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(54) **Portable device and method for temporarily covering a hole in a floor**

(57) A portable device for temporarily covering a hole in a floor comprises a left frame (2), a right frame (4), a frame hinge (6), a left bar (8), a left hinge (10), a right bar (12), a right hinge (14), a fixing element (16), and a coupling hinge (35). The left frame and right frame are supportable on the floor in a working position of the portable device and define a bearing surface (24). The frame hinge connects the left frame in a pivoting manner to the right frame. The coupling hinge is located at a distance

from the bearing surface in the working position. The left bar extends from the left hinge to the coupling hinge and is connected to the right bar by means of the coupling hinge. The right bar extends from the right hinge to the coupling hinge. The fixing element extends from the coupling hinge to the frame hinge. At least one of the left hinge, the right hinge, and the coupling hinge is movable in order to attain a distance in relation to the frame hinge in the folded position which differs from the distance in the working position.

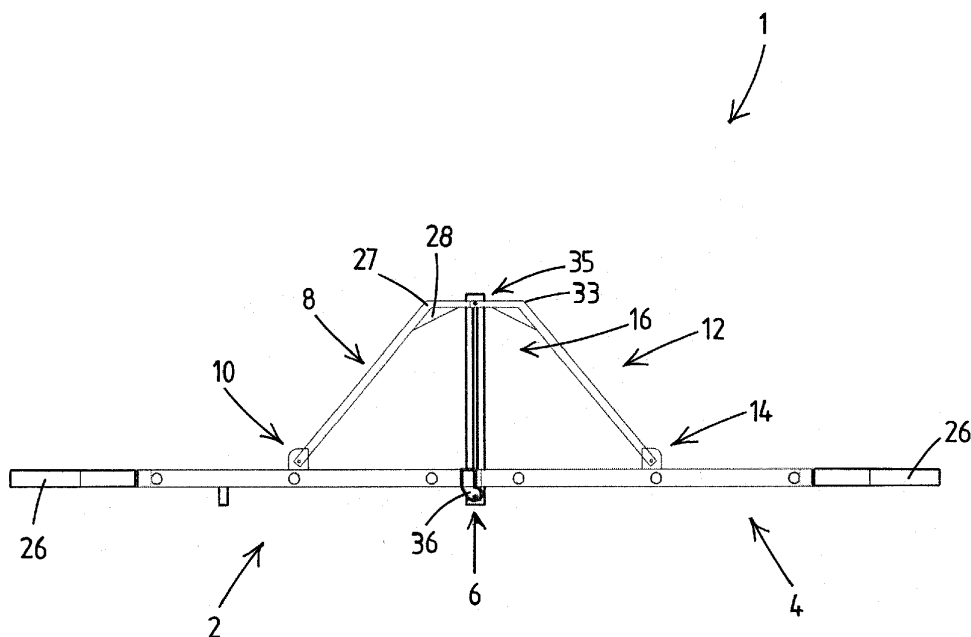


Fig.1

Description

[0001] The invention relates to a portable device for temporarily covering a hole in a floor. A device for temporarily covering a hole in a floor is normally used in practice for temporarily covering a stairwell during a part of the construction period of a building and is then also referred to as stairwell protection. A device of this type can also be used for temporarily covering a hole in a ground floor, or a hole forming part of a lift shaft.

[0002] GB-A-2.431.193 discloses a portable device for temporarily covering a hole in a floor. This device comprises a rigid frame, on which a work floor is disposed. In the work floor, a trapdoor is provided which is connected in a pivoting manner to the remainder of the work floor. The pivoting trapdoor is used to be able to enter or leave the lower level on which the known device lies.

[0003] The disadvantage of the known device is that it is expensive to use. It was found to be laborious to install and remove this device. The device is intended to be left in place for a lengthy period and, given the laborious installation, it is less suitable for installation only when work has to be carried out in situ. Thus, many portable devices are required on a construction site in order to cover a plurality of holes in floors, and a relatively large amount of work is required for the installation and removal thereof.

[0004] The object of the invention is to eliminate the aforementioned disadvantages at least partially, or at any rate provide a usable alternative. In particular, the object of the invention is to provide a portable device which can be disposed more simply than the known device by one person.

[0005] The invention achieves this object by means of a portable device according to claim 1.

