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GUARD RAIL SYSTEM

Introduction

The invention relates to a guard rail system. In particular, the invention relates to a guard rail system suitable for mounting to a frame of a roof of a building. The invention also relates to a stanchion forming part of the guard rail system.

Falls from height are the single most common cause of serious injury on construction sites where they account for approximately 50% of all construction fatalities. This problem is particularly relevant for workers who are required to work on roofing jobs. In an effort to address this problem, the Irish Health and Safety Authority have introduced legislation to ensure that certain precautions are taken before a roofing job has started. In this regard, guard rails must be provided where a person is liable to fall more than two metres. The height of the guard rail should be between 950 and 1200 mm above the working platform. Additionally, toe-boards must accompany guard rails, the top of the toe-board

having to be at least 150 mm above the working platform.

On many building sites, this legislation has necessitated the provision of scaffolding all the way around, or partially around, a building. As the construction of such scaffolding is a time and labour intensive process, it does not always provide a practical and cost effective means of meeting the above- referenced health and safety legislation.

United States Patent No. 5,573,227 provides a guard rail system for mounting to a frame of a roof of a building. The system comprises a plurality of guard rail stanchions which are adapted to attach to a facia board and rafter of the frame of the building. The design of this system has a number of problems. First, the shape of the lower part of the stanchion which includes a U-bend has the effect of weakening the inherent strength of the stanchion. Secondly, the positioning of the right facia nailing flange adjacent this stanchion post means that the guard rail system cannot be attached to a roof frame in which the guttering is already in place. A further problem with the guard rail system of this US Patent is that the the rafter support arm 250 comprises a square metal tube and, as such, is prone to damage and deformation when it is bolted to the rafter.

It is an object of the invention to overcome at least one of the above referenced problems.

Statement of Invention

According to the invention, there is provided a stanchion for a guard rail system and suitable for attachment to a frame of a roof of a building, the stanchion, comprising a post having an upper end and a lower end; a foot extending away from the lower end; and two spaced-apart fastening brackets extending upwardly from the foot, in use, wherein a first of the fastening brackets is disposed for attachment to a face of a facia board or an end face of a rafter or a joist.

Preferably, a second of the fastening brackets is disposed for attachment to a side of a rafter or a joist.

In this specification the term "facia board" should be understood to include a cladding members which is attached along a horizontal edge of a roof, generally underneath the roof tiles, and which is usually attached to a rafter or a joist. In this regard, the term should also be understood to include facia boards which are attached along a gable end of a roof, these been commonly known in the trade as barge boards. Likewise, the terms "rafter" and "joist" should be understood to include outriggers.

In a particular preferred embodiment of the invention, the first fastening bracket is spaced apart from the post.

Preferably, the first fastening bracket lies between the post and the second fastening bracket. Typically, the first fastening bracket is shorter than the second fastening bracket.

In one embodiment of the invention, the post comprises attachment means for one or more guard rails. Suitably, the attachment means comprises an attachment bracket which is adapted to receive a pair of overlapping guard rail members. Preferably, the post includes a lower attachment bracket located towards the lower end of the post, which first attachment bracket is dimensioned to receive a pair of overlapping, upright, guard rail members or toe-boards sitting on edge. Ideally, the lower attachment bracket is dimensioned to receive two pairs of overlapping, upright, guard rail members or toe-boards, one rail positioned on top of another and one pair positioned beside the other at the laps. Typically, the post includes at least one upper attachment bracket, and preferably two spaced apart upper attachment brackets. In one embodiment, the or each upper attachment bracket is dimensioned to receive a pair of overlapping, flat-lying, guard rail members. Preferably, the post includes two upper attachment brackets, one located adjacent the upper end of the post, and a second located intermediate the upper and lower ends of the post.

In one embodiment of the invention, the guard rail members and/or toe-boards comprise timber rails. Typically, the timber rails are preservative treated.

Typically, the foot of the stanchion is generally perpendicular to the post, and ideally generally horizontal. Ideally, the fastening brackets are generally parallel to the post, and ideally vertical.

In one embodiment of the invention, the post comprises a box frame. Typically, the box frame post has a width of at least 20 mm and, optionally, a depth of at least 40 mm. In an ideal embodiment, the box frame post has dimensions of approximately 50 mm x 25 mm. Typically, the post is formed of steel. Ideally, the steel is hot-dipped galvanised. Suitably, each fastening bracket includes a plurality of bore holes which are dimensioned to receive fastening means for fastening the brackets to the frame of the building. Suitably, the fastening means are screws, ideally TECH fastening wood screws.

In one embodiment of the invention, the foot comprises an L-shaped bracket. Suitably, the first fastening bracket is an L-shaped bracket. In another embodiment of the invention, the foot of the post includes a through hole encompassed by a footprint of the post. This hole allows an inside of the post to be galvanised during a galvanising operation.

In one embodiment of the invention, the foot includes an extendable bracing member which, in use, is extendable underneath a roof overhang to abut a wall of the building.

Preferably, the extendable bracing member comprises a main threaded bolt, and a threaded socket for the bolt integrally mounted to the foot of the

stanchion, wherein the bolt engages the threaded socket such that relative movement therebetween results in extension or retraction of the bolt with respect to the stanchion. Suitably, the threaded socket comprises a nut. Ideally, the first fastening bracket includes a hole for receipt of one end of the bolt.

