions in dotted lines in the drawing, which tabs 57 and 58 may be folded around the other of the members 53 to secure the members 52 and 53 and the intermediate part 32 together.

[0025] Further to secure the members 52 and 53 together, a body 54 of the second part 30 of the bracket

20 is apertured by a punching tool, to provide a plurality of openings such as that indicated at 56. Material from the one of the members 52, 53 from which side the openings 56 are provided, and from the other of the members 53, 52 thus mutually interfere by virtue of the punching operation, to secure the members 52 and 53 together.

[0026] In another example, instead of the second part 30 of the bracket 20 including a pair of members 52 and 53, these may be provided as a single body which may be folded to bring the pair of members 52 and 53 of the body part to the position as shown in the drawings, when the tabs 57 and 58 may be folded to secure the members 52, 53 together.

[0027] Also, the apertures 56 provided in the body 54 of the second bracket part 30 reduce the conductivity of heat through the second body part 30 thereby adding to the insulating properties of the bracket 20.

[0028] Referring now to Figure 2, a second embodiment of bracket 120 in accordance with the invention is shown. Again, the bracket 120 has a first part 122 which includes a pair of out-turned flanges 124 and 125, provided with openings 126 to receive fasteners by means of which the bracket 120 may be secured to the superstructure 11 of the roof structure 10. The first part 122 of this embodiment is substantially identical to the first part 22 of the first embodiment illustrated in Figure 2, and therefore requires no further description.

[0029] The bracket 120 also further includes a second part 130 which is provided with a head 121 about which the adjacent edges of the roofing panels 12a and 12b may be seamed in exactly the same manner as shown in Figure 1. Again, the first 122 and second 130 parts of the bracket 120 are separated by an intermediate part including, in this example, a stainless steel rod 132 with a generally circular transverse cross-section bent to a generally inverted U-shape, and two reinforcing members 160.

[0030] The U-shaped rod 132 includes a base 133, and two limbs 134, and the limbs 134 are bent so that they include first, generally mutually parallel portions 134a, and second, mutually inclined portions 134b, the second portions 134b being adjacent the base 133. The second portions 134b are mutually inclined such that the separation of the second portions 134b adjacent the base 133 is greater than the separation of the first portions 134a. The second portions 134b of the limbs 134 are flattened, typically by forging, so that they have a generally rectangular cross-section.

[0031] The base 133 of the inverted U-shaped rod 132 is secured to the second bracket part 130, whilst each of the first portions 134a of the limbs 134 of the inverted U-shaped rod 132 are secured to the first bracket part 122, such that the first 122 and second 130 parts of the bracket 120 are spaced apart to a desired extent, to suit the roof structure 110 to which the bracket 120 is applied. Thus the limbs 134 of the U-shaped bracket 132 may be of any desired length to achieve a bracket 120 of a desired height dimension.

[0032] Lowermost ends of the first, generally mutually parallel, portions 134a are received in the two reinforcing members or sheaths 160. Each reinforcing member 160 comprises a generally tubular part, which in this example is made from a strip of sheet stainless steel bent to form a tube with a generally circular transverse cross-section. Whilst the free edges of the sheet may be welded together along the length of the tube, in this example, the edges are not welded, and simply butt together to form a tube. Alternatively, the reinforcing members 160 may be made from extruded tubing.

[0033] The reinforcing portions 160 assist in stiffening the limbs 134 of the intermediate part so that the length of the intermediate part may be increased for use in a roof structure with a relatively large gap between the roofing panels 12a and 12b and the superstructure 11, without compromising the rigidity of the bracket 120. Thus, the reinforcing members 160 may be omitted, if, for example, the rigidity of the bracket 120 is adequate without such reinforcing members 160.

[0034] The limbs 134 of the intermediate part 132 are secured to the first part 122 of the bracket 120 by means of out-turned portions 142, 143 as in the first embodiment as shown in Figure 2. In this case, the reinforcing members 160 extend along the first portion 134a of each limb 134 between the two members of the first part 122 of the bracket 140, 141 to a point adjacent the out-turned portion 142, 143.

