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(54) **Support structure for wall formwork**

(57) The structure is of the type which has an upper console with the support for the wall formwork panels, a main work platform and safety rail, as well as a lower console equipped with a walkway platform and arms for connection to the upper console, characterised in that the lower console is composed of a minimum of one rigid portion or module connected to the platform of the upper console and one or more successive portions or modules articulated to one another, with vertical arms on the part adjacent to the wall and on the part opposite thereto, to form substantially parallelepiped cage structures, the height of which is limited to a predetermined value to prevent risks of falls.

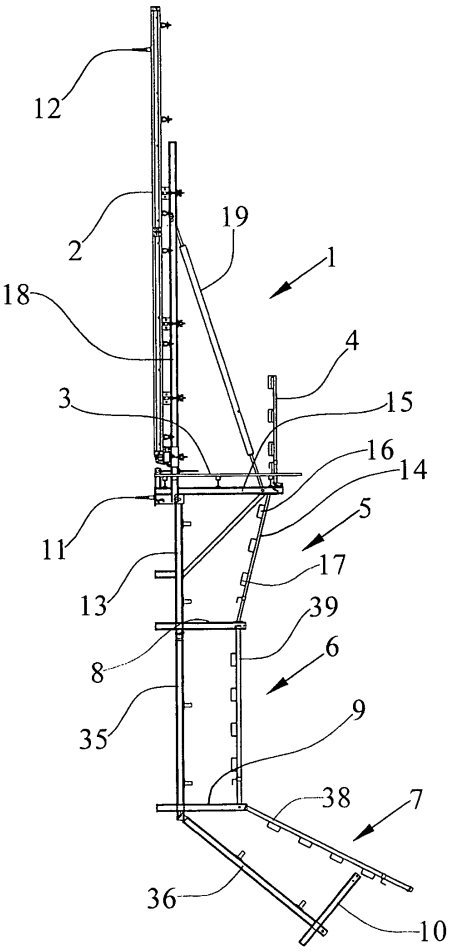

FIG.1

EP 1 990 482 A2

Description

[0001] The present invention relates to a suspended support structure for wall formwork which leads to substantial advantages over what is currently known.

[0002] Suspended structures for wall formwork are to provide means enabling operators who construct formwork to do so as the wall is being built, thereby increasing the height thereof. In the case of high walls, double-type structures are used, which allow elevated heights for manipulating the formwork to be achieved. Apart from their work platform or upper "console", said structures have a substantial projection on the lower part or second "console", allowing work to be carried out on portions of the wall which are located below the work platform. However, these types of structures display a particular problem due to their large dimensions which hamper the mounting of the structure onto the building work by means of lifting cranes, particularly in the initial stage when hoisting the structure off the ground, where it has been assembled, into its position so that it can begin its work. Given the size of the structure with the double console, the operation of lifting is complicated due to the inadequate transverse rigidity of said structure, which is simply to be coupled, via suspension, to the wall which is being progressively concreted.

[0003] The present invention is also intended to cover important safety aspects of the currently known double consoles, since, on reaching substantial heights of approximately 6 metres, the part of the structure below the work platform itself presents safety problems for operators who have to work on it and who possibly have to move from the work platform to the said lower platform, since a height of 6 metres can be dangerous should a member of the workforce fall therefrom.

[0004] To solve the said problems, the present invention is based on forming the part of the structure which is located below the work platform by means of a plurality of shorter portions, of 2 metres for example, an auxiliary work platform being located on each one and said portions being articulated to one another, in such a way that the rear part of each portion, in other words the part adjacent to the wall being constructed, to which the auxiliary work platform is fixed, is articulated at the upper end and lower end, whilst the front part of each portion is, in the initial stage, detached at its lower part and articulated at its upper part, thereby allowing free movement and adaptation of the entire structure in the stage of lifting from the horizontal position to the vertical or suspended position. Once in the vertical position, the lower ends of the front elements of each portion of the structure are fixed together, rendering the assembly rigid and leaving the structure with the double console ready for routine work, with a main work platform and a plurality of auxiliary platforms, preferably three, one for each of the lower portions which is approximately 2 metres in height.

[0005] In a preferred embodiment of the invention, the upper part of the console, which supports the formwork panels, is displaceable in order that the formwork panel assembly can be displaced backwards, and away from the part of the wall which has already set, and forwards, in order to take up the working position. Said formwork panels are also vertically displaceable, for the purpose of adjusting the working position thereof.

[0006] For a better understanding, a preferred embodiment of the present invention is illustrated, by way of an explanatory but not limiting example, in the accompanying drawings, in which:

Fig. 1 is a lateral elevation of the set of elements of the support structure for wall formwork according to the present invention, with a main platform and three portions, the two lower portions being articulated.

Fig. 2 is a front view of the elements shown in Fig. 1.

Fig. 3 is a perspective view of a structure corresponding to Figs. 1 and 2, an auxiliary platform being omitted for the sake of greater clarity.

