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(54) Vertical support structure for roofing safety fence system

Vertikale Stützstruktur für Dachschutzzaun-System

Structure de support vertical pour un système de barrière de sécurité de toiture

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Description

Background of the invention

[0001] The invention relates to a vertical support structure for a safety fence system on the outside of a building roof.

Brief description of the invention

[0002] A requirement for ensuring sufficient safety at work is that a roofing site or other work site must be provided with a temporary safety fence system, i.e. one during the building works, when the distance of the working area from the ground is at least 3 meters or when a possible falling of a worker in the building site might cause injuries.

[0003] Safety fence systems typically include a number of vertical support structures and, running of top of these, superimposed horizontal protections made of plank wood, for example, provided one top of the other at distances of 20 to 30 cm, for example, for a sufficient height to be provided above the edge of the roof pane.

[0004] A prior art solution consists of a vertical support structure to be fastened to a wall of a building or a support structure having a hooked bottom end for fastening to a roof truss or underneath the roof or an eave. These structures need to be fastened by screws or nails to the building, particularly to roof trusses. The fastening is problematic because it needs to be accomplished to a fastening point that is high up, which is both slow and involves a safety risk, and also because of the holes created due to the fastening, which may weaken the structural strength of the roof truss and which must be tidied with a stopping after removal of the support structures. Prior art also knows a self-supported scaffolding that stands on the ground, but it is slow to assemble and disassemble. Further, prior art knows providing workers with safety harnesses, but they limit the movements of the worker and require the worker to change the fastening point of the safety rope or catch provided in the harness according to the movements. Document DE 19846470 A1 discloses a vertical support for supporting working planks for making a working support for repairing an outer wall of a building. Document DE 19631233 A1 discloses a support resting against a wall of a building through rolls and further discloses the features of the preamble of claim 1. Document WO 01/48334 A1 discloses a scaffolding wherein upper parts are provided with foot members with clasp a roof truss from above. Document GB 2262559 A discloses a scaffolding system wherein a support rod is positioned between the ground and a wall of the building.

[0005] It is an object of the invention to alleviate the problems of the prior art solutions. This object is achieved by a vertical support structure of the invention, characterized by the features of claim 1. The vertical support structure comprises a lower support to be supported

against the ground or some other support surface, an upper support resting on the lower support and mountable against the underside of an eave of the roof and, in addition, a tightening structure for changing the distance between the lower support and upper support for tightening the vertical support structure between the underside of the eave and the support surface, and in that the vertical support structure comprises a bearer for a rail post.

[0006] The invention provides a number of advantages. The invention is easy and safe to assemble and disassemble at a site, and the measures may be carried out at a low level, i.e. operating on the ground. The structure of the invention is light and easy to transport by normal transport equipment of a roof contracting business. The invention does not necessarily require making holes to roof structures, such as trusses. The structure may also be implemented so that one person is able to carry the vertical support structure and assemble it, which facilitates and speeds up the mounting. It is also possible to provide a structure in which the vertical support structure may be dismantled, which makes transport easier.

Detailed description of the invention

[0007] Next, the invention will be explained with reference to the accompanying drawings, in which:

Figure 1 is a front view of a vertical support structure of a fence system, i.e. the structure is viewed from a position facing a building wall;

Figure 2 is a side view of the vertical support structure of the fence system, i.e. the structure is viewed from a longitudinal direction of the building wall;

Figure 3 shows the vertical support structure of the fence system mounted to a site;

Figure 4 shows the vertical support structure of the fence system in parts;

Figure 5 shows an upper support of the vertical support structure of the fence system supported to a truss;

Figure 6 shows an assembled vertical support structure.

[0008] With reference to the figures, a vertical support structure 50 of a fence system outside a roof B of a building A is shown. The vertical support structure supports a rail post C. A plural number of adjacent vertical support structures and horizontal stoppers running on top of their rail posts allow a fence system to be provided. A temporary fence system providing occupational safety is needed during building construction or renovation e.g. when a roof or an eave is being built.

[0009] It is observed that the vertical support structure comprises a lower support 100 that may be supported against the ground D or some other support surface D, an upper support 140 that may be placed against the underside of an eave E of the roof B, supported by the

lower support 100, and, in addition, a tightening structure 200 for changing the distance between the lower support 100 and the upper support 140 to allow the vertical support structure 50 to be tightened between the underside of the eave E and the support surface. In addition, the vertical support structure 50 comprises a support 121 provided in a support structure 120 for the rail post C.

[0010] The structure allows the vertical support structure 50 to be tensioned in place by tightening it between the eave E and the ground D, and a good support to be achieved for the support 121 of the rail post C and thereby also for the rail post C. The rail post has been removed from Figure 1 to bring the rest of the structure in view.

[0011] The support structure 120 comprises a support frame 122 and the lower support 100 supports the support 121 by means of the support frame 122. According to an embodiment, the support 121 is an arm, e.g. a horizontal arm, and the support 121 is supported to the support frame 122 by an intermediate support 123.

[0012] The figures show that the support 121 is supported by a vertical runner 101 comprised by the lower support 100, and thus, according to an embodiment, by the support frame 122.

