

[54] METHOD AND SYSTEM OF ERECTING TOWER BUILDINGS

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[22] Filed: **Sept. 24, 1971**

[21] Appl. No.: **183,342**

[30] Foreign Application Priority Data

Sept. 25, 1970 Sweden..... 13079/70

[52] U.S. Cl..... 52/747, 52/749, 52/122, 52/192, 212/34, 212/64

[51] Int. Cl..... E04b 1/00

[58] Field of Search... 187/2, 6; 212/57, 64; 52/747, 52/749, 122

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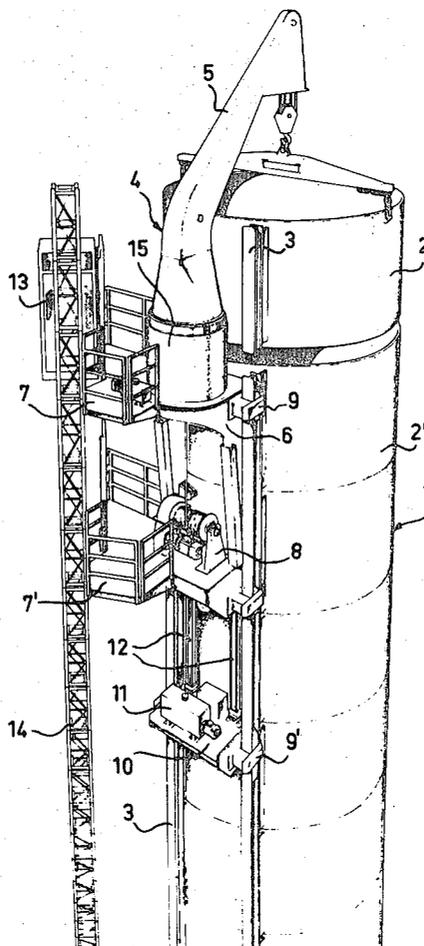
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[57] ABSTRACT

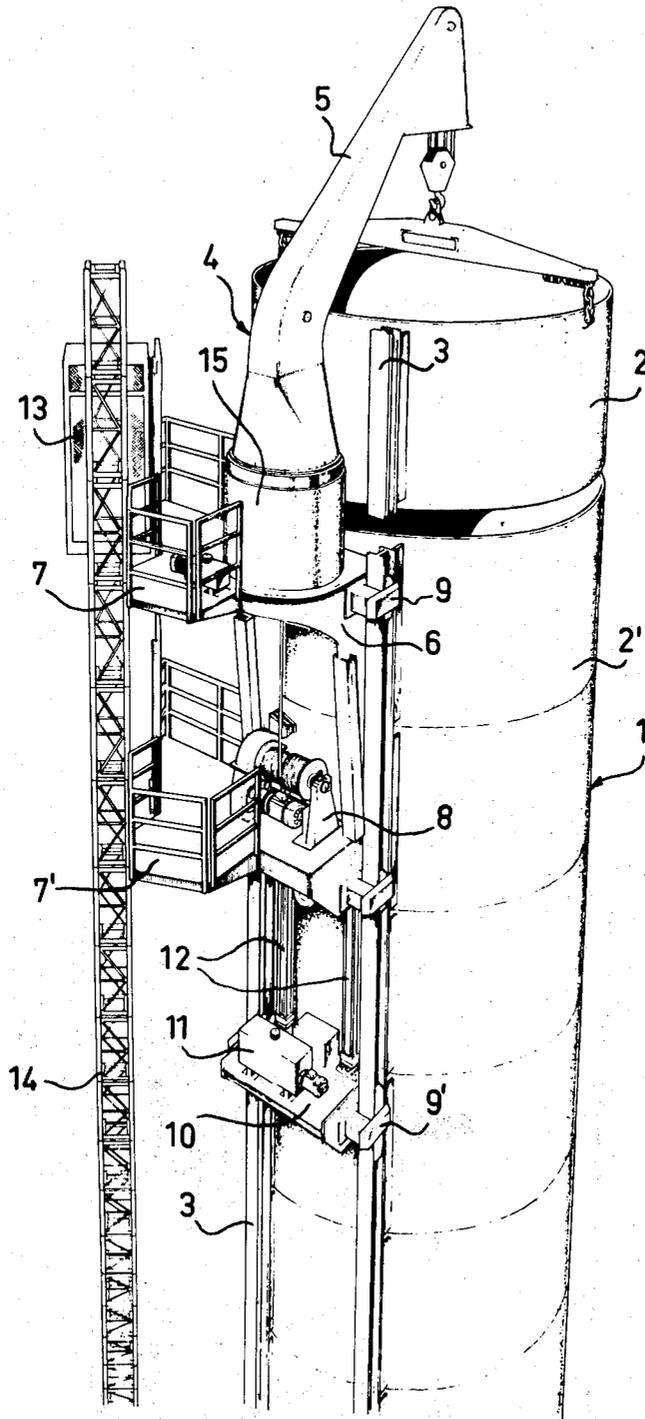
A method and a system of erecting tower buildings from segments of optional cross-sectional shapes to be mounted on top of each other. The object of the method is to facilitate the erection of tall buildings, such as pulp digesters, silos, chimneys and the like, in which mobile cranes cannot be utilized. This object is realized in that each segment is provided with at least one beam or profile member which serves as a guide for the crane used for the mounting of the segments, the beam or profile members on erection of the building are caused to form for the crane a continuous track which is extended as each further segment is mounted, and the crane is so adapted that it can perform a continuous upward climbing movement on the outer side of the building. The system for carrying out the method includes the crane which is adapted to climb upward along the guides on the outer side of the building as the erection of the building progresses. The crane has a bracket structure which is coupled over jack units adjustable in length to a further bracket structure which serves as a movable abutment. Further, latch means are arranged at the two bracket structures to permit the alternate latching thereof to the guides.