[0006] A portable device for temporarily covering a hole in a floor comprises a left frame, a right frame, a frame hinge, a left bar, a left hinge, a right bar, a right hinge, a fixing element, and a coupling hinge. In a working position of the portable device, the left frame and right frame are supportable on the floor and define a bearing surface to bear a load, such as persons or goods, above the hole. The frame hinge connects the left frame in a pivoting manner to the right frame in such a way that the left frame and right frame are pivotable towards one another around a pivot axis which runs parallel to the bearing surface to attain a folded position of the portable device. The left hinge is provided at a distance from the frame hinge on the left frame, the right hinge is provided at a distance from the frame hinge on the right frame, and the coupling hinge is located at a distance from the bearing surface in the working position. The left bar extends from the left hinge to the coupling hinge, is connected to the left frame in a pivoting manner by means of the left hinge, and is connected to the right bar in a pivoting manner by means of the coupling hinge. The right bar extends from the right hinge to the coupling hinge and is connected to the right frame in a pivoting

manner by means of the right hinge. The fixing element extends from the coupling hinge to the frame hinge and is designed to fix the frame hinge at a predefined distance from the coupling hinge in the working position. At least one of the left hinge, the right hinge, and the coupling hinge is movable in order to attain a distance in relation to the frame hinge in the folded position which differs from the distance in the working position.

[0007] By dividing the frame in a pivoting manner, a portable device is created which, in the folded position, is easier to handle than the known device. Thanks to the bars and the fixing element, the portable device is made rigid in the working position, so that the frame hinge cannot buckle, as a result of which it could drop through the hole. Since at least one hinge is movable, the device is nevertheless foldable.

[0008] It is noted that US-83.795 discloses a fruit ladder comprising two ladders and a platform. The two ladders are rotatably connected on their upper side to the platform. Each ladder is provided with two supports, which are also connected here in a pivotable manner. The supports extend from the ladder concerned to a block, to which they are also rotatably connected. The block is slidable along a strut, which is permanently connected on its upper side to the platform. The block can be connected in various positions with a pin to the strut, as a result of which the ladders can assume different angles in relation to the platform. The distances between each of the pivot points change here.

[0009] US-83.795 differs in various components from the present invention. The two ladders are provided with rungs instead of a bearing surface. The strut extends from the platform to the block. The two ladders are each separately rotatably connected on their upper side to the platform. The supports are connected to the block with separate pivot points.

[0010] Advantageous embodiments are defined in the dependent claims.

[0011] In one embodiment, the fixing element is bar-shaped. This makes the portable device more robust during use and during folding and unfolding, and makes it possible to use hinges with more play than if a flexible fixing element is used.

[0012] In particular, the bar-shaped element is provided with a groove for the accommodation in a sliding manner of at least one of the coupling hinge and the frame hinge. A groove of this type is a simple and advantageous measure for making at least one hinge movable. More particularly, the coupling hinge and the frame hinge are both accommodated in a sliding manner in the groove. For the folding and unfolding of the portable device, it suffices if one of these hinges is accommodated in a sliding manner. The frame hinge is then preferably accommodated in a sliding manner. As a result, the fixing element is accommodated in the folded position between the left frame and right frame. If both hinges are accommodated in a sliding manner, it is possible to fold the portable device by pulling the upper edge of the fixing

element upwards and then, once folded, sliding it between the left frame and the right frame.

[0013] In one embodiment, the coupling hinge and the frame hinge are movable towards one another in order to attain a distance in relation to the frame hinge in the folded position which is shorter than in the working position. As a result, the portable device is relatively compact in the folded position.

[0014] In particular, the fixing element defines a predetermined maximum distance in the working position between the coupling hinge and the frame hinge. Thus, the fixing element is subjected to traction in the working position and can therefore hold the two hinges at the required distance from one another.

[0015] In one embodiment, the coupling hinge is located in the working position above the bearing surface, preferably directly above the frame hinge. As a result, the fixing element projects upwards in relation to the right frame and left frame and there is less risk of it colliding with a stair already disposed in a stairwell. A position directly above the frame hinge, perpendicular in relation to the bearing surface, results in a symmetry of the portable device and a more compact folded position.

[0016] In an advantageous form, the left hinge, the right hinge, the coupling hinge and the frame hinge each define a pivot axis, said pivot axes running parallel to one another.

[0017] In one embodiment, the pivot axis of the frame hinge in the working position is lower than an underside of the left frame and right frame. As a result, the left frame and right frame can be folded so far that they extend parallel in relation to one another.

[0018] In an advantageous form, at least one of the left bar and right bar has a kink, said kink dividing the bar concerned into a first bar part and a second bar part, wherein the first bar part extends from the left or right hinge to the kink, the second bar part extends from the coupling hinge to the kink, and the angle of the kink and the length of the second bar part are chosen in such a way that the coupling hinge is located at a distance from a centreline through the first bar part which is greater than a thickness of the relevant frame. As a result, the first bar parts concerned will extend in the folded position parallel to one another and to the left frame and right frame, resulting in a compact folded position.

