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**(54) GUARD RAIL**

(57) A guard rail configured to be attached to a scaffolding is disclosed. The guard rail comprises a rail adapted to cordon off a work area in one or more horizontal directions. The guard rail comprises a vertical member

and a rail extending basically perpendicular to the vertical member. The rail is formed as a one-piece body that is configured to be detachably attached to the vertical member.

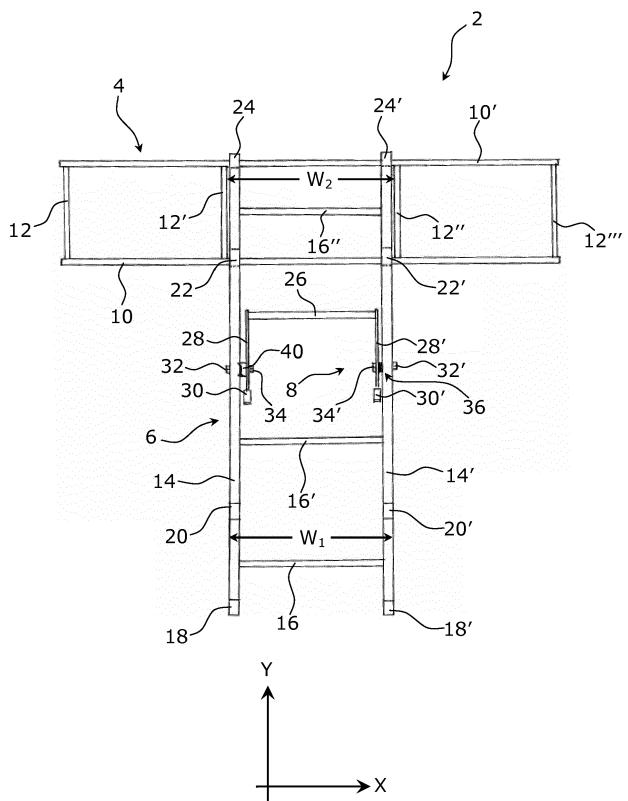


Fig. 1

**Description****Field of invention**

5 [0001] The present invention relates to a guard rail for scaffolding. The present invention more particularly relates to an improved detachable guard rail that takes up less space during storage and transport and allows for fast and secure scaffolding assembly.

**Prior art**

10 [0002] During scaffolding construction, vertical scaffolding elements designed as so-called adjusting frames are fitted onto one another by means of pipe connectors as the structure is built upwards. In each tier, the adjusting frames are erected first and these are subsequently connected by flooring or planking elements. Accordingly, each time a scaffolding is built upwards, a scaffolder is required to step onto the flooring or planking element, which has just been laid as the 15 uppermost walk surface. Therefore, since the scaffolder stands freely on the walk surface without any back protection, this work is especially dangerous.

[0003] Therefore, it is an object of the invention is to provide means whereby this danger may be obviated.

20 [0004] Due to the potential risk of falling down, the authorities have enforced new regulations that require the scaffolders to wear safety belts during assembling of scaffolding. This procedure is, however, time consuming and a nuisance to the scaffolders.

25 [0005] Several attempts have been made to provide a guard rail for scaffolding with the purpose of preventing scaffolders from falling down. EP2527563A discloses a guard rail for scaffolding. The guard rail is basically T-shaped and comprises a set of vertical rail parts permanently attached to horizontal parts mutually connected by a vertical member to form a one-piece body rail element. Thus, this guard rail takes up a lot of space during storage and transport. Accordingly, the applicability of the guard rail is restricted by the space that the guard rail takes up during storage and transport.

30 [0006] Accordingly, it is an object of the present invention to provide a guard rail that takes up less space during storage and transport. It is also an object of the present invention to provide a guard rail that is fast and easy to assemble and disassemble.

**Summary of the invention**

[0007] The object of the present invention can be achieved by a guard rail as defined in claim 1. Preferred embodiments are defined in the dependent sub claims, explained in the following description and illustrated in the accompanying drawings.

35 [0008] The guard rail according to the invention is a guard rail configured to be attached to a scaffolding, wherein the guard rail comprises a rail, adapted to cordon off a work area in one or more horizontal directions, wherein the guard rail comprises a vertical member and a rail extending basically perpendicular to the vertical member, wherein the rail is formed as a one-piece body that is configured to be detachably attached to the vertical member.

40 [0009] Hereby, it is possible to provide a guard rail that takes up less space during storage and transport, since the rail can be detached from the vertical member so that two separate units (the vertical member and the rail) can be transported in a manner in which less space is required. Furthermore, the guard rail is fast and easy to assemble and disassemble, since the rail can be detachably attached to the vertical member.

[0010] The guard rail is capable of preventing scaffolders from falling down from the scaffolding.

45 [0011] The guard rail is configured to be attached to a scaffolding by any suitable means including suspending brackets shaped as hook bodies.

[0012] The guard rail comprises a rail, adapted to cordon off a work area in one or more horizontal directions. Accordingly, the rail provides a safe working area on a scaffold platform when no transverse members have yet been mounted. The working referred to may be a scaffold platform. The guard rail can prevent scaffolders from falling down as they approach the periphery of the scaffolding (the periphery of the scaffold platform).

50 [0013] The guard rail comprises a vertical member and a rail extending basically perpendicular to the vertical member. It may be an advantage that the guard rail is essentially T-shaped.

[0014] The rail is formed as a one-piece body that is configured to be detachably attached to the vertical member by means of any suitable attachment means.

[0015] It may be an advantage that the vertical member comprises means for detachable attachment to the scaffolding.

55 [0016] Hereby, the vertical member and thus the guard rail can be detachably attached to the scaffolding. It is preferred that the means for detachable attachment to the scaffolding provide an easy and fast attachment and detachment of the guard rail.

[0017] The vertical member may comprise a grate structure comprising a plurality of rods extending perpendicular to

each other. Hereby is meant that the longitudinal axis of the rail and the longitudinal axis of the vertical member extend perpendicular to each other. If the longitudinal axis of the rail of the guard rail extends horizontally, the longitudinal axis of the vertical member preferably extends vertically.

[0018] In a preferred embodiment, the vertical member extends basically perpendicular to the rail and comprises means for detachable attachment to a scaffolding.

[0019] It may be an advantage that the vertical member comprises two essentially parallel longitudinal vertical structures, wherein a number of transverse frame members extend between the vertical structures.

[0020] It may be advantageous that the vertical member comprises a first vertical structure and a second vertical structure extending parallel to the first vertical structure, wherein a plurality of transverse structures extend between the first vertical structure and the second vertical structure.

[0021] Hereby, a strong and reliable vertical member suitable for fast and easy montage can be provided. Furthermore, the vertical structures may be equipped with means for attaching the vertical member and thus the guard rail to the scaffolding. Moreover, the vertical structures may be provided with means for attaching the rail to the vertical member.

[0022] It may be beneficial that the rail overlaps the vertical member.

[0023] Hereby, it is possible to provide a strong guard rail that is resistant toward impact. Two layers (one rail layer and one vertical member layer) will be present. Accordingly, a strong and reliable attachment of the rail to the vertical member can be achieved.

[0024] It may be advantageous that the rail overlaps the top portion of the vertical member.

[0025] Hereby, the rail of the guard rail can be provided in the largest distance from the bottom portion of the guard rail. Accordingly, the height of the vertical member can be minimised.

[0026] It may be advantageous that the rail comprises two longitudinal frame members and one or more frame members extending between the two longitudinal frame members.

[0027] Hereby, a strong construction can be achieved.

[0028] In one preferred embodiment according to the invention, the rail comprises two longitudinal frame members and two, three or more frame members extending between the two longitudinal frame members.

[0029] In a particular preferred embodiment according to the invention, the rail comprises two longitudinal frame members and four frame members extending between the two longitudinal frame members.

[0030] It may be beneficial that the rail comprises one or more frame members that are offset relative to the vertical structures of the vertical member.

[0031] Hereby, it is possible to apply the frame members that are offset relative to the vertical structures of the vertical member to prevent the motion of the rail along the longitudinal axis of the rail.

[0032] If the rail is attached to the vertical member by means of suspending brackets attached to horizontal frame members, the vertical frame members that are offset relative to the vertical structures of the vertical member can prevent the motion of the rail along the longitudinal axis of the rail, because the suspending brackets will abut the vertical frame members when the rail is moved along its longitudinal axis. Since the vertical frame members extend between the horizontal frame members, suspending brackets will prevent the vertical frame members and thus the rail from being moved further along (one direction of) the longitudinal axis of the rail when the suspending brackets abut the vertical frame members.

