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(54) **An access tower and advanced guard rail**

(57) An access tower (1) comprising:
two end frames (2), each comprising a pair of generally vertical stiles (4) connected by a plurality of generally horizontal rungs (5), the rungs (5) of an end frame (2) being vertically distributed by a distance X,
at least one advanced guard rail (12) arranged between the two end frames (2), the advanced guard rail (12) having a frame including a plurality of horizontal members (13-16) vertically distributed by said distance X, the advanced guard rail further having a hook (19) provided at each respective corner of the frame, each hook (19) receiving a respective rung of (5) a respective end frame (2),
wherein the at least one advanced guard rail (12) is arranged between the end frames (2) such that the horizontal members (13-16) of the advanced guard rail are substantially aligned with the rungs (5) of the adjacent end frames (2).

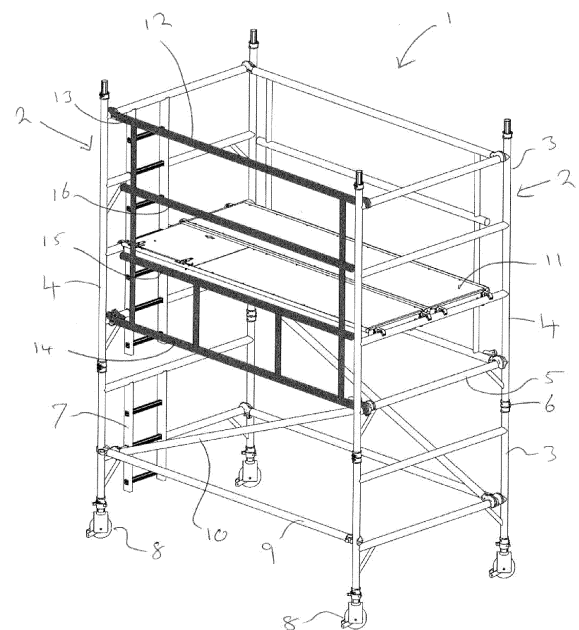


Figure 3

Description

[0001] THE PRESENT INVENTION relates to an access tower comprising at least one advanced guard rail connectable between two respective end frames. The present invention further relates to a method of assembly thereof, and an advanced guard rail.

[0002] Access towers are known and provide a quick and efficient way of erecting (and subsequently dismantling) a scaffolding structure. Whereas traditional scaffolding structures are constructed from a plurality of discrete scaffolding poles and connectors, access tower systems provide a number of interchangeable modular components, configured to fit together to create an access tower of a desired height.

[0003] A known access tower comprises two 'ladder-like' end frames, connected to one another by a number of structural bracing elements. Some bracing elements need to be arranged horizontally and others diagonally with respect to the end frames, to provide suitable rigidity.

[0004] Platforms (decks) are provided between the end frames to provide work surfaces. The provision of the bracing elements adjacent to a platform, together with the rungs of the end frames above the platform level, effectively provides a safety rail arrangement around the platform, improving safety. When additional levels of the access tower are being constructed, the bracing elements may not yet be securely in place, increasing the risk of the installer falling from the tower.

[0005] To address this issue, it is known to use an advanced guard rail, which provides a temporary safety rail adjacent the subsequent level to be constructed. The advanced guard rail is positioned in place above while standing on a completed level below. Once the bracing elements of the subsequent level are in place, the advanced guard rail may be removed and re-used for the construction of the next level.

[0006] The use of an advanced guard rail adds an additional component and installation step to the access tower system. It has become desirable to use an advanced guard as a structural, as well as safety, component, such that an advanced guard rail may be used as a substitute for the bracing elements, and thus left in place when assembled. Figures 1 and 2 illustrate one such suitable advanced guard rail, disclosed in GB2475118, which additionally provides structural rigidity to the access tower.

[0007] As will be noted from Figure 1, when the known advanced guard rail is installed in an access tower, the middle horizontal member of the advanced guard rail (see figure 2) is arranged at a predetermined height above the work surface, providing a safety rail for a worker on the work surface, to prevent a worker slipping from the deck. The top horizontal member acts as a hand rail.

[0008] In use, there may be a need to move a deck or decks, to a different height within the access tower, for example to provide a work surface at a more convenient

height for a particular task.

[0009] With reference to Figure 1, there may be a need to move the deck down by one rung on the end frame, such that it is then adjacent the lowest horizontal member of the advanced guard rail. In so doing, however, an unacceptable opening is formed between the deck and the middle horizontal member of the advanced guard rail, which is potentially hazardous as a worker may slip through the opening. In some jurisdictions, safety regulations prevent the use of an access tower with such an opening.