[0019] In one embodiment, the portable device comprises movable extension means to extend at least one of the left frame and right frame. Thus, the portable device, which is kept relatively small for the sake of portability, can be enlarged to span a relatively large hole.

[0020] In particular, the movable extension means are connected in a telescopically slidable manner to at least one of the left frame and right frame. This is a compact and robust way to extend the portable device.

[0021] The invention furthermore relates to a method for temporarily covering a hole, according to the relevant independent claim.

[0022] The invention will be explained in detail below

with reference to an embodiment as shown in the drawing, in which:

Fig. 1 shows a side view of a stairwell protection in a working position;

Fig. 2 shows a side view of a left part of the stairwell protection shown in Fig. 1;

Fig. 3 shows a top view of the stairwell protection shown in Fig. 1;

Fig. 4 shows a side view of the stairwell protection shown in Fig. 1 in an unfolded position; and

Fig. 5 shows a detail of a left part of the stairwell protection, in the unfolded position shown in Fig. 4.

[0023] In Fig. 1, a portable device for temporarily covering a hole in a floor is denoted in its entirety with reference number 1. In this example embodiment, the portable device 1 is designated as a stairwell protection, but it will be clear that a device of this type is also suitable for covering holes in grounds or floors other than stairwells. The stairwell protection 1 comprises a left frame 2, a right frame 4, a frame hinge 6, a left bar 8, a left hinge 10, a right bar 12, a right hinge 14, a fixing element 16, and a coupling hinge pin 18.

[0024] In this example embodiment, the left frame 2 is constructed from longitudinal and transverse tubes, in this case aluminium tubes. In this example embodiment, two longitudinal tubes 20 have a rectangular cross-section of 60X30 mm² and are rigidly interconnected by means of three transverse tubes 22, in this case with a circular cross-section of 40 mm. Thus, the left frame 2 is in itself a rigid frame which defines a bearing surface 24 on its upper side. At the location of the bearing surface 24, a physical bearing floor can be provided as a separate element, although this is preferably permanently connected to the left frame 2 and, more preferably, is formed as an integral part thereof. The longitudinal tubes 20 are extendable by means of insertable tubes 26, which are accommodated in a telescopically slidable manner in the longitudinal tubes 20.

[0025] In this example embodiment, the left bar and right bar 8, 12 are designed as aluminium tubes with a rectangular cross-section of 30X30mm². The left bar 8 is provided near a first end with a kink 27. At the location of this kink 27, a corner plate 28 is provided in order to increase the local rigidity. The left hinge 10 comprises two hinge plates 30 which are rigidly connected to the longitudinal tube 20 (see Fig. 2). The left hinge 10 further comprises a hinge pin 32. The left bar 8 is connected in a pivoting manner to the left frame 2 near a second end by means of the hinge pin 32 and the hinge plates 30 of the left hinge 10.

[0026] In this example embodiment, the right frame 4 and the right bar 12 are essentially identical to the left frame 2 and the left bar 8 respectively, so that a detailed description is not required. The right bar 12 is provided near a first end with a kink 33 and is connected at a second end in a pivoting manner via the right hinge 14

to the left frame 4.

[0027] In this example embodiment, the fixing element 16 is formed by a strip of aluminium which is provided in its longitudinal direction with a groove 34. The coupling hinge pin 18 is provided in a sliding manner in the groove 34 of the fixing element 16 to form a sliding hinge 35. The hinge pin 18 is also provided in a rotatable manner on the first end of the left bar 8 and on the first end of the right bar 12. Thus, the sliding hinge 35 is a coupling hinge for the reciprocally rotatable connection of the left bar 8, the right bar 12 and the fixing element 16.

[0028] The frame hinge 6 comprises left hinge plates 36, a hinge pin 38, and right hinge plates 40. The left hinge plates 36 are rigidly connected to the longitudinal tube 20 of the left frame 2. The right hinge plates 40 are rigidly connected to the right frame 4. The hinge pin 38 is rotatably connected to the left hinge plates 36 and the right hinge plates 40, and is also accommodated in a sliding manner in the groove 34 of the fixing element 16. Thus, the frame hinge 6 is a sliding hinge, as a result of which the left frame 2 and the right frame 4 are both rotatable and movable in relation to the fixing element 16.

[0029] The left frame 2 is optionally provided with an impact buffer 42.