[0013] It is observed that the vertical runner 101 of the lower support 100 and the support frame 122 are at least partly nested structures, which allows easier adjustability to be achieved and good support to be obtained between the parts. According to an embodiment, the vertical runner 101 of the lower support 100 is the inner part in the nested structure and the support frame 122 of the support structure 120 is the outer part in the nested structure.

[0014] In addition to the vertical runner 101, the lower support 100 comprises a foot part 102 on which the lower support 100 rests on the support surface D, such as the ground D.

[0015] According to an embodiment, the tightening structure 200 is provided in association with the lower support. According to an embodiment, the tightening structure 200 is between the foot part 102 of the lower support 100 and the vertical runner 101 of the lower support, i.e. provides between them an adjusting movement that makes the rest of the structures move upward away from the foot part 102 and thereby cause the vertical support structure 50 to tighten in place between the ground D and the eave E.

[0016] The support points for the support of the vertical support structure 50 are provided between the upper support 140 and the underside of the eave E and between the foot part 102 of the lower support 100 and the ground D. With a particular reference to Figure 6, according to an embodiment the adjustment movement is provided by a threaded structure in which the foot part 102 of the lower support 100 is a threaded rod 201 and the vertical part 101 of the lower support 100 has a corresponding thread, meaning that when the foot part 102 is turned, the foot part 102 moves in the direction of the vertical adjustment in relation to the vertical part 101 of the lower part 100.

[0017] For easy adjustability to different eave heights the vertical support structure 50 comprises an adjustment structure 181 to 183 for changing the height position of the rail post support 121 in relation to the lower support 100. The adjustment structure 181 to 183 for changing the height position of the support 121 is an adjustment structure that changes the position of the vertical runner 101 of the lower support 100 and the support frame 122 of the supporter 121 in relation to one another and it is implemented as a tenon-and-hole-type structure, for example, the vertical runner 101 of the lower support 100 being provided with successive alternative hole structures 181, the supporting frame 122 with at least one whole structure 182 and a tenon 183 driven through the hole structures connects the vertical runner 101 of the lower support 100 and the supporting frame 122 of the support structure 120 together. The adjusting movement is depicted in Figure 1 by arrow 11.

[0018] According to the invention, the vertical support structure 50 comprises an adjustment structure 191 to 193 for changing the height position of the upper support 140 in relation to the support frame 122 and the lower support 100 supporting it. The support movement is depicted in Figure 1 by arrow 12. This structure is used for making a rough adjustment of the height of the vertical support structure 50, i.e. the distance of the upper support 140 from the lower support 100, although the distance between the upper support 140 and the lower support 100 is also affected by the position of the supporting frame 122 in relation to the lower support 100, because the upper support 140 rests on the supporting frame 122, which in turn rests on the lower support. The rough adjustment reduces the travel distance of the tightening structure that is needed when the vertical support structure 50 is tightened in place between the ground D and the underside of the eave E.

[0019] According to an embodiment, the adjustment structure 191 to 193 for changing the height position of the upper support 140 is an adjustment structure 191 to 193 that changes the position of the vertical part 141 in the upper support in relation to that of the support frame 122 of the support. The adjustment structure 191 to 193 is a tenon-and-hole type structure, for example, with successive alternative hole structures 191 provided in the vertical runner 141 of the upper support, at least one hole structure 192 in the support frame 122 and a tenon 193 placed through the hole structures connecting the vertical part 141 of the upper support 140 and the support frame 122 of the support structure 120 together, for example.

[0020] To allow a suitable structure for eaves of different depths to be provided easily, the vertical support structure 50 comprises a tenon-and-hole type adjustment structure 301 to 303, for example, for changing the position of the rail post C along the support 121 to a different position, i.e. to a predetermined distance from the support frame 122, to make the rail post C extend further outward than the front edge of the eave E. The adjusting movement is depicted in Figure 2 by arrow 13. Figures

2, 4 and 6 show fastenings 400 comprised by the rail post C for horizontal boards, which thus function as horizontal parts of the fence, the boards being placed to travel via the fastenings of the adjacent vertical support structures.

[0021] The above tenons 183, 193 and 303 may be bolts secured by screws.

[0022] With a particular reference to Figure 5 and partly to Figure 3 also, for easy implementation of a suitable structure for eaves E of different slopes, a vertical support structure 50 according to an embodiment may comprise a tilt structure 143 to 144 for tilting the upper support 140 or a part 147 to 148 thereof in the vertical plane to adjust to the direction of the underside structures of the eave E. According to an embodiment, this is implemented by providing the tilt structure 143, 144 between a transverse part 142 resting on the vertical part 141 of the upper support 141 and one or more support parts 147 to 148 resting on the transverse part. The support part 147 and 148 is the part by which the upper support 140 is supported to the underside of the eave E, such as the roof truss 150.

[0023] The tilt structure 143, 144 of the support parts 147, 148 of the upper support may be implemented by a round or otherwise curved surface 143 of the transverse part 142 of the upper support 140 and a through-hole nest 144 provided in the support part 147, 148 that sets on top of or surrounds it. The support parts 147, 148 of the upper support are locked in place by a locking 149, such as bolts 149.

