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(54) **SCAFFOLDING AND GUARD RAIL FOR APPLICATION THEREIN**

GERÜST UND FÜHRUNGSSCHIENE IN DEM GERÜST

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(56) References cited:  
**EP-A2- 1 760 224 DE-A1- 10 128 595**  
**DE-A1- 10 305 158 GB-A- 2 427 433**  
**JP-A- 2006 291 473**

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## Description

**[0001]** The present invention relates to a scaffolding-comprising upright elements which are placed at regular distances from each other and which extend in a height direction for receiving successive scaffold sections one above another therebetween which are separated from each other by at least a floor part, provided with a guard rail having at least one lying rail element extending between at least two standing rail elements that are connected to the lying rail element, in which said standing rail elements are provided with manually releasable coupling means for coupling to a scaffold element in the underlying scaffold section and in which said guard rail is provided with locking means on at least one of the at least two standing rail elements which locks the guard rail relative to the scaffolding and can be released with the hand or foot for the purpose of releasing the guard rail from the scaffolding.

**[0002]** Such a scaffolding is usually applied during building and maintenance operations on buildings and industrial installations. A scaffolding is here sometimes designed to size and normally erected from the bottom between uprights arranged for this purpose and anchored to a wall. Series of scaffold sections are thus created at successive levels one above another and are separated from each other by floor parts. The floor parts provide at each level a work floor on which the building or maintenance operations can be safely carried out.

**[0003]** For safety reasons the work floor in each scaffold section must provide a fall protection on an exposed side remote from the wall. Workers can for this purpose secure themselves to a scaffolding with a personal fall restraint means, although this limits their freedom of movement within the scaffolding, this being perceived as impractical. Partly for this reason there is a real danger of workers becoming careless to greater or lesser extent during work, and not always being properly secured.

**[0004]** An extremely practical solution for a fall protection incorporated in the scaffolding is provided by a guard rail which bounds a scaffold section on the exposed side in order to safeguard a worker against an undesirable fall. A problem which however presents itself here during the erection of a scaffolding is that such a guard rail must preferably be arranged from an underlying scaffolding to a level lying thereabove since, due to the absence of this rail in the upper-lying scaffold section, it is not yet possible to work safely therein without a line.

**[0005]** A scaffolding in which such a guard rail is being used is for instance known from German patent application DE 103.05.158, British patent application GB 2.427.433 and Japanese patent application JP 2006/291473. These known guard rails each consist of two standing rail elements at the extreme ends of the guard rail which are connected by one or more lying rail elements that extend in between said standing rail elements. In order to be able to lock the guard rail to the scaffolding, locking means are provided on the standing

rail elements at the extreme lateral ends of the guard rail.

**[0006]** In a first aspect the present invention has for its object, among others, to provide a scaffolding with such a guard rail which, owing to its special construction, allows rapid and simple arrangement from a first scaffold level to a level lying thereabove by one person in one operation in an exceptionally practical and ergonomic manner.

**[0007]** A scaffolding of the type described in the preamble, according to the present invention, is characterized in that the standing rail elements are arranged laterally within the reach of a worker, such that they can be gripped by him/her with both hands, while the lying rail element extends laterally outside the standing rail elements for bounding the scaffold section on the exposed side, and in that said locking means can be operated by one and the same person simultaneously with manipulation of the guard rail.

**[0008]** According to a first aspect of the invention, the scaffolding of the type stated in the preamble has the feature here that the guard rail comprises at least two standing rail elements connected to the lying rail element, which standing rail elements are arranged laterally within the reach of a worker and extend in the height direction into an underlying scaffold section, that the standing rail elements are provided with manually releasable coupling means for coupling to a scaffold element in the underlying scaffold section, and that a locking is provided which locks the guard rail relative to the scaffold element in the underlying scaffold section and which can be released with the foot for the purpose of releasing the guard rail from the scaffolding. Both assembly and disassembly of the guard rail in the scaffolding can hereby be performed in ergonomic manner by one person, wherein he/she handles one upright element with each hand. The locking safeguards at all times against an undesirable release of the guard rail from the scaffolding but can, if desired, be released with the hand or foot according as to whether the scaffold is being erected or dismantled, so that the guard rail can nevertheless be released later from the scaffolding single-handedly by only one person.

**[0009]** In a particular embodiment the scaffolding according to the first aspect of the invention is characterized in that the locking comprises locking means on at least one of the two standing rail elements, the locking means being provided with a foot-plate for the purpose of foot operation thereof.

**[0010]** According to the first aspect of the invention, a preferred embodiment of the scaffolding is characterized in that locking means extend from both standing rail elements, which locking means are mutually coupled, particularly by a bracket extending therebetween. Such a coupling provides for a synchronization of the locking means, whereby they can be operated simultaneously with a foot in one operation while the bracket also allows for practical hand operation.

**[0011]** In a further preferred embodiment the scaffolding according to the first aspect of the invention is char-

acterized in that the guard rail is suspended from already present horizontal scaffold parts. According to the first aspect of the invention a particular embodiment of the scaffolding has for this purpose the feature that the coupling means comprise suspending brackets which fit over a lying scaffold element in the underlying scaffold section.

**[0012]** In a further particular embodiment the scaffolding according to the first aspect of the invention is characterized in that a width of the guard rail is adjustable, and more particularly in that for this purpose at least one distal outer end of the guard rail is mounted adjustably, in particular slidably and more in particular telescopically, in the width direction relative to the standing rail elements. The width can thus be easily modified to an actual width dimension of a scaffold section so as to thus provide optimum protection over substantially this whole width, while the upright elements nevertheless remain within the reach of a person.

**[0013]** A particularly efficient safety is provided by a further particular embodiment of the scaffolding which, according to the first aspect of the invention, is characterized in that the lying rail element forms part of a framework connected to both standing rail elements.

**[0014]** In the following another scaffolding is described which, however, does not form part of the present invention as defined in the claims.

**[0015]** This scaffolding is of the type described in the preamble and has the feature that the lying rail element extends diagonally between the successive upright elements with a proximal outer end at least close to a first scaffold section and a distal outer end at a height above the floor part of a scaffold section lying above, that coupling means are provided at the proximal outer end for a releasable coupling to a first of the successive upright elements, and that a hook is provided at the distal outer end which, in a first diagonal position of the rail element relative to a second of the successive upright elements, can be placed laterally round the second upright element and, in a second diagonal position of the rail element relative to the second upright element, engages in locking manner round the second upright element, wherein the guard rail is mounted in the second diagonal position of the rail element.

**[0016]** It is thus possible to hook the rail element in the first diagonal position diagonally round an upright from an underlying level to a higher-lying level of the scaffolding. By then moving the rail element to the second diagonal position, it locks itself with the hook round the second upright. The rail element is then coupled with the coupling means to the first upright, whereby a fall protection is realized up to the level lying above. Once the level lying above has thus been wholly provided with guard rails in the scaffold sections, floor parts can be arranged and it is possible to walk on the higher-lying level. The scaffolding can then be erected further from this level. The scaffolding work in continuous safety here because a guard rail preventing an undesirable fall is present at all times on the exposed side.

**[0017]** In a preferred embodiment the scaffolding is characterized in that the rail element in the first diagonal position forms a first acute angle with the second upright element, and in the second diagonal position forms a second acute angle therewith, wherein the first acute angle is smaller than the second. The rail element can thus be carried upward from below from the first to the second diagonal position by pivoting the rail element away from the second upright away about a coupling position and coupling the element to the first upright. The manoeuvre with the rail element required for this purpose can be performed by a single person with little difficulty and in complete safety.

**[0018]** In a particular embodiment the scaffolding has the feature that the hook provided at the distal outer end of the rail element extends from a hook body with a body cavity which is bounded by a wall and which opens on a side facing toward the second upright element for the purpose of receiving the second upright element therein, and that the wall of the cavity has a first and a subsequent second transition whereby in the first diagonal position, at least in cross-section of the upright element, the wall fits in at least substantially a U-shape round the upright element and in the second diagonal position encloses the upright element close-fittingly over a greater part of a periphery thereof. Such a hook body can for instance be provided on a hollow tube which here otherwise forms the rail element.

