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(54) **DEVICE FOR COLLAPSING TOWERS IN MOVABLE STRUCTURES**

(57) The device is specially designed to facilitate the collapsing of towers (4) in movable structures that are frequently assembled and dismantled, such as, for example, in the field of the staging of events. The invention consists in establishing, on which the tower (4) is to be raised, whilst the remaining, principal sector (4) of the tower and the fixed structure (1), a connecting rod (6) joined in an articulated established, between the principal sector (4) of the tower and the fixed structure (1), a con-

necting rod (6) joined in an articulated manner to both elements, which together with those elements and with, the base (2) forms a deformable quadrilateral. A hydraulic or pneumatic piston (7) extends between the connecting rod (6) and the fixed structure (1) such that, in a retraction situation, it generates the collapsing of the principal sector (4) of the tower on the structure (1), whilst in a situation of maximum extension it positions said tower (4) vertically.

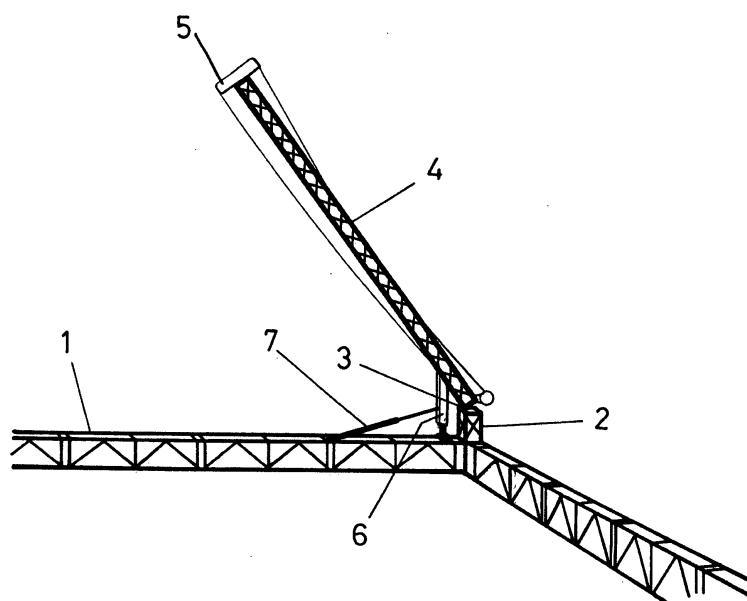


FIG. 4

Description

Object of the Invention

[0001] The present invention relates to a device which has been especially designed to facilitate the lowering of towers, both in its raising and in its lowering, in mobile structures such as for example in structures for services related to show business.

[0002] The object of the invention is to achieve the lowering of said towers quickly, easily and simply, considerably minimizing the risks of accidents during their handling.

Background of the Invention

[0003] Structures are usually used in outdoor events, which structures are temporarily assembled on the ground and in which towers of a considerable height participate, on which towers respective carriages that are able to reach the level determined by the height of the corresponding tower can usually slide, such that these carriages can carry event illumination means, cameras for filming the event, etc.

[0004] These shows are normally not very repetitive, on many occasions there is a single performance in a certain place, such that the lowering of the towers is a constant and virtually daily task.

[0005] In order to carry out these tower handling operations, manual labor is mainly used currently, normally with the help of ten people who pull the tower by both sides thereof, so that the tower passes from the horizontal to the vertical position and vice versa, a solution that is not very reliable and safe and which evidently further needs a considerable participation of manual labor.

[0006] The towers are sometimes also lowered with a trapezoidal system using the motor of the tower, the one for mobilizing the mentioned carriage, in order to pass from the vertical to the horizontal position, a system entailing unacceptable safety risks.

[0007] The lowering system based on pulling the tower with a cord or rope, pulled manually with a small forklift truck, is equally unsafe because said cord frequently slides and even breaks.

[0008] Crane systems are also used to handle the towers, securing them by means of a hook at its upper end, but evidently this solution is very expensive due to the investment or the rental required for said crane.

Description of the Invention

[0009] The device for lowering towers proposed by the invention completely and satisfactorily solves the drawbacks set forth previously, constituting a simple and safe structuring that is easily handled and completely effective.