[0024] The upper support 140 comprises at least two support parts 147, 148 and an adjustment structure for adjusting the mutual distance of the support parts so that it corresponds to the width of a beam in the roof truss 150, as in Figure 3, for example, or the distance between two adjacent roof truss beams, for example, if the vertical support structure is supported to two roof trusses. The adjustment structure for adjusting the distance between the support parts 147, 148 of the upper support 140 may be the same as the one disclosed above for adjusting the tilt of the support parts, i.e. a common structure 143, 144, 149. The adjusting movement is depicted in Figure 1 by arrow 14. With reference to Figures 4 and 5, the support parts 147, 148 may be provided with holes 170 if the support parts are to be fastened to the roof truss 150 by screws 165, for example.

[0025] The structure is assembled in the order of the running numbers 1 to 8 in Figure 4, i.e. in steps 1 to 2 the tubular support frame 122 is placed on top of the vertical rail 101 by inserting it bottom end first at least partly inside the vertical rail from the top end of the vertical part 101, i.e. the vertical rail 101, of the lower support 100, and the parts are locked together by a tenon-and-hole structure 181 to 183. In step 3 the upper support 140 is placed at least partly inside the support frame 122 from the top end of the support frame 122, with the bottom end of its vertical part 141 first, and the parts are locked together by a tenon-and-hole structure 191 to 193. In steps 4 to 5, using the nests 144 of the support parts 147, 148 of the upper support 140, the support parts are

placed around the transverse part 142 of the upper support 140 and locked to a suitable tilt and mutual distance, as shown in Figure 3. In step 6, the rail post C is placed so that it rests on a suitable location on the arm-like support 121 and the rail post C is locked in place by the adjustment structure 301 to 303. In steps 7 to 8, the foot part 102 of the lower support is set, with the tightening structure 200, i.e. the threaded part 201 and the fitting part 202 above it. Figure 6 shows an assembled vertical support structure, although without the support parts 147, 148 resting on the transverse bar 142 of the upper support 140.

[0026] It is possible that the rail post C and the support 121 of the rail post may be provided with a fold mechanism locked into a rectangular position of use, as shown in the figures, by a locking pin or the like. This facilitates the packing of the structure in a small space for transport.

[0027] It will be apparent to a person skilled in the art that as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the examples described above but may vary within the scope of the claims.

Claims

1. A vertical support structure for a safety fence system on the outside of a building roof, the vertical support structure (50) comprising a lower support (100, 101, 102) to be supported against the ground or some other support surface, an upper support (140) resting on the lower support and to be mounted against an underside of an eave of the roof, a tightening structure (200) for changing the distance between the lower support and the upper support for tightening the vertical support structure between the underside of the eave and the support surface a support (121) for a rail post (C) and an adjustment structure (301 to 303) for changing the position of the rail post (C) to a different place along the support (121), **characterized in that** the support (121) for the rail post (C) is supported to the lower support (100, 101, 102) by a support frame (122), the vertical support structure further comprising an adjustment structure (191 to 193) for changing the height position of the upper support (140) in relation to the support frame (122) and the lower support (100) supporting it.
2. A vertical support structure as claimed in claim 1, **characterized in that** the support (121) is supported on a vertical runner (101) comprised by the lower support (100).
3. A vertical support structure as claimed in claim 1 or 2, **characterized in that** it comprises an adjustment structure (181 to 183) for changing the height position of the support (121) in relation to the lower sup-

port (100).

4. A vertical support structure as claimed in claim 3, **characterized in that** the adjustment structure (181 to 183) for changing the height position of the support (121) is an adjustment structure changing the position of the vertical runner (101) of the lower support (100) in relation to that of a support frame (122) of the support (121). 5
5. A vertical support structure as claimed in claim 1, **characterized in that** the tightening structure (200) is in the lower support (100). 10
6. A vertical support structure as claimed in claim 5, **characterized in that** the tightening structure (200) is between a foot part (102) comprised by the lower support (100) and the vertical runner (101). 15
7. A vertical support structure as claimed in claim 1, **characterized in that** the adjustment structure (191 to 193) for changing the height position of the upper support (140) is an adjustment structure changing the position of a vertical part (141) comprised by the upper support (140) in relation to that of the support frame (122) of the support. 20 25
8. A vertical support structure as claimed in claim 1, **characterized in that** it comprises a tilt structure (143, 144, 149) for a tilting the upper support (140) or a part thereof in the vertical plane to adapt it to a direction of the underside structures of the eave. 30
9. A vertical support structure as claimed in claim 8, **characterized in that** the tilt structure (143, 144, 149) is between a transverse part (142) resting on the vertical part of the upper support (140) and one or more support parts (147, 148) resting on the transverse part (142). 35
10. A vertical support structure as claimed in any one of claims 1, 8 or 9, **characterized in that** the upper support (140) comprises at least two support parts (147, 148) and an adjustment structure (143, 144, 149) for adjusting the distance of the support parts (147, 148) in relation to one another. 40 45