**[0019]** The first transition allows that in the first diagonal position the hook can be removed laterally from the second upright just as easily as it can be arranged. With a rotation to the second diagonal position the second transition engages further round the upright and can then only be released therefrom by means of an opposite rotation back to the first diagonal position. In the second diagonal position the guard rail can be pivoted substantially sideways into position in order to be coupled at an opposite outer end to the first upright.

**[0020]** A particularly practical embodiment of the scaffolding has in the above respect the feature that the wall with the first transition encloses an at least substantially cylindrical first part of the cavity with a first centre line, and with the second transition encloses an at least substantially cylindrical second part with a second centre line, wherein the first and second centre line intersect at an angle in the cavity. The mutual angle between the two central axes at least substantially corresponds here to an angle between the two said diagonal positions.

**[0021]** The uprights of a scaffolding are normally provided at regular distances with coupling positions for girders in the scaffolding. The guard rail of the scaffolding then advantageously rests with the distal outer end at such a coupling position. In a particular embodiment of the scaffolding these are cup-like holders in which a coupling hook of a girder can be received. With a view thereto, a further preferred embodiment of the scaffolding has the feature that the hook body comprises on a base a flanged edge which protrudes on an outer wall thereof

and on a closed side of the hook rises gradually with the outer wall. The hook can here support with the flanged edge on the coupling position while the rising profile on a closed side thereof guides and enhances a rotation from the first diagonal position to the second.

**[0022]** A further particular embodiment of the scaffolding is characterized in that the guard rail comprises an assembly of the rail element with at least a first and a second further rail element which extend between respectively the proximal and distal outer end and a shared corner point located above the proximal outer end, wherein at least close to the corner point a further hook is provided which in the second diagonal position receives the first upright releasably therein. Not only does the guide rail thus comprise more material, the further hook moreover allows a more comprehensive assembly and securing to the first upright. The guard rail moreover serves here to absorb horizontal forces in the plane in which it is mounted, so that no additional diagonals are necessary for the scaffolding in this plane.

**[0023]** For the purpose of a smooth alignment of successive guard rails, as desired in a straight line or at right angles to each other, a further particular embodiment of the scaffolding has the feature that at least two recesses are provided in the flanged edge which are placed at about an angle of 90 and 180 degrees relative to a centre line of the rail element. The recesses in the flanged edge are intended and adapted to co-act with a protrusion which is provided for this purpose at an opposite outer end on the following guard rail and which will fit therein during assembly, whereby both guard rails are fixed relative to each other. Owing to the placing of the recesses at an angle of about 90 and 180 degrees the successive guard rails can readily be fixed at right angles to each other or, conversely, in a straight line during erection of a scaffolding. A further particular embodiment of the scaffolding is characterized for this purpose in that the further hook extends from a further hook body on which is formed a protrusion to be received in a recess in a flanged edge of the first hook.

**[0024]** For the purpose of economic serial production a further particular embodiment of the scaffolding has the feature that at least one hook extends from a hook body, in particular a casting from a metal such as aluminium or iron. Both the hook at the distal outer end and the optional further hook can thus be separately cast in the form of a cast tipped part, for instance of lightweight aluminium or iron, and be later assembled with the at least one rail element to form the final guard rail. Preferably applied for the rail elements are hollow tube parts into which the hook body can be inserted at least substantially close-fittingly with a hookless outer end and secured. This latter can take place for instance by pop-rieving, deformation, adhesion or welding, but optionally also by means of a screw thread connection or the like.

**[0025]** A further embodiment of the scaffolding has the feature that the upright elements are provided at regular intervals in the height direction with cup-like holders in

which at least one hook of the guard rail is received. Owing to the regular placing of such cups the size of the guard rail applied in accordance with the second aspect of the invention can advantageously be adapted thereto so that the cups can serve as stop and mounting base of the distal outer end, and the guard rail is always mounted at the correct height.

**[0026]** For a rapid and reliable mounting a further embodiment of the scaffolding has the feature that the coupling means comprise a tightenable rapid-action coupling. A rapid-action coupling usual for scaffolding is advantageously applied as such a rapid-action coupling.

**[0027]** The invention also relates to a guard rail of the type as applied in the above specified scaffolding, and will now be further elucidated on the basis of an exemplary embodiment and accompanying figures. Herein:

figure 1 shows an exemplary embodiment of a guard rail according to the invention for application in a scaffolding;

figure 2 shows an exemplary embodiment of a suspending bracket with locking of the guard rail of figure 1;

figures 3A-H show an exemplary embodiment of a scaffolding according to a first aspect of the invention at successive stages of its erection;

figure 4 is a top view of the guard rail of figure 1 during use;

figure 5 shows an alternative embodiment of the guard rail of figure 1;

figures 5A-B show the guard rail of figure 5 in respectively locked and unlocked position;

figure 6 shows an exemplary embodiment of another guard rail; however, this embodiment does not form part of the present invention;

figures 7A-C show respectively a top view, a perspective view and a side view of a hook body as applied at a distal outer end of the guard rail of figure 6;

figures 8A-C show respectively a top view, a side view and a perspective view of a further hook body as applied in the guard rail of figure 6;

figures 9A-B show the hook body of figure 7 in respectively a first diagonal position and at a transition to a second diagonal position;

figures 10A-B show the hook body of figure 7 unified with the hook body of figure 8 in a cup-like holder; and

figures 11A-F show an exemplary embodiment of a scaffolding with the guard rail according to figure 6 at successive stages of erection.

**[0028]** The figures are otherwise purely schematic and

not drawn to scale. For the sake of clarity some dimensions in particular may be exaggerated to a greater or lesser extent. Corresponding parts are designated as far as possible in the figures with the same reference numeral.

**[0029]** The exemplary embodiment of a guard rail according to the invention shown in figure 1 comprises a push-up frame comprising a pair of standing rail elements 1,2 coupled to horizontal parts 3,4 and to horizontal part 5 which couples the uprights. Horizontal parts 3 and 4 together form a lying rail element and are in turn also mutually connected by standing parts 6 and 7. The standing rail elements 1,2 are provided with coupling means in the form of four hooks or suspension brackets 8 with locks 9 on the upper pair thereof.

**[0030]** A horizontal distance A between the two standing rail elements 1,2 is such that it falls within the reach of an average scaffolder, so that he/she can independently handle and arrange the guard rail in ergonomic manner. Because horizontal parts 3,4 extend laterally outside the standing rail elements 1,2 for handling, this is independent of the overall width of the rail so that there are various possibilities, irrespective of an actual scaffold section width.

**[0031]** The bracket 8 with lock 9 applied in the guard rail of figure 1 is shown in more detail in figure 2. The bracket comprises a bent strip which functions as hook and fits over a girder of the scaffold. A further bent plate 10 is mounted pivotally about a pivot axis at a base thereof and functions as lock. Plate 10 lies under bias or as a result of the force of gravity in the position shown in figure 2 and in this position bounds the cavity which is enclosed by bracket 8 and in which a scaffold element is received. During placing of the guard rail the standing rail parts 1,2 are manipulated downward over a horizontal scaffold element in a lower section, wherein strips 10 are temporarily forced counter to the bias or gravity out of their starting position as shown in figure 2 and then snap into place under the relevant scaffold element. This locking can later be released with a foot using the foot-plate 11 connected to strip 10.

**[0032]** The application of the described guard rail in a scaffolding is described at successive stages in figures 3A to 3H. From the lowest shown floor level a worker has to be safeguarded against an undesired fall from the scaffolding. For this purpose guard rails are mounted in the scaffold sections in the manner shown in figures 3A to 3H. This method roughly comprises the following steps, corresponding to the figures, of:

- (1) Assembling the scaffold to a height of 2 m. (Fig. 3A)
- (2) Assembling the push-up frames so that they extend 1 m above the floor at 2 m. (Fig. 3B)
- (3) Mounting the scaffold ladder and moving onto the safe work floor at 2 m. (Fig. 3C)
- (4) Assembling the following tier. (Fig. 3D)
- (5) Assembling the final rails (Fig. 3E)

(6) Releasing the locking with the feet and assembling the push-up frames about 1 metre above the work floor lying above. (Fig. 3F)

(7) Mounting the diagonal in the first tier. (Fig. 3G)

(8) Placing a scaffold ladder so that it is possible to move onto the safe work floor (Fig. 3H)

**[0033]** A scaffolding can thus be wholly erected from the bottom upward without the scaffolder having to work at height unsecured, i.e. without guard rail, for this purpose. This also applies for the dismantling of the scaffolding, wherein the method is performed in reverse sequence, wherein the release can optionally also be operated manually.