[0035] In this embodiment, the second part 130 of the bracket 120 is formed from a single piece of sheet metal, such as mild steel sheet, which is folded about a fold line F to form first and second members 152, 153 which are brought together to entrap the base 133 of the intermediate part 32 between the pair of members 152, 153. An uppermost free edge of the first member 152 is folded over an uppermost free edge of the second member 153 to secure the members 152, 153 and the intermediate part 132 together. Moreover the first and second members 152, 153 are shaped around the base 133 of the intermediate part 132 to form the head 121.

[0036] When in use in a roof structure as illustrated in Figure 1, the second part 130 and base 133 and second portions 134b of the limbs 134 of the U-shaped rod 132 are sandwiched between the edges of adjacent roofing panels 12a, 12b. The second part 130 preferably does not extend into the space between the roofing panels 12a, 12b and the superstructure 11, which may assist in reducing conduction of heat from the interior of building through the roof structure.

[0037] Various modifications can be made without departing from the scope of the invention.

[0038] Although a preferred method of fabricating the first bracket part 22, 122 has been described which involves folding tabs 47, 48 and 49 to secure a pair of members 40, 140, 41, 141 together, any other method of fabricating the first body part 22, 122 in a sufficiently strong and ridged material for securing to the roof superstructure 11 may alternatively be provided. Further-

more, the limbs 34, 134 of the intermediate part 32, 132 could otherwise be secured to the first bracket part 22, 122 although the method described provides an economic and effective method. The first body part 22, 122 could be made in any suitable metal material such as steel or aluminium or indeed any other suitably strong material.

[0039] The second body part 30, 130 may also be fabricated by other methods to that described above, and the intermediate part 32, 132 may otherwise be secured to the second body part 30. The body 54, need not have apertures 56 if undesired but another means may be provided to add to the security of the pair of members 52 and 53.

[0040] Although the intermediate part 32, 132 has been described as being made in stainless steel and being of inverted U-shaped configuration, the intermediate part 32, 132 could be made in other materials having suitable strength and low thermal conductivity. The intermediate part 32, 132 could be made in other configurations. For example the intermediate parts 32, 132 may include a single span of material between the first 22, 122 and second 30, 130 bracket parts, or may be of a more complex configuration than that shown. Where the intermediate part 32, 132 includes at least one rod of low thermal conductivity material, the rod need not be of circular cross section, but could be of any other desired cross section to provide the necessary strength to the bracket, at an economic cost, and having a suitably low thermal conductivity.

[0041] In the specification, by "low" thermal conducting, we mean a lower conductivity than aluminium, and preferably a lower conductivity than ordinary steel.

[0042] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A roof bracket (20, 120) for a roof structure (10) including a superstructure (11), a plurality of brackets (20, 120) secured to the superstructure (11), and roofing panels (12a, 12b) which are supported above the superstructure (11) by the brackets (20, 120), and wherein the bracket (20, 120) includes a first part (22, 122) which is adapted to be secured to the superstructure (11), a second part (30, 130) which is adapted to support the roofing panels (12a, 12b) and a part (32, 132) intermediate the first (22, 122) and second (30, 130) parts, the intermediate part (32, 132) including a rod which has a significantly lower thermal conductivity than aluminium or

mild steel.

2. A roof bracket (20, 120) according to claim 1 wherein the rod has a generally circular transverse cross-section.
3. A roof bracket (20, 120) according to claim 1 or 2 wherein the first part (22, 120) of the bracket is made of aluminium or steel sheet, and the second part (22, 122) is made of aluminium.
4. A roof bracket (20, 120) according to claim 1, 2 or 3 wherein the first part (22, 122) of the bracket (20, 120) is adapted to be secured to the superstructure (11) by having one or preferably a pair of out-turned flanges (24, 24, 124, 125) with openings (26, 126) to receive fasteners, and the second part (30, 130) includes a head (21, 121) around which the edges of an adjacent pair of roofing panels (12a, 12b) may be seamed.
5. A roof bracket (20, 120) according to any preceding claim wherein the intermediate part (32, 132) is of generally inverted U-shape, the bend (33, 133) of the U being secured to the second part (30, 130) of the bracket (20, 120), and the limbs (34, 134) of the U being secured to the first part (22, 122) of the bracket.
6. A roof bracket (20, 120) according to claim 5 wherein the intermediate part (32, 132) further includes two reinforcing parts (160) which each envelope at least a portion of one of the limbs (34, 134) of the U-shaped rod.
7. A roof bracket (20, 120) according to any preceding claim wherein the first part (22, 122) of the bracket (20, 120) includes a pair of members (40, 41, 140, 141) which may be secured together and to the intermediate part (32, 132), by a pressing/folding operation.
8. A roof bracket (20, 120) according to claim 7 wherein the two members (40, 41, 140, 141) of the first part (22, 122) each provide part of a recess and at least one of the parts includes a foldable tab (40, 41, 140, 141), the two members being brought together about the intermediate part (32, 132) which is received in the recess and then the tab or tabs (47, 48) folded over to secure the two members (40, 41, 140, 141) and the intermediate part (32, 132) together.
9. A roof bracket (20, 120) according to any preceding claim wherein the second part (30, 130) of the bracket (20, 120) also includes a pair of members (52, 53, 152, 153) which provide a recess, with at least one of the members (52, 53, 152, 153) includ-