Patentansprüche

1. Vertikale Stützstruktur für ein Schutzzaunsystem auf der Außenseite eines Gebäudedachs, wobei die vertikale Stützstruktur (50) eine untere Stütze (100, 101, 102), die gegen den Erdboden oder gegen irgendeine andere Stützfläche abstützen soll, eine obere Stütze (140), die auf der unteren Stütze ruht und gegen eine Unterseite eines Dachvorsprungs zu befestigen ist, eine Anziehstruktur (200), um den Ab-

stand zwischen der unteren Stütze und der oberen Stütze zu verändern, um die vertikale Stützstruktur zwischen der Unterseite des Dachvorsprungs und der Stützfläche einer Stütze (121) für eine Schienensäule (C) anzuziehen, und eine Anpassungsstruktur (301 bis 303), um die Position der Schienensäule (C) hin zu einem anderen Platz entlang der Stütze (121) zu verändern, umfasst, **dadurch gekennzeichnet, dass** die Stütze (121) für die Schienensäule (C) an der unteren Stütze (100, 101, 102) durch einen Trägerahmen (122) gestützt und getragen wird, wobei die vertikale Stützstruktur ferner eine Anpassungsstruktur (191 bis 193) umfasst, um die Höhenposition der oberen Stütze (140) in Bezug auf den Trägerahmen (122) und auf die untere Stütze (100), die sie stützt, zu verändern.

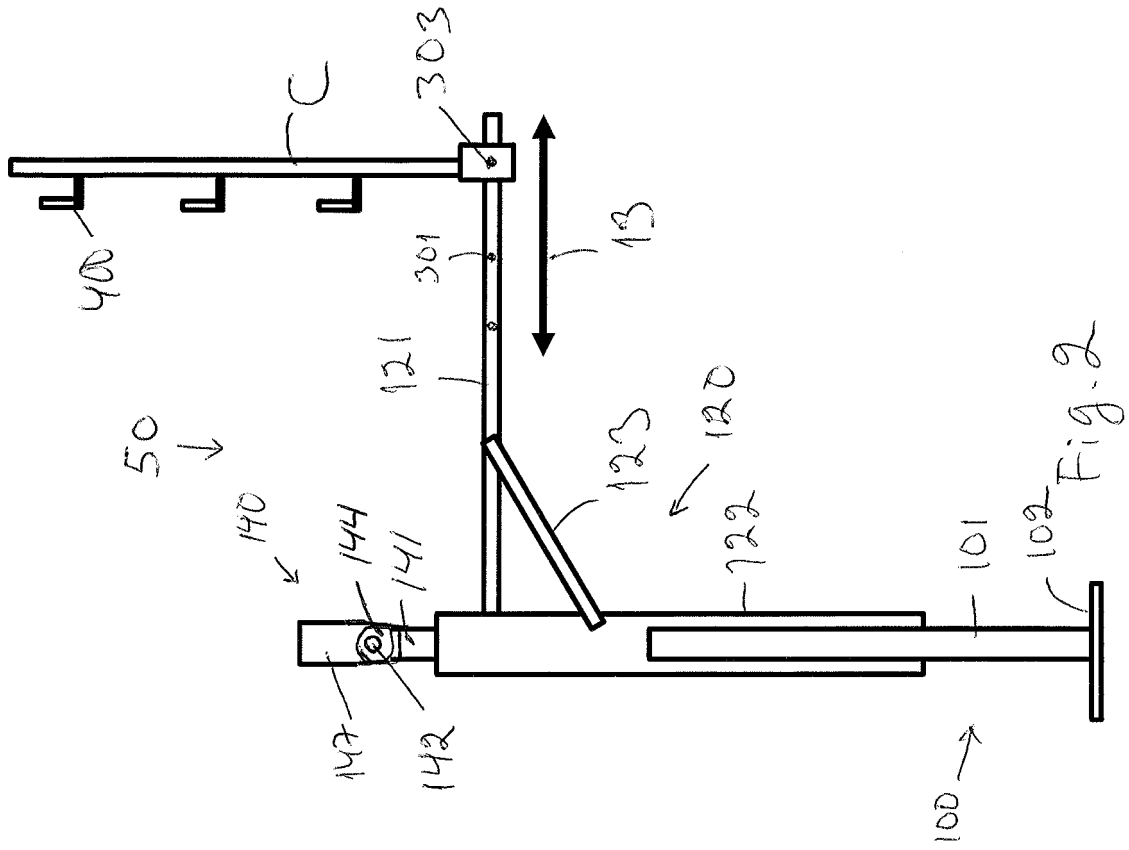
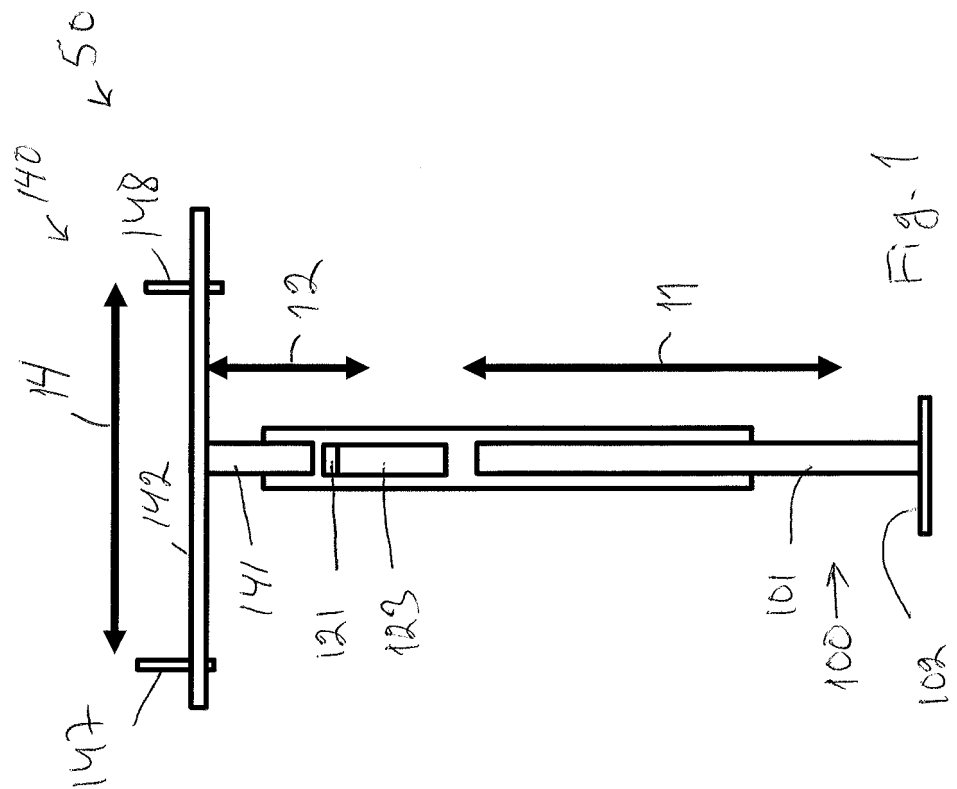
2. Vertikale Stützstruktur nach Anspruch 1, **dadurch gekennzeichnet, dass** die Stütze (121) auf einer vertikalen Laufschiene (101) gestützt wird, die aus der unteren Stütze (100) besteht.
3. Vertikale Stützstruktur nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sie eine Anpassungsstruktur (181 bis 183) umfasst, um die Höhenposition der Stütze (121) in Bezug auf die untere Stütze (100) zu verändern.
4. Vertikale Stützstruktur nach Anspruch 3, **dadurch gekennzeichnet, dass** die Anpassungsstruktur (181 bis 183) zum Verändern der Höhenposition der Stütze (121) eine Anpassungsstruktur ist, die die Position der vertikalen Laufschiene (101) der unteren Stütze (100) in Bezug auf die eines Trägerahmens (122) der Stütze (121) verändert.
5. Vertikale Stützstruktur nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Anziehstruktur (200) in der unteren Stütze (100) befindet.
6. Vertikale Stützstruktur nach Anspruch 5, **dadurch gekennzeichnet, dass** sich die Anziehstruktur (200) zwischen einem Fußteil (102), das aus der unteren Stütze (100) zusammengesetzt ist, und der vertikalen Laufschiene (101) befindet.
7. Vertikale Stützstruktur nach Anspruch 1, **dadurch gekennzeichnet, dass** die Anpassungsstruktur (191 bis 193) zum Verändern der Höhenposition der oberen Stütze (140) eine Anpassungsstruktur ist, die die Position eines vertikalen Teils (141), das aus der oberen Stütze (140) zusammengesetzt ist, in Bezug auf die des Trägerahmens (122) der Stütze verändert.
8. Vertikale Stützstruktur nach Anspruch 1, **dadurch gekennzeichnet, dass** sie eine Kippstruktur (143, 144, 149) umfasst, um die obere Stütze (140) oder