[0030] In use, the stairwell protection 1 can assume a working position, as shown in Figs. 1-3. In this working position, the stairwell protection 1 can be supported with the left end of the left frame 2 and the right end of the right frame 4 on the floor around the hole. If the stairwell protection 1 is smaller than the hole concerned, it can be extended by means of the insertable tubes 26, which are inserted into the left frame and/or the right frame 2, 4, wherein the free ends of these insertable tubes 26 are then supported on the ground. A load, such as persons who have to carry out work above the hole or goods, can be disposed on a work floor (not shown). A load of this type exerts a downwardly directed vertical force on the bearing surface 24. At the location of the frame hinge 6, the fixing element 16 exerts an upwardly directed force. This vertical force is translated into pressure forces in the left bar and right bar 8, 12. The left bar and right bar 8, 12, together with the fixing element 16 and the intermediate parts of the left frame and right frame 2, 4, form a statically defined construction, as a result of which no rotation is possible around the connecting frame hinge 6 in the event of a downwardly directed vertical load.

[0031] In order to bring the stairwell protection 1 from the working position to a folded position, a vertical upwardly directed force must be exerted on the left frame and/or right frame 2, 4 via or near the frame hinge 6. If this force is exerted directly on a frame, 2, 4, the hinge pin 38 of the frame hinge 6 will slide up via the groove 34 in the fixing element. The frame hinge 6 is preferably lifted up via the fixing element 16 and the hinge pin 18 slides down through the groove 34 in relation to the fixing element 16. Due to the sliding movement concerned, the stairwell protection is no longer statically defined and the left frame and right frame 2, 4 can rotate in relation to

one another around the frame hinge 6. Thus, the stairwell protection 1 is foldable to a folded position, as shown in Figs. 4 and 5. The impact buffer 42 ensures a stable, reciprocally parallel, positioning of the left frame and right frame 2, 4.

[0032] Fig. 5 furthermore shows that the hinge plates 36 position the hinge pin 38 under the left frame 2, as a result of which the left frame 2 can be folded completely parallel to the fixing element 16. The kink 27 of the left bar 8 divides the left bar into a first bar part 44 and a second, kinked bar part 46. A centreline 48 runs through the first bar part. The kink 27 has an angle, and the kinked bar part 46 has a length such that the coupling hinge 35 is located at a distance d from the centreline 48 which is greater than a thickness of the left frame 2. As a result, the first bar part 44 extends from the left bar 8 in the folded position parallel to the left frame 2 and the fixing element 16. Fig. 4 shows that this applies mutatis mutandis to the right frame 4, as a result of which the left frame and right frame 2, 4 and the left bar and right bar 8, 12 are foldable parallel to one another.

[0033] Miscellaneous variants are possible within the scope of the invention. Thus, instead of a rigid fixing element which is provided with a groove, a flexible fixing element can also be used, for example in the form of a band or rope. A band or rope of this type defines a maximum distance between the frame hinge and the coupling hinge and can absorb a tractive force under tension. When the stairwell protection is folded, a band or rope of this type allows the aforementioned hinges to move towards each other.

[0034] Furthermore, it is possible for the left hinge and right hinge to be provided in a slidable manner on the relevant frame, wherein the frame hinge and coupling hinge are held at a fixed distance by means of the fixing element. In a variant of this type, the hinge pins concerned of the left and right hinges will slide towards the frame hinge during the folding of the stairwell protection.

[0035] Furthermore, it is possible to design a stairwell protection with a fixing element on the underside instead of the upper side. In this case, the fixing element will be subjected to pressure instead of traction. In a design of this type, the left hinge and right hinge are then preferably accommodated in a sliding manner in the frames concerned, wherein the relevant hinge pins of the frame hinge move down during the folding of the stairwell protection.

[0036] In the example embodiment shown, all bars and hinges are duplicated, i.e. hinges, bars and a fixing element are provided on each longitudinal side of the left frame and right frame. A symmetrical design of this type on both longitudinal sides is favourable from the perspective of the absorption of forces and the avoidance of torsion. However, it is also possible to design rods and hinges singly, wherein these are either positioned asymmetrically or are provided on or near the centreline of the frames.

[0037] The pressure bars, longitudinal tubes and

transverse tubes can be designed as tubes, as described above. Other embodiments, including solid bars or strips, are also possible. The example embodiment shown is more or less symmetrical in relation to the frame hinge. This is advantageous, but not essential within the scope of the invention.

[0038] In the embodiment shown and variants described, the stairwell protection folds in such a way that the frame hinge moves upwards. Thus, it is achieved that the stairwell protection is statically defined as long as it is subjected to a downward vertical force. In this way, the stairwell protection is inherently safe. As a result, it is not necessary to provide the stairwell protection with safety means, and it is therefore not necessary to remove such safety means in order to be able to fold the stairwell protection.

[0039] By means of a suitable choice of material and shape, the stairwell protection can be carried by one person. Depending on locally determined legal requirements, a maximum weight applies to a portable device of this type. The example embodiment shown is lighter than 20 kg, with folded dimensions of 1650X670 mm². This can also be achieved by the use of aluminium, as described above. Alternative lightweight materials and constructions are similarly possible, including fibre-reinforced plastics.