[0010] To that end and more specifically, said device consists of a lowering part in the form of a connecting

rod linking in a hinged manner the general and basic structure on which the base of the tower is secured with the mobile part of said tower, i.e. with the major part thereof which is joined to the mentioned base in a collapsible manner, such that the base assembly of the tower-general structure, the mobile part of the tower and the connecting rod form a deformable quadrangle allowing the mobile part of the tower to adopt two end positions, a horizontal or lowered position and another vertical position or position of use.

[0011] In order to change the mentioned mobile part of the tower from one position to another, a plunger is provided between the middle area of the mentioned connecting rod and the general structure, the maximum retraction position of which corresponds to the horizontal or lowered position of the mobile part of the tower, whereas its maximum extension position corresponds in turn to the vertical arrangement of the mobile part of the tower.

[0012] The mentioned plunger will preferably be hydraulic, the device having a pressure pump actuated by an electric motor with the usual mains voltage, i.e. with a rated voltage of 220-380 V AC current, but obviously it is possible for the mentioned plunger to be replaced by a "spindle-screw" extension system, in which said spindle will be directly actuated by an electric motor, with virtually no restriction regarding the selection possibilities for the mechanism responsible for tilting the connecting rod or folding part.

Description of the Drawings

[0013] In order to complement the description which is being made and with the aim of aiding in a better understanding of the features of the invention according to a practical embodiment thereof, a set of drawings is attached as an integral part thereof in which the following has been represented with an illustrative and non-limiting character:

Figure 1 shows a schematic side elevational view of a mobile structure and a tower, the latter being assisted by a lowering device object of the present invention, in a horizontal position for the tower.

Figure 2 shows a similar view to that of figure 1 but corresponding to an intermediate lifting phase of the tower.

Figure 3 shows another schematic view similar to those of figures 1 and 2 but in which the tower is fully upright.

Figure 4 shows a perspective view of the real aspect of part of the structure and one of its towers in the intermediate handling position of figure 2.

Preferred Embodiment of the Invention

[0014] The general mobile structure, i.e. a structure that can be lowered and transported, is numbered with (1) in the drawings, which structure participates in as-

semblies for outdoor shows and the like and defining for example a rectangular frame, according to the representation of figure 4, in one or each of the vertexes of which there is arranged the fixed base (2) of the tower, fixed to the structure (1), base (2) projecting in height with respect to the structure (1) and receiving, through a hinging shaft (3), the mobile or lowering part (4) of the tower, which is normally finished at its upper free end in a crosspiece (5) with pulleys or gear rings for transmitting movement to belts or chains actuated by a lower electric motor and allowing the raising and lowering of a carriage that can be used as a work or support platform for different elements to be installed at the height defined by the tower.

[0015] From this basic and conventional structuring and according to the invention, between the general structure (1) and the mobile part (4) of the tower, a connecting rod or lowering part (6) is provided, joined in an articulated manner to the two parts it links and with which, as can be seen in figures 1 to 3, it forms a deformable parallelogram in which two of its sides, the ones corresponding or defined by the general structure (1) and the fixed base (2) of the tower, remain immobile, whereas the two other sides can change positions, specifically they can vary their inclinations from the position shown in figure 1 to the position shown in figure 3, respectively corresponding to the lowered or horizontal situation of the mobile part (4) of the tower and the vertical situation thereof.

[0016] In order to achieve this change of position in mobile part (4) in a comfortable, safe and easy manner, between the middle area of the connecting rod (6) and the general structure (1) there is arranged a plunger (7) which when it is in a maximum retraction condition determines a maximum inclination position for the connecting rod (6) and consequently a horizontal position for the mobile part (4) of the tower, shown in figure (1), whereas as the plunger extends it causes the upward tilting of the connecting rod (6), with a parallel also upward tilting of the mobile part (4) of the tower, as shown in figure 2, up to a limit position which must normally correspond to the maximum extension of said plunger (7), in which the inclination of the connecting rod (6) has surpassed the vertical and has the opposite sign, in which the mobile part (4) of the tower adopts a perfectly vertical arrangement as an extension of its base (2) as shown in figure 3.

[0017] Finally, it must be mentioned that the connecting rod or lowering part (6) and the plunger (7) must evidently be removed while the mobile structure is in its situation of use or transport, to that end the general structure and the tower must incorporate quick coupling/uncoupling means for both the connecting rod and the plunger, the same occurring with these elements between each other, such that a single device can also be used in the multiple towers that can participate in a certain structure.