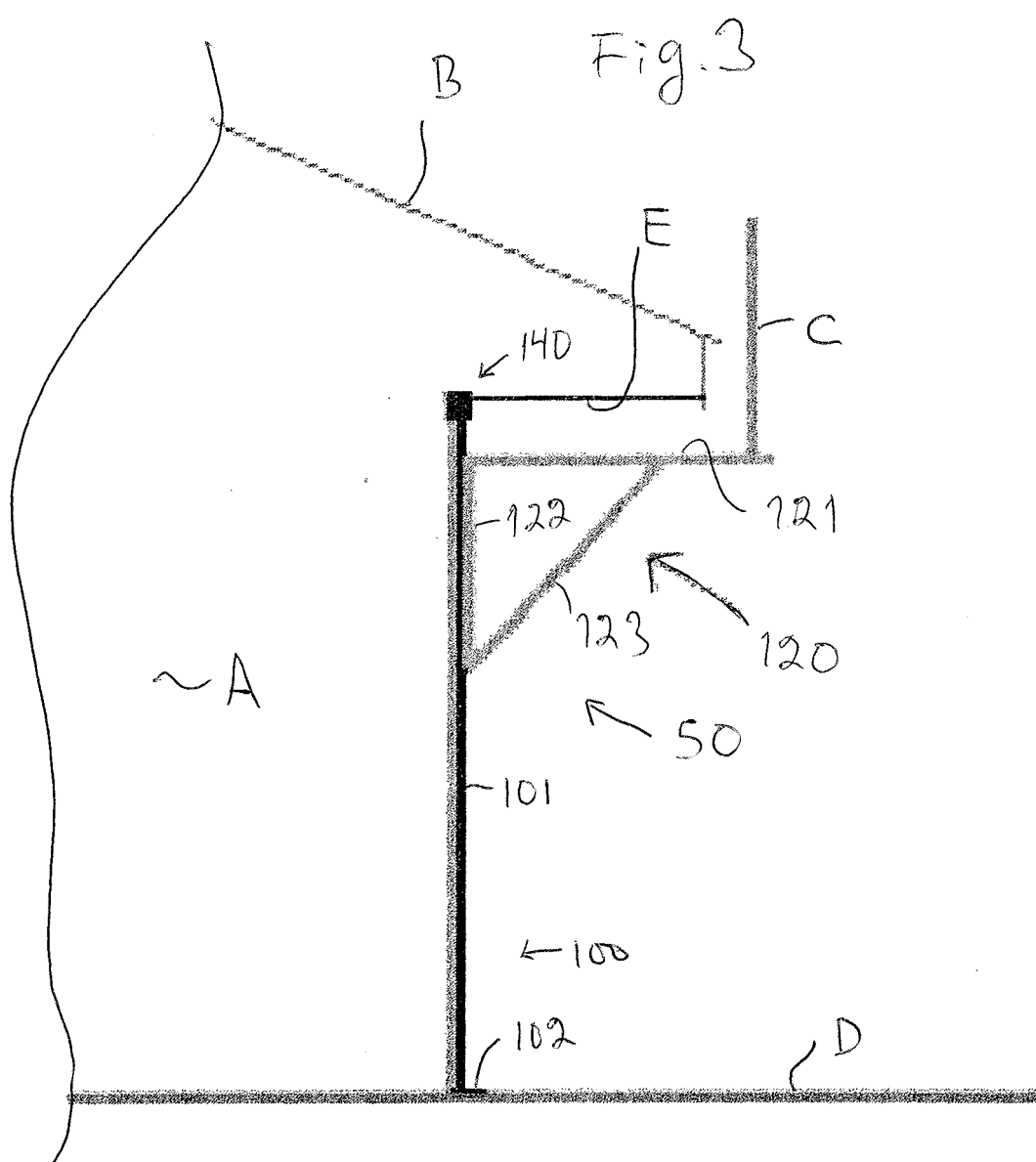
einen Teil davon in die vertikale Ebene zu kippen, um sie an eine Richtung der Unterseitenstrukturen des Dachvorsprungs anzupassen.