In one embodiment of the invention, the stanchion includes an auxiliary threaded bolt, and wherein a through-hole in the foot of the stanchion provides access to a socket in the post, which socket is adapted for receipt of the auxiliary threaded bolt when it is not in use. Preferably, the auxiliary threaded bolt is connectable to the main threaded bolt to extend the length of the bracing member. More preferably, the auxiliary threaded bolt and the main threaded bolt are connectable by means of a connecting nut.

The invention also relates to a guard rail system suitable for mounting to a frame of a roof of a building comprising a plurality of stanchions according to the invention, and a plurality of guard rails and/or toe-boards adapted to extend between the stanchions. Typically, the stanchions are adapted to receive the guard rails, optionally, in an overlapping fashion. In one embodiment of the invention, the guard rails comprise timber rails, which timber is suitably treated with preservative.

The invention also relates to a method of mounting a guard rail system onto a frame of a roof of a building, which method comprise the steps of mounting a plurality of stanchions according to the invention at spaced

apart intervals to an edge of the frame, and mounting a plurality of guard rails and/or toe boards across the stanchions.

In one embodiment, the method comprising the steps of mounting a plurality of stanchions according to the invention at spaced apart intervals to an edge of a roof frame, extending a bracing member of at least one of the stanchions such that it abuts and is braced against a wall of the building, and mounting a plurality of guard rails and/or toe boards across the stanchions.

Detailed Description of the Invention

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings in which :

Fig. 1 is a perspective view of a stanchion according to the invention;

Fig. 2 is a perspective view of an opposite side of the stanchion of Fig 1;

Fig. 3 is a sectional view of a frame of a roof of a building showing a stanchion and a guard rail system according to the invention attached thereto;

Fig. 4 is a front elevational view of the stanchion and guard rail system of Fig 3 but only showing the facia board of the frame of the roof;

Fig. 5 is a perspective view of a guard rail system of Fig 3;

Fig. 6 is a perspective view of a stanchion according to an alternative embodiment of the invention; and

Fig. 7 is a sectional view of a frame of a roof of a building showing a stanchion and guard rail system according to an alternative embodiment of the invention attached thereto.

Referring to the drawings initially to Figures 1 and 2, there is illustrated a stanchion for a guard rail system according to the invention, and indicated generally by the reference numeral 1, comprising a post 2 having an upper end 2a and a lower end 2b, a foot 3 extending away from the post 2, and a pair of spaced apart fastening brackets 4, 5 extending upwardly from the foot 3.

The foot 3 comprises an L-shaped bracket which is attached to a base of the post 2 and extends generally away from the post at a right angle. A

part of the foot 3 where the post 2 abuts the foot 3 includes a through hole (not shown) to allow galvanisation of the post during a galvanisation operation. A first fastening bracket 4 comprises an L-shaped bracket which is attached to the foot 3 at a spaced apart location from the post 2. The bracket 3 includes a plate 7 which is positioned such that in use it abuts and faces a facia board, or an end of a joist or rafter, The plate 7 of the first fastening bracket 4 includes a pair of through holes for receipt of TECH fastening wood screws (not shown).

A second fastening bracket 5 is mounted to an end of the foot 3 takes the form of a flat plate which lies generally at a right angle to the plate 7 of the first fastening bracket 4. The second fastening bracket includes a number of through holes located adjacent a top of the bracket for receipt of TECH fastening wood screws (not shown).

The stanchion additionally includes three attachment brackets for receiving guard rails. A first attachment bracket 9 is located adjacent the lower end 2b of the post 2 and is dimensioned to receive four upstanding (preservative-treated) timber rails, one rail sitting on top of another and side by side at their respective laps. The first bracket 9 includes a pair of through-holes for receipt of a pair of TECH fastening wood screws 20. A second attachment bracket 11 is located adjacent an upper end 2a of the post 2 and is dimensioned to receive a

pair of flat-lying (preservative-treated) timber rails, one on top of another, at their respective laps. A third attachment bracket 10, dimensioned similar to the second attachment bracket, is attached to the post intermediate the first and second attachment brackets 9, 11. In the embodiment described, the second and third attachment brackets 10,11 include a single through hole for receiving a TECH fastening wood screw 20.

All parts of this stanchion are made from steel which has been hot-dipped galvanised. In the embodiment disclosed, all parts are welded together, however, other means of attaching the various parts of the stanchion together will be apparent to the skilled person. Likewise, other materials having a suitable strength may be used for the manufacture of the various parts of the stanchion. In the embodiment described, the post is a box frame tube having a width of approximately 25mm and a depth of approximately 50mm. In use, and for maximum strength, the narrow side of the post faces the building.

Referring to Figs 3, 4 and 5, there is illustrated a guard rail system according to the invention, and including the stanchions described above, shown attached to a frame of a roof of a building. As is best illustrated in Fig 3, the stanchion 1 is positioned adjacent an edge of a roof such that the foot 3 extends partially underneath an edge of the roof. In this position, the first fastening bracket

4 is screwed through a facia board 14 and into a rafter 15. The second fastening bracket 5 extends up along a side of the rafter 15 and is screwed to the rafter using the through holes provided on the bracket 5. The first attachment bracket 9 receives two pairs of upstanding (preservative-treated) timber rails 17, one pair sitting beside the other at the laps. As best illustrated in Fig 4, the respective rails of a given pair overlap with each other across the attachment bracket. The second and third attachment brackets 11, 10 receive a pair of overlapping, flat-lying, (preservative-treated) timber rails 18. TECH screws 20 are provided to fasten the rails 18 to each other and to the attachment brackets 9, 10 and 11.