**[0034]** Figure 4 shows a top view of the displacement of the guard rail according to the invention. The user has his hands on the standing rail elements of the framework which, irrespective of a width of the rail, are arranged at a distance from each other such that during displacement of the guard rail the arms of the user can be moved up and downward ergonomically, i.e. as straight as possible in forward direction.

**[0035]** Figure 5 shows an alternative embodiment of the guard rail of figure 1 which can likewise be applied in the scaffolding of figures 3A-H. The guard rail of this example largely corresponds to that of figure 1, and corresponding parts are therefore provided with the same reference numerals. As in the guard rail of figure 1, locking means 9 extend in this guard rail from both standing rail elements 1,2.

**[0036]** Also as in the guard rail of figure 1, the locking means can be foot-operated, so that the same person keeps his/her hands free for the desired manipulation of the guard rail, i.e. placing or disassembly thereof. Other than in the guard rail of figure 1, both the locks 9 are in this case mutually coupled by means of a bracket 12 which extends therebetween and which can, if desired, be hand or foot-operated. The lock is tiltable by means of bracket 12 and can be moved out of the locking position of equilibrium shown in figure 5A and thereby released, see figure 5B. The movement of bracket 12 is bounded by means of stops 12A.

**[0037]** Figure 6 also shows a guard rail which can be applied in a scaffolding for the purpose of safeguarding an end user of the scaffolding as well as a scaffolder against an undesirable fall from height. The guard rail comprises a lying rail element 1 with a proximal outer end 14 and a distal outer end 15. Arranged at the proximal outer end 14 is a standard tightenable rapid-action coupling 21 which is assumed sufficiently well known to a skilled person and therefore not further elucidated here. Situated at the distal outer end 15 is a hook body 22 with a hook 23, see also figures 7A-7C. The rail element also comprises a first further rail element 2 and a second further rail element 3 which form substantially a right angle relative to each other at a shared corner point 13. Provided at the shared corner point 13 is a further hook body 32 bearing a further hook 33, see also figures 8A-8D.

**[0038]** The further hook 33 and rapid-action coupling 21 serve for fixing to a first upright of a scaffolding, while first hook 23 couples to a following upright in the scaffolding. Round hollow tube profiles of aluminium are applied in this example for rail elements 1,2,3, although it is also possible to have recourse instead to another material, in particular steel. The hook bodies comprise in this example castings of cast steel, although another material can also be applied for this purpose, such as cast-iron or aluminium, and another manufacturing technique can optionally be chosen, such as for instance forging or milling.

**[0039]** The guard rail also comprises a railing part 4 firmly connected to the other rail elements 1-3 in order to reduce the opening between these latter and impart more stability to the whole. Hook bodies 22,32 protrude into the above stated hollow tube profiles with their outer end 24,34 remote from the associated hook 23,33, see also figures 7A and 8A and are firmly connected thereto. Use can be made for this connection of welding, adhesion or deformation, or pop rivets or camping bushes can be applied for this purpose. A screw thread can optionally be provided on the outer end and in the tube outer end so that the parts can be screwed together.

**[0040]** Hook 23 extends from the hook body shown in figures 7A-7B. Present herein is a body cavity 26 which is bounded by a wall 25 and which opens on one side to receive therein a scaffold element of a scaffolding. The wall has here a first transition 25A and a second transition 25B, whereby in a first diagonal position as shown in figure 9A the hook fits in a U-shape round such a scaffold element 100 and can be laterally released again therefrom. In the transition to the second diagonal position shown in figure 9B the hook on the other hand engages round scaffold element 100 in the second transition 25B over a greater part of the periphery of cavity 26 and can therefore no longer be released therefrom. The hook eventually takes up an at least substantially horizontal position, see figure 10B. In a top view this situation corresponds to that as shown in figure 7A, wherein the scaffold element lies substantially close-fittingly against wall 25 of cavity 26. By adjusting rail element 1 with the hook body thereon between these two diagonal positions it is thus possible to switch easily between a releasing and a locking mode between the two components.

**[0041]** The angle between the two diagonal positions corresponds to the angle between a centre line A of an almost cylindrical first passage through the body in the first transition 25A and a centre line B of an almost cylindrical second passage in the second transition 25B, see figure 7C. This angle is chosen such that the guard rail can be fully adjusted between the two diagonal positions from one scaffold section in order to be locked into or released from a scaffold section lying above with hook 23. The hook body is flattened on both sides to provide space for this adjustment.

**[0042]** As can be seen in figures 9A-10B, hook 23 is positioned on a cup-like holder 110. Such holders are

provided at a regular pitch on scaffold element 100 and can be closed with a so called cuplok upper cup 115 which is freely axially movable and rotatable over the scaffold element but which, owing to a helical wall progression, clamps itself fixedly here to hook 23, see figures 10A and 10B. Hook body 22 comprises a flat flanged edge 27 which protrudes from wall 25 so as to thereby be able to support on such a holder 110. Provided in the flanged edge are two openings 28 lying respectively at 90 and 180 degrees relative to an axial longitudinal axis through body 22. In order to guide the adjustment of rail element 1 with hook 23 thereon, wall 25 of hook 23 rises gradually on the closed side together with flanged edge 27 over a rounded portion 29 therein.

**[0043]** The further hook 33 at corner point 13 of the guard rail extends in a similar manner from a hook body and is connected in similar manner. This hook body is shown in greater detail in figures 8A-C and comprises on a side remote from a free outer end 34 a round, half-open hook 33 which fits round a scaffold element and can be released therefrom again only at a right angle. A body cavity 36 inside the hook opens in a U-shape for this purpose and has a width a little larger than an external dimension of the scaffold element. The hook body comprises on an underside a protrusion 38 which engages either in one of the openings 28 in flanged edge 27 of the first hook element or, in the absence of a preceding guard rail in the scaffolding, in the cup-like holder 110 close to a scaffold junction, see figure 10A. The round hook 33 is provided on the upper side with an upright edge 37 which is enclosed in both cases by the cuplok upper cup 115 of the scaffold junction. This enclosing of hook 33 provides for a reliable absorption of force which influences a static behaviour of a scaffolding. Owing to the registration of protrusion 38 with openings 28 at 180 and 90 degrees in flanged edge 27 both hooks 23,33 will fit either straight or at a right angle into each other.

**[0044]** The application of the described guard rail in a scaffolding is shown at successive stages in figures 11A-11F. The scaffolding comprises a series of successive scaffold elements in the form of uprights extending in a height direction. Successive levels in the scaffolding are separated from each other by floor parts 120 so that a matrix of separate scaffold sections is created. The floor parts rest here on girders in the scaffolding which are arranged transversely of the plane of the drawing and couple to the same system of uprights 100 anchored to an outside wall or the like.

**[0045]** From the lowest shown floor level a worker must be safeguarded against an undesirable fall from the scaffolding. Guard rails are mounted for this purpose in the scaffold sections in the manner indicated in the figure. This method roughly comprises the following steps, corresponding to the figures, of:

11A Hooking the guard rail at an angle  $\varphi$  into the second upright;

11B Rotating the frame into horizontal position. The

frame cannot come loose from the upright during this operation;

11C Laying the further hook on the holder and subsequently fixing the rapid-action coupling on the underside to the first upright;

11D Repeating the previous steps as often as necessary to complete a series;

11E Arranging the floor parts for a higher-lying work floor;

11F Scaffolder moving onto the higher-lying work floor and knocking the upper cups of the holders into place.

**[0046]** The whole scaffolding can thus be fully erected single-handedly from the bottom upward without the scaffolder having to work at height unsecured, i.e. without guard rail. This is likewise the case for dismantling of the scaffolding.

**[0047]** Although the invention has been further elucidated above with reference to only a single exemplary embodiment, it will be apparent that the invention is by no means limited thereto. On the contrary, many more variations and embodiments are possible within the scope of the invention for a person with ordinary skill in the art. Instead of a fixed push-up frame, a push-up frame can particularly be applied with two axially adjustable end parts, in particular slidable or telescopic end parts. A width of the guard rail is then adjustable and can be modified to a width to be spanned in the scaffold section. A further possible embodiment is that the rail is collapsible or can be disassembled into parts, for instance for the purpose of a small storage volume or transport volume.