Figs. 4 and 5 are lateral and perspective views respectively of an element of the lower portion which can be coupled to the work platform of the structure, with a support post for the safety rail.

Fig. 6 is a perspective view of part of an element such as is shown in Figs. 5 and 6, with the post for carrying the safety rail in the collapsed position.

Fig. 7 is a view identical to Fig. 6 but with the post for carrying the safety rail raised.

Fig. 8 shows a detail of the means for locking the post for carrying the safety rail and the platform.

Fig. 9 shows a detail of the arrangement of means for adjusting the formwork panel vertically and horizontally.

[0007] As shown in the figures, the support structure for wall formwork according to the present invention comprises an upper module 1 for carrying the panels 2 for wall formwork and a work platform 3 as well as posts 4 for safety rails, said module extending downward into a plurality of portions or modules articulated to one another and disposed one after the other, as indicated by reference numerals 5, 6, and 7, each of which is approximately 2 metres high and has an auxiliary work platform, indicated by reference numerals 8, 9 and 10 respectively. The entire structure is to be suspended on the wall, as the wall sets. For this purpose, anchors, for example 11 and 12, are fixed to the wall, thereby allowing the structure to be suspended by said anchors.

[0008] According to the invention, the structure portions or modules 5, 6 and 7 have a predetermined height of approximately 2 metres, for example, to prevent risks of falls and thereby improve safety in each portion, since the height of each does not pose any particular danger for staff with regard to a having a fall, which does happen with current portions which are up to 6 metres high.

[0009] In order to easily lift the structure off the ground, once it has been formed in its entirety, modules 6 and 7 at least are articulated to the front and rear platforms

which correspond thereto. In this way, the structure can be easily lifted by means of a crane, said modules being articulated to one another. The front elements of each module are fixed once the structure has been vertically positioned, as will be explained in more detail hereinafter.

[0010] Each of the modules 5, 6 and 7 is in the form of a cage, which, in the case of module 5 is formed by a minimum of two end elements, as shown in Fig. 1, formed by a rear arm 13 which is adjacent to the wall, a front arm 14 opposite the wall and the support 15 for the main or work platform and the lower support 8 for an auxiliary platform. The arm 14 carries supports 16 and 17, in a variable number, to incorporate safety rails. The upper module 1 has a frame 18 for supporting the formwork panel or panels 2, said frame 18 being swivel-mounted about a lower pivot point by action of an adjustable brace 19 incorporated between the support 15 and the said frame 18. In this way, the formwork panel assembly 2 can be easily detached from the wall, which has already set, to begin a new cycle of lifting the structure supporting the formwork panels to a more elevated position. The frame 18, together with the panels 2, can be displaced vertically and horizontally so as to be positioned exactly vertically, allowing them to possibly overlap the already built wall as well as achieve sufficient pressure to seal the lower part of the formwork panels, facing the part of the wall which has already set. This can be seen in the figures and in particular in Fig. 9, which shows the threaded screw 30 for horizontal displacement and immobilisation, which can be displaced horizontally and push on the formwork panel 2, which has the vertical plate 31 for frontal coupling thereof to the adjacent part at the upper edge of the concrete wall 32. The arrangement shown in the figure provides a seal, thereby preventing seepage when the concrete is poured.

[0011] Vertical displacement is achieved by means of the vertical screw 33, which allows the formwork panel 2 and the front plate 31 to be vertically displaced in order to achieve the desired height.

[0012] In Fig. 1, all the most important elements of the different modules which form the structure have been numbered and described in a lateral elevation. It must be understood, however, that said modules adopt a three-dimensional cage structure as is shown in the other views, particularly in Figs. 2 and 3, in which the same numerals have been used as in Fig. 1, numerals with primes designating the elements in a symmetrical arrangement in each module. Thus, for example, the back arms of module 5 are designated by 13 and 13', the front arms by 14 and 14', and the position-adjusting braces by 19 and 19', etc.

[0013] Figs. 4, 5, 6, 7 and 8 show construction details of one of the elements of module 5, in other words, the first module located below the support 15 of the platform. The specific embodiment of one of the elements of module 5 comprises support cross-members 8 and 15 for an auxiliary platform and for the main work platform respectively, as well as a rear vertical arm 13 and a front arm 14 carrying supports 16 and 17 for safety rail elements. In a preferred version, elements 8, 13, 14 and 15 are rigidly interconnected by a reinforcing brace in the form of a bar 20, forming a strong frame which, with the arrangement of the corresponding platforms and rail elements, together with another symmetrical component on the other end of the formwork support structure, forms the modular component 5 with a generally cage-like structure, which is the first element below the work platform. The horizontal component 8 extends on the side adjacent to the wall in a projection 21 which abuts the wall and is complemented by another projection 22 at the height at which the brace 20 is fixed and a third upper projection 23, which is an extension of the supporting cross-member 15, and a lower reinforcing plate 24 carrying an angled groove 25 with the rounded vertex directed upwards, carrying a pin 26, which at one end of the groove prevents the support structure from being accidentally disassembled from the formwork, whilst at the other end it allows the structure to move freely and vertically so that it can take up another position at a greater height.