[0033] It may be beneficial that the rail comprises a first frame member and a second frame member that are offset relative to the vertical structures of the vertical member.

[0034] Hereby, the first frame member can restrict the motion of the rail in a first direction (along its longitudinal axis), whereas the second frame member can restrict the motion of the rail in the opposite direction (along its longitudinal axis).

[0035] It may be advantageous that the distance between the first frame member and a second (adjacent) frame member is larger than the width of the vertical member.

[0036] Hereby, it is possible to attach the vertical member between the first frame member and the second adjacent frame member. Furthermore, the first frame member and the second adjacent frame member can be used to restrict displacement of the rail along its longitudinal axis.

[0037] It may be an advantage that the guard rail comprises a locking device configured to be brought into engagement with a scaffold platform, wherein the locking device comprises a handle and is configured to be positioned in a locked position and in an unlocked position, wherein the locking device comprises means for maintaining the locking device fixed in the positions, wherein the locking device comprises means for bringing the locking device from a locked position to an unlocked position and for bringing the locking device from an unlocked position to a locked position solely by rotation and/or displacement of the handle.

[0038] Hereby, the guard rail can be fixed to the scaffolding in a fast and user-friendly manner without using screws that have to be fastened by means of tools. Moreover, the guard rail can be detached from the scaffolding in an easy and fast manner.

[0039] It may be advantageous that the locking device is rotatably attached to the vertical structures of the vertical member.

[0040] Hereby, the locking device may be brought from a locked position to an unlocked position and from an unlocked position to a locked position solely by rotation of the handle. Accordingly, the locking device can be operated by the scaffolder in a fast and easy manner.

5 [0041] It may be beneficial that the guard rail comprises a positioning member configured to maintain the locking device in a locked position and in an unlocked position, wherein the positioning member comprises a cavity configured to bear against an abutting structure of the guard rail in such a manner that the locking device is fixed to the abutting structure.

[0042] Hereby, the positioning member can be maintained fixed to the abutting structure in an easy manner.

10 [0043] It may be advantageous that the guard rail comprises a spring or another resilient member arranged to provide a force keeping the positioning member in engagement with the abutting structure.

[0044] Hereby, the spring or another resilient member secures that the locking device can be maintained in a locked position or in an unlocked position as long as desired. Moreover, the use of a spring or another resilient member allows for an easy change of the position of the locking device.

15 [0045] It may be beneficial that the guard rail comprises a locking device comprising locking arms configured to engage with a portion of the scaffolding, preferably a scaffold platform, e.g. a plane plate-shaped structure extending perpendicular to a horizontal direction.

[0046] Hereby, a safe, strong and user-friendly attachment of the guard rail can be provided. Moreover, the guard rail may be attached to the scaffold platform independent of the geometry and type of the scaffolding as long as the locking device fits the scaffold platform.

20 [0047] It may be an advantage that the guard rail comprises a locking device comprising locking arms configured to engage with a portion of the scaffolding, preferably a scaffold platform.

[0048] It may be an advantage that the guard rail comprises a plurality of suspension brackets configured to be attached to a transverse member of the scaffolding.

25 [0049] Hereby, the guard rail can easily be attached to the transverse member of the scaffolding so that the scaffolders, required to step onto the scaffold platform which has just been laid as the uppermost walk surface, can be prevented from falling down.

[0050] The guard rail according to the invention is easy and fast to use because no tools are needed to fasten screws. In a preferred embodiment of the invention, the guard rail comprises hook bodies for attachment to a first transverse structure and a second parallel transverse structure of the scaffolding. In a preferred embodiment of the invention, the guard rail comprises a locking device comprising a handle that allows for fast and easy positioning of the locking device into a locked position and an unlocked position, respectively.

[0051] It is beneficial that the guard rail can be attached to a scaffolding without screws and scaffolding split pins because the montage time can be reduced.

30 [0052] It may be an advantage that the guard rail comprises first suspending brackets configured to be received by the top portion of horizontally oriented transverse members of a scaffolding, wherein the guard rail furthermore comprises other suspending brackets configured to receive at least the bottom portion of horizontally oriented frame members of the rail. It may be beneficial that the first suspending brackets are attached at a one side of the vertical member and that the other suspending brackets are arranged at the other side of the vertical member.

#### 40 Description of the Drawings

[0053] The invention will become more fully understood from the detailed description given herein below. The accompanying drawings are given by way of illustration only, and thus, they are not limitative of the present invention. In the accompanying drawings:

45 Fig. 1 shows a schematic side view of a guard rail according to the invention;  
 Fig. 2 a) shows a schematic illustration of a first portion (the rail) of a guard rail according to the invention;  
 Fig. 2 b) shows a schematic front view of a second portion (the vertical member) and a third portion (locking device) of a guard rail according to the invention;  
 50 Fig. 2 c) shows a close-up view of the locking device shown in Fig. 2 b);  
 Fig. 2 d) shows a schematic front view of the second portion (the vertical member) and the third portion (locking device) shown in Fig. 2 b);  
 Fig. 3 a) shows a schematic front view of a locking device according to the invention;  
 Fig. 3 b) shows a side view of the locking device shown in Fig. 3 a);  
 55 Fig. 3 c) shows a close-up view of a positioning member of the locking device shown in Fig. 3 a);  
 Fig. 3 d) shows a schematic view of a longitudinal vertical member according to the invention and a suspending bracket detachably mounted therein;  
 Fig. 4 shows a scaffolding comprising a first guard rail and a second guard rail according to the invention attached

to the scaffolding;

Fig. 5 shows a scaffolding comprising two guard rails according to the invention;  
 Fig. 6 a) shows a top view of a first positioning device according to the invention;  
 Fig. 6 b) shows a top view of a second positioning device according to the invention;  
 Fig. 6 c) shows a top view of a third positioning device according to the invention and  
 Fig. 7 shows a front view of a guard rail according to the invention.

#### Detailed description of the invention

[0054] Referring now in detail to the drawings for the purpose of illustrating preferred embodiments of the present invention, a guard rail 2 of the present invention is illustrated in Fig. 1.

[0055] Fig. 1 is a schematic side view of a guard rail 2 according to the invention. A coordinate system showing a first axis X and a second axis Y is provided below the guard rail 2.

[0056] The guard rail 2 comprises a rail 4 (a frame-shaped grate structure) having two parallel longitudinal frame members 10, 10'. Four parallel transversal frame members 12, 12', 12", 12"" extend between the frame members 10, 10'. The longitudinal frame members 10, 10' extend parallel to the axis X, whereas the parallel transversal frame members 12, 12', 12", 12"" extend parallel to the axis Y. The rail 4 may be produced in metal, e.g. a light metal such as aluminium or in steel (e.g. galvanized steel).

[0057] It may be an advantage that the longitudinal frame members 10, 10' and the transversal frame members 12, 12', 12", 12"" are hollow in order to reduce the weight of the rail 4. It may be beneficial that the longitudinal frame members 10, 10' and the transversal frame members 12, 12', 12", 12"" are cylindrical with a circular, rectangular or triangular cross-section. The longitudinal frame members 10, 10' and the transversal frame members 12, 12', 12", 12"" may be welded together by separate pipes. Alternatively, it is possible to attach the transversal frame members 12, 12', 12", 12"" to the longitudinal frame members 10, 10' by means of screws (e.g. corresponding bolts and nuts).

[0058] The guard rail 2 furthermore comprises a vertical member 6 comprising two longitudinal vertical structures 14, 14' and three transverse structures 16, 16', 16" extending there between. The longitudinal vertical structures 14, 14' extend parallel to the axis Y, whereas the three transverse structures 16, 16', 16" extend parallel to the axis X.

[0059] The longitudinal vertical structures 14, 14' and the transverse structures 16, 16', 16" may be shaped as hollow pipes in order to reduce the weight of the vertical member 6. It may be an advantage that the vertical structures 14, 14' and the transverse structures 16, 16', 16" are shaped as cylindrical pipes having a circular, rectangular or triangular cross-section. The vertical structures 14, 14' and the transverse structures 16, 16', 16" may beneficially be joint by means of welding or mechanically by means of screws (e.g. corresponding bolts and nuts).