[0010] In order to 'close' the opening, and provide a safety rail in a suitable position relative to the deck, the advanced guard rail must be removed and then repositioned (e.g. in a lower position). Not only does this potentially destabilise the access tower, but it also removes any form of fall prevention in that area of the access tower while the advanced guard rail is repositioned.

[0011] In any event, in preferred arrangements of access tower, where multiple advanced guard rails are positioned vertically adjacent one another, such repositioning of a single advanced guard rail may not be possible due to its proximity to a neighbouring advanced guard rail (vertically above or below). Complete disassembly of the access tower may be required. Overlapping of the advanced guard rails is not generally possible, since there will not then be sufficient space to install a deck in that section of the access tower.

[0012] Due to the proximity of the advanced guard rail to the stiles of the end frame, it may not be possible to 'retro-fit' a single horizontal bracing member to provide the required safety rail. Indeed, the advanced guard rail may entirely prevent the attachment of a bracing member.

[0013] Known systems therefore limit the flexibility of the access tower in use.

[0014] Accordingly, the present invention provides an access tower comprising:

two end frames, each comprising a pair of generally vertical stiles connected by a plurality of generally horizontal rungs, the rungs of an end frame being vertically distributed by a distance X, at least one advanced guard rail arranged between the two end frames, the advanced guard rail having a frame including a plurality of horizontal members vertically distributed by said distance X, the advanced guard rail further having a hook provided at each respective corner of the frame, each hook receiving a respective rung of a respective end frame, wherein the at least one advanced guard rail is arranged between the end frames such that the horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

[0015] Preferably, at least one deck is secured at each end to a rung of a respective end frame or to a horizontal

member of a respective advanced guard rail, to create a substantially horizontal work platform.

[0016] Conveniently, two advanced guard rails are arranged between the end frames, spaced horizontally apart from one another, wherein the work platform is arranged between the advanced guard rails and surrounded on all sides by a safety rail at said distance X above the work platform defined by a rung of each respective end frame and a horizontal member of each respective guard rail.

[0017] Advantageously, the at least one deck is removable and securable at each end to another rung of a respective end frame or a horizontal member of a respective guard rail.

[0018] Preferably, the access tower comprises a plurality of advanced guard rails arranged between the end frames, wherein the lowermost horizontal member of a first advanced guard rail is spaced from the uppermost horizontal member of a second advanced guard rail by said distance X.

[0019] Conveniently, said distance X is 500mm.

[0020] Another aspect of the present invention provides a method of erecting an access tower comprising:

providing two end frames, each comprising a pair of generally vertical stiles connected by a plurality of generally horizontal rungs, the rungs of an end frame being vertically distributed by a distance X, arranging at least one advanced guard rail between the two end frames, the advanced guard rail having a frame including a plurality of horizontal members vertically distributed by said distance X, the advanced guard rail further having a hook provided at each respective corner of the frame, receiving a respective rung of a respective end frame within each hook, such that at least one advanced guard rail is arranged between the end frames such that the horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

[0021] Preferably, the method further comprises:

securing at least one deck at each end to a rung of a respective end frame or to a horizontal member of a respective advanced guard rail, to create a substantially horizontal work platform.

[0022] Conveniently, the method further comprises:

removing said at least one deck and re-securing said at least one deck at each end to another rung of a respective end frame or to another horizontal member of a respective advanced guard rail.

[0023] Another aspect of the present invention provides an advanced guard rail, comprising a frame including a plurality of horizontal members vertically distributed

by distance X, the advanced guard rail further having a hook provided at each respective corner of the frame to receive a respective rung of a respective end frame in use, the advanced guard rail being operable such that, when secured between two end frames, in use, said horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

[0024] Preferably, the frame further includes two outer vertical members, to which the plurality of horizontal members are secured at each end.

[0025] Conveniently, the frame further includes two inner vertical members, spaced inwardly from the outer vertical members.

[0026] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying figures, in which:

Figure 1 shows a PRIOR ART access tower incorporating a known advanced guard rail;

Figure 2 shows the PRIOR ART advanced guard rail of Figure 1;

Figure 3 shows an access tower embodying the present invention;

Figure 4 shows the access tower of Figure 3, wherein the deck has been moved; and

Figure 5 shows an advanced guard rail embodying the present invention.

[0027] Figure 3 illustrates an access tower 1 in accordance with the present invention. The access tower 1 comprises two end frames 2. Each end frame 2 is comprised of a number of end frame sections 3, which are interconnected so as to define an end frame 2 of a desired height. Each end frame section 3 comprises a pair of vertical stiles 4, interconnected by a plurality of horizontal rungs 5. The stiles 4 of one end frame section 3 are connectable to the respective stiles of another end frame section 3 by way of a spigot and socket connection 6.