Referring to Figs. 6 and 7, an alternative and preferred embodiment of the invention is described in which parts similar to those described with reference to the previous embodiment are assigned the same reference numerals. In this embodiment, the stanchion 30 includes a main bracing member which is mounted to the foot 3 and functions to brace the stanchion 30 against a wall of the building. In more detail, the main bracing member comprises a threaded bolt 31 which engages a threaded nut 32 which is welded to the foot 3 of the stanchion 30. A trailing end of the bolt 31 engages a hole 34 formed in the plate 7 of the first fastening bracket 4. A leading end of the bolt 31 carries a pair of nuts 33, 35, an innermost one of which (35) is welded to the threaded bar 31 to form an actuating nut. In use,

the stanchion 30 is attached to a roof frame as described above with reference to the previous embodiment. Once firmly attached to the roof frame, the bolt 31 is extended away from the foot 3 of the stanchion 30 by rotation of the actuating nut 35 until the leading end of the bolt 31 abuts the wall of the building, thereby bracing the stanchion 30 against the building.

To facilitate attachment of a stanchion to a roof frame having an overhang (distance from wall of building to facia board) of greater than 375mm, an auxiliary bracing member 34 is provided. When not required, the auxiliary bracing member 34 is stowed in a socket in the post 2 which is accessed through a hole (not shown) provided in the foot 3 of the stanchion 30. A nut 36 is welded to an underside of the foot 3 of the stanchion flush with the hole and functions to receive the auxilliary bracing member 34 when it is stowed in the socket. In use, the bolt 33 is removed from the main bracing member 31 which is then partially unscrewed from the nut 32. The auxiliary bracing member 34 is then unscrewed from the nut 36, removed from the socket, and attached to the main bracing member 31 by means of the nut 35 to thereby extend the main bracing member to a length of 600mm. The redundant bolt 33 is then stowed away in the socket in the post via the nut 36.

During storage and transport of the stanchion of the invention, the auxilliary bracing member 34 is re-stowed in the socket via the nut 36, and the bolt 33

is re-attached to the main bracing member 31 via the nut 35 before retraction of the main bracing member 31 into the nut 32.

The provision of a pair of separate fastening brackets which are spaced apart from the post of the stanchion provides a greater degree of strength and rigidity to the system as compared to a stanchion in which one or both of the fastening brackets are directly attached to the post. Additionally, the provision of a first fastening bracket which is separate, and spaced apart from, the post allows the system to be attached to a frame roof in which a guttering system is already in place.

Moreover, while the system is primarily described shown attached to a horizontal side of a roof frame, it is equally applicable for attachment to a sloping, gable-end, of a roof. In this regard, the first fastening bracket is attached through a barge board and, ideally, through an end of an outrigger, and the second fastening bracket is attached to a side of an outrigger. Likewise, while the guard rail system described above is shown attached to a frame of a roof which includes a facia board, the guard rail system of the present invention is equally applicable for use with roof frames which do not include a facia board. In this regard, the first fastening bracket may attach directly to an end of a joist or rafter. Moreover, while the embodiment describes the use of timber rails as guard rails, other types of guard rails are envisaged.

Additionally, the use of cable or netting-type guard rails is envisaged.

Claims

1. A stanchion for a guard rail system and suitable for attachment to a frame of a roof of a building, the stanchion comprising:

- a post having an upper end and a lower end, in use;
- a foot extending away from the lower end; and
- two spaced-apart fastening brackets extending upwardly from the foot, in use, wherein a first of the fastening brackets is disposed for attachment to a face of a facia board or an end face of a rafter or a joist.

2. A stanchion as claimed in claim 1 in which a second of the fastening brackets is disposed for attachment to a side of a rafter or a joist.

3. A stanchion as claimed in claim 2 in which the first fastening bracket lies between the post and the second fastening bracket.

4. A stanchion as claimed in any of claims 1 to 3 in which the first fastening bracket is shorter than the second fastening bracket.

5. A stanchion as claimed in any preceding claim in which the post includes attachment means for one or more guard rails.

6. A stanchion as claimed in claim 5 in which the attachment means comprises an attachment bracket which is adapted to receive a pair of overlapping guard rail members.

7. A stanchion as claimed in either claim 5 or claim 6 in which the post, in use, includes a lower attachment bracket located towards the lower end of the post which first attachment bracket is dimensioned to receive a pair of overlapping, upright, toe-boards, in use.

8. A stanchion as claimed in claim 7 in which the lower attachment bracket is dimensioned to receive two pairs of overlapping, upright, toe-boards, in use, one rail positioned on top of another, and one pair positioned relatively beside the other at the laps, in use.

9. A stanchion as claimed in any of claims 6 to 8 in which the post includes at least one upper attachment bracket, in use.

10. A stanchion as claimed in claim 9 in which the upper attachment bracket is dimensioned to receive a pair of overlapping, flat-lying, guard rail members, in use.

11. A stanchion as claimed in claim 9 or 10 including two upper attachment brackets, one located adjacent the upper end of the post, and a second located intermediate the upper and lower ends of the post, in use.