## Claims

1. Scaffolding, comprising upright elements which are placed at regular distances from each other and which extend in a height direction for receiving successive scaffold sections one above another therebetween which are separated from each other by at least a floor part, provided with a guard rail having at least one lying rail element (3,4) extending between at least two standing rail elements (1,2) that are connected to the lying rail element, in which said standing rail elements are provided with manually releasable coupling means (8) for coupling to a scaffold element in the underlying scaffold section and in which said guard rail is provided with locking means (9) on at least one of the at least two standing rail elements which locks the guard rail relative to the scaffolding and can be released with the hand or foot for the purpose of releasing the guard rail from the scaffolding, **characterized in that** the standing rail elements (1,2) are arranged laterally within the reach of a worker, such that they can be gripped by him/her with both hands, while the lying rail element (3,4) extends laterally outside the standing rail ele-

ments for bounding the scaffold section on the exposed side, and **in that** said locking means (9,10) can be operated by one and the same person simultaneously with manipulation of the guard rail.

2. Scaffolding as claimed in claim 1, **characterized in that** locking means (9,10) extend from both said standing rail elements (1,2), and **in that** the locking means on both said standing rail elements are mutually coupled, particularly by a bracket (12) extending therebetween.
3. Scaffolding as claimed in claim 1, **characterized in that** the locking comprises locking means (9,10) on at least one of the two standing rail elements, the locking means being provided with a foot-plate (11) for the purpose of foot operation thereof.
4. Scaffolding as claimed in one or more of the preceding claims, **characterized in that** the coupling means comprise suspending brackets (8) which fit over a lying scaffold element in the underlying scaffold section.
5. Scaffolding as claimed in one or more of the preceding claims, **characterized in that** a width of the guard rail (3,4) is adjustable.
6. Scaffolding as claimed in one or more of the preceding claims, **characterized in that** the lying rail element (3,4) forms part of a framework.

## Patentansprüche

1. Gerüst, umfassend stehende Elemente, die in regelmäßigen gegenseitigen Abständen angeordnet sind und sich in die Höhe erstrecken, um aufeinanderfolgende und übereinanderstehende Gerüstabschnitte dazwischen aufzunehmen, die durch wenigstens ein Bodenteil voneinander getrennt sind, ausgestattet mit einer Führungsschiene, die wenigstens ein liegendes Schienenelement (3, 4) umfasst, das sich zwischen wenigstens zwei stehenden Schienenelementen (1, 2) erstreckt, die ihrerseits mit dem liegenden Schienenelement verbunden sind, wobei die stehenden Schienenelemente mit manuell lösbaren Kupplungen (8) versehen sind zum Ankoppeln an ein Gerüstelement im darunterliegenden Gerüstabschnitt, und wobei die Führungsschiene versehen ist mit einer Verriegelungseinrichtung (9) an wenigstens einem der wenigstens zwei stehenden Schienenelemente zum Verriegeln der Führungsschiene relativ zum Gerüst, lösbar von Hand oder mittels des Fußes zum Zwecke des Freigebens der Führungsschiene vom Gerüst, **dadurch gekennzeichnet, dass** die stehenden Schienenelemente (1, 2) seitlich in-

nerhalb der Reichweite des Arbeiters derart angeordnet sind, dass sie von ihm mit beiden Händen erfasst werden können, während sich das liegende Schienenelement (3, 4) seitlich außerhalb der stehenden Schienenelemente erstreckt, um den Gerüstabschnitt auf der ausgefahrenen Seite anzubinden, und dass die Verriegelungseinrichtung (9, 10) gleichzeitig mit dem Manipulieren der Führungsschiene von ein- und derselben Person betätigt werden kann.

2. Gerüst nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Verriegelungseinrichtung (9, 10) von beiden stehenden Schienenelementen (1, 2) aus erstreckt, und dass die Verriegelungseinrichtung auf beiden stehenden Schienenelementen gegenseitig angekoppelt werden können, insbesondere durch eine Konsole (12), die sich zwischen diesen beiden erstreckt.
3. Gerüst nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Verriegelungseinrichtungen (9, 10) an wenigstens einem der beiden stehenden Schienenelemente befinden, und dass die Verriegelungseinrichtung mit einer Fußplatte (11) zur Fußbedienung versehen ist.
4. Gerüst nach einem oder mehreren der vorausgegangenen Ansprüche, **dadurch gekennzeichnet, dass** die Kupplung zwei hängende Konsolen (8) umfasst, die ein liegendes Gerüstelement im darunterliegenden Gerüstabschnitt umfassen.
5. Gerüst nach einem oder mehreren der vorausgegangenen Ansprüche, **dadurch gekennzeichnet, dass** die Breite der Führungsschiene (3, 4) justierbar ist.
6. Gerüst nach einem oder mehreren der vorausgegangenen Ansprüche, **dadurch gekennzeichnet, dass** das liegende Schienenelement (3, 4) ein Teil eines Fachwerkes bildet.

#### Revendications

1. Echafaudage, comprenant des éléments verticaux qui sont placés à des distances régulières les uns des autres et qui s'étendent dans la direction de la hauteur pour recevoir entre eux des sections d'échafaudage successives les unes au-dessus des autres, qui sont séparées les unes des autres par au moins une partie formant plancher, doté d'un garde-corps ayant au moins un élément de garde-corps horizontal (3, 4) s'étendant entre au moins deux éléments de garde-corps verticaux (1, 2) qui sont reliés à l'élément de garde-corps horizontal, où lesdits éléments de garde-corps verticaux sont dotés de

moyens de couplage (8) pouvant être libérés manuellement pour le couplage à un élément d'échafaudage dans la section d'échafaudage sous-jacente et où ledit garde-corps est doté d'un moyen de blocage (9) sur au moins l'un des au moins deux éléments de garde-corps verticaux qui bloque le garde-corps par rapport à l'échafaudage et peut être débloqué à la main ou au pied afin de libérer le garde-corps de l'échafaudage, **caractérisé en ce que** les éléments de garde-corps verticaux (1, 2) sont agencés latéralement à portée d'un ouvrier, de telle sorte qu'ils peuvent être agrippés des deux mains par lui/elle, tandis que l'élément de garde-corps horizontal (3, 4) s'étend latéralement à l'extérieur des éléments de garde-corps verticaux pour délimiter la section d'échafaudage sur le côté exposé, et **en ce que** les moyens de blocage (9, 10) peuvent être actionnés par une seule et même personne simultanément à la manipulation du garde-corps.

2. Echafaudage selon la revendication 1, **caractérisé en ce que** des moyens de blocage (9, 10) s'étendent depuis lesdits deux éléments de garde-corps verticaux (1, 2), et **en ce que** les moyens de blocage sur lesdits deux éléments de garde-corps verticaux sont couplés mutuellement, en particulier par un support (12) s'étendant entre eux.
3. Echafaudage selon la revendication 1, **caractérisé en ce que** le blocage comprend des moyens de blocage (9, 10) sur au moins l'un des deux éléments de garde-corps verticaux, les moyens de blocage étant dotés d'une pédale (11) destinée à être actionnée par le pied.
4. Echafaudage selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** les moyens de couplage comprennent des supports de suspension (8) qui s'adaptent au-dessus d'un élément d'échafaudage horizontal dans la section d'échafaudage sous-jacente.
5. Echafaudage selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**une largeur du garde-corps (3, 4) est ajustable.
6. Echafaudage selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** l'élément de garde-corps horizontal (3, 4) fait partie d'une structure.