Claims

1. Portable device (1) for temporarily covering a hole in a floor, comprising a left frame (2), a right frame (4), a frame hinge (6), a left bar (8), a left hinge (10), a right bar (12), a right hinge (14), a fixing element (16), and a coupling hinge (35), wherein the left frame and right frame (2, 4) are simultaneously supportable in a working position of the portable device on the floor on both sides of the hole, the left frame defines a bearing surface (24) on the upper side of the left frame for bearing a load, such as persons or goods, above the hole, the right frame defines a bearing surface on the upper side of the right frame for bearing a load, such as persons or goods, above the hole, the bearing surface of the left frame and the bearing surface of the right frame extend into the same area, and the left frame and right frame (2, 4) are each provided with a physical bearing floor at the location of the bearing surface concerned, the frame hinge (6) connects the left frame (2) in a pivoting manner to the right frame (4) in such a way that the left frame and right frame (2, 4) are pivotable from the working position towards one another around a pivot axis which runs parallel to the bearing surface (24) to attain a folded position of the portable device, the left hinge (10) is provided at a distance from the frame hinge (6) on the left frame (2), the right hinge (14) is provided at a distance from the frame hinge (6) on the right frame (4), and the coupling hinge (35) is located at a distance from the bearing surface (24) in the working position. the left bar (8) extends from the left hinge (10) to the coupling hinge (35), is connected to the left frame (2) in a pivoting manner by means of the left hinge (10) and is connected to the right bar in a pivoting manner by means of the coupling hinge (35), the right bar (12) extends from the right hinge (14) to the coupling hinge (35) and is connected to the right frame (4) in a pivoting manner by means of the right hinge (14), the fixing element (16) extends from the coupling hinge (35) to the frame hinge (6) and is designed to fix the frame hinge (6) at a predefined distance from the coupling hinge (35) in the working position, and at least one of the left hinge (10), the right hinge (14), and the coupling hinge (35) is movable in order to attain a distance in relation to the frame hinge (6) in the folded position which differs from the distance in the working position.
2. Portable device (1) according to claim 1, wherein the fixing element (16) is bar-shaped.
3. Portable device (1) according to claim 2, wherein the bar-shaped element is provided with a groove (16), for the accommodation in a sliding manner of at least one of the coupling hinge (35) and the frame hinge (6).
4. Portable device (1) according to one of the preceding claims, wherein the coupling hinge (35) and the frame hinge (6) are movable towards one another in order to attain a distance in relation to the frame hinge (6) in the folded position which is shorter than the distance in the working position.
5. Portable device (1) according to claim 4, wherein the fixing element (16) defines a predetermined maximum distance between the coupling hinge (35) and the frame hinge (6) in the working position.
6. Portable device (1) according to one of the preceding claims, wherein the coupling hinge (35) is located above the bearing surface (24) in the working position, preferably directly above the frame hinge (6).
7. Portable device (1) according to one of the preceding claims, wherein the left hinge (10), the right hinge (14), the coupling hinge (35) and the frame hinge (6) each define a pivot axis, said pivot axes running parallel to one another.
8. Portable device (1) according to one of the preceding claims, wherein the pivot axis of the frame hinge (6) in the working position is lower than an underside of

the left frame and right frame (2, 4).

9. Portable device (1) according to one of the preceding claims, wherein at least one of the left bar and right bar (8, 12) has a kink (27, 33), said kink dividing the bar concerned into a first bar part (44) and a second bar part (46), wherein the first bar part extends from the left or right hinge (10, 14) to the kink, the second bar part extends from the coupling hinge (35) to the kink, and the angle of the kink and the length of the second bar part (46) are chosen in such a way that the coupling hinge (35) is located at a distance (d) from a centreline (48) through the first bar part which is greater than a thickness of the relevant frame (2, 4). 5 10 15
10. Portable device (1) according to one of the preceding claims, further comprising movable extension means (26) to extend at least one of the left frame and right frame (2, 4). 20
11. Portable device (1) according to claim 10, wherein the movable extension means (26) are connected in a telescopically slidable manner to at least one of the left frame and right frame (2, 4). 25
12. Portable device (1) according to one of the preceding claims, wherein the physical bearing floor is permanently connected to, and is preferably formed as an integral part of, the left frame (2). 30
13. Method for temporarily covering a hole in a floor, comprising
 - a. the carrying by one person to the hole of a portable device (1) in a folded position, wherein the portable device comprises a left frame and a right frame (2, 4), and also a plurality of hinges, 35
 - b. the unfolding by one person of the portable device to a working position, wherein at least one of the hinges of the portable device moves in order to attain a distance in relation to one of the other hinges in the working position which differs from the distance in the folded position, and 40 45
 - c. the positioning by one person over the hole of the portable device, wherein the left frame and the right frame are supported in the working position on the floor on both sides of the hole and each define a bearing surface (24) on the upper side of the relevant frame to bear a load, such as persons or goods, above the hole, wherein the bearing surfaces of the left frame and right frame extend into one area and the left frame and right frame are each provided with a physical bearing floor at the location of the bearing surface. 50 55