[0060] Four pairs of suspending brackets 18, 18', 20, 20', 22, 22', 24, 24' are pair wisely attached at four vertical positions on the vertical structures 14, 14'. The suspending brackets 18, 20, 22, 24 are attached to the first vertical structure 14, whereas the suspending brackets 18', 20', 22', 24' are attached to the second vertical structure 14'.

[0061] The suspending brackets 18, 18', 20, 20' are configured to engage with horizontal pipe structures on a scaffolding, whereas the suspending brackets 22, 22', 24, 24' are configured for mounting and keep the rail 4 fixed to a scaffolding.

[0062] The guard rail 2 furthermore comprises a locking device 8 rotatably attached to the vertical member 6. The locking device 8 comprises a handle 26 shaped as a pipe structure that is a little shorter than the transverse structures 16, 16', 16". The handle 26 extends parallel to the axis X.

[0063] The locking device 8 moreover comprises two parallel arms 28, 28' shaped as plate-shaped structures attached to the end structures of the handle (on each end of the handle) 26. The two parallel arms 28, 28' extend parallel to the axis Y. The two parallel arms 28, 28' are rotatably attached to the first longitudinal vertical structure 14 and the second longitudinal vertical structure 14', respectively.

[0064] The first arm 28 is rotatably attached to the first longitudinal vertical structure 14 by means of a bolt 32 and a nut 34 attached thereto. Between the first longitudinal vertical structure 14 and the first arm 28, a positioning member 40 is provided. It may be an advantage that the positioning member 40 is made in a softer material than the first longitudinal vertical structure 14. It may be an advantage that the positioning member 40 is made in nylon, wood or in a plastic material.

[0065] The other arm 28' is rotatably attached to the second longitudinal vertical structure 14' by means of a bolt 32' and a nut 34' attached thereto. A spring 36 is provided between the second longitudinal vertical structure 14' and the other arm 28'. The spring 36 provides a sustained force against the locking device 8 along the axis X in the direction from the second longitudinal vertical structure 14' towards the first longitudinal vertical structure 14.

[0066] A locking arm 30 is attached to the distal end of the first arm 28, whereas a corresponding locking arm 30' is attached to the distal end of the second arm 28'. The locking arms 30, 30' may be shaped as angle structures comprising two rectangular plate structures attached to each other. The locking arms 30, 30' are configured to engage with a portion of a scaffold platform (see Fig. 4 or Fig. 5).

[0067] The distance  $W_2$  between the first frame member 12' and the second frame member 12" is larger than the

width  $W_1$  of the vertical member 6.

**[0068]** As it can be seen from Fig. 2, the guard rail 2 can be disassembled. On Fig. 2 a) one can see a guard rail 4 formed as a frame-shaped grate structure comprising two parallel longitudinal frame members 10, 10' and four frame members 12, 12', 12", 12"" extending there between. The longitudinal frame members 10, 10' extend parallel to the axis X, whereas the frame members 12, 12', 12", 12"" extend parallel with the axis Y, wherein the axes X, Y are shown in a coordinate system above the rail 4.

**[0069]** Fig. 2 b) illustrates the vertical member 6 of a guard rail 2 according to the invention. A coordinate system is arranged below the vertical member 6. The vertical member 6 comprises two longitudinal vertical structures 14, 14' extending parallel to the axis Y. Four hook bodies 18, 20, 22, 24 are provided in the first vertical member 14, whereas four corresponding hook bodies 18', 20', 22', 24' are provided in the second vertical member 14'. In the uppermost hook bodies 24, 24', bores 44, 44' are provided for attachment of attachment means (e.g. scaffolding split pins).

**[0070]** Three transverse structures 16, 16', 16" and a rotatably attached locking device 8 extend between the two longitudinal vertical structures 14, 14'. The locking device 8 comprises a rod-shaped handle 26 extending parallel to the axis X. The locking device 8, furthermore, comprises a first arm 28 attached to one of the free ends of the handle 26 and a second arm 28' attached to the other free end of the handle 26. Both arms 28, 28' extend parallel to the axis Y.

**[0071]** A positioning member 40 is provided between the first arm 28 and the first vertical structure 14. The positioning member 40 is formed to fit the outer periphery of the first vertical structure 14 that abuts the positioning member 40. The positioning member 40 is configured to maintain the locking device 8 fixed in a first position and in a second position relative to the vertical member 6. A spring 36 is provided between the second arm 28' and the second vertical structure 14'. The spring 36 pushes the locking device 8 to the left against the first vertical structure 14 in such a manner that the first vertical structure 14 abuts the positioning member 40.

**[0072]** By moving the locking device 8 to the right towards the second vertical structure 14', it is possible to bring the locking device 8 out of engagement with the positioning member 40, whereby it is possible to change the position of the locking device 8 as shown in Fig. 2 d). The locking device 8 is automatically brought in engagement with the positioning member 40 when the spring presses the locking device 8 to the left against the first vertical structure 14.

**[0073]** The locking device 8 comprises two L-shaped locking arms 30, 30' attached to the first arm 28 and the second arm 28', respectively.

**[0074]** Fig. 2 c) illustrates a close-up view of the positioning member 40 shown in Fig. 2 b). It can be seen that the positioning member 40 is rotatably attached to the first vertical structure 14 by means of a bolt 32 extending through a bore extending through the first vertical structure 14 and further through the positioning member 40 and the arm 28. A nut 34 is attached to the free end of the bolt 32.

**[0075]** Fig. 2 d) illustrates a side view of the vertical member 6 shown in Fig. 3 b). A three-dimensional Cartesian coordinate system having three perpendicular axes X, Y, Z is provided below the vertical member 6. The vertical member 6 comprises a straight vertical structure 14 extending parallel to the axis Y. A first suspending bracket 18' and a second suspending bracket 20' having L-shaped profiles extending downwards are attached to the vertical structure 14. A third suspending bracket 22' and a fourth suspending bracket 24' having L-shaped profiles extending upwards are attached to the vertical structure 14.

**[0076]** The three transverse structures 16, 16', 16" are indicated with dotted circles.

**[0077]** It can be seen that the vertical member 6 comprises a locking device 8 that is rotatably attached to the longitudinal vertical structure 14. The axis of rotation  $\alpha$  is shown in Fig. 2 d) and it can be seen that the locking device 8 can be arranged in two different configurations (positions). In the "unlocked position" A, the arm 28' extends parallel to the longitudinal vertical structure 14 and thus parallel to the axis Y. In the "locked position" B, the arm 28' extends perpendicular to the longitudinal vertical structure 14 and thus parallel to the axis Z.

**[0078]** In the unlocked position A, the distal portion of the L-shaped locking arm 30' extends horizontally parallel to the axis Z. In the locked position B, the distal portion of the L-shaped locking arm 30' extends vertically, which enables it to engage with a portion of a scaffold platform.

**[0079]** Fig. 3 a) illustrates a front view of a locking device 8 according to the invention. The locking device 8 comprises a rod-shaped handle 26 extending between and being attached to two parallel arms 28, 28'. A first locking arm 30 and a second locking arm 30' are attached to the distal end of the first arm 28 and the second arm 28, respectively. A positioning member 40 is provided on the first arm 28.

**[0080]** Fig. 3 b) illustrates a front view of the locking device 8 shown in Fig. 3 a). It can be seen that the locking device 8 comprises a rod-shaped, pipe-shaped handle 26 having a circular cross-section (indicated with a dotted circular line). A first L-shaped locking arm 30 is attached to the distal end of the first arm 28. A positioning member 40 having a through-going bore 44 is provided on the first arm 28. The bore 44 is configured to receive a through-going bolt for attachment of the positioning member 40 to the first arm 28.

**[0081]** Fig. 3 c) illustrates a close-up view of the positioning member 40 shown in Fig. 3 a). It can be seen from Fig. 3 c) that the positioning member 40 comprises a basically circular profile (seen from a side perspective). Accordingly, the positioning member 40 comprises a cavity 42 shaped as a section of a sphere with a radius  $r$  (a circle with radius  $r$

is indicated with a dotted line). Therefore, the positioning member 40 is configured to abut and engage a pipe structure having a circular cross-section (see Fig. 1, Fig. 2 b) and Fig. 2 c)).