Fig. 1

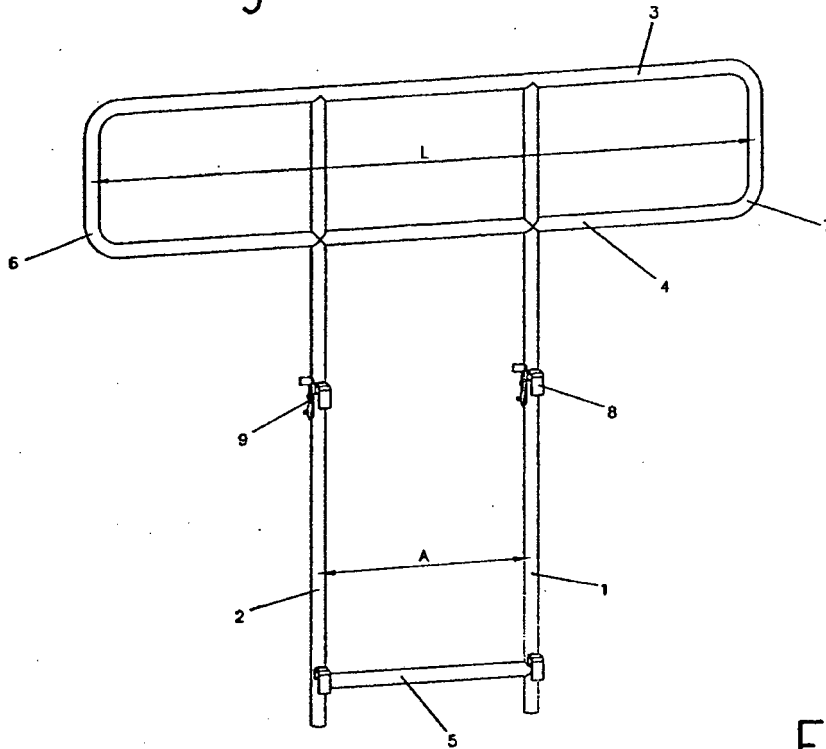


Fig. 2

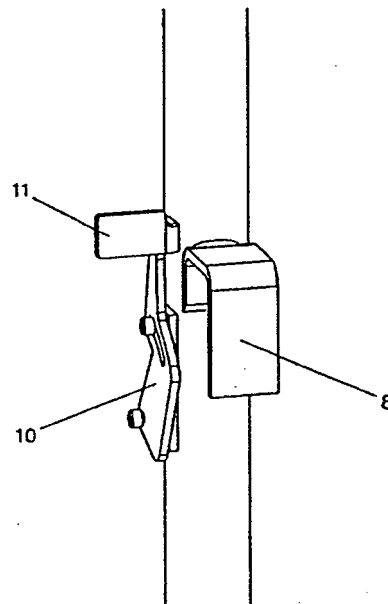


Fig. 3A

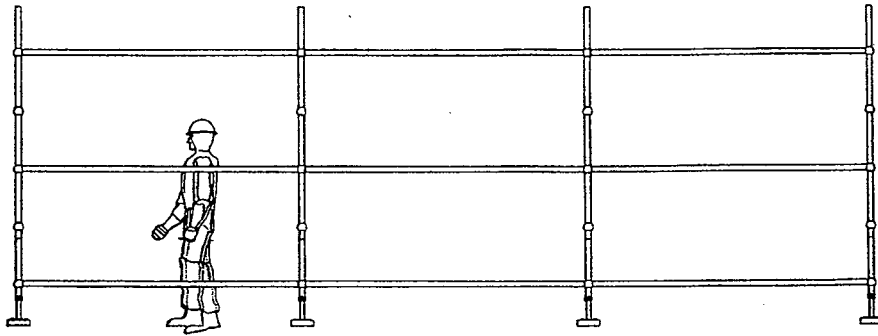


Fig. 3B

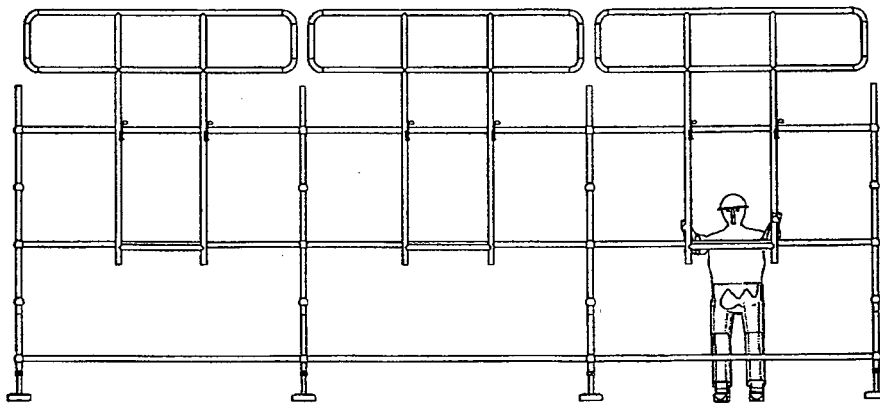


Fig. 3C

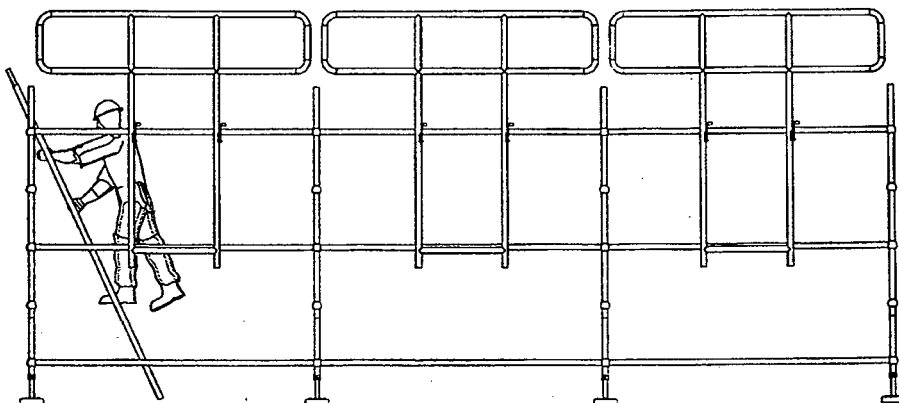


Fig. 3D

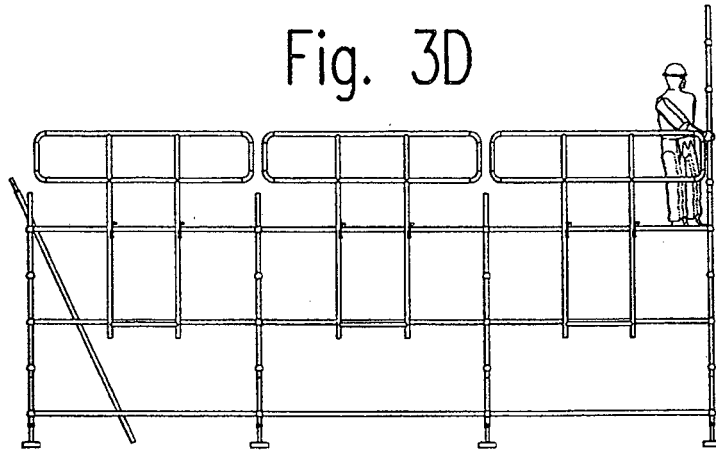


Fig. 3E

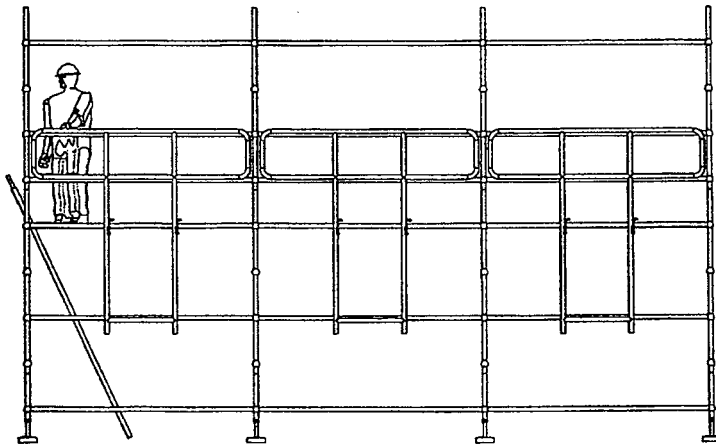