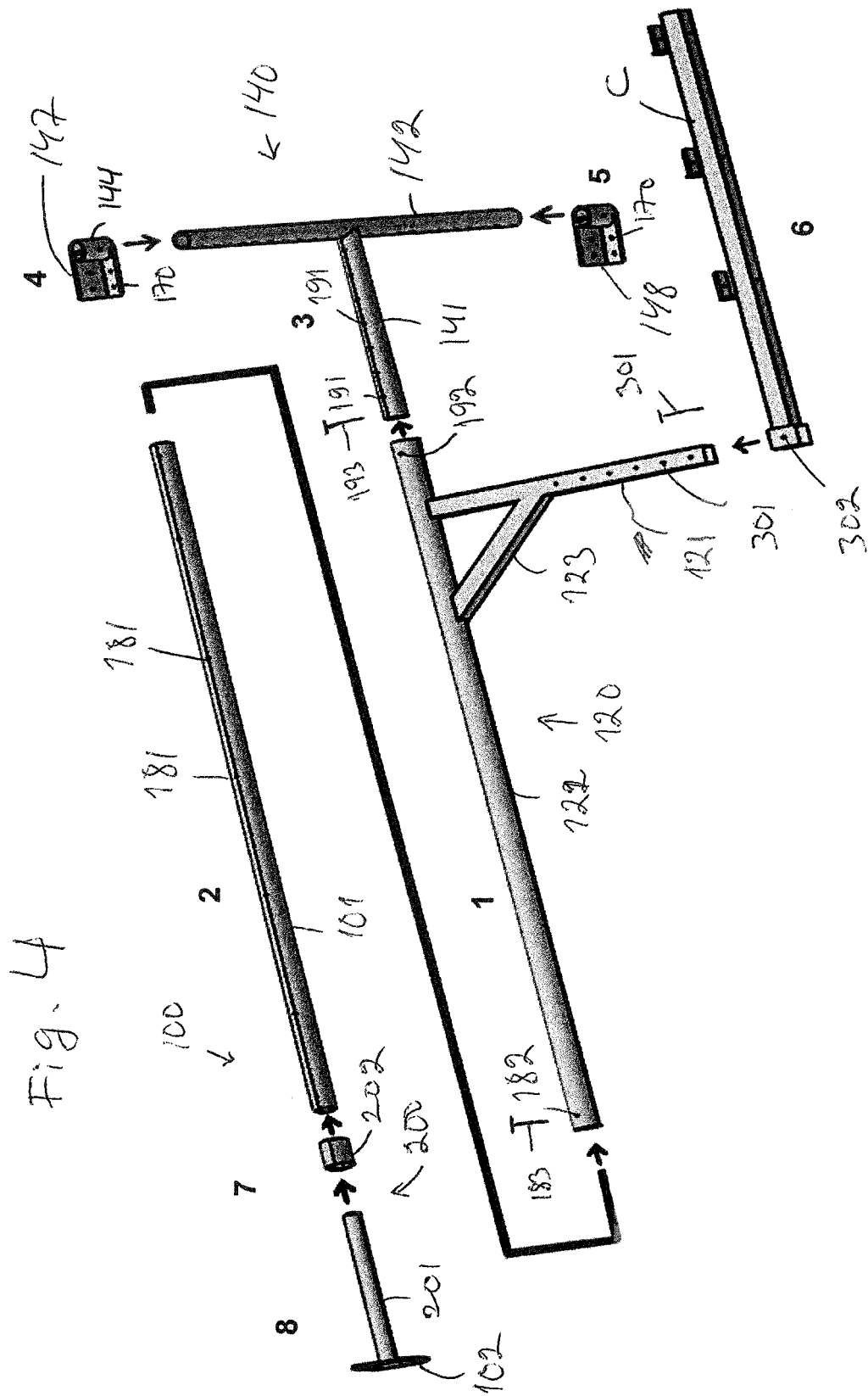
9. Vertikale Stützstruktur nach Anspruch 8, **dadurch gekennzeichnet, dass** sich die Kippstruktur (143, 144, 149) zwischen einem Querteil (142), das auf dem vertikalen Teil der oberen Stütze (140) ruht, und einem oder mehreren Stützteilen (147, 148), die auf dem Querteil (142) ruhen, befindet. 5
10. Vertikale Stützstruktur nach einem der Ansprüche 1, 8 oder 9, **dadurch gekennzeichnet, dass** die obere Stütze (140) mindestens zwei Stützteile (147, 148) umfasst und eine Anpassungsstruktur (143, 144, 149) umfasst, um den Abstand der Stützteile (147, 148) in Bezug zueinander anzupassen. 10 15