12. A stanchion as claimed in any of claims 5 to 11 in which the guard rail members and/or toe-boards comprise timber rails which are optionally preservative treated.

13. A stanchion as claimed in any preceding claim in which the foot of the stanchion is perpendicular to the post.

14. A stanchion as claimed in any preceding claim in which fastening brackets are parallel to the post.

15. A stanchion as claimed in any preceding claim in which the post comprises a box frame.

16. A stanchion as claimed in claim 15 in which the box frame post has a width of at least 20 mm and a depth of a least 40 mm.

17. A stanchion as claimed in claim 16 in which the box frame post has dimensions of approximately 50 mm x 25 mm.

18. A stanchion as claimed in any preceding claim which is formed of steel.

19. A stanchion as claimed in claim 18 in which the steel is hot-dip galvanised.

20. A stanchion as claimed in any preceding claim in which each fastening bracket includes a plurality of bore holes.

21. A stanchion as claimed in any preceding claim in which the foot comprises an L-shaped bracket.

22. A stanchion as claimed in any preceding claim in which the first fastening bracket is an L-shaped bracket.

23. A stanchion as claimed in any preceding claim wherein the first fastening bracket is spaced apart from the post.

24. A stanchion as claimed in any preceding claim in which the foot includes an extendable bracing member which, in use, is extendable underneath a roof overhang to abut a wall of the building.

25. A stanchion as claimed in claim 24 in which the extendable bracing member comprises:-

- a main threaded bolt; and
- a threaded socket for the bolt integrally mounted to the foot of the stanchion,

wherein the bolt engages the threaded socket such that relative movement therebetween results in extension or retraction of the bolt with respect to the stanchion.

26. A stanchion as claimed in claim 25 in which the threaded socket comprises a nut.

27. A stanchion as claimed in claim 25 or 26 in which the first fastening bracket includes a hole for receipt of one end of the bolt.

28. A stanchion as claimed in any of claims 25 to 27 and including an auxiliary threaded bolt, and wherein a through-hole in the foot of the stanchion provides access to a socket in the post, which socket is adapted for receipt of the auxiliary threaded bolt when it is not in use.

29. A stanchion as claimed in claim 28 in which the auxiliary threaded bolt is connectable to the main threaded bolt to extend the length of the bracing member.

30. A stanchion as claimed in claim 29 in which the auxiliary threaded bolt and the main threaded bolt are connectable by means of a connecting nut.

31. A stanchion substantially as hereinbefore described with reference to the accompanying drawings.

32. A guard rail system suitable for mounting to a frame of a roof of a building and comprising:

- a plurality of stanchions according to any of Claims 1 to 31; and
- a plurality of guard rails and/or toe-boards.

33. A guard rail system as claimed in claim 32 in which the guard rails and/or toe-boards comprise timber rails.

34. A method of mounting a guard rail system on a frame of a roof of a building, which method comprises the steps of:

- mounting a plurality of stanchions according to any of claims 1 to 31 at spaced apart intervals to an edge of the frame; and

mounting a plurality of guard rails and/or toe-boards across the stanchions.

35. A method as claimed in claim 34 and comprising the steps of:

- mounting a plurality of stanchions according to any of claims 24 to 31 at spaced apart intervals to an edge of a roof frame;
- extending a bracing member of at least one of the stanchions such that it abuts and is braced against a wall of the building; and
- mounting a plurality of guard rails and/or toe boards across the stanchions.

36. A guard rail system substantially as hereinbefore described with reference to the accompanying description and figures.

37. A method of mounting a guard rail system on a frame of a roof of a building substantially as hereinbefore described with reference to the accompanying drawings and figures.