[0082] A through-going bore 44 extends through the positioning member 40 and the first arm 28. The through-going bore 44 is indicated with dotted lines. A spring 36 is provided between the nut 34 and the first arm 28. Hereby, it is possible to displace the positioning member 40 perpendicular to (in a direction away from) the first arm 28, whereby the positioning member 40 can rotate about the bore 44.

[0083] Fig. 3 d) illustrates a schematic illustration of a vertical structure 14 according to the invention. A first suspending bracket 18 is moveably attached to the vertical structure 14 by means of a bracket 48, onto which the suspending bracket 18 is attached. A through-going bore configured to receive a bolt for attaching the suspending bracket 18 to the vertical structure 14 extends through the bracket 48. Three through-going bores 46, 46', 46" for attachment of the suspending bracket 18 are provided in the vertical structure 14. Hereby, it is possible to change the position of the suspending bracket 18. By displacing the suspending bracket 18 from the second bore 46' to the third bore 46", the suspending bracket 18 is displaced a length d as indicated on Fig. 3 d).

[0084] Fig. 4 illustrates a scaffolding 56 provided with a first guard rail 2 and a second guard rail 2' according to the invention.

[0085] The scaffolding 56 is placed on a support 50 provided with tiles and cobblestones by means of a plurality of feet 52. The scaffolding 56 comprises a scaffold platform 58 to which the first guard rail 2 is detachably attached.

[0086] The first guard rail 2 comprises a vertical member 6 that is attached to one of the transverse members 60 of the scaffolding 56 by means of four suspending brackets 18, 18', 20, 20'. The suspending brackets 18, 18', 20, 20' rest on the transverse members 60 that prevent the guard rail 2 from being moved downwards.

[0087] The means for detachable attachment comprise a locking device 8 that engages the scaffold platform 58 and thus is fixed to it. This fixation prevents the guard rail 2 from being moved perpendicular to the longitudinal axis of the scaffold platform 58.

[0088] A rail 4 comprising a first longitudinal frame member 10 and a second frame member 10' extending parallel to the first frame member 10 is attached to the vertical member 6. The rail 4 is attached to four suspending brackets 22, 22', 24, 24' provided in the top portion of the vertical member 6. The first longitudinal frame member 10 is attached to the two second uppermost suspending brackets 22, 22', whereas the second longitudinal frame member 10' is attached to the vertical member 6 by means of the uppermost suspending brackets 24, 24'. Locking members 54 formed as scaffolding split pins are attached to the uppermost suspending brackets 24, 24' in order to prevent the rail 4 from being detached from the vertical member 6.

[0089] It can be seen that the guard rail 2 according to the invention is light and easy to use and that the first guard rail 2 prevents the scaffolders from falling down from the scaffolding 56, when they step onto the scaffold platform 58 which has just been laid as the uppermost walk surface (where no transverse members 60, 60', 60" have been mounted). The guard rail 2, is very easy to assemble, because it can be mounted by means of the suspending brackets 18, 18' and the locking device 8. Further hook bodies may, however, be used.

[0090] A second guard rail 2' is mounted on the end wall of the scaffolding 56. The end wall of the scaffolding 56 is shorter than the long side of the scaffolding 56. The second guard rail 2' comprises a vertical member 6'. A first pair of suspending brackets 18, 18' is attached to the vertical member 6'. The first suspending brackets 18, 18' engage a first transverse member 60'. Similarly, a second pair of suspending brackets 20, 20' is attached to the vertical member 6'. The second suspending brackets 20, 20' engage a second transverse member 60".

[0091] The vertical member 6' is mechanically attached to the scaffold platform 58 by means of a first fastening member 62 connecting the first vertical structure 14 and the scaffold platform 58 and by means of a second fastening member 62' connecting the second vertical structure 14' and the scaffold platform 58. The fastening members 62, 62' can comprise a wire connected to a scaffolding split pin, suspending brackets or other suitable mechanical attachment means.

[0092] Since the second guard rail 2' has to cover a shorter side (end wall of the scaffolding 56), the rail 4' attached to the second vertical structure 6' is shorter than the first rail 4 attached to the first guard rail 2.

[0093] The second rail 4' comprises a first longitudinal frame member 10 and a second longitudinal frame member 10', extending parallel to each other. The second rail 4' is attached to four suspending brackets 22, 22', 24, 24' provided in the top portion of the vertical structure 6'. The first longitudinal frame member 10 is attached to the two second uppermost suspending brackets 22, 22', whereas the second frame member 10' is attached to the two uppermost suspending brackets 24, 24'. Scaffolding split pins 54 are attached to the uppermost suspending brackets 24, 24' in order to prevent the rail 4' from detaching from the vertical structure 6'.

[0094] Fig. 5 illustrates two guard rails 2, 2' according to the invention attached to a scaffolding 56. The scaffolding 56 is arranged on a support 50 up against a building (a block of flats) 64. The support 50 is a pavement upon which the feet 53 of the scaffolding 56 rest.

[0095] The first guard rail 2 comprises a vertical structure 6 attached to a transverse member 60 by means of two suspending brackets 18, 18' that engage the transverse member 60 and rest upon it. The vertical structure 6 comprises a locking device 8 attached to the scaffold platform 58.

[0096] The first guard rail 2 furthermore comprises a rail 4 attached to the two upper most pairs of suspending brackets 22, 22', 24, 24' of the vertical structure 6. Scaffolding split pins 54 are attached to the uppermost suspending brackets 24, 24' in order to fix the rail 4 to the uppermost pair of suspending brackets 24, 24'.

[0097] The second guard rail 2' comprises a vertical structure 6' attached to a first transverse member 60' by means of two suspending brackets 18, 18' and to a second transverse member 60" by means of two suspending brackets 20, 20'. The vertical structure 6' comprises a locking device 8' attached to the scaffold platform 58.

[0098] The second guard rail 2' comprises a rail 4' attached to the two uppermost pairs of suspending brackets 22, 22', 24, 24' of the vertical structure 6.

[0099] The two guard rails 2, 2' are easy and fast to apply and they are capable of preventing scaffolders from falling down when the scaffolders step on the scaffold platform 58 when no side structures yet are mounted. The guard rail 2 is fast to assemble and fix to the scaffolding, since it is only attached by means of the suspending brackets 18, 18', 20, 20' and the locking device 8. The two guard rails 2, 2' almost bear against each other. A small gap is, however, provided between the two guard rails 2, 2' in order to mount the guard rails 2, 2'.

[0100] Fig. 6 a) illustrates a schematic top view of a positioning member 40 brought into engagement with a longitudinal vertical structure 14. The longitudinal vertical structure 14 has a circular profile that fits the cavity 42 of the positioning member 40. The positioning member 40 is attached to the arm 28. A bore 44 extends through the positioning member 40 and the arm 28. A bolt extends through the bore 44, and a nut 34 is attached to the free end of the bolt. A spring 36 that presses the nut 34 away from the arm 28 is provided between the nut 34 and the arm 28.

[0101] When the spring 36 is pressed together, and the positioning member 40 no longer engages the longitudinal vertical structure 14, it is possible to rotate the positioning member 40 relative to the longitudinal vertical structure 14.

[0102] A three-dimensional Cartesian coordinate system having a vertical axis Y and two horizontal axes X, Z corresponding to the one shown in Fig. 1 and Fig. 2 is illustrated in Fig. 6 a).

[0103] Fig. 6 b) illustrates a schematic top view of a positioning member 40 brought into engagement with a longitudinal vertical structure 14. In Fig. 6 b), the arm 28 and the positioning member 40 attached to the arm 28 are rotated 90 degrees compared to Fig. 6 a). A three-dimensional Cartesian coordinate system having a vertical axis Y and two horizontal axes X, Z corresponding to the one shown in Fig. 1 and Fig. 2 is illustrated in Fig. 6 b).

[0104] Fig. 6 c) illustrates a schematic top view of a positioning member 40 brought into engagement with a longitudinal vertical structure 14. In Fig. 6 c), the arm 28 and the positioning member 40 attached to the arm 28 are arranged in the same manner relative to each other as in Fig. 6 b). This can be seen in the Cartesian coordinate system having a vertical axis Y and two horizontal axes X, Z corresponding to the one shown in Fig. 1 and Fig. 2.