[0028] The rungs 5 of an end frame section 3 are vertically spaced at regular intervals ("pitch") by a distance X. The distance X is preferably 500 mm. Each end frame section 3 is configured such that, when two end frame sections 3 are connected to one another, the spacing between the uppermost rung 5 of the lower end frame section 3 and the lowermost rung 5 of the upper end frame section 3 is equal to distance X. As a consequence, the rungs 5 of an end frame 2 collectively have a substantially identical pitch - of distance X.

[0029] As shown in Figure 3, each end frame section 3 of at least one end frame 2 comprises an integral ladder section 7. A wheel 8 is connected to the bottom of each stile 4 of the lower end frame section 3. Although the end frames 2 of the access tower 1 shown in figure 3 both comprise two end frame sections 3 of different heights

(one with four rungs; the other with two rungs), this is not essential. The end frame sections 3 could be identical in height (four rungs). A user may use the end frame sections 3 to configure a tower of any desired height.

[0030] The two end frames 2 are connected to one another at their lower ends by a plurality of horizontal 9 and diagonal 10 braces, which connect to either the stiles 4 or rungs 5 of the end frames 2.

[0031] Two decks 11 are provided between the end frames 2, engaged with the horizontal rungs 5. One deck 11 may comprise a hatch, as is known in the art. Indeed, there may be only one deck 11 provided, either of the width shown in Figure 3 or of wider width to extend substantially between the two stiles. The end frames 2 may be of any width, such as the 'double-deck' width in Figure 3, or the 'single-deck' width in Figure 1.

[0032] The access tower 1 further includes an advanced guard rail 12 embodying the present invention (two are shown, one of which is shaded for clarity).

[0033] With reference to Figure 5, the advanced guard rail 12 comprises an upper horizontal member 13, a lower horizontal member 14 and two intermediate horizontal members 15, 16. Further, the advanced guard rail 12 comprises two outer vertical members 17 and two inner vertical members 18.

[0034] The upper 13, lower 14 and intermediate 15, 16 horizontal members are spaced apart such that the members 13, 14, 15, 16 are equally distributed by distance X. The outer vertical members 17 are connected to the upper 13, lower 14 and intermediate 15, 16 horizontal members at a point inwards from the distal ends thereof.

[0035] In the embodiment shown, the diameter of the intermediate horizontal members 15, 16 is larger than the diameter of the outer vertical members 17. In one embodiment, apertures are provided at a location inwards from each end of the intermediate horizontal members 15, 16, to receive the respective outer vertical members 17 therethrough.

[0036] The inner vertical members 18 are interconnected between the lower horizontal member 14 and the lowest intermediate horizontal member 15. The inner vertical members 18 are spaced apart from one another at a distance suitable for a user to grasp the inner vertical members 18 by hand in use.

[0037] The upper 13, lower 14 and intermediate horizontal 15, 16 members; and the outer 17 and inner 18 vertical members together define a frame of the advanced guard rail 12. Any connections between the members are made substantially at right angles.

[0038] A hook 19 is provided at each respective corner of the frame, and is configured to receive a rung 5 of a respective end frame 2 therein (See figure 3). The hooks 19 are preferably the same as those disclosed in GB2475118.

[0039] As will be noted from Figure 3, wherein the advanced guard rail 12 is arranged between the end frames 2, the horizontal members 13, 14, 15, 16 are all aligned with the rungs 5 of the adjacent end frames 2.

[0040] Preferably, as shown in Figure 3, two advanced guard rails 12 are used, each connected to a respective stile 4 of a respective end frame 2. Accordingly, the advanced guard rails 12 and end frames 2 collectively define the space envelope of the access tower 1. Accordingly, the deck 11 is surrounded on all sides, creating a safe working environment.

[0041] As shown in Figure 3, a safety rail surrounds the deck 11 on all sides, at a distance X above the deck 11, defined by a rung 5 of each respective end frame 2 and a horizontal member 15 of each respective guard rail 12. The rungs 5 and horizontal members 15 are arranged in a horizontal plane, which is parallel to the work platform and spaced therefrom by a distance X.