[0014] The cross-member 15 carries the post 4 for supporting the rail elements, in such a way that said post 4 is mounted in an articulated manner on said cross-member 15, having two stable positions, one of them being shown in Figs. 4 and 5, to allow the posts 4 to function as supports for the rail elements and the other being the folded-down position which will be described with reference to Figs. 6, 7 and 8 and facilitates transport and storage.

[0015] Figs. 6 and 7 show the element for a module with a shorter vertical arm 13. However, the collapsible feature of the posts 4 carrying the rail elements is equally valid for this short arm version or for the long arm version shown in Figs 1 to 5. In the embodiment shown, the post 4 is articulated on a pin 27 and has a second opening near to its end with a second pin 28 which can be disposed as shown in Fig 8, for the folded-down position, or can be disposed so as to pass through the opening 29 located near to the end of the cross-member 15, vertically immobilising said arm 4 as shown in Fig. 7.

[0016] The lower modules 6 and 7 are articulated and consist of rear arms 35 and 36, front arms 38 and 39, articulated at their ends as shown, and the auxiliary platforms 8, 9 and 10.

[0017] As previously indicated, the wall formwork support structure is suspended from anchors which are fixed on said wall, for which purpose the adjacent ends of the structure carry plates with recesses for the said anchors. One of said plates 34 is shown in Fig. 5 and equipped with an opening 35, the entrance of which is directed downward and is aligned with the anchors which have been previously fixed to the wall, to suspend the formwork support structure.

[0018] It will be appreciated that many of the elements which have been illustrated in the figures given by way of example refer to individual elements but that, as is

clearly shown in Figs. 2 and 3 in particular, the structure is three-dimensional, a minimum of two elements being provided to support, fix and anchor the platforms.

[0019] The disclosed formwork structure allows simple and rapid construction of the structure which can be safely raised using a crane, the fixing of some of the articulated parts being completed once the structure has been partially raised, avoiding currently existing disadvantages.

[0020] Although the invention has been described in relation to embodiments, it will be appreciated that different variations of the invention which are included within the scope of the present invention are possible if they lie within the definition of said invention in accordance with the following claims.

Claims

1. Support structure for wall formwork, of the type which has an upper console with the support for the wall formwork panels, a main work platform and safety rail, as well as a lower console equipped with a walkway platform and arms for coupling to the upper console, **characterised in that** the lower console comprises a minimum of one rigid portion or module connected to the platform of the upper console and one or more successive portions or modules articulated to one another, with vertical arms on the part adjacent to the wall and on the part opposite the wall for forming substantially parallelepiped cage structures, the height of which is limited to a predetermined value to prevent risks of falls.

2. Support structure for wall formwork according to claim 1, **characterised in that** the portions or articulated modules are approximately 2 metres high.

3. Support structure for wall formwork according to claim 1, **characterised in that** the module of the lower console connected to the main work platform forms a cage structure by means of rigid end elements formed by a vertical arm adjacent to the wall, to which the cross-member for supporting its auxiliary platform is fixed, a brace fixed to the cross-member supporting the work platform and the vertical arm and a front arm connected at its ends to the upper and lower platforms, respectively.

4. Support structure for wall formwork according to claim 1, **characterised in that** the lower part of the main platform adjacent to the wall has an angled groove with the rounded vertex directed upward, carrying a pin which, at one end of the groove, prevents the support structure from accidentally being disassembled from the formwork, whilst at the other end it allows the structure to move freely and vertically in order to take up another position at a greater height.

5. Support structure for wall formwork according to claim 3, **characterised in that** the cross-members supporting the platforms are extended so as to project towards the wall so that the structure rests on the wall.

6. Support structure for wall formwork according to claim 3, **characterised in that** the upper regions of the rigid end elements of the first portion or module are carriers of posts which carry safety rail elements, which posts can be folded down from their operating position to a position adapted to the support of the walkway platform in order to allow them to be stored and transported.

7. Support structure for wall formwork according to claim 6, **characterised in that** the posts carrying the rail elements of the upper console are rotatable about a lower pin which passes through the support of the upper platform and has a second opening which likewise passes through the said support of the upper platform, being able to receive a second pin to keep the post in the upright protective position and being complemented by a third opening of the particular support for the upper platform and post, for receiving the said second pin for immobilising the post in the folded-down position, in order to determine a transport and storage position.

8. Support structure for wall formwork according to claim 1, **characterised in that** the articulated portions or modules of the lower console which carry the auxiliary platforms of the structure have their vertical arms adjacent to the wall articulated at their upper end to the upper module, and the front arms are articulated at their upper ends to the same upper module and are detachable at their lower ends, producing a formwork panel support structure which is articulated in the horizontal position and raised for suspension and is rigid in the working position.

9. Support structure for wall formwork according to claim 1, **characterised in that** the support for the wall formwork panels is rotatable about a lower horizontal axis, so as to allow the formwork to be detached from the already set wall.