[0105] Fig. 7 illustrates a front view of a guard rail 2 according to an embodiment of the invention. The guard rail 2 comprises a rail 4 having a frame-shaped grate structure. The rail 4 comprises two parallel longitudinal frame members 10, 10'. Four parallel transversal frame members 12, 12', 12", 12''' extend between the frame members 10, 10'. The rail 4 may be produced in metal, e.g. a light metal such as aluminium or in steel (e.g. galvanized steel). The two central frame members 12', 12" are arranged closer to each other than the other adjacent frame members.

[0106] The guard rail 2 comprises a vertical member 6 comprising two longitudinal vertical structures 14, 14' and three transverse structures 16, 16', 16" extending there between.

[0107] Four pairs of suspending brackets 18, 18', 20, 20', 22, 22', 24, 24' are attached to the vertical structures 14, 14'. The suspending brackets 18, 20, 22, 24 are attached to the first vertical structure 14, whereas the suspending brackets 18', 20', 22', 24' are attached to the second vertical structure 14'.

[0108] The suspending brackets 18, 18', 20, 20' are adapted to be brought into engagement with horizontal pipe structures on a scaffolding, whereas the suspending brackets 22, 22', 24, 24' are configured for mounting and keep the rail 4 fixed to a scaffolding.

[0109] The guard rail 2 comprises a locking device 8 rotatably attached to the vertical member 6. The locking device 8 comprises a handle 26 shaped as a pipe structure that is a little shorter than the transverse structures 16, 16', 16".

[0110] The locking device 8 moreover comprises two parallel arms shaped as plate-shaped structures attached to the end structures of the handle (on each end of the handle) 26. The two parallel arms are rotatably attached to the first longitudinal vertical structure 14 and the second longitudinal vertical structure 14', respectively.

[0111] The vertical member 6 is attached to first frame member 10 and the second frame member 10' of the rail 4 between the frame members 12 and 12'. Accordingly, the rail 4 protrudes to the right side of the vertical member 6 to a much greater extent than to the left side of the vertical member. By changing the position of the rail 4 on which the vertical member 6 is attached, it is possible to arrange the rail 4 according to space specific requirements.

[0112] The distance  $W_2$  between the first frame member 12' and the second frame member 12" is larger than the width  $W_1$  of the vertical member 6.

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#### List of reference numerals

[0113]

2, 2'	Guard rail
4, 4'	Rail
6, 6'	Vertical member
8, 8'	Locking device
5 10, 10', 12, 12', 12", 12"	Frame member
14, 14"	Vertical structure
16, 16', 16"	Transverse structure
18, 18', 20, 20'	Suspending bracket (hook body)
22, 22', 24, 24'	Suspending bracket
10 26	Handle
28, 28'	Arm
30, 30'	Locking arm
32, 32'	Bolt
34, 34'	Nut
15 36	Spring
40	Positioning member
42	Cavity
44, 44', 46, 46', 46"	Bore
48	Bracket
20 50	Support
52	Foot
54, 54'	Locking member
56	Scaffolding
58	Scaffold platform
25 60, 60', 60"	Transverse member
62, 62'	Fastening member
64	Building
X, Y, Z	Axis
A, B	Position
30 $\alpha$	Axes of rotation
W <sub>1</sub> , W <sub>2</sub>	Distance/width

## Claims

35 1. A guard rail (2, 2') configured to be attached to a scaffolding (56), wherein the guard rail (2, 2') comprises a rail (4, 4'), adapted to cordon off a work area in one or more horizontal directions (X, Z), wherein the guard rail (2, 2') comprises a vertical member (6, 6') and a rail (4, 4') extending basically perpendicular to the vertical member (6, 6'), **characterised in that** the rail (4, 4') is formed as a one-piece body that is configured to be detachably attached to the vertical member (6, 6').

40 2. A guard rail (2, 2') according to claim 1, **characterised in that** the vertical member (6, 6') comprises means (18, 18', 20, 20', 8, 8') for detachable attachment to the scaffolding (56).

45 3. A guard rail (2, 2') according to claim 1 or claim 2, **characterised in that** the vertical member (6, 6') comprises a first vertical structure (14) and a second vertical structure (14') extending parallel to the first vertical structure (14), wherein a plurality of transverse structures (16, 16', 16") extend between the first vertical structure (14) and the second vertical structure (14').

50 4. A guard rail (2, 2') according to one of the preceding claims, **characterised in that** the rail (4, 4') overlaps the vertical member (6, 6').

55 5. A guard rail (2, 2') according to claim 4, **characterised in that** the rail (4, 4') overlaps the top portion of the vertical member (6, 6').

6. A guard rail (2, 2') according to one of the preceding claims, **characterised in that** the rail (4, 4') comprises two longitudinal frame members (10, 10') and one or more frame members (12', 12") extending between the two longitudinal frame members (10, 10').

7. A guard rail (2, 2') according to claim 3 and claim 6, **characterised in that** the rail (4, 4') comprises one or more frame members (12', 12'') that are offset relative to the vertical structures (14, 14') of the vertical member (6, 6').

5 8. A guard rail (2, 2') according to claim 7, **characterised in that** the rail (4, 4') comprises a first frame member (12') and a second frame member (12'') that are offset relative to the vertical structures (14, 14') of the vertical member (6, 6').

10 9. A guard rail (2, 2') according to claim 8, **characterised in that** the distance ( $W_2$ ) between the first frame member (12') and a second frame member (12'') is larger than the width ( $W_1$ ) of the vertical member (6, 6').

15 10. A guard rail (2, 2') according to one of the preceding claims, **characterised in that** the guard rail (2, 2') comprises a locking device (8, 8') configured to be brought into engagement with a scaffold platform (58), wherein the locking device (8, 8') comprises a handle (26) and is configured to be positioned in a locked position (B) and in an unlocked position (A), wherein the locking device (8, 8') comprises means (26, 28, 28', 40, 30, 30', 36, 32, 32', 34, 34') for maintaining the locking device (8, 8') fixed in the positions (A, B), wherein the locking device (8, 8') comprises means for bringing the locking device (8, 8') from a locked position (B) to an unlocked position (A) and for bringing the locking device (8, 8') from an unlocked position (A) to a locked position (B) solely by rotation and/or displacement of the handle (26).

20 11. A guard rail (2, 2') according to claim 10, **characterised in that** the locking device (8, 8') is rotatably attached to the vertical structures (14, 14') of the vertical member (6, 6').

25 12. A guard rail (2, 2') according to claims 10 or claim 11, **characterised in that** the guard rail (2, 2') comprises a positioning member (40) configured to maintain the locking device (8, 8') in a locked position (B) and in an unlocked position (A), wherein the positioning member (40) comprises a cavity (42) configured to bear against an abutting structure (14, 14') of the guard rail (2, 2') in such a manner that the locking device (8, 8') is fixed to the abutting structure (14, 14').

30 13. A guard rail (2, 2') according to claims 12, **characterised in that** the guard rail (2, 2') comprises a spring (36) or another resilient member arranged to provide a force keeping the positioning member (40) in engagement with the abutting structure (14, 14').

35 14. A guard rail (2, 2') according to one of the preceding claims, **characterised in that** the guard rail (2, 2') comprises a locking device (8, 8') comprising locking arms (30, 30') configured to engage with a portion of the scaffolding (56), preferably a scaffold platform (58).

40 15. A guard rail (2, 2') according to one of the preceding claims, **characterised in that** the guard rail (2, 2') comprises suspension brackets (18, 18', 20, 20') configured to be attached to a transverse member (60, 60', 60'') of the scaffolding (56).