[0042] With reference to Figure 4, a benefit of the present invention is that even when the deck(s) 11 is/are moved and secured to any other rungs 5 of the end frames 2, a respective horizontal member 13, 14, 15, 16 of the advanced guard rail 12 and a respective rung 5 of the end frames 2 still define a safety rail at a distance X from the work platform. It will be noted from Figure 4 that the decks 12 are located adjacent the lowest horizontal member 14 of the advanced guard rails 12. Equally, the decks 12 could be positioned higher with respect to an advanced guard rail 12, such as adjacent the highest horizontal member 13, since the lower horizontal member 14 of the adjacent advanced guard rail 12 will then provide a safety rail.

[0043] The access tower 1 according to the present invention therefore offers an entirely flexible system, since the decks may be moved anywhere in the tower without needing to move the advanced guard rails.

[0044] Although it is preferred that a deck 11 is secured to the rungs 5 of an end frame 2, it is of course possible for the deck 11 to be secured to the horizontal members 13, 14, 15, 16 of the advanced guard rail 12. Different decks 11 within the access tower 1 may be secured to a combination of the rungs or horizontal members.

[0045] In an embodiment of the access tower 100, shown in Figure 4, multiple advanced guard rails 12 are provided. The lowermost horizontal member 14 of a first advanced guard rail 12 is spaced from the uppermost horizontal member 13 of a second advanced guard rail 12 by said distance X.

[0046] Consequently, substantially the whole height of the access tower 100 is surrounded by groups of horizontal members 13, 14, 15, 16 and rungs 5 on all sides, equally vertically spaced by distance X, allowing the positioning and repositioning of decks 12 substantially anywhere within the access tower 100. It will be noted that

[0047] Although bracing members are shown in Figure 3 and 4, they are not necessarily needed. The end frames may be connected only by advanced guard rails and decks, such is the flexibility, stability and rigidity of the access tower according to the present invention.

[0048] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are

included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

[0049] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. An access tower comprising:

two end frames, each comprising a pair of generally vertical stiles connected by a plurality of generally horizontal rungs, the rungs of an end frame being vertically distributed by a distance X,

at least one advanced guard rail arranged between the two end frames, the advanced guard rail having a frame including a plurality of horizontal members vertically distributed by said distance X, the advanced guard rail further having a hook provided at each respective corner of the frame, each hook receiving a respective rung of a respective end frame, wherein the at least one advanced guard rail is arranged between the end frames such that each of the horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

2. An access tower according to claim 1, comprising at least one deck secured at each end to a rung of a respective end frame or to a horizontal member of a respective advanced guard rail, to create a substantially horizontal work surface.

3. An access tower according to claim 2, having two advanced guard rails arranged between the end frames, spaced horizontally apart from one another, wherein the work surface is arranged between the advanced guard rails and surrounded on all sides by a safety rail at said distance X above the work platform defined by a rung of each respective end frame and a horizontal member of each respective guard rail.

4. An access tower according to any of claims 2 and 3, wherein the at least one deck is removable and securable at each end to another rung of a respective end frame or a horizontal member of a respective guard rail.

5. An access tower according to any preceding claim,

comprising a plurality of advanced guard rails arranged between the end frames, wherein the lowermost horizontal member of a first advanced guard rail is spaced from the uppermost horizontal member of a second advanced guard rail by said distance X.

6. An access tower according to any preceding claim, wherein said distance X is 500mm.

7. A method of erecting an access tower comprising:

providing two end frames, each comprising a pair of generally vertical stiles connected by a plurality of generally horizontal rungs, the rungs of an end frame being vertically distributed by a distance X,

arranging at least one advanced guard rail between the two end frames, the advanced guard rail having a frame including a plurality of horizontal members vertically distributed by said distance X, the advanced guard rail further having a hook provided at each respective corner of the frame,

receiving a respective rung of a respective end frame within each hook, such that at least one advanced guard rail is arranged between the end frames such that each of the horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

8. A method according to claim 7, further comprising:

securing at least one deck at each end to a rung of a respective end frame or to a horizontal member of a respective advanced guard rail, to create a substantially horizontal work platform.

9. A method according to claim 8, further comprising:

removing said at least one deck and re-securing said at least one deck at each end to another rung of a respective end frame or to another horizontal member of a respective advanced guard rail.

10. An advanced guard rail, comprising a frame including a plurality of horizontal members vertically distributed by distance X, the advanced guard rail further having a hook provided at each respective corner of the frame to receive a respective rung of a respective end frame in use, the advanced guard rail being operable such that, when secured between two end frames, in use, said horizontal members of the advanced guard rail are substantially aligned with the rungs of the adjacent end frames.

11. An advanced guard rail according to claim 10, where-

in the frame further includes two outer vertical members, to which the plurality of horizontal members are secured at each end.