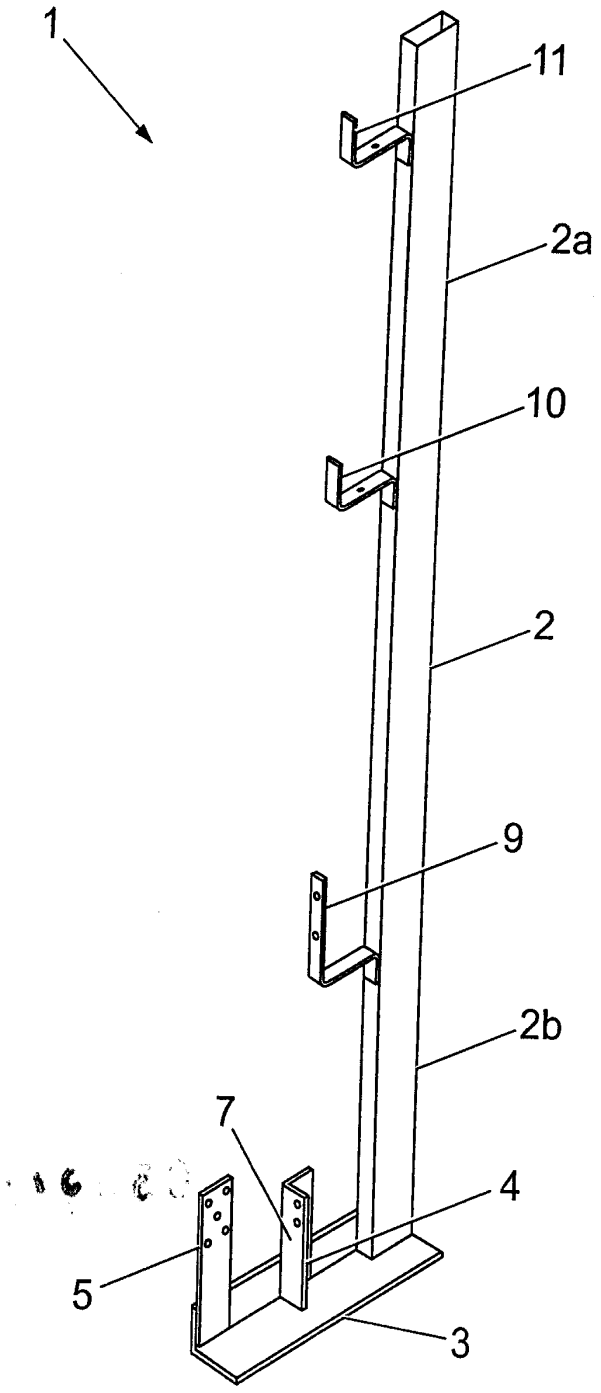

Fig. 1

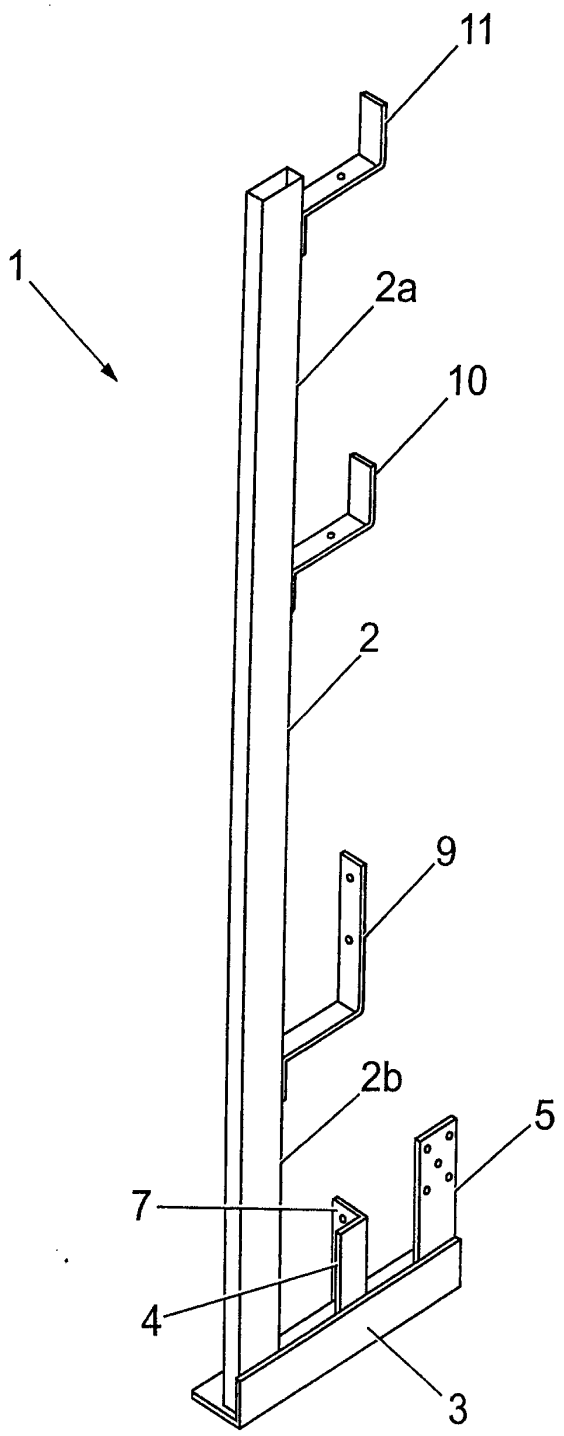