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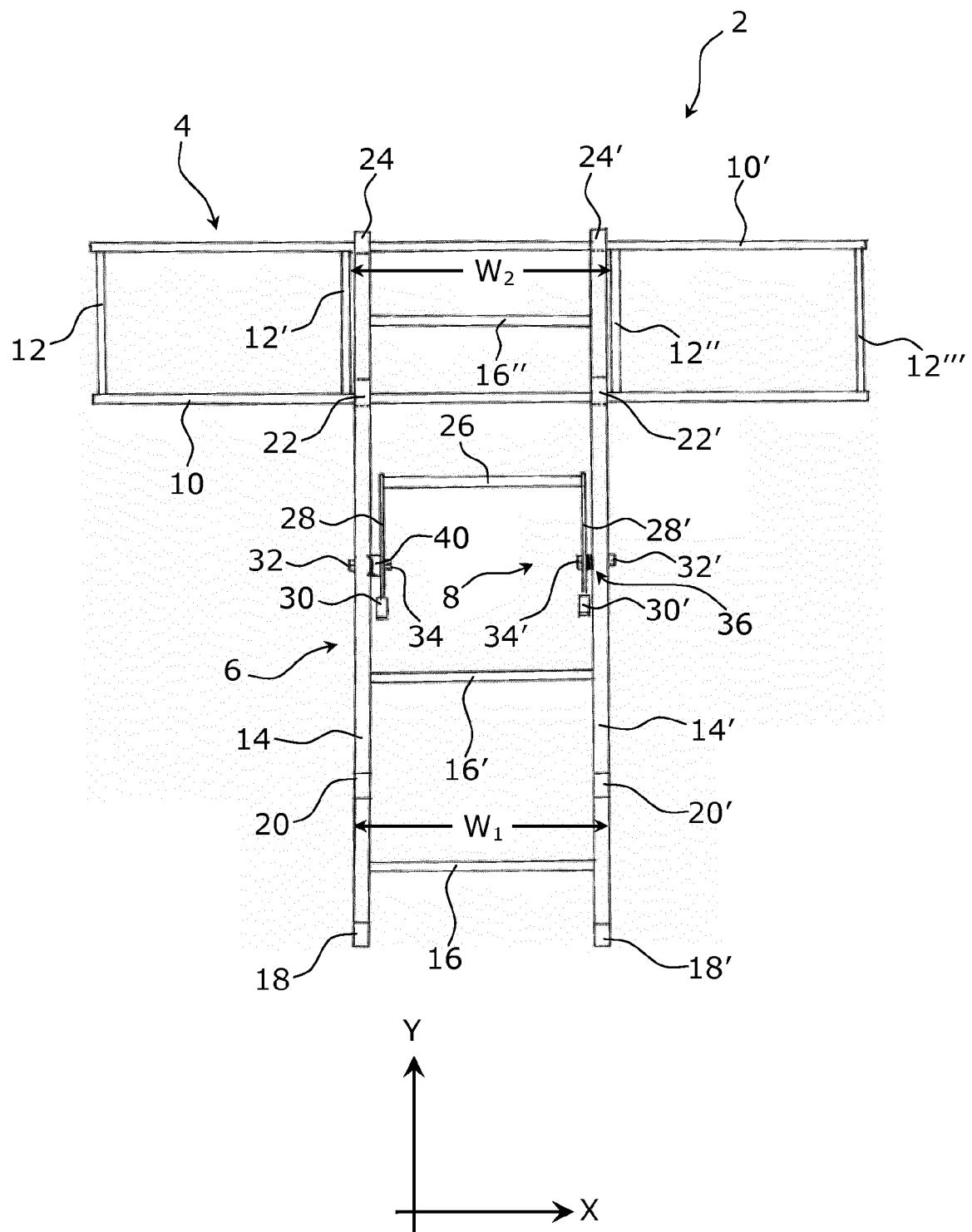