12. An advanced guard rail according to claim 11, where- 5
in the frame further includes two inner vertical mem-
bers, spaced inwardly from the outer vertical mem-
bers.
13. An access tower, method or advanced guard rail 10
substantially as hereinbefore described with refer-
ence to the figures.
14. Any novel matter or combination thereof hereinbe- 15
fore described.

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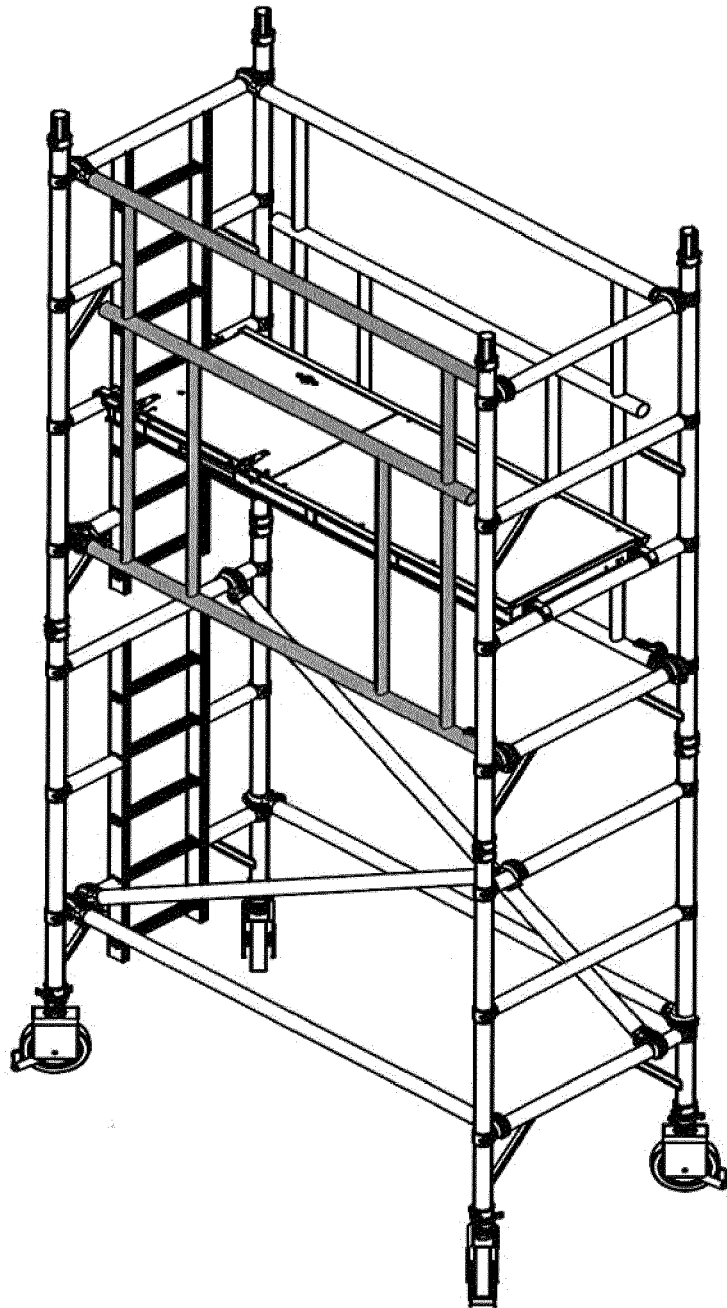


Figure 1
(PRIOR ART)