10. Support structure for wall formwork according to claim 1 and claim 9, **characterised in that** the support for the wall formwork panels is adjustable in height parallel to the wall and perpendicularly thereto.

11. Support structure for wall formwork according to claim 10, **characterised in that** the setting of the support for the wall formwork panels is adjustable in

height and perpendicularly to the wall by means of respective mechanisms of threaded screws and nuts coupled thereto.

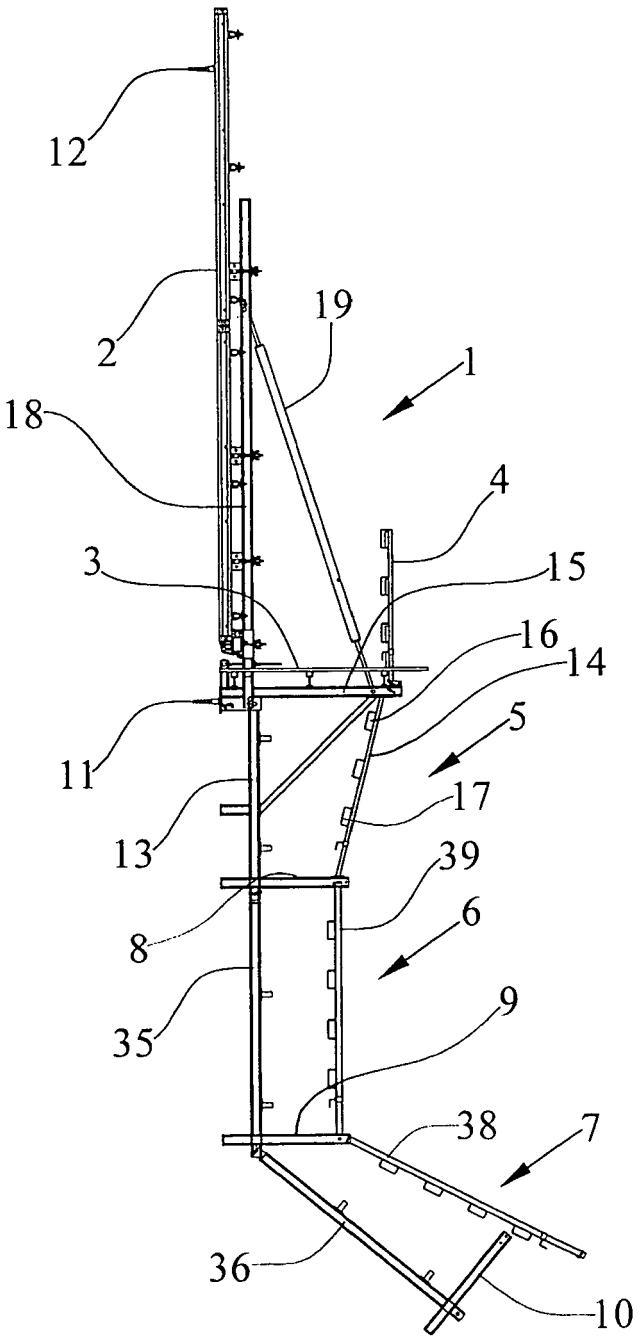

FIG.1