Fig. 1

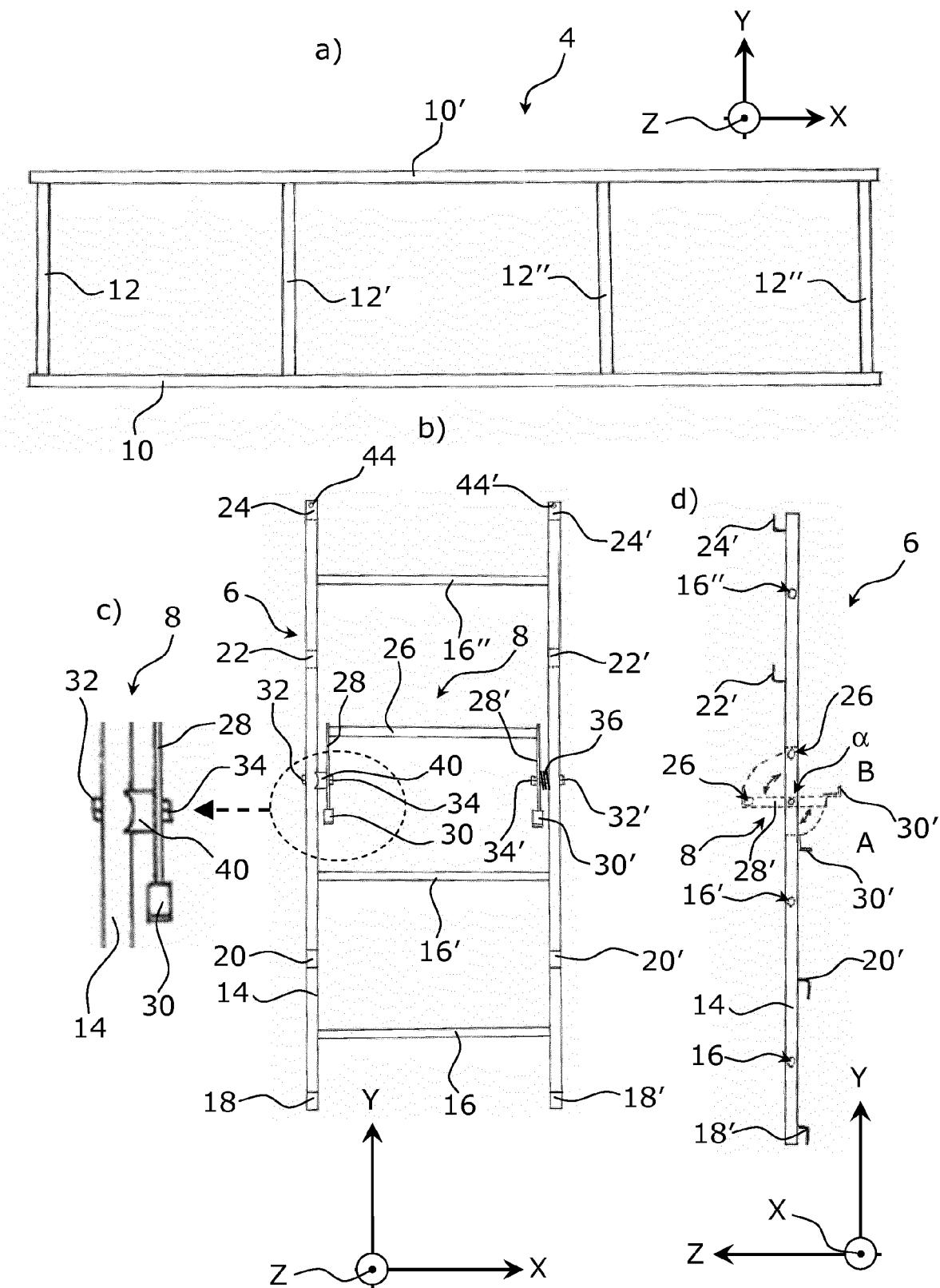


Fig. 2

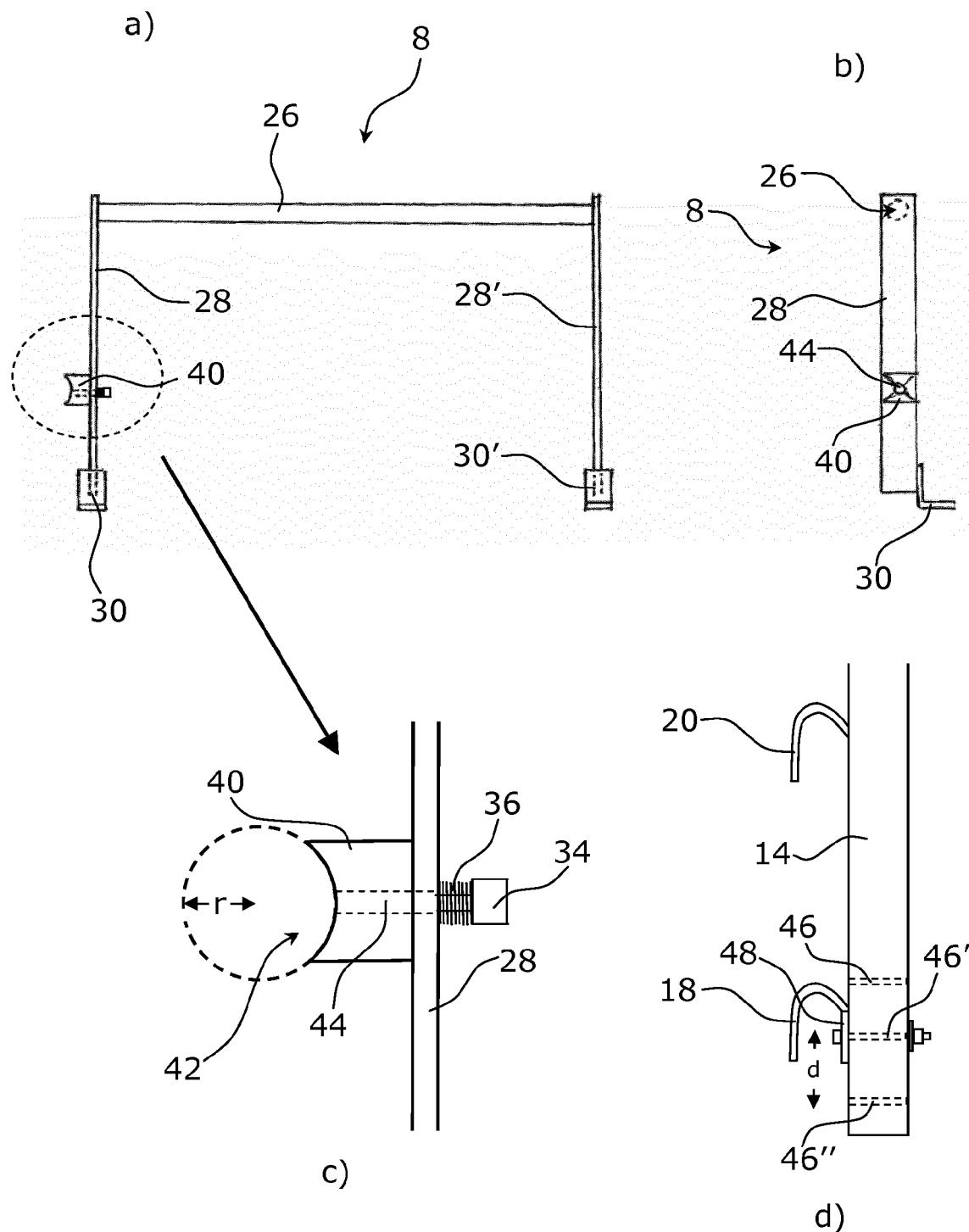


Fig. 3

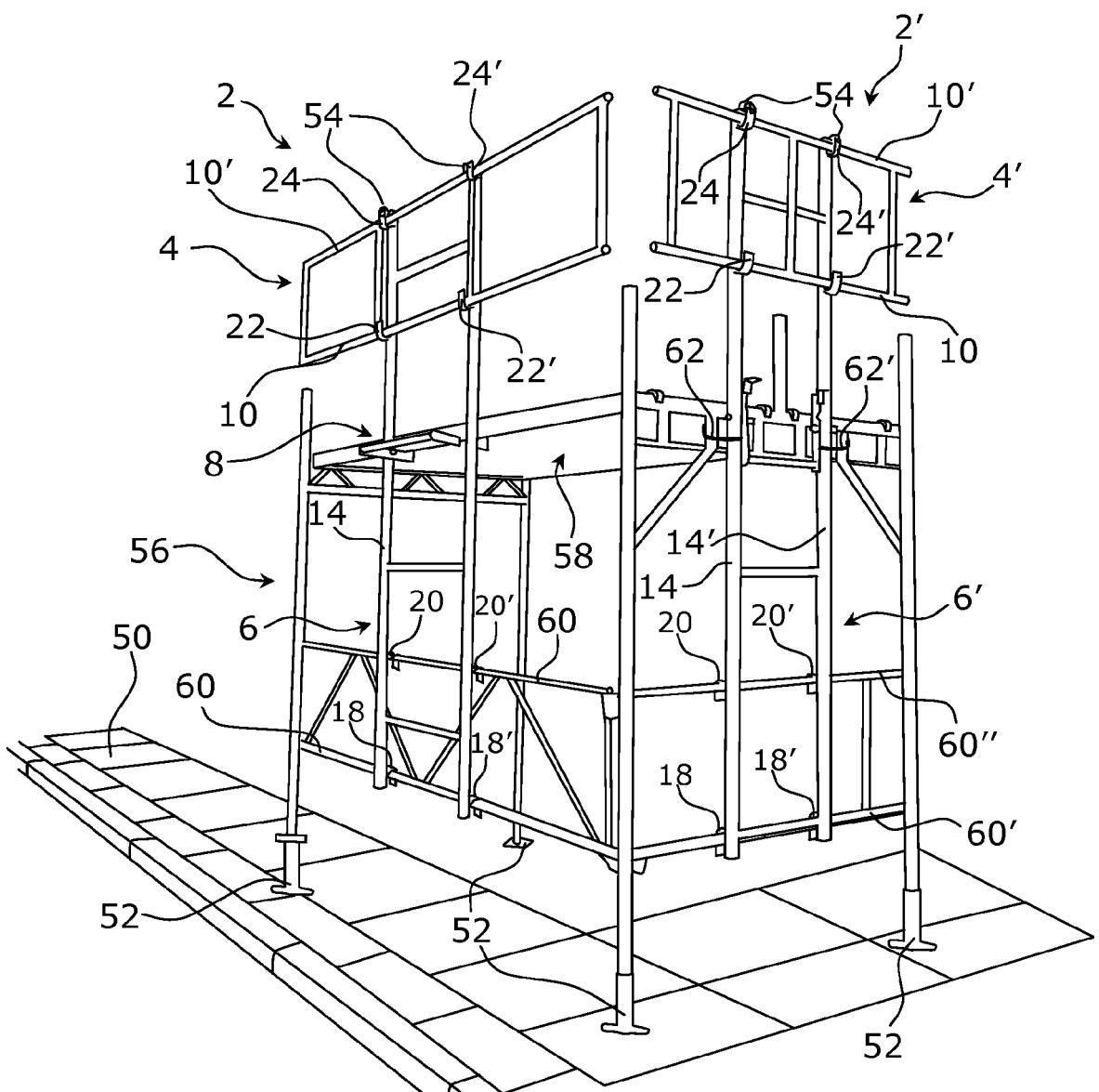
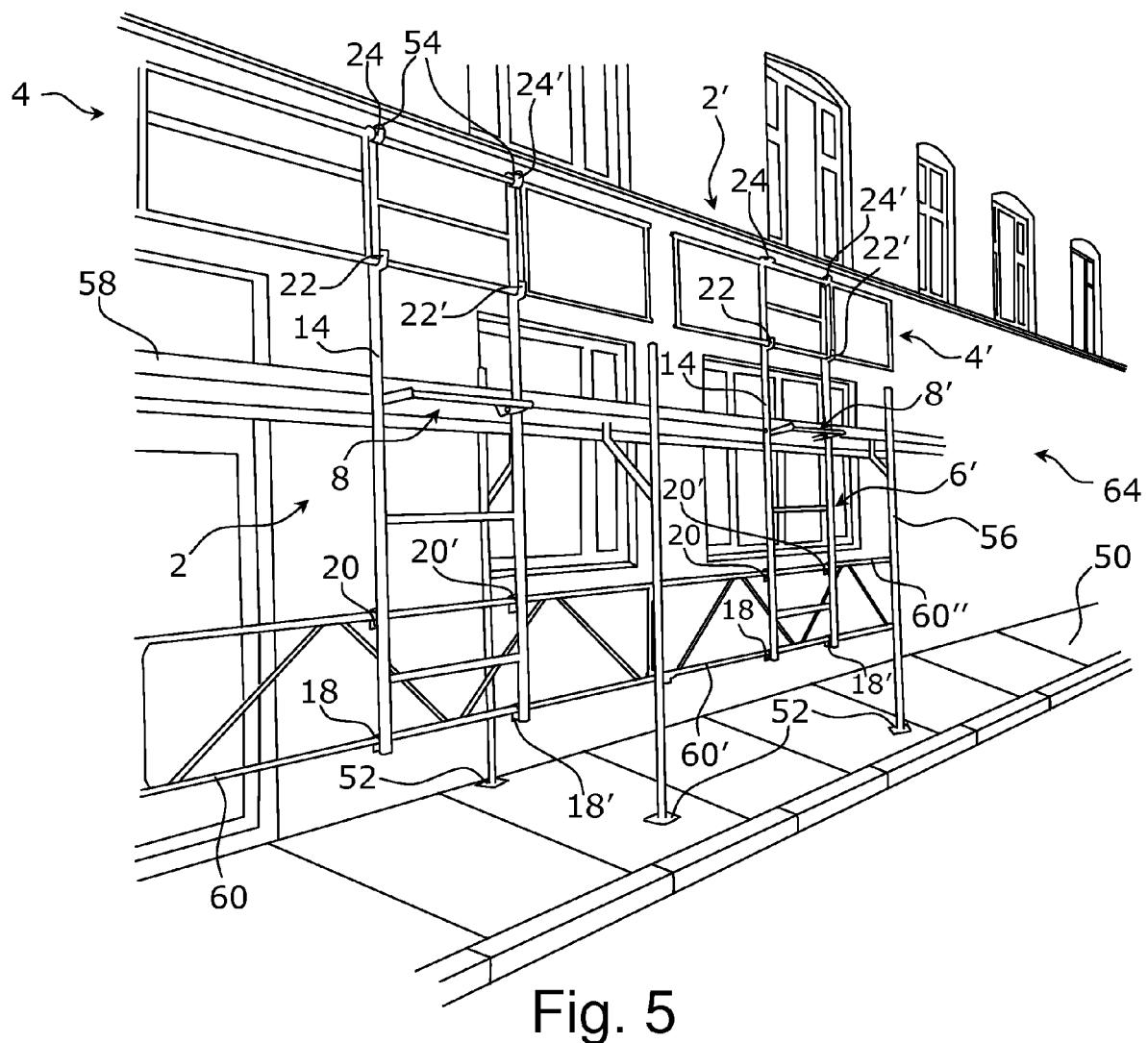