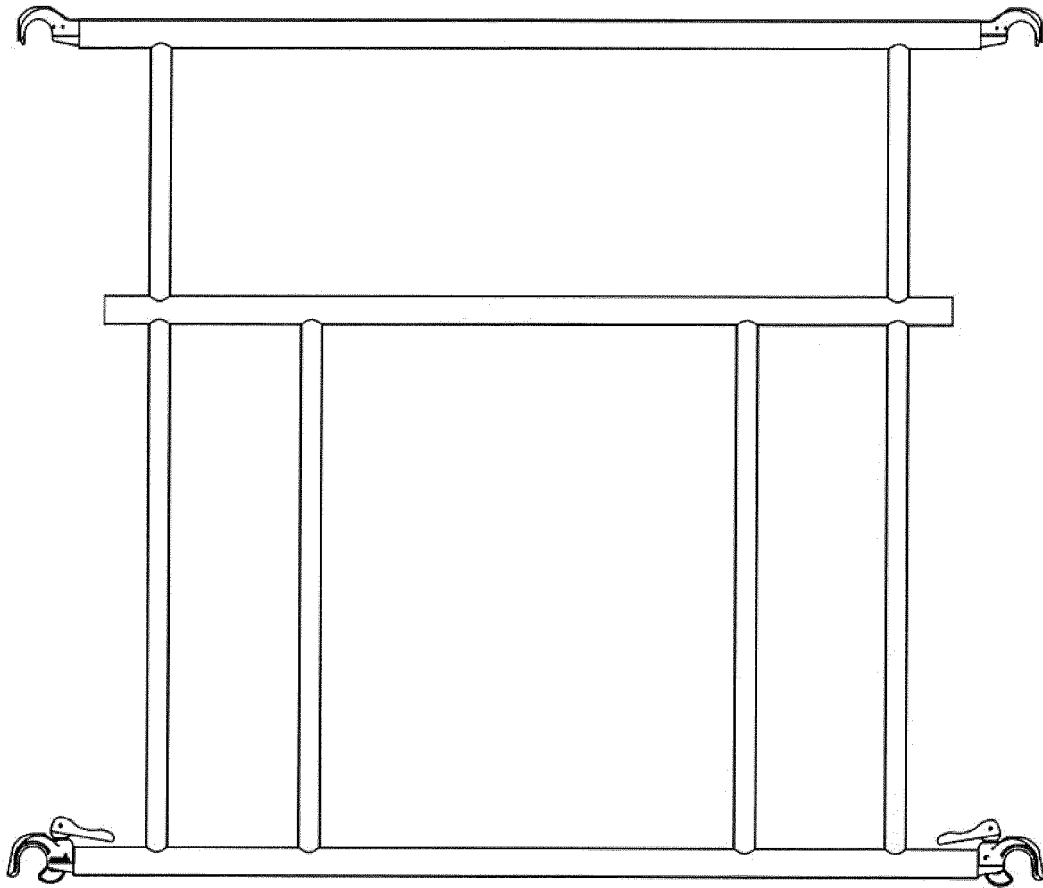


Figure 2
(PRIOR ART)