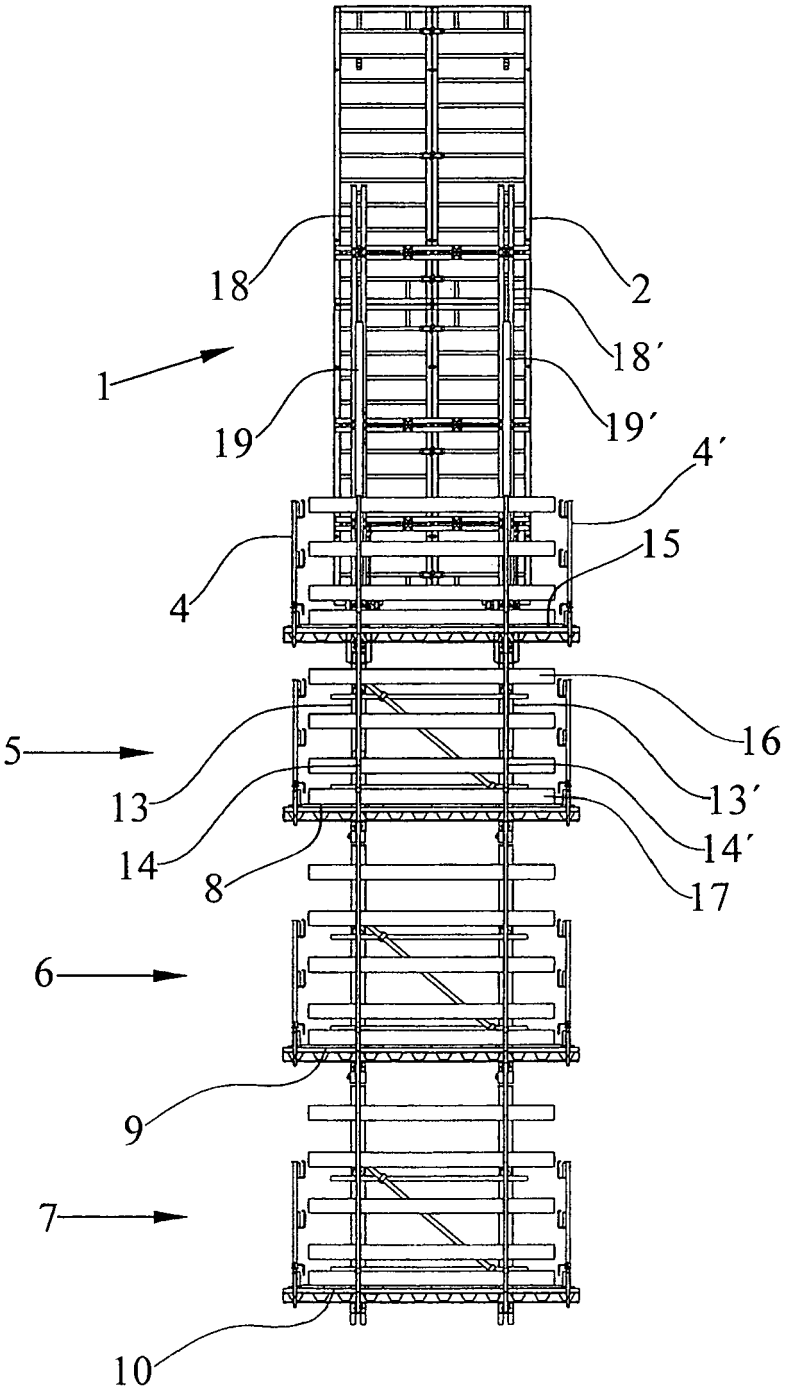

FIG.2

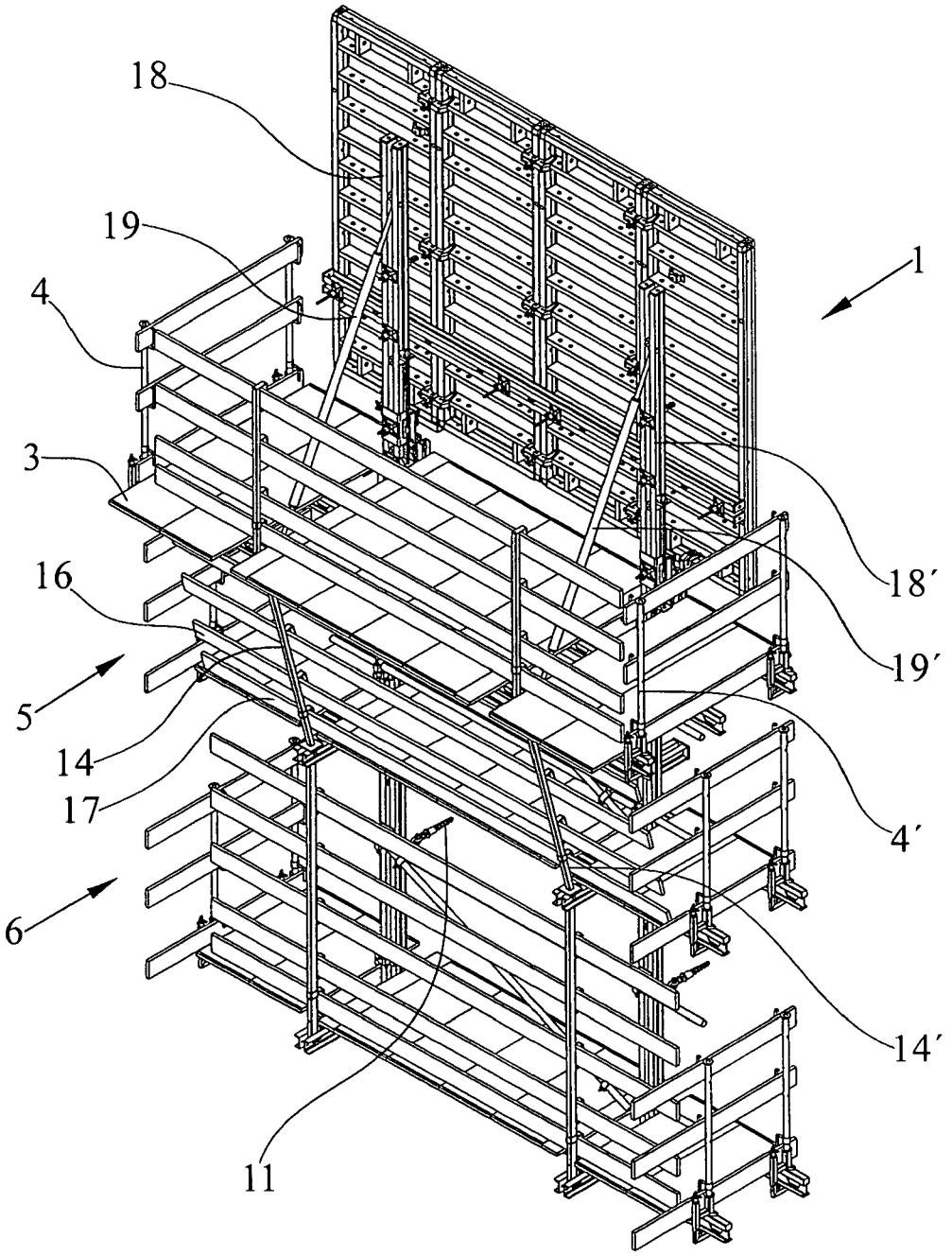

FIG.3

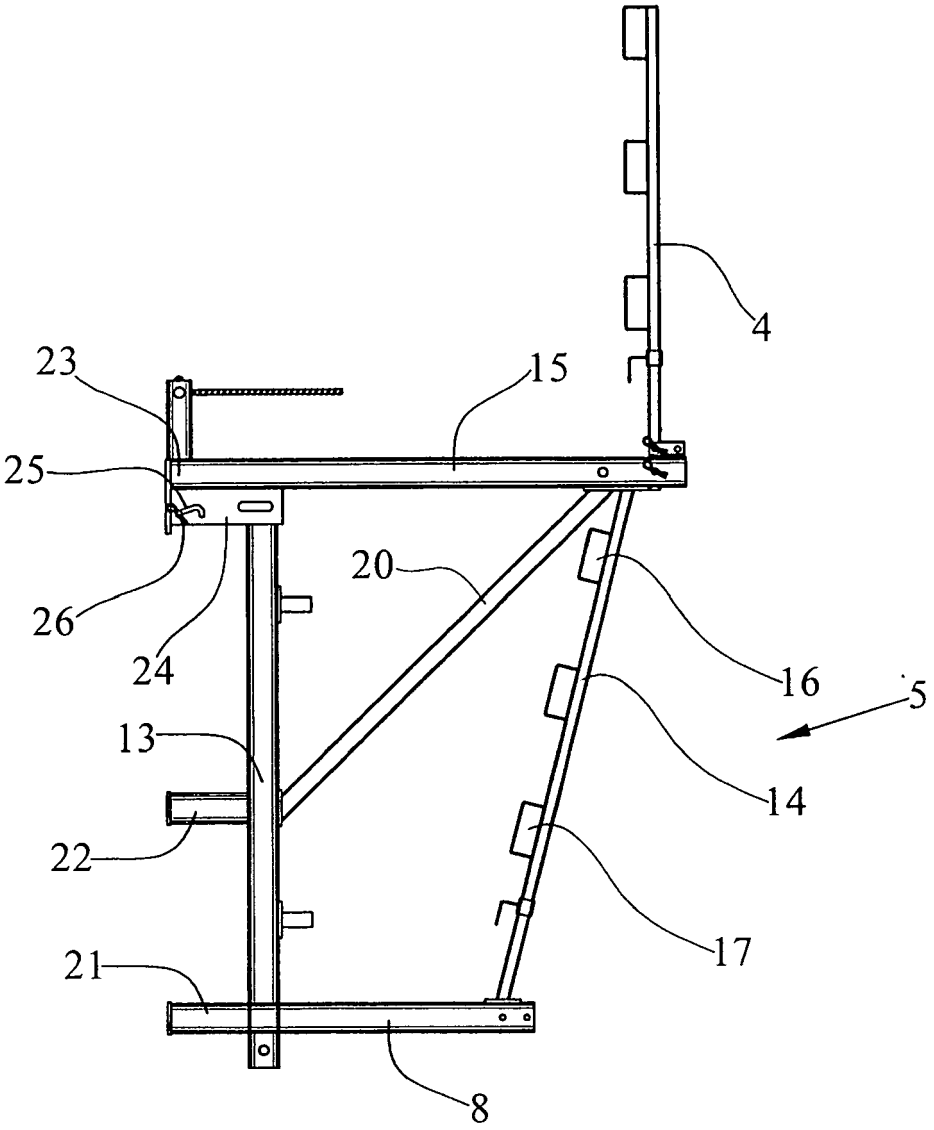

FIG.4

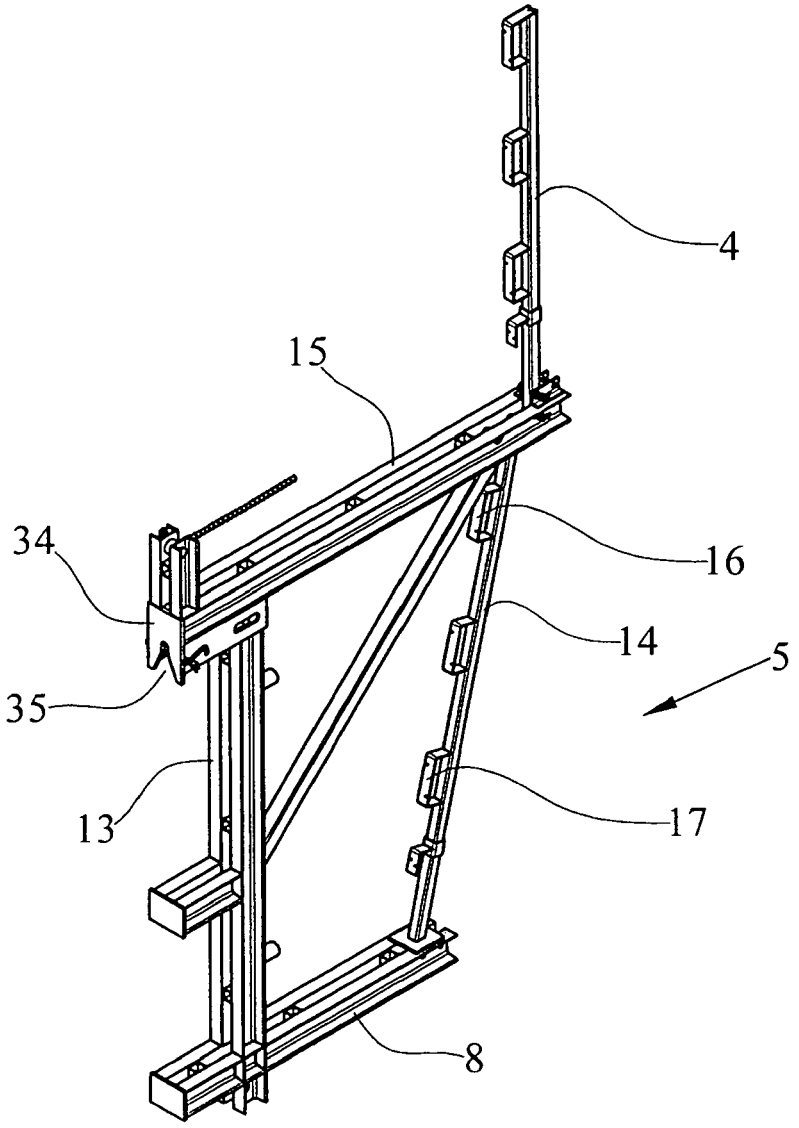

FIG.5