ing at least one tab (57, 58) which may be folded over to secure the pair of members (52, 53, 152, 153) together and to the intermediate part (32, 132).

10. A roof bracket (20, 120) according to any preceding claim wherein the second part (30, 130) of the bracket (20, 120) includes a generally planar body (54) having a plurality of through openings (56), the openings (56) being formed by punching whereby upon forming the openings (56) material from the first member (52) interferes with material of the second member (53) to assist in securing the first and second members (52, 53) of the first part of the bracket (22, 122) together.
11. A roof bracket (20, 120) according to any preceding claim wherein the rod is made of stainless steel.

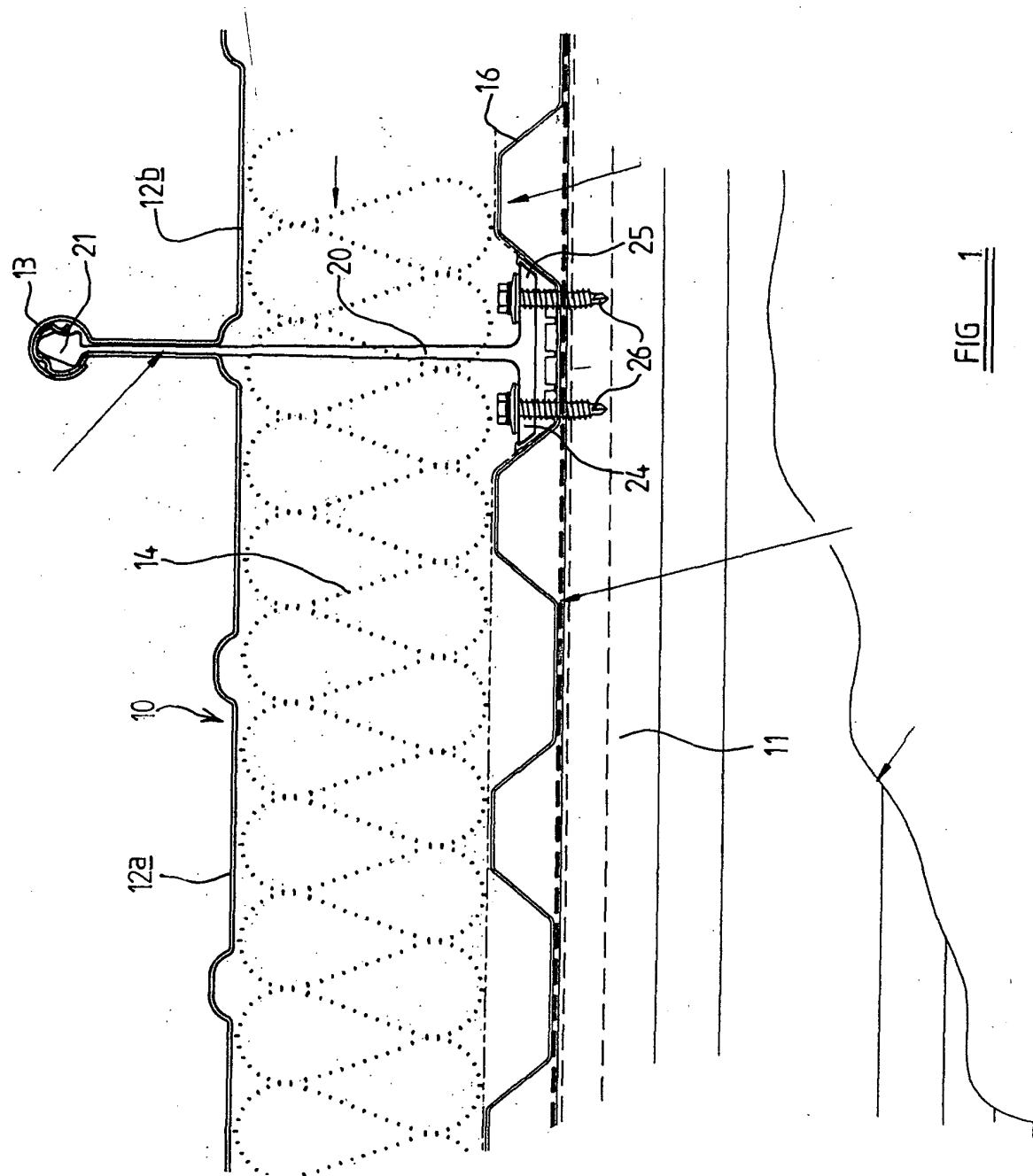
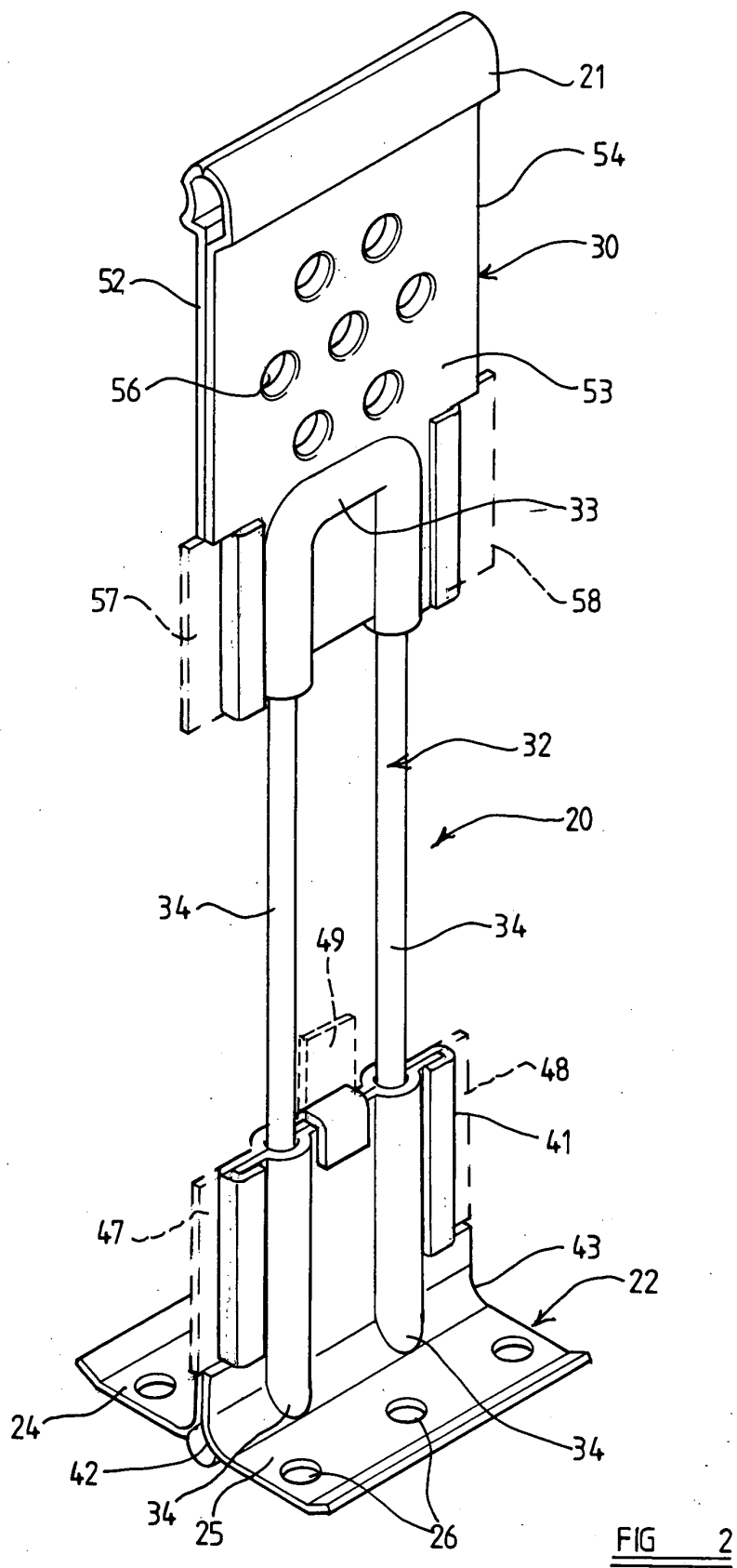