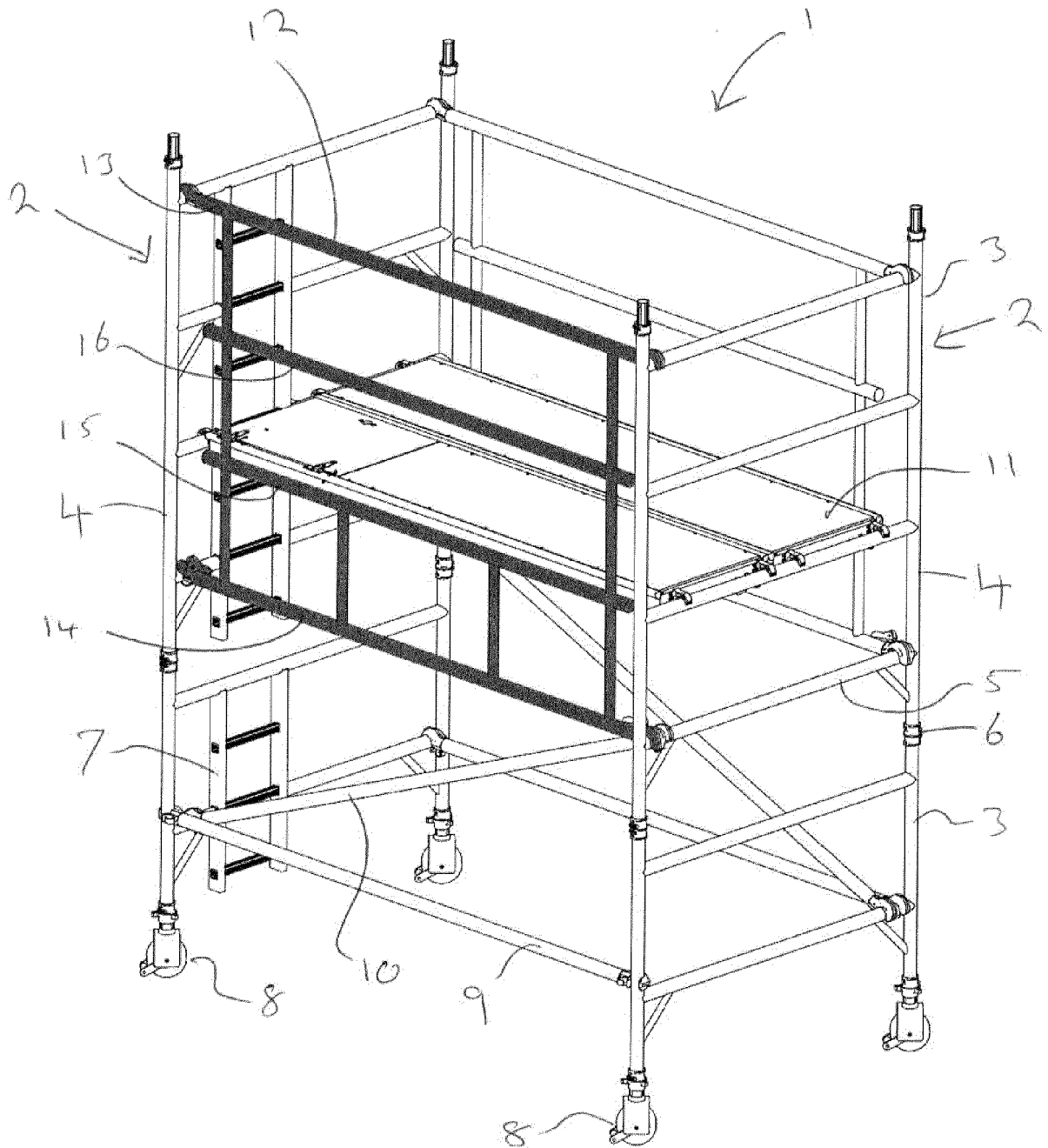


Figure 3

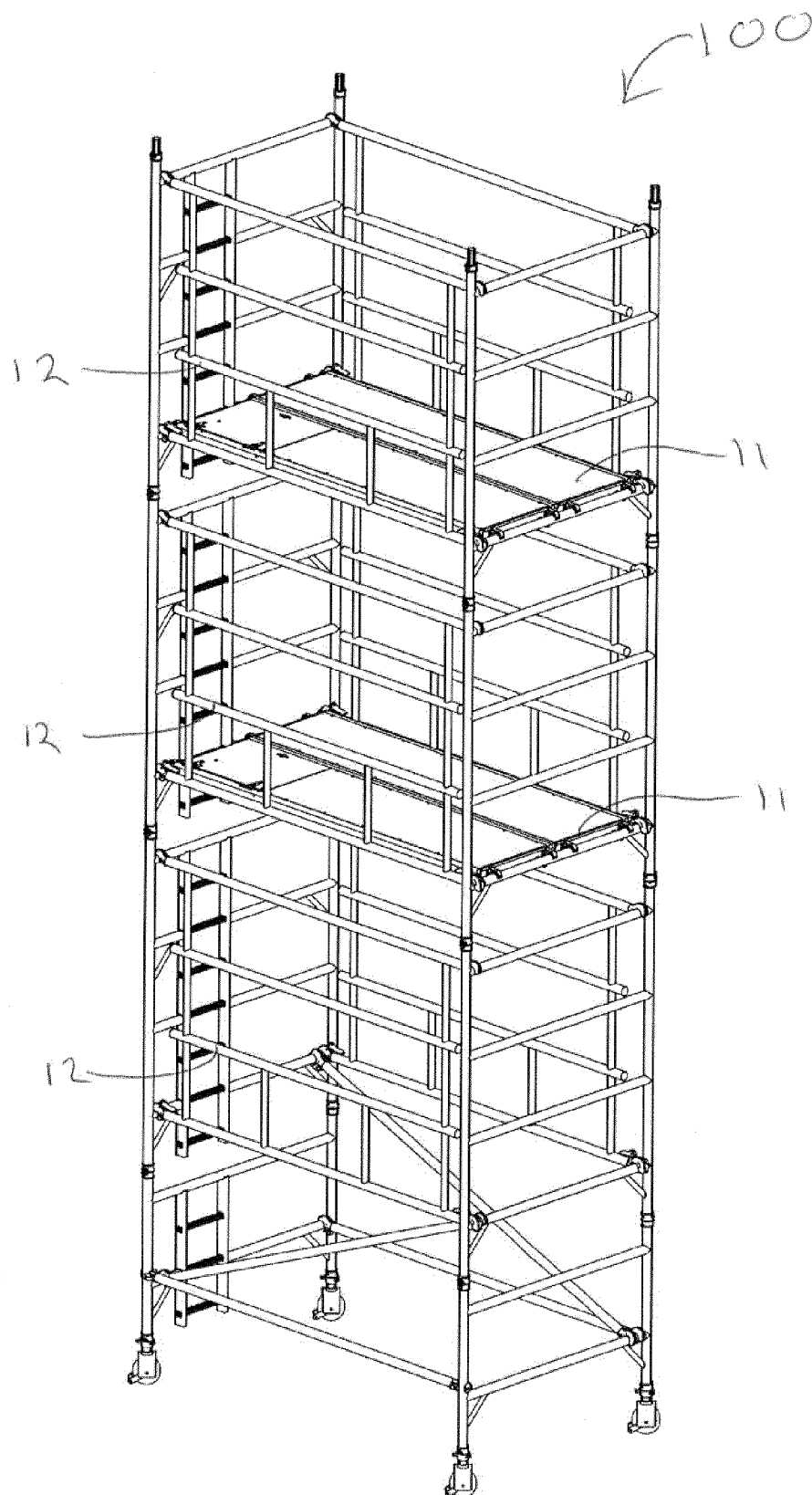


Figure 4