Claims

1. A device for lowering towers in mobile structures, such as for example in structures related to show business, wherein said towers have a short base rigidly joined to the general structure and to which a major mobile part is joined in a hinged manner and can adopt a vertical arrangement as an extension of its base, or a horizontal lowered position on the general structure, **characterized in that** it consists of a connecting rod or lowering part which is joined in an articulated manner at its ends to the general structure and to the mobile part of the tower, such that with these elements and with the base of the tower it forms a deformable parallelogram, in which in the limit lowered position in which the mobile part of the tower adopts a horizontal position, the connecting rod adopts a pronounced inclined arrangement from which it progressively tilts towards the vertical as the mobile part of the tower also tilts towards the vertical, adopting an inclination in the opposite direction in the limit situation in which said mobile part of the tower is located in a vertical alignment with the base thereof, said connecting rod or lowering part having actuation means thereof in the tilting direction.
2. A device for lowering towers in mobile structures according to claim 1, **characterized in that** said actuation means of the connecting rod or lowering part consist of a plunger arranged between a middle point of the connecting rod and the general structure, joined in an articulated manner to these elements and actuated by a hydraulic pump which is in turn actuated by an electric motor, all of this such that in the maximum retraction situation for said plunger, the mobile part of the tower adopts a horizontal position, whereas in the maximum extension position for the plunger the mobile part of the tower adopts a vertical position.