Fig. 3F

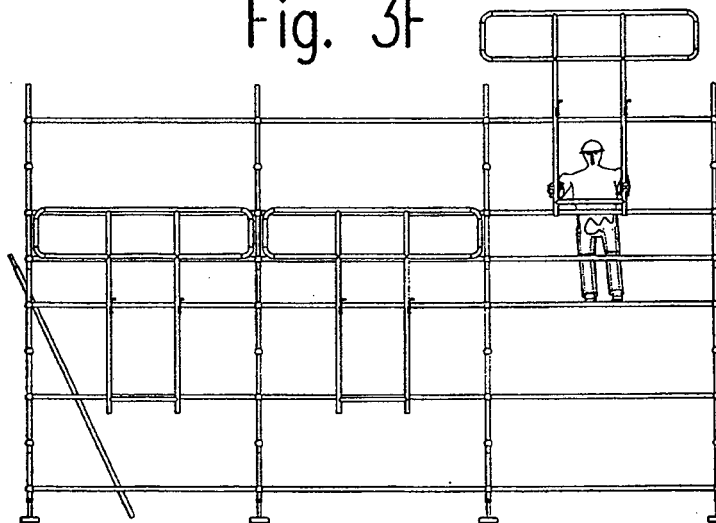


Fig. 3G

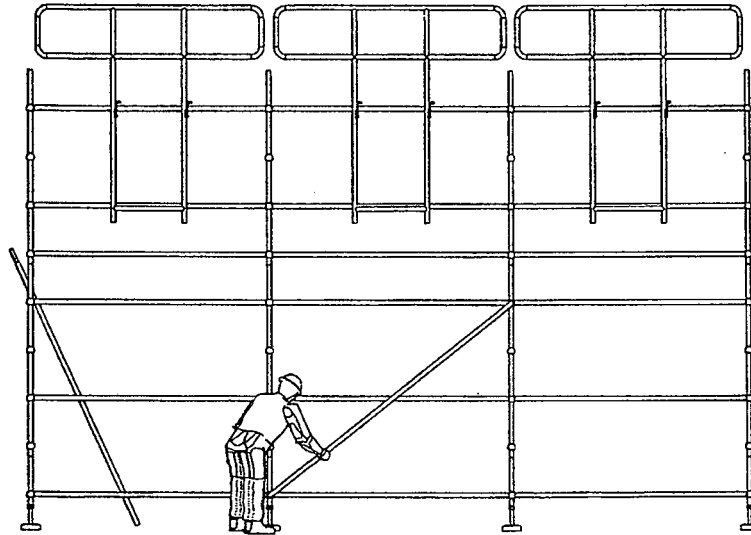


Fig. 3H

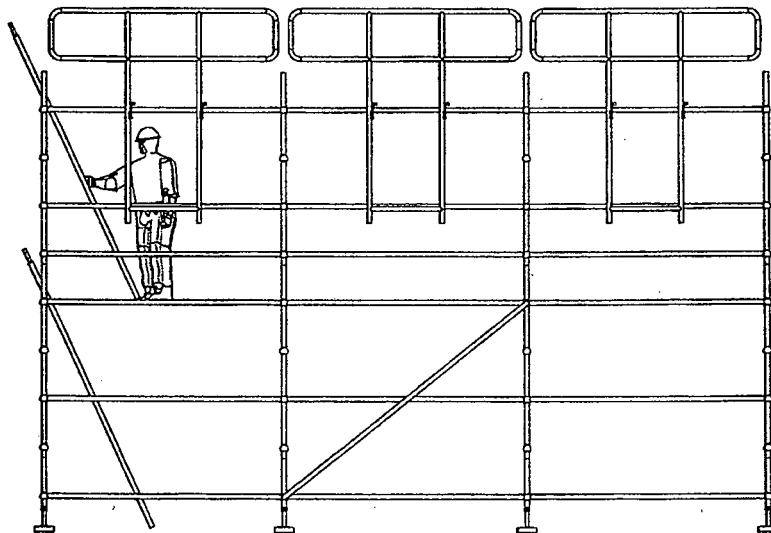
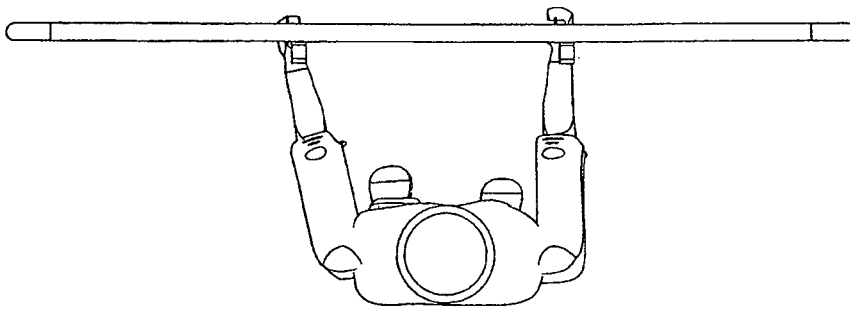


Fig. 4



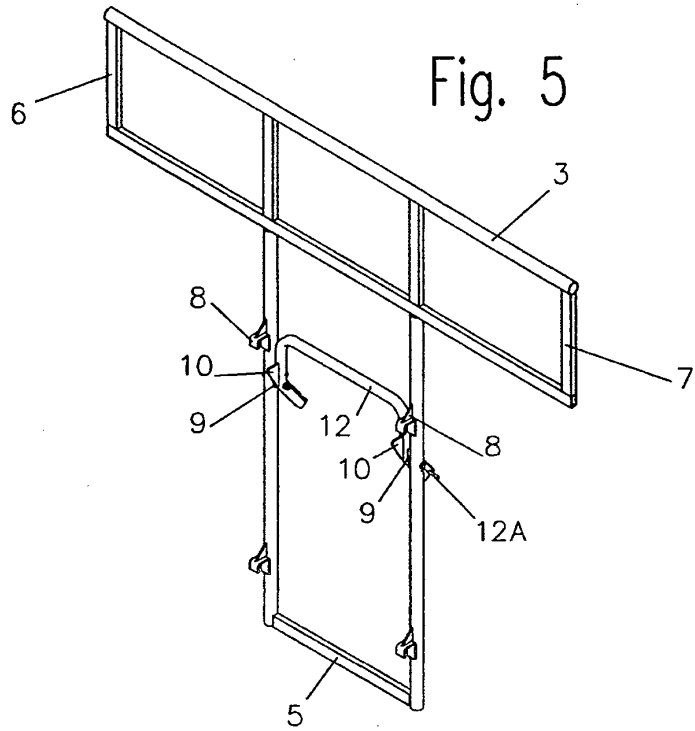


Fig. 5A

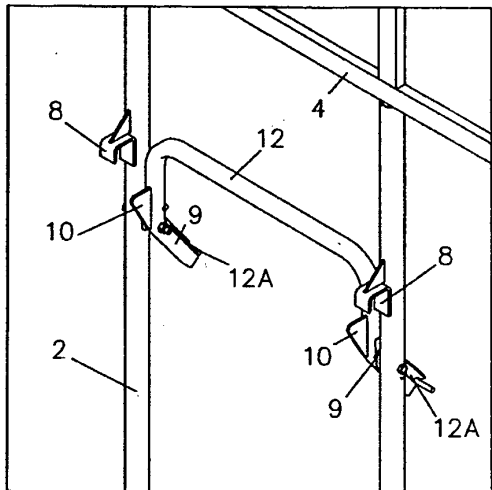
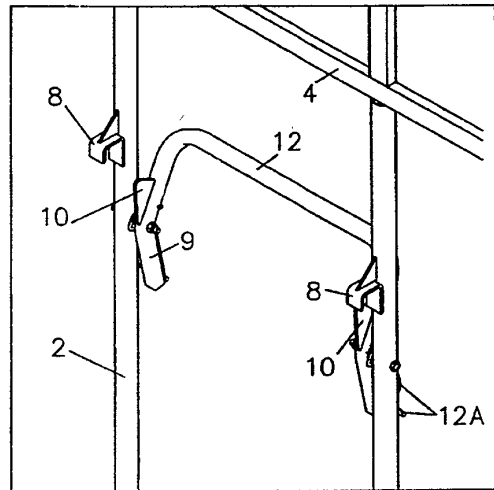