Fig. 2

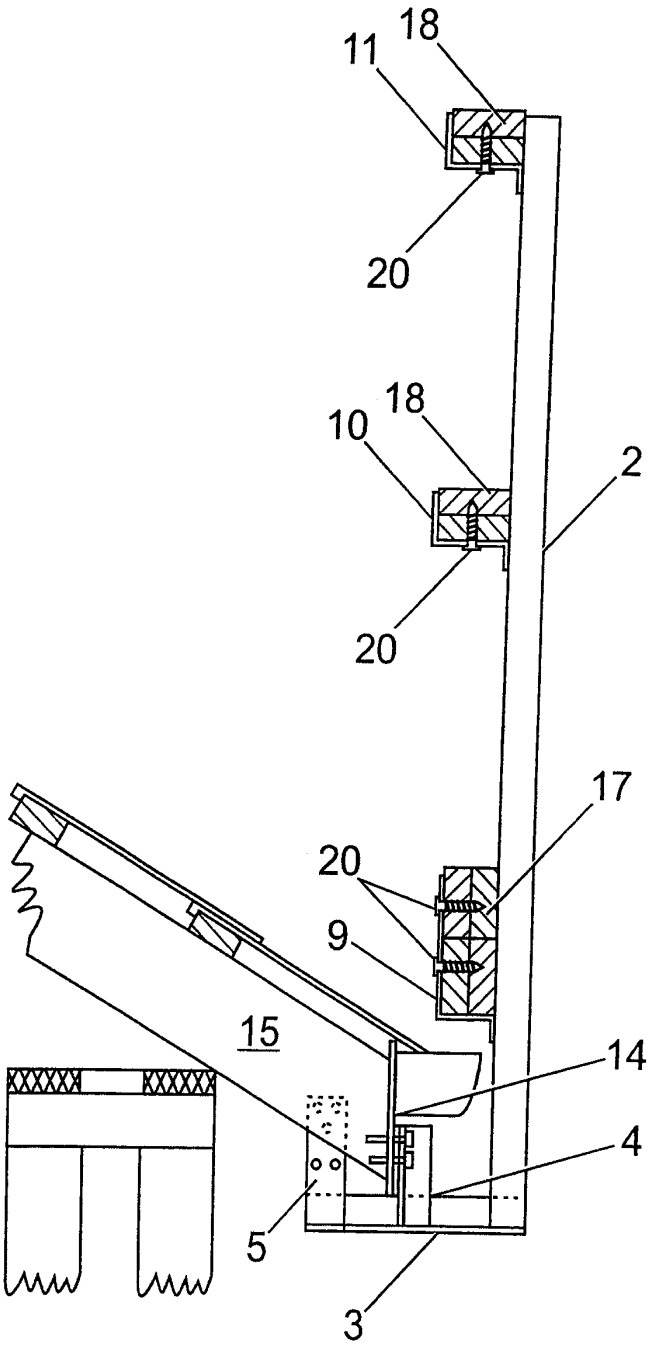

Fig. 3

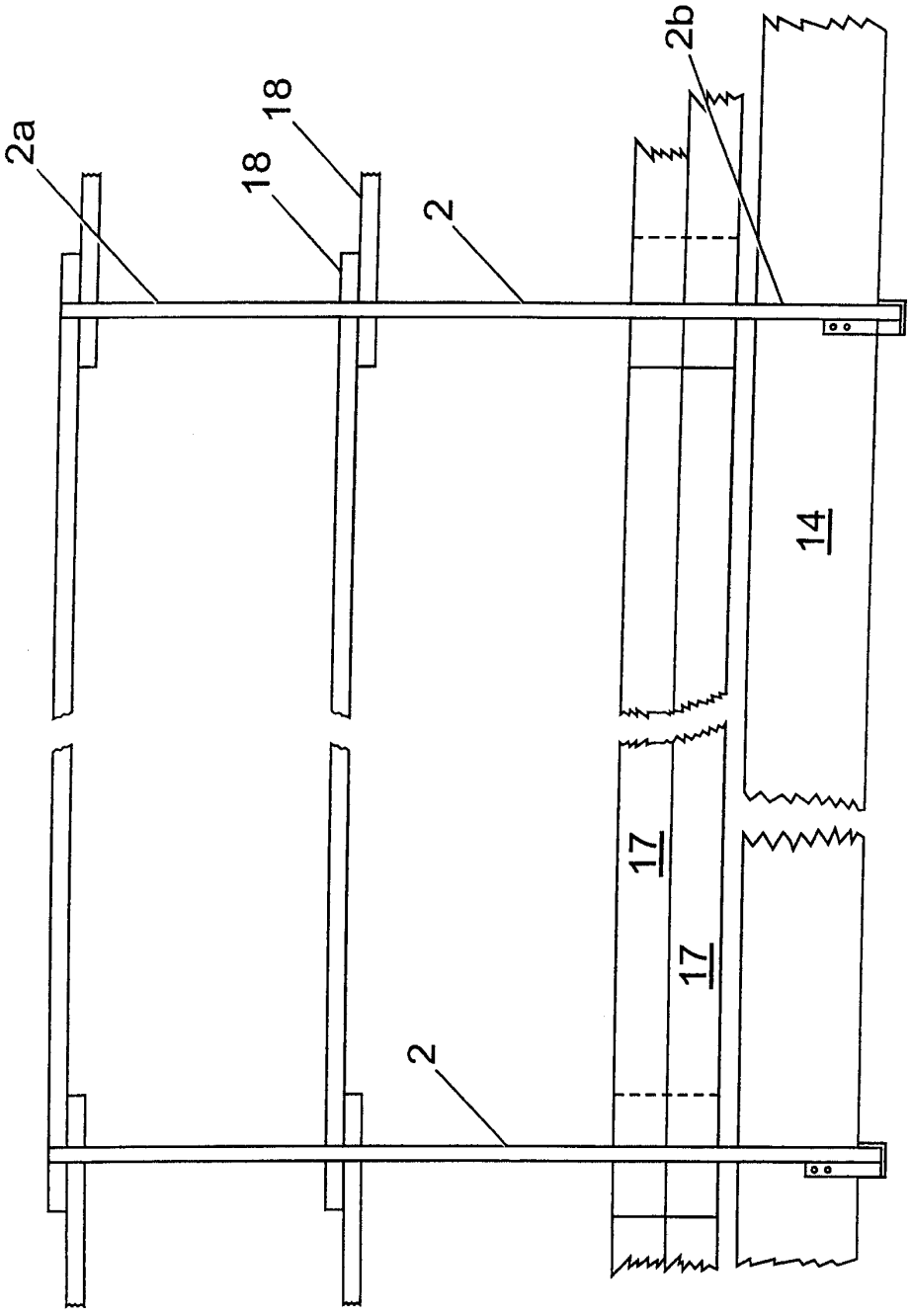