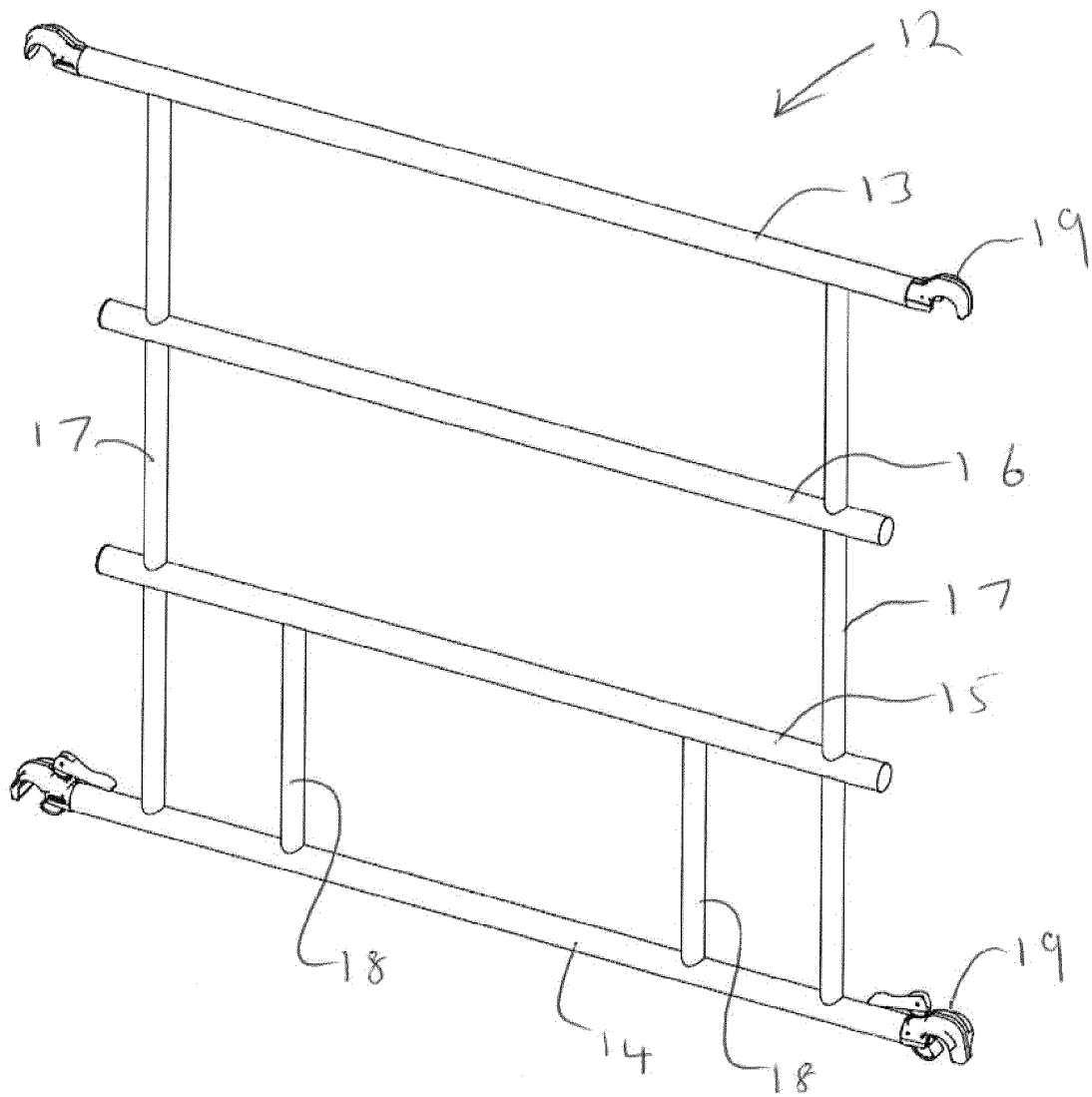


Figure 5

REFERENCES CITED IN THE DESCRIPTION

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