Fig. 5B



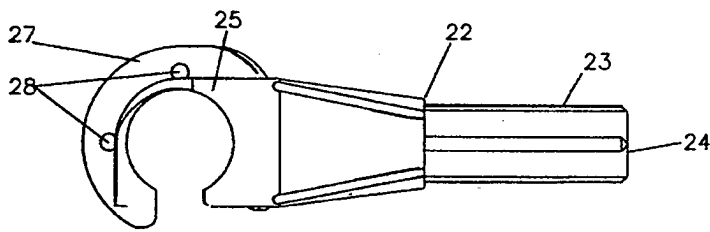
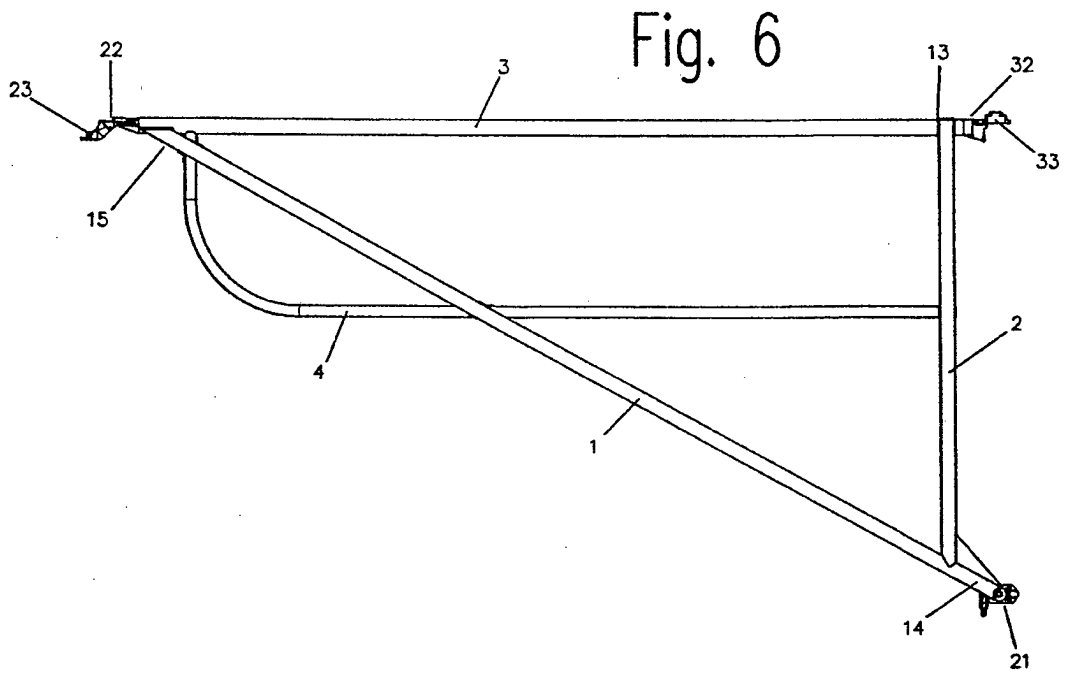