Fig. 4

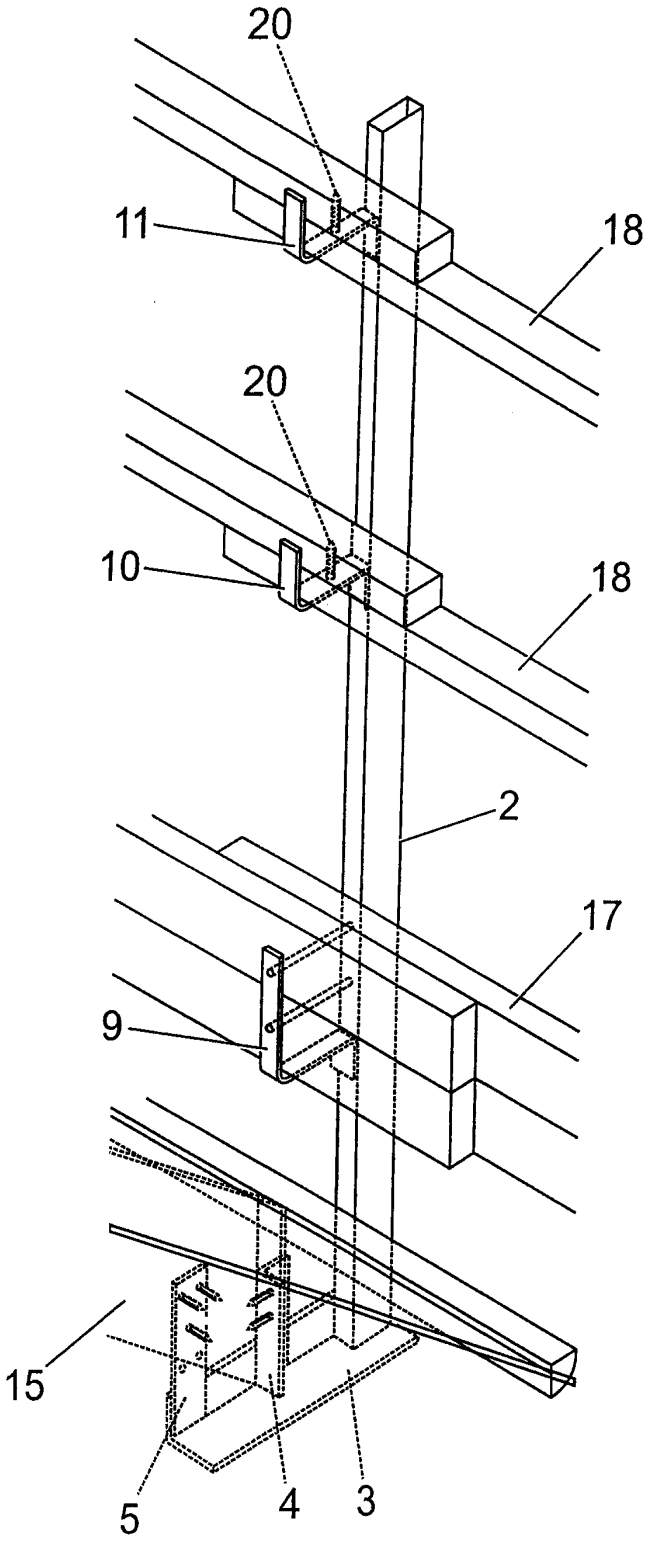

Fig. 5