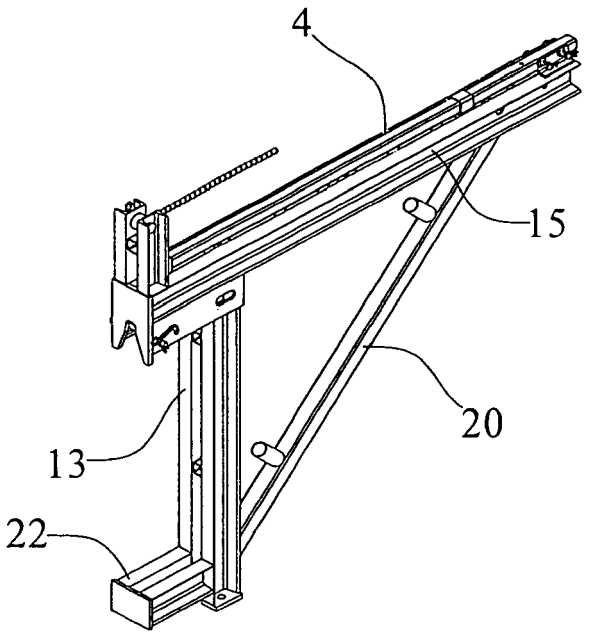

FIG.6

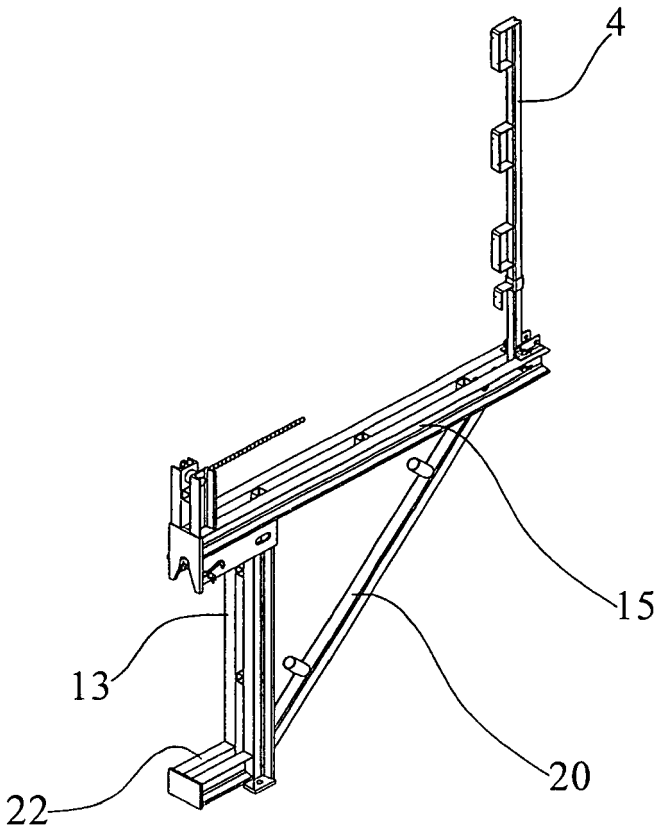

FIG.7

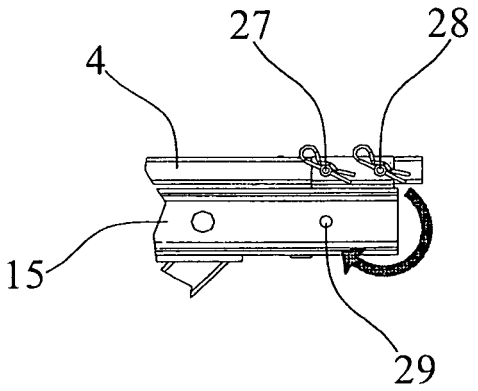

FIG.8

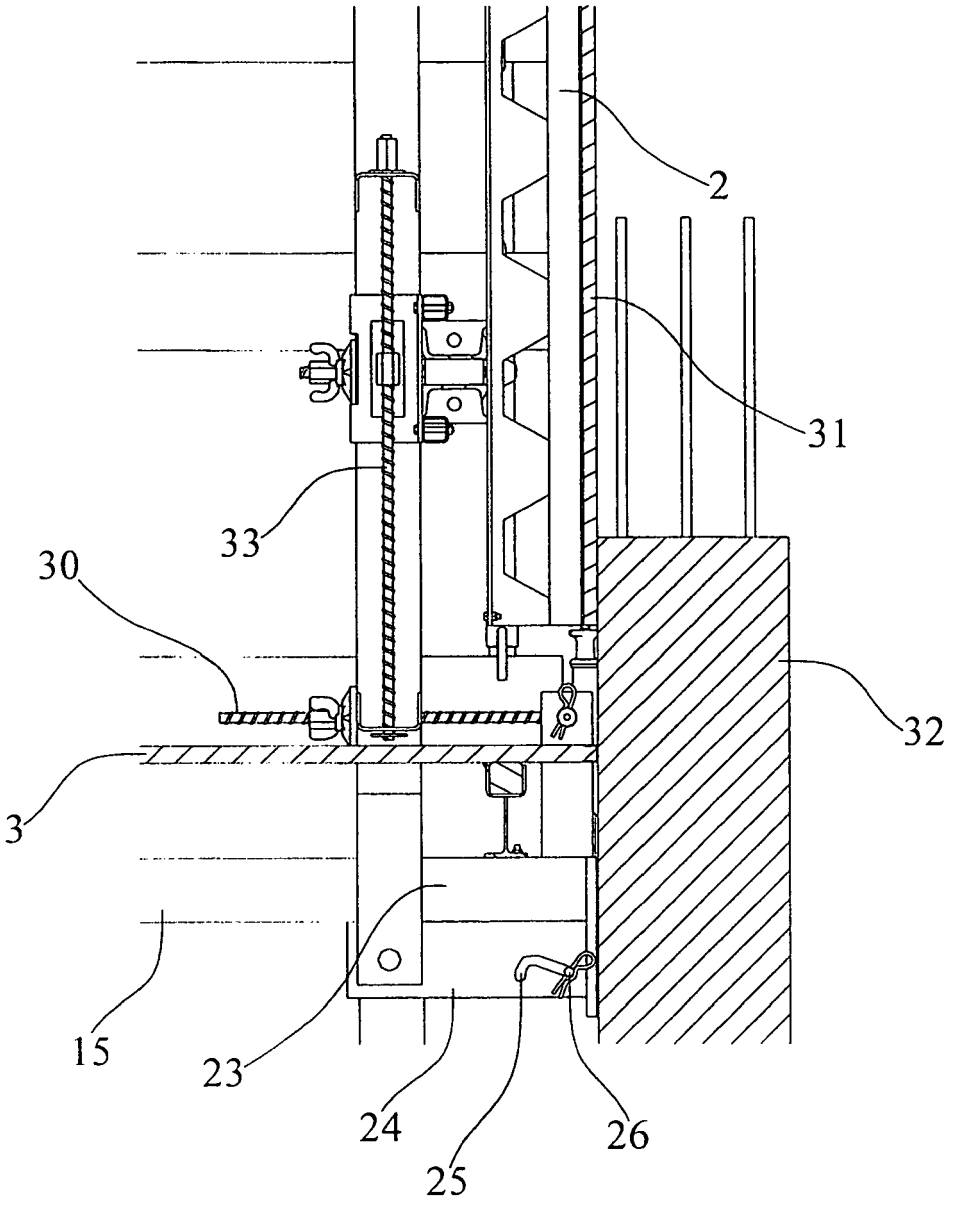

FIG.9