Revendications 20

1. Structure de support verticale pour un système de barrière de sécurité sur l'extérieur d'un toit de bâtiment, la structure de support verticale (50) comprenant un support inférieur (100, 101, 102) à supporter contre le sol ou autre surface de support, un support supérieur (140) reposant sur le support inférieur et à monter contre une face inférieure d'un avant-toit du toit, une structure de raidissement (200) pour changer la distance entre le support inférieur et le support supérieur pour tendre la structure de support verticale entre la face de dessous de l'avant-toit et la surface de support d'un support (121) pour un montant de garde-corps (C) et une structure de réglage (301 à 303) pour changer la position du montant de garde-corps (C) à une place différente le long du support (121), **caractérisée en ce que** le support (121) pour le montant de garde-corps (C) est supporté sur le support inférieur (100, 101, 102) par un châssis de support (122), la structure de support verticale comprenant en outre une structure de réglage (191 à 193) pour changer la position en hauteur du support supérieur (140) par rapport au châssis de support (122) et du support inférieur (100) le soutenant. 25 30 35 40 45
2. Structure de support verticale selon la revendication 1, **caractérisée en ce que** le support (121) est supporté sur un profilé vertical (101) compris par le support inférieur (100). 50
3. Structure de support verticale selon la revendication 1 ou 2, **caractérisée en ce qu'elle** comprend une structure de réglage (181 à 183) pour changer la position en hauteur du support (121) par rapport au support inférieur (100). 55
4. Structure de support verticale selon la revendication 3, **caractérisée en ce que** la structure de réglage (181 à 183) pour changer la position en hauteur du support (121) est une structure de réglage changeant la position du profilé vertical (101) du support inférieur (100) par rapport à celle d'un châssis de support (122) du support (121).
5. Structure de support verticale selon la revendication 1, **caractérisée en ce que** la structure de raidissement (200) est dans le support inférieur (100).
6. Structure de support verticale selon la revendication 5, **caractérisée en ce que** la structure de raidissement (200) est entre une partie formant pied (102) comprise par le support inférieur (100) et le profilé vertical (101).
7. Structure de support verticale selon la revendication 1, **caractérisée en ce que** la structure de réglage (191 à 193) pour changer la position en hauteur du support supérieur (140) est une structure de réglage changeant la position d'une partie verticale (141) comprise par le support supérieur (140) par rapport à celle du châssis de support (122) du support.
8. Structure de support verticale selon la revendication 1, **caractérisée en ce qu'elle** comprend une structure d'inclinaison (143, 144, 149) pour incliner le support supérieur (140) ou une partie de celui-ci dans le plan vertical pour l'adapter à une direction des structures de face inférieure de l'avant-toit.
9. Structure de support verticale selon la revendication 8, **caractérisée en ce que** la structure d'inclinaison (143, 144, 149) est entre une partie transversale (142) reposant sur la partie verticale du support supérieur (140) et une ou plusieurs parties de support (147, 148) reposant sur la partie transversale (142).
10. Structure de support verticale selon l'une quelconque des revendications 1, 8 ou 9, **caractérisée en ce que** le support supérieur (140) comprend au moins deux parties de support (147, 148) et une structure de réglage (143, 144, 149) pour régler la distance des parties de support (147, 148) l'une par rapport à l'autre.