14. Method according to claim 13, wherein the portable device is the portable device according to one of claims 1-12.

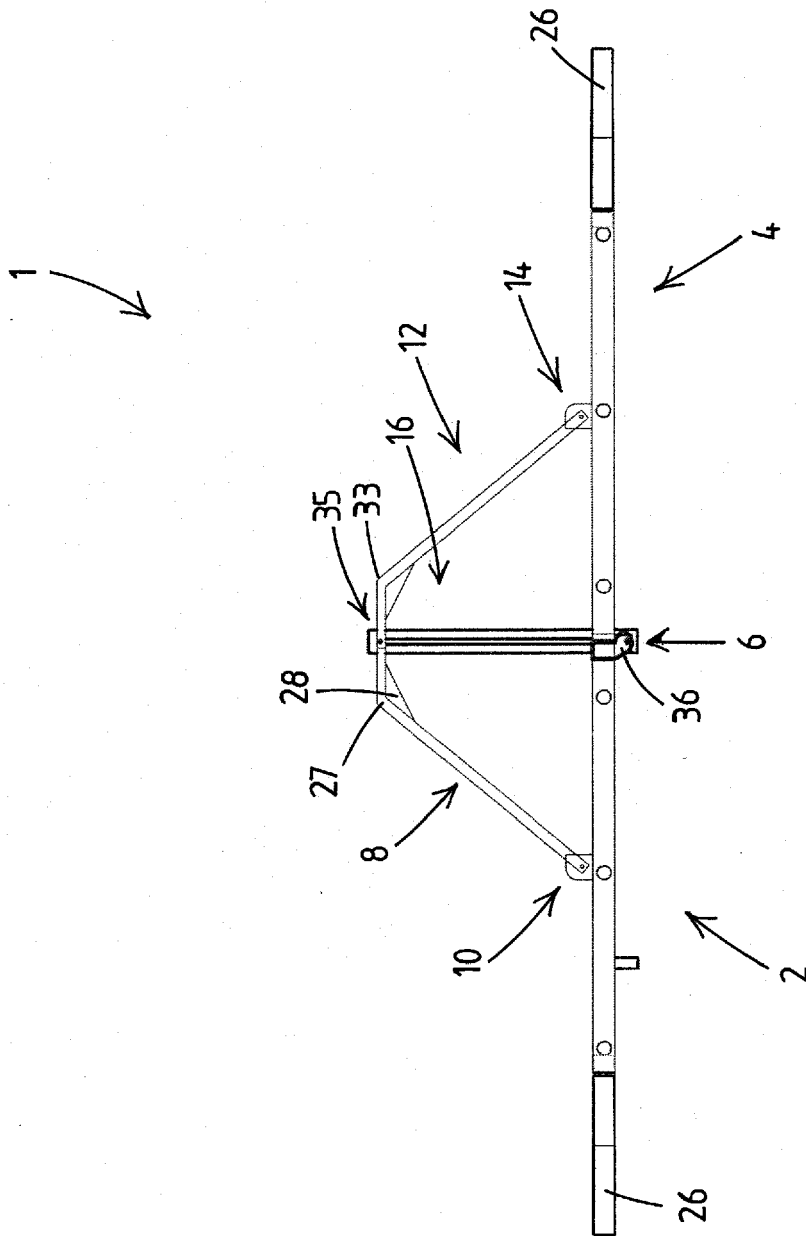


Fig. 1

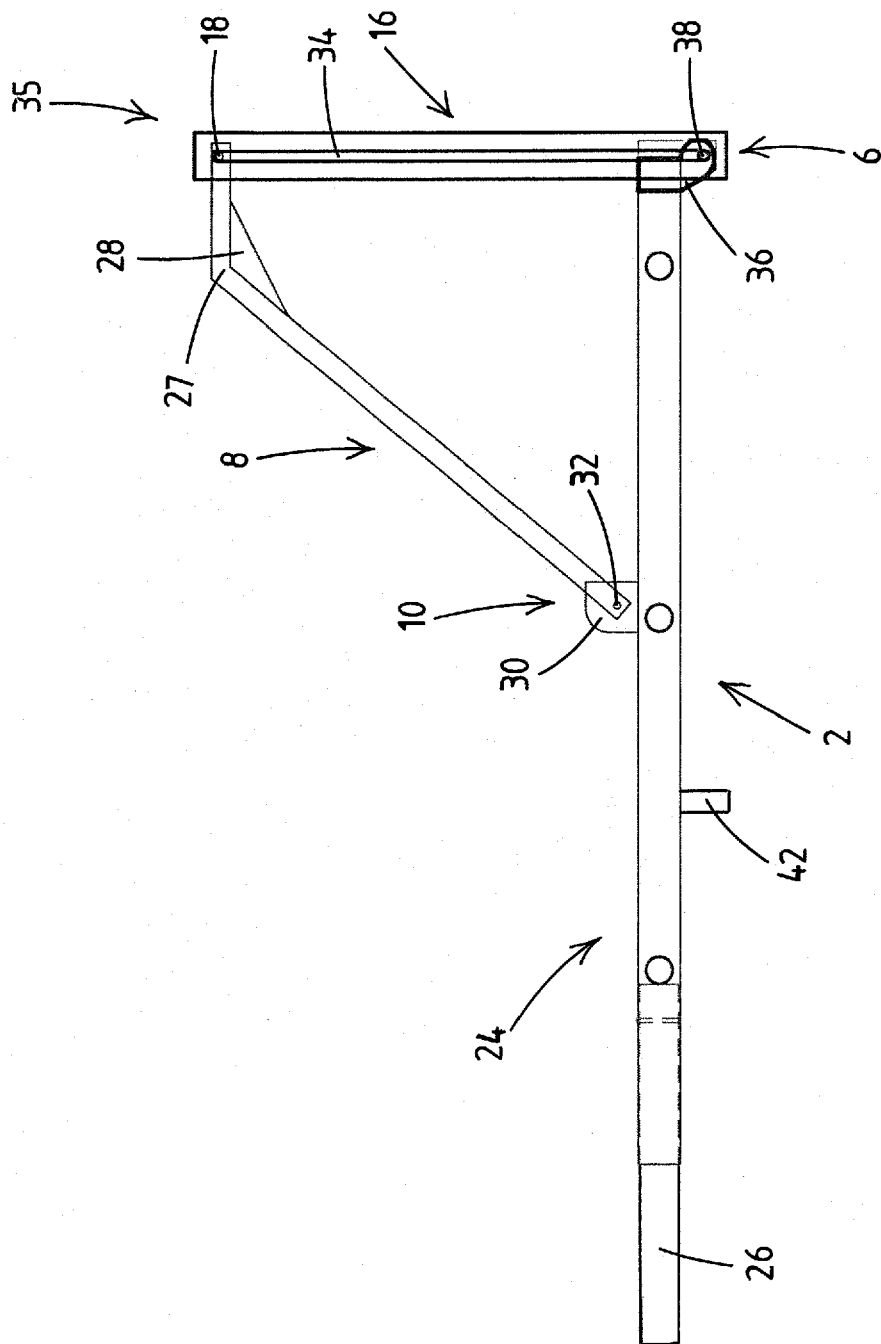


Fig.2

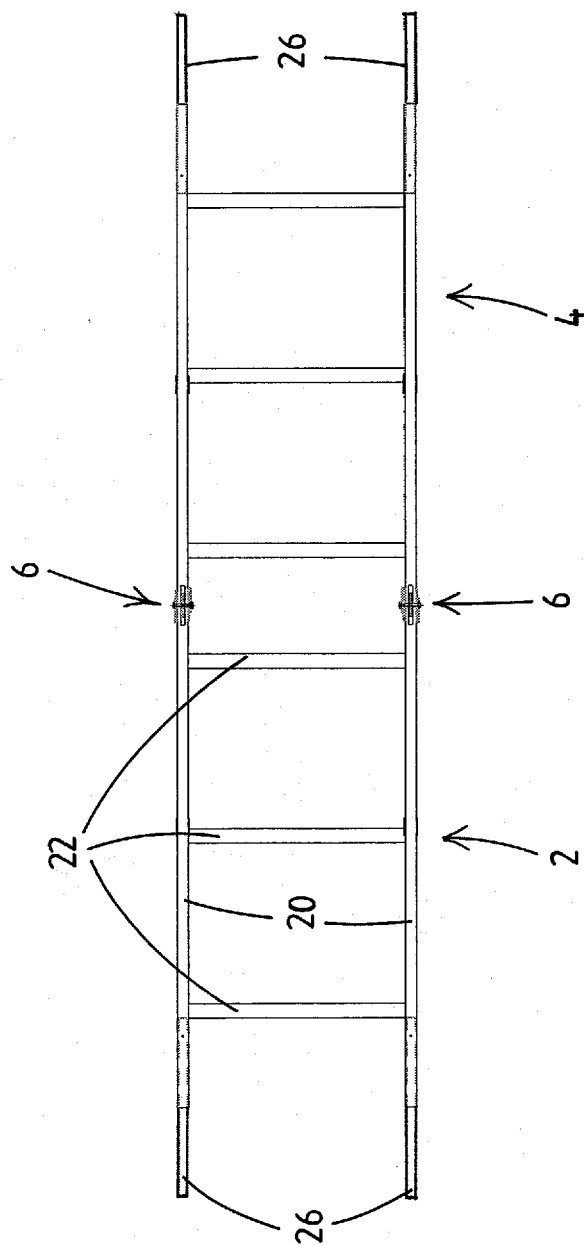


Fig. 3

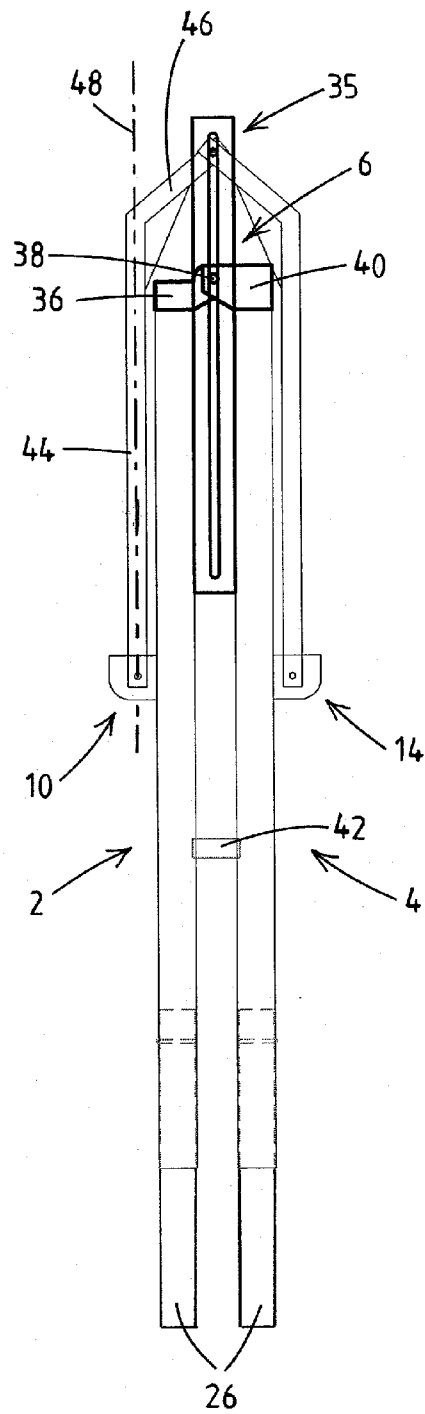


Fig.4

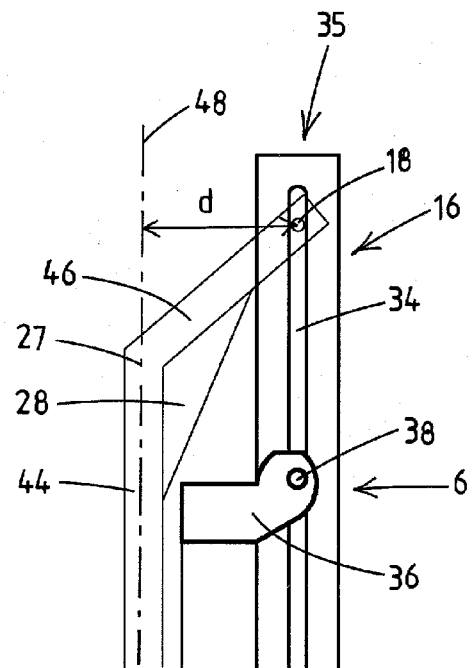


Fig.5



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 2100

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 83795 A (C. S. ROUSE) 3 November 1868 (1868-11-03) * the whole document *	1-14	INV. E04G21/32 E06C1/32
A	NL 1 022 406 C2 (DIJK PIETER VAN [NL]) 19 July 2004 (2004-07-19) * figures *	1,13	
A	DE 198 15 662 A1 (LECHNER HELMUT [DE]) 21 October 1999 (1999-10-21) * figures *	1,13	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04G E06C E01D E02D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 June 2011	Examiner Andlauer, Dominique
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 2100

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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21-06-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 83795	A	NONE	
NL 1022406	C2	19-07-2004	NONE
DE 19815662	A1	21-10-1999	NONE

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2431193 A [0002]
- US 83795 A [0008] [0009]