Fig. 4



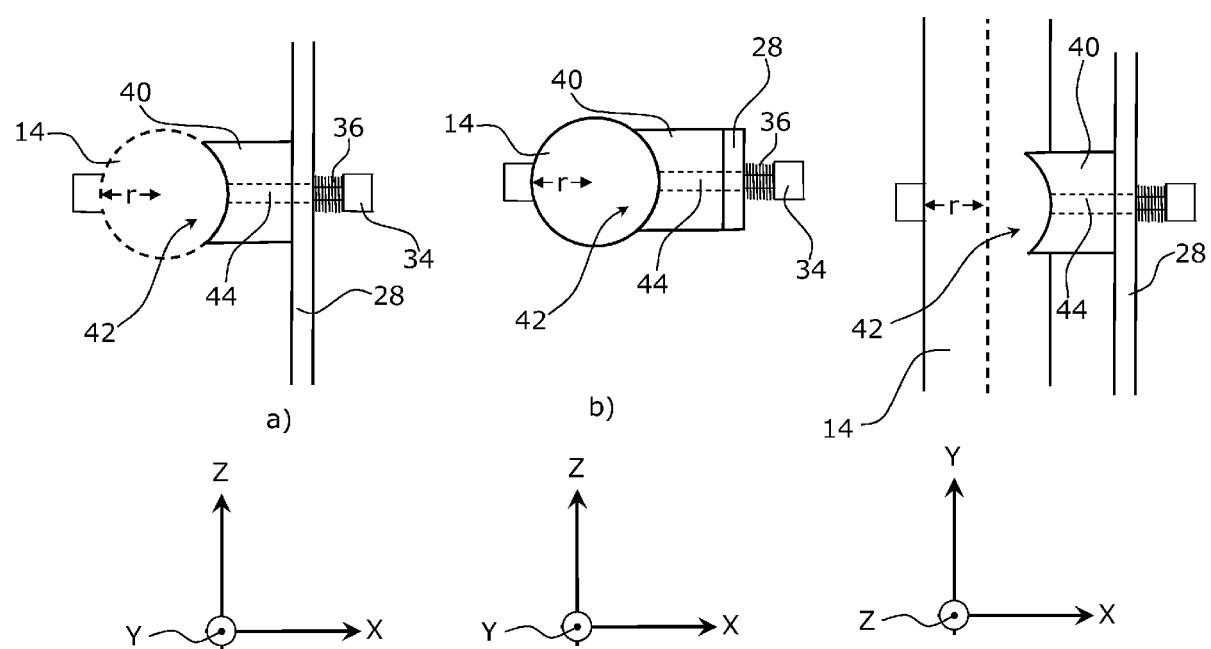


Fig. 6

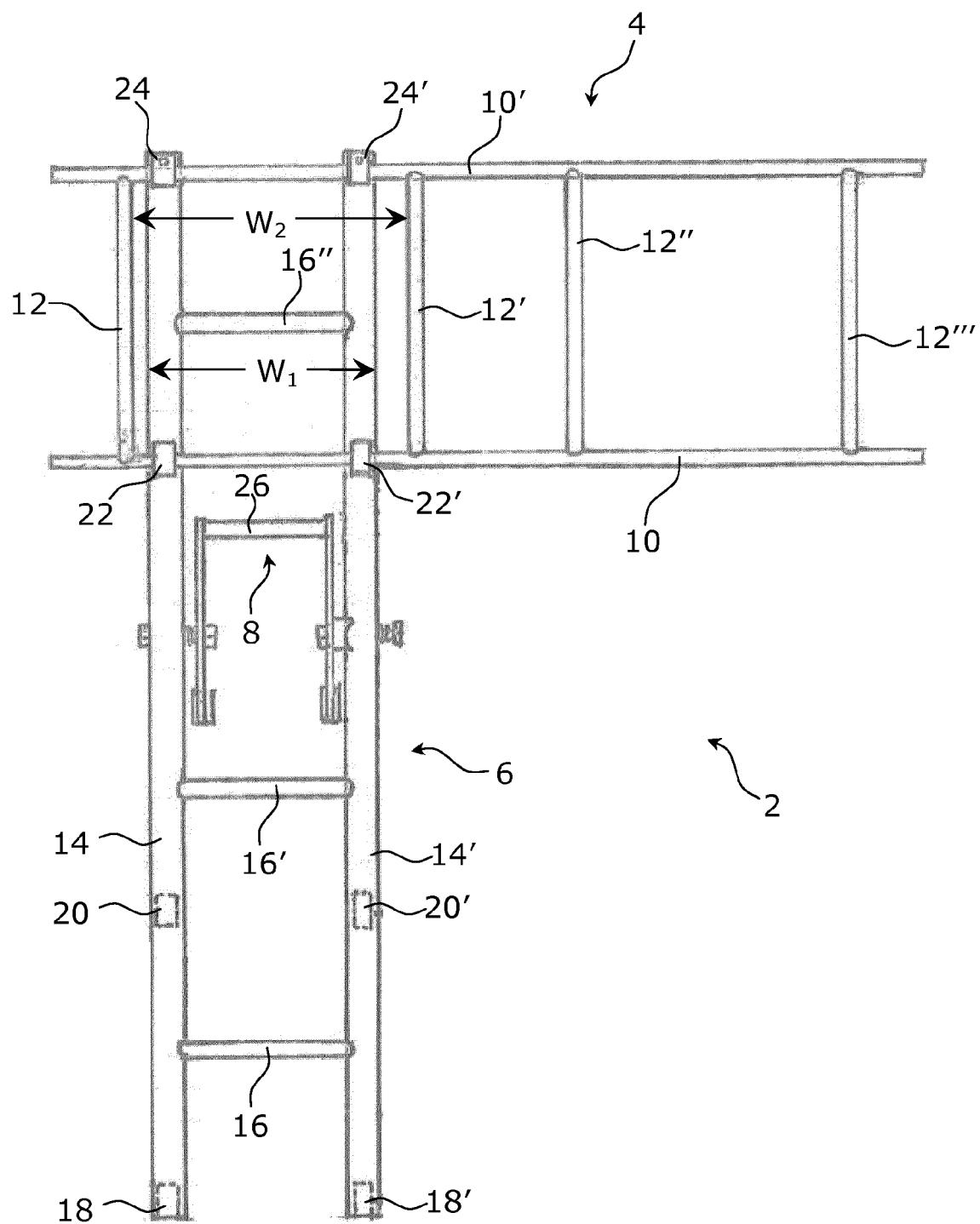


Fig. 7



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Application Number

EP 15 18 9071

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55	Place of search The Hague	Date of completion of the search 5 January 2016	Examiner Baumgärtel, Tim
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