Fig. 7A

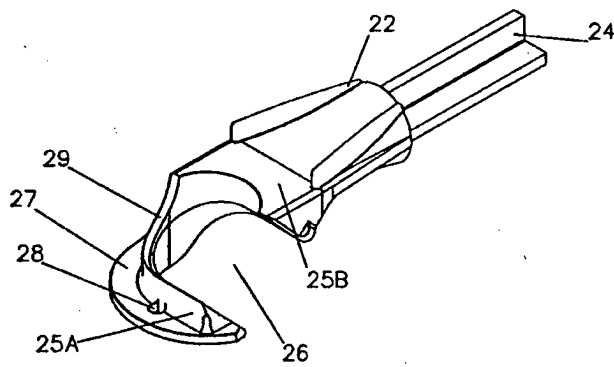


Fig. 7B

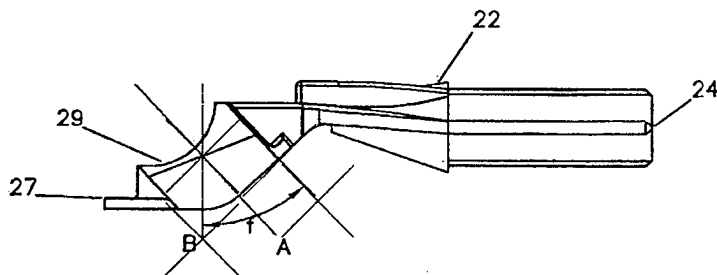


Fig. 7C

Fig. 8A

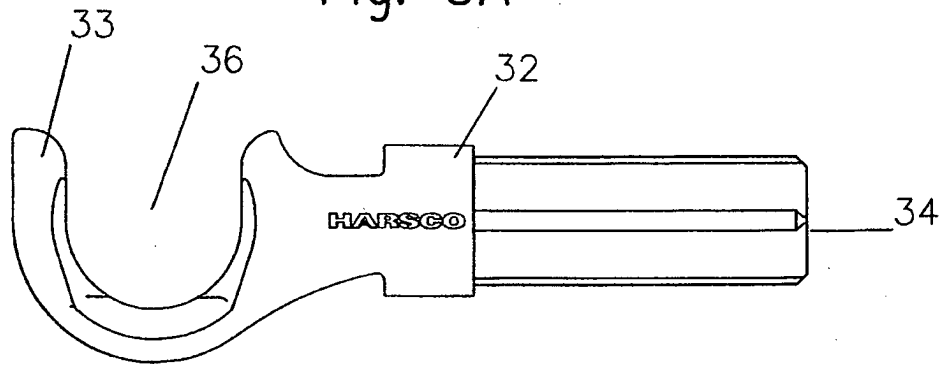


Fig. 8B

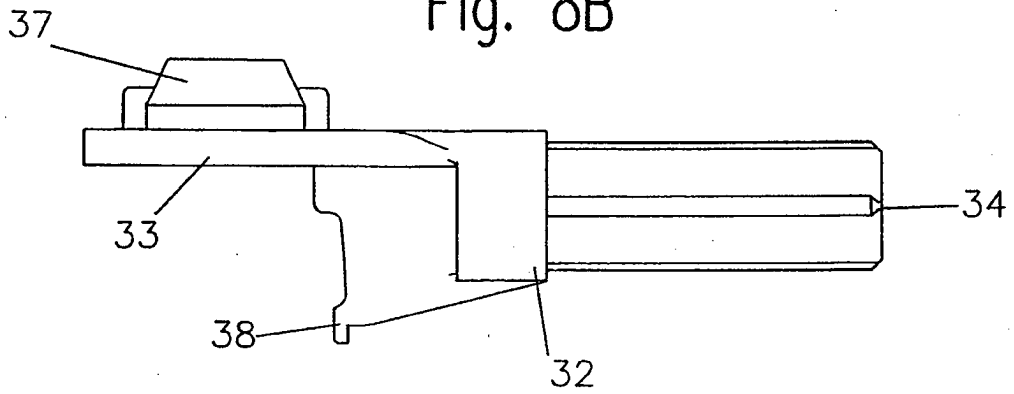


Fig. 8C

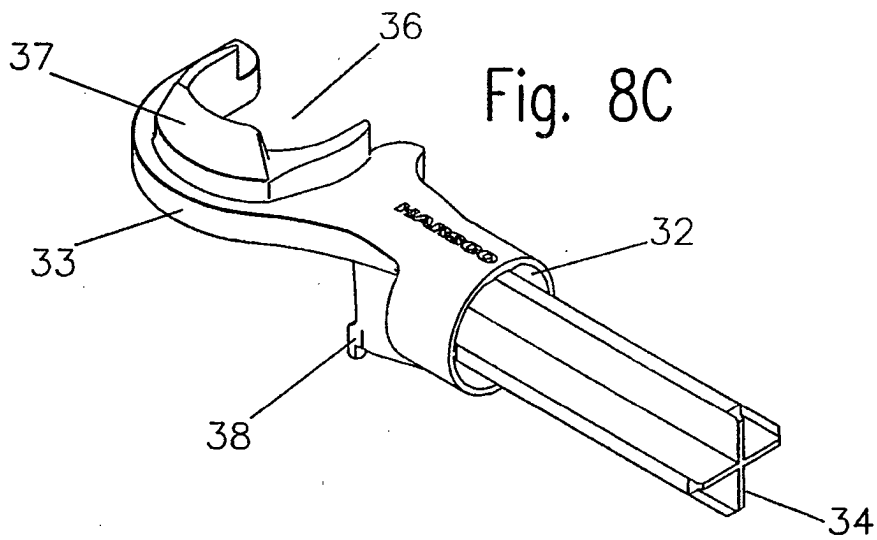


Fig. 9A

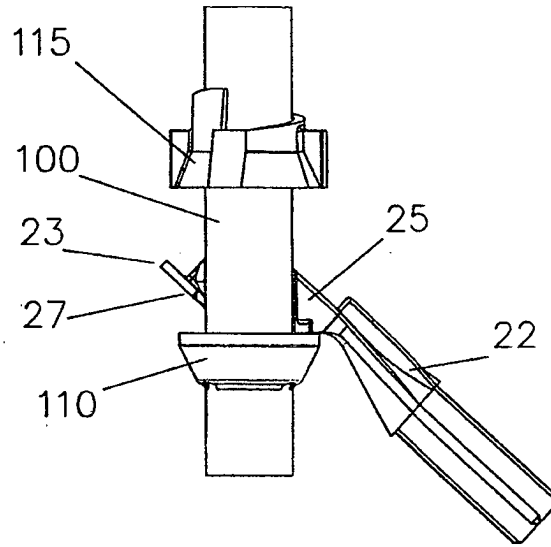


Fig. 9B

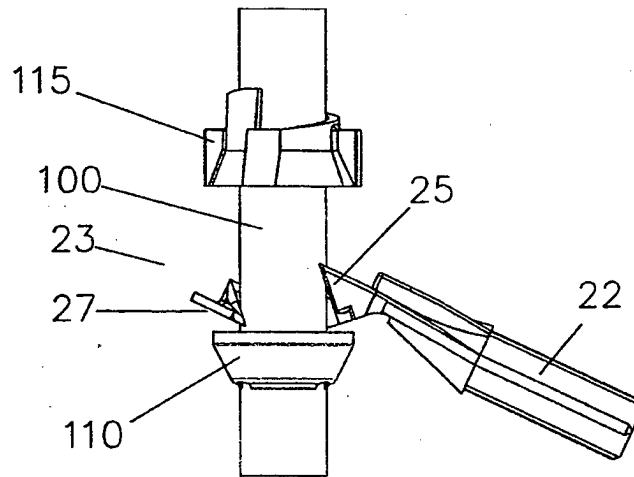


Fig. 10A

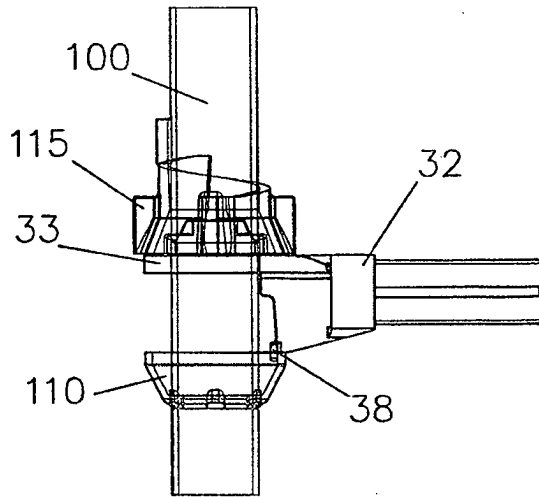


Fig. 10B

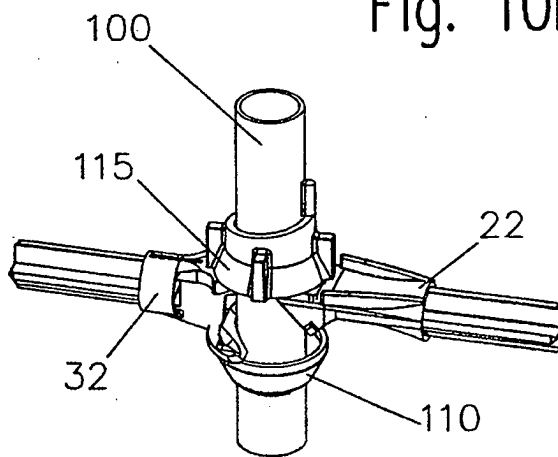


Fig. 11A

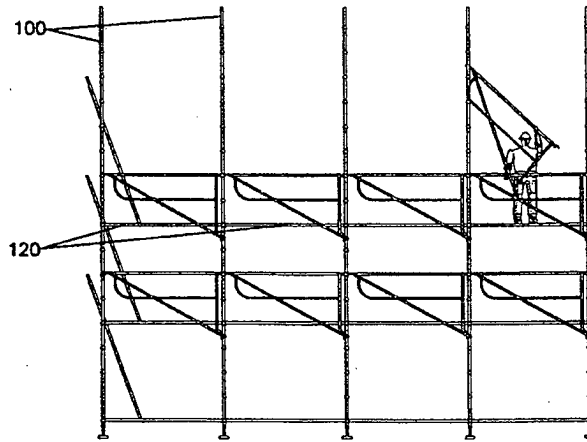


Fig. 11B

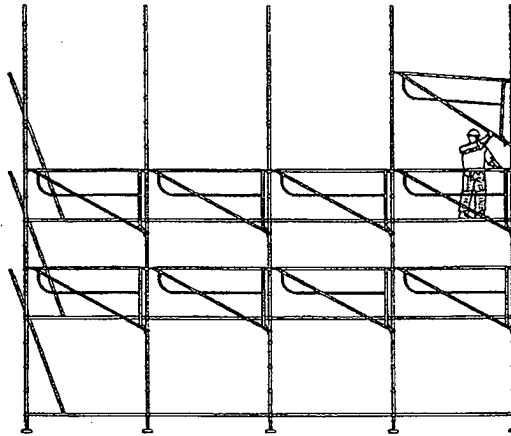


Fig. 11C

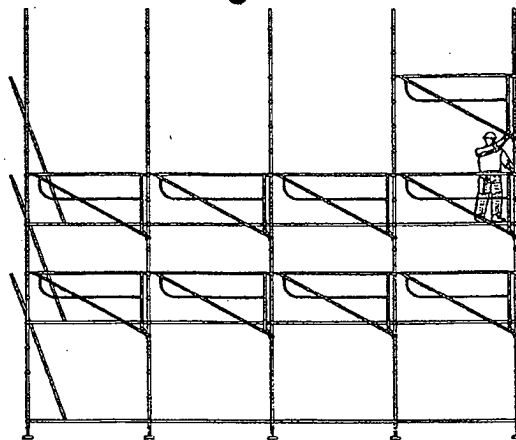


Fig. 11D

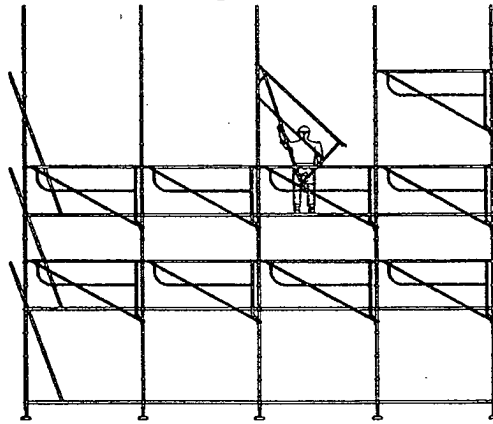


Fig. 11E

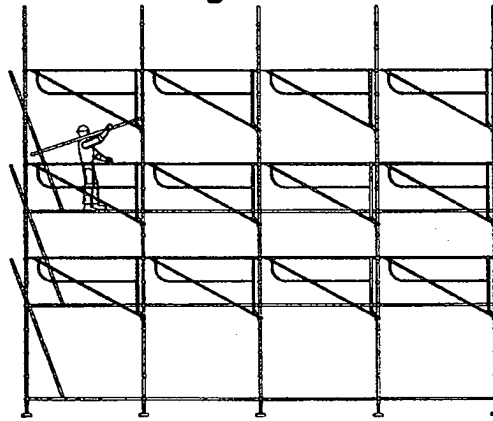
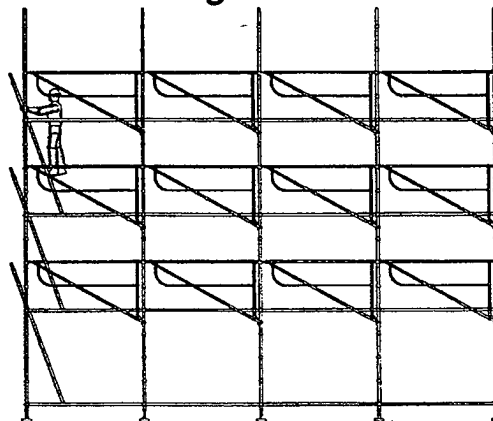


Fig. 11F



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- DE 10305158 [0005]
- GB 2427433 A [0005]
- JP 2006291473 A [0005]