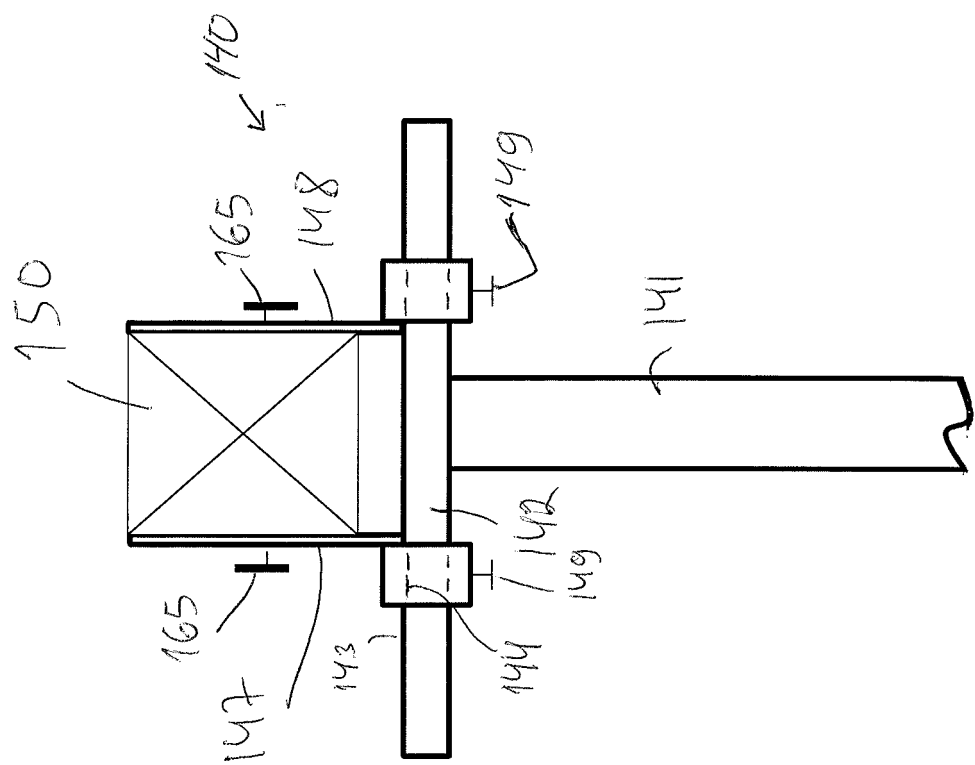
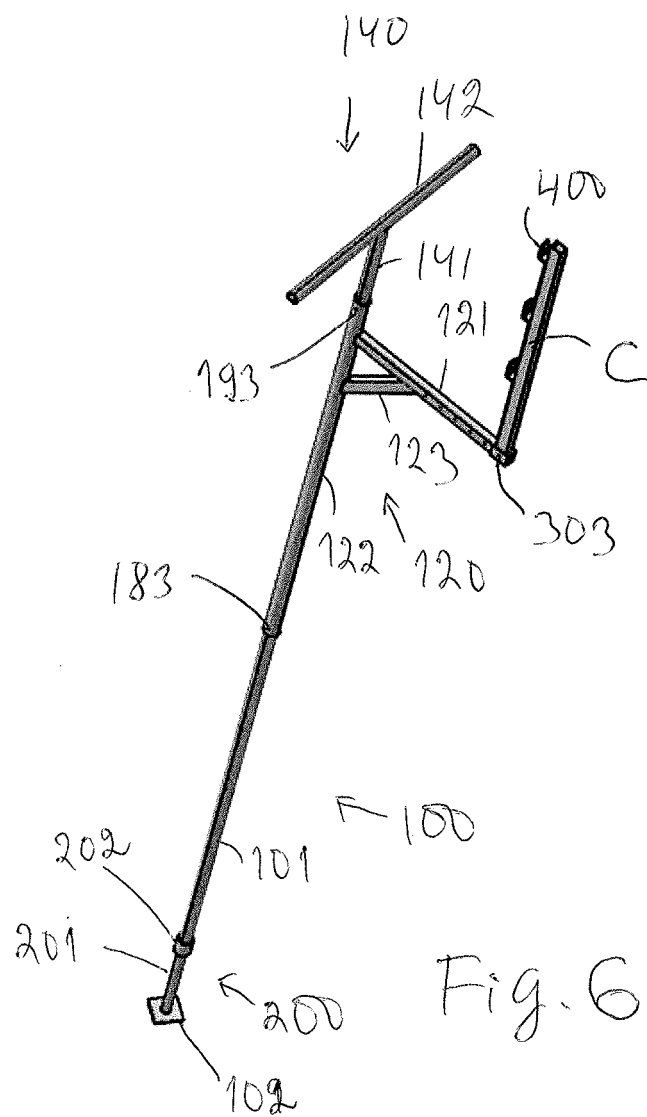


Fig. 5



REFERENCES CITED IN THE DESCRIPTION

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