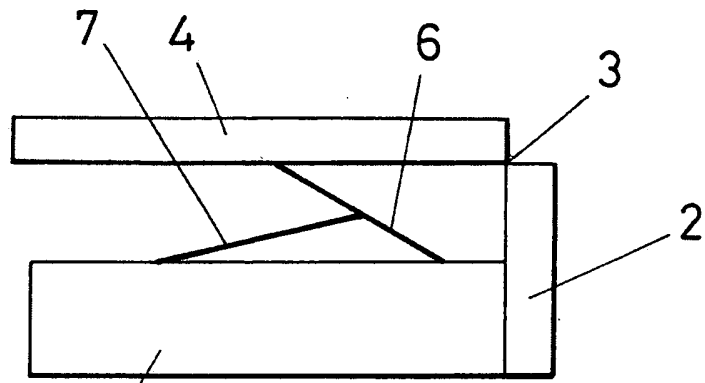


FIG.1

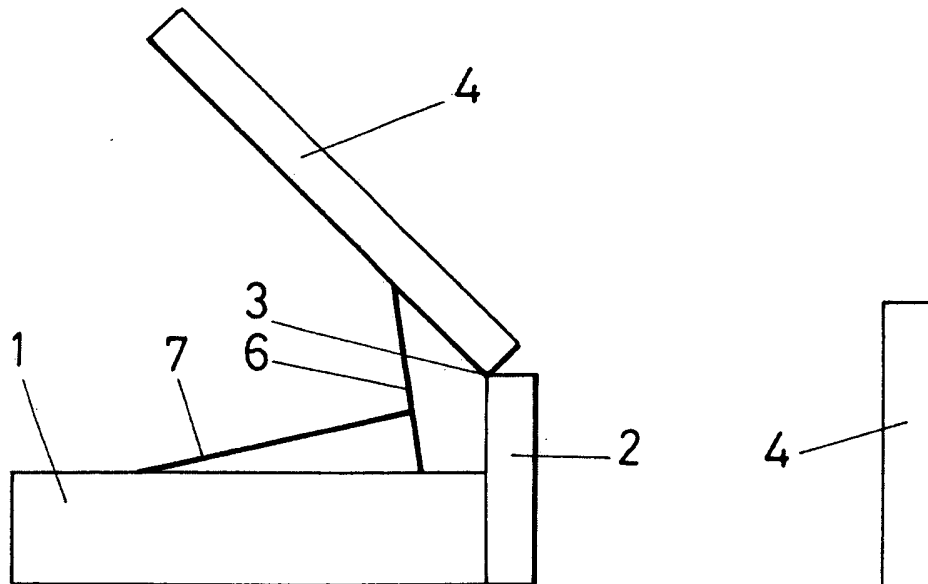


FIG.2

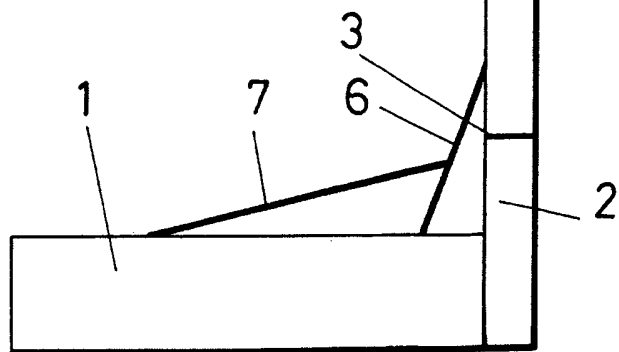


FIG.3

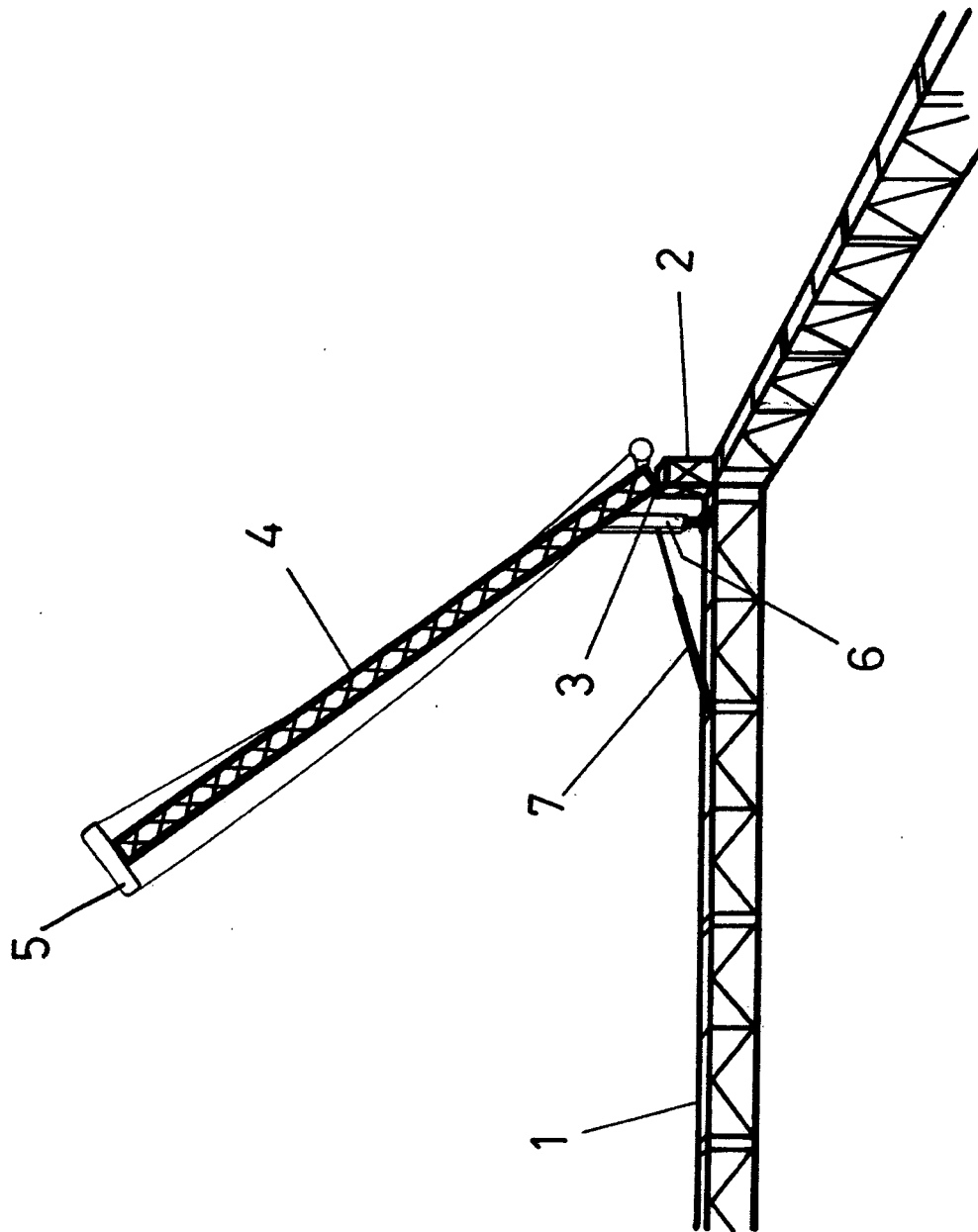


FIG. 4