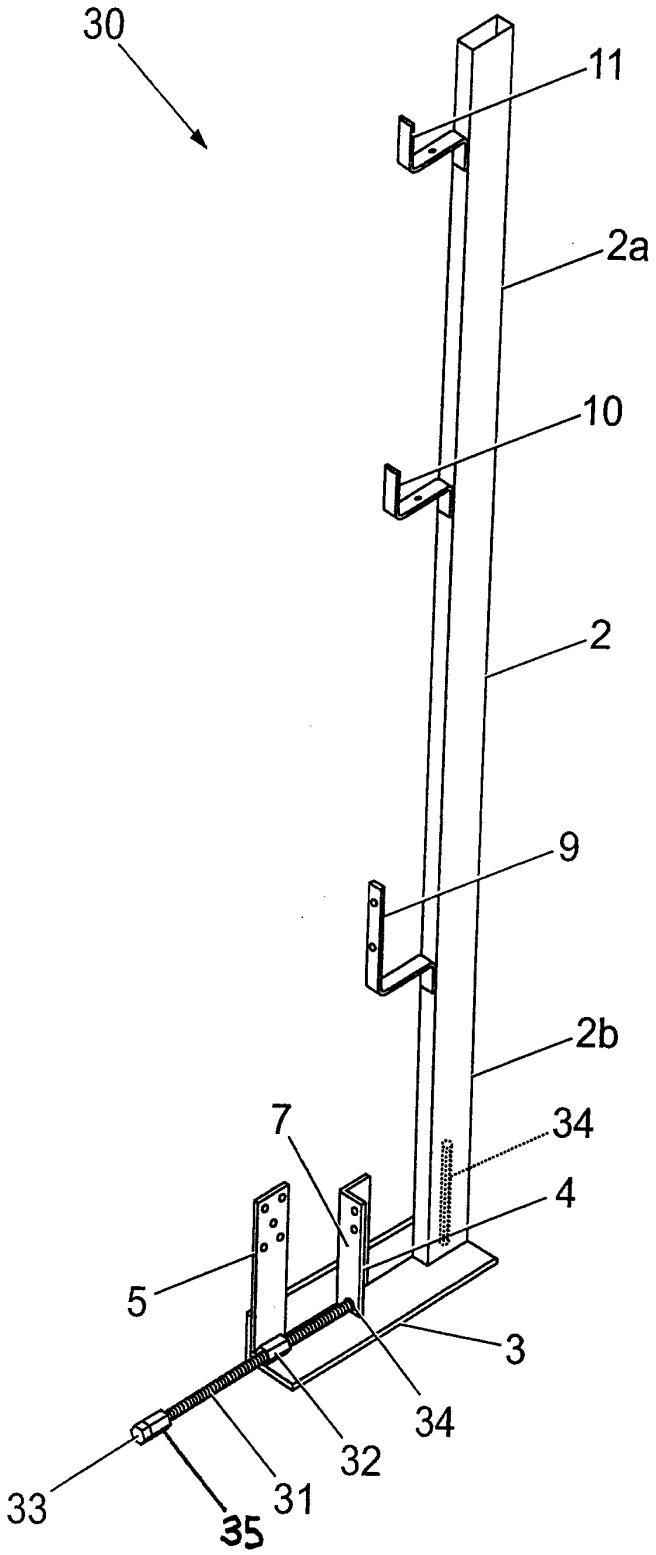

Fig. 6

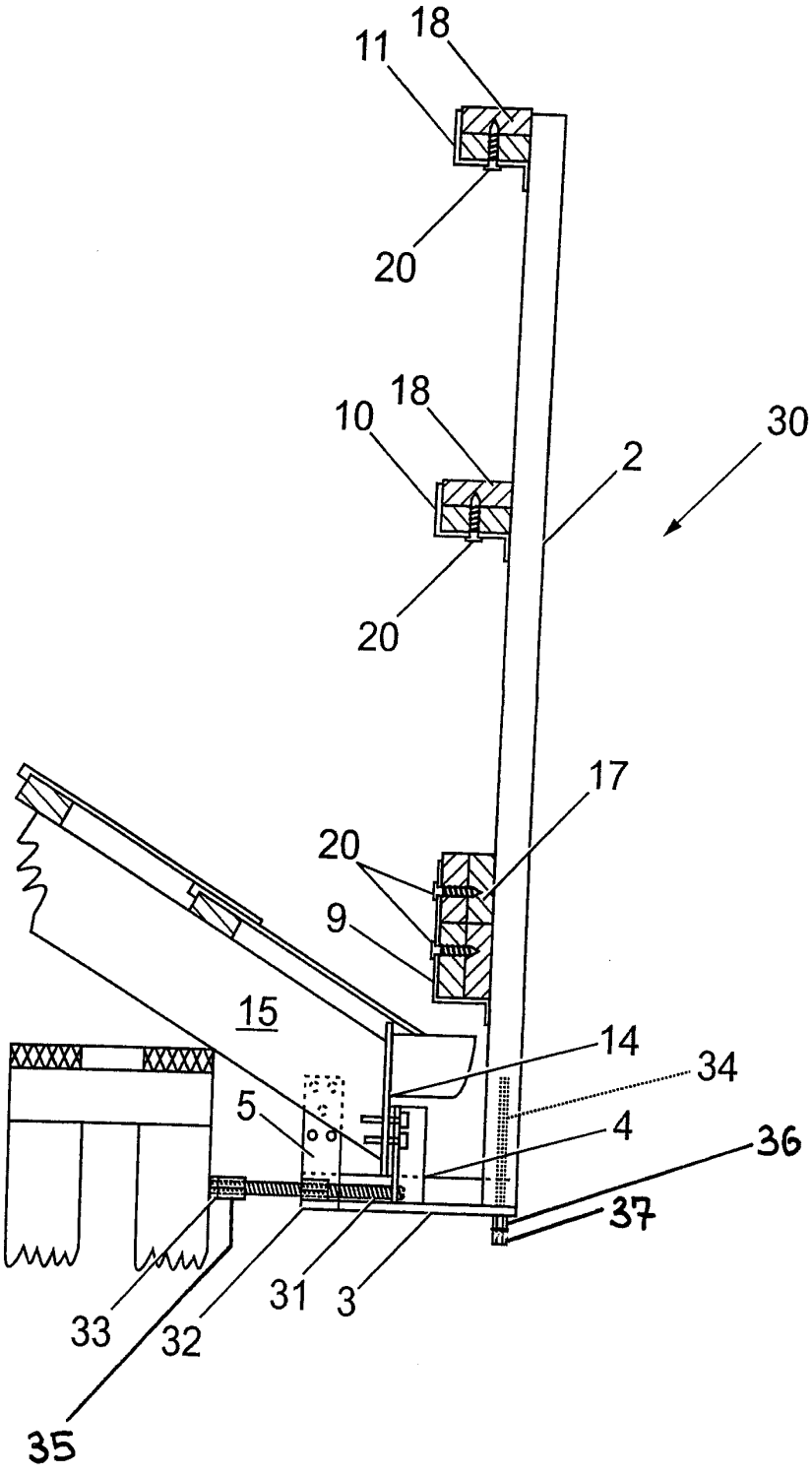

Fig. 7