FIG. 1



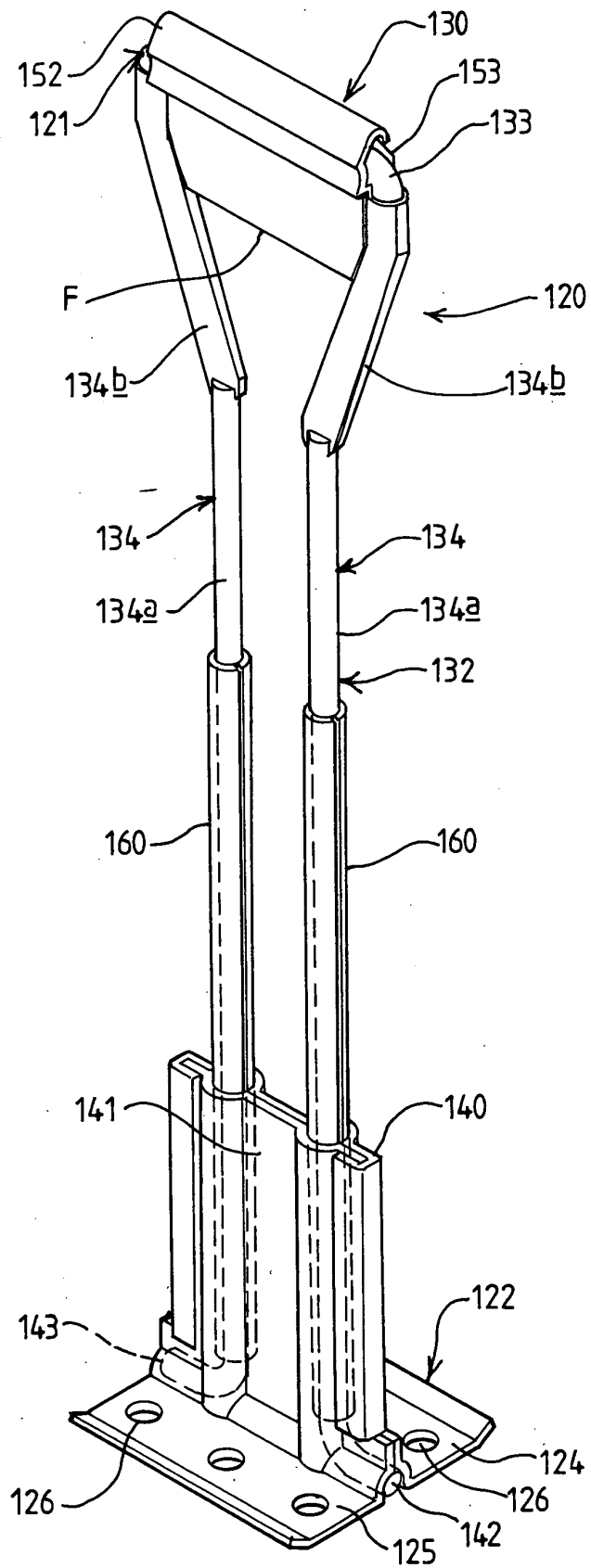


FIG 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number
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Place of search MUNICH		Date of completion of the search 18 May 2004	Examiner Saretta, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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