1 Claim, 1 Drawing Figure



Patented Feb. 5, 1974

3,789,565



METHOD AND SYSTEM OF ERECTING TOWER BUILDINGS

This invention relates to a method and system of erecting tower buildings from segments of optional cross-sectional shapes to be mounted on top of each other. The system comprises a crane which is adapted to climb upward along guides on the outer side of the building as the erection of the building progresses.

On erection of for instance continuous pulp digesters and other tall buildings such as silos, chimneys etc. so large heights (80 to 100 m or more) are now reached that the mobile cranes available do not as a rule possess sufficient lifting height to permit being used for the mounting of the uppermost portions of the building. Earlier, it was necessary to use a crane for the mounting of pulp digesters, and furthermore a crane fixedly mounted on the digester was required for maintenance work. The latter crane had to be mounted on top of the digester after the digester had been finished, which entailed considerable difficulties particularly at narrow building sites where a mobile crane could be manipulated only with great difficulty.

The disadvantages outlined above as well as a number of other disadvantages are eliminated in that the above mentioned types of buildings are erected according to the method of the present invention with the use of the crane invented for the realization of the method.

The method suggested by the present invention comprises providing each segment with at least one beam or profile member to serve as a guide for a crane adapted to realize mounting of said segments, causing said beam or profile members on erection of the building to form for the crane a continuous track which is extended as each further segment is mounted, and constructing the crane so that it can perform an upward climbing movement on the outer side of the building as the erection of the building progresses.

The system according to the invention comprises a bracket structure carrying the crane and coupled over jack units adjustable in length to a further bracket which serves as an abutment, and latch means so arranged on the brackets as to permit said brackets to be alternately latched to the guides and to be alternately moved upward with the aid of the jack units.

The invention will be more fully described hereinbelow with reference to the accompanying drawing which shows a perspective view of a pulp digester being erected with the use of the crane particularly constructed for that purpose.

In the drawing, 1 generally designates the pulp digester being erected. The digester comprises a number of segments 2 to which are welded H-beams or like elements which serve as guides. The crane which is generally designated 4 includes an arm 5 and is supported on a crane bracket 6. The crane bracket 6 comprises two platforms, the upper 7 carrying the crane 4 and the lower 7' carrying a winch assembly 8 for the crane. The bracket 6 is also provided with sliding shoes 9 running along and engaging the beams or guides 3. The sliding shoes 9 can be latched to the beams or guides 3.

Disposed below the crane bracket 6 is a further separate bracket 10 which serves as an abutment and which is coupled to the crane bracket by means of a pair of hydraulic cylinder and piston lifting units 12. The lower bracket 10 carries a pump unit 11 and is also provided with sliding shoes 9 of the same type as those of the

crane bracket 6. The platforms 7 are supplied by means of a hoist 13 running along a scaffolding 14 laterally of the digester 1.

The erection of the building by means of the crane according to the invention is carried out as follows, starting from the position illustrated in the drawing. A segment 2 of the digester is hoisted and lifted in position by means of the crane 4, which can be swung about its lower portion 15, so that the segment will rest upon the segment 2' earlier mounted. Care is taken at the mounting so that the guide members 3 will register correctly. After that the segment 2 is welded to the segment 2' earlier mounted. When the segment 2 has been so welded in position on the segment 2' the H-beam members 3 constitute a continuous guiding surface throughout the height of the digester. Before the next segment can be lifted in position the crane 4 must be raised. To realize this, the lower bracket 10 is latched in the position shown in the drawing, whereupon the crane bracket 6 is released. Latching is preferable effected in that lock bolts or like means (not shown) operated by pressure medium or electronically and disposed on each sliding shoe 9 are caused to engage with studs, holes or the like formed in the guides. To simplify the running of the requisite cables and pipes a source of pressure medium can be disposed in conjunction with each bracket and the operation of valves and like means for the pressure medium can be operated electronically from a central control panel. The lock bolts may of course be electromagnetically operated, instead of by pressure medium.

When the bracket 10 is thus latched to the guides 3 and the crane bracket 6 is released from the guides, the hydraulic lifting units 12 are operated with the aid of the pump unit 11, the crane bracket 6 being raised in relation to the bracket 10. The lifting units may be dimensioned either in such a way that the requisite lifting height is directly obtained or in such a way that the crane is raised in several steps. After the crane bracket 6 has been raised to a suitable position by means of the lifting units the bracket is latched in position. Latching of the bracket 10 can then be released, whereupon the bracket 10 is caused to rise by means of a lifting unit to a new position corresponding to the position shown, although one segment higher up. A new lifting cycle can then be commenced. To eliminate any risk that the latching of both the crane bracket 6 and the further bracket 10 will be simultaneously released, there is provided a safety device which permits release of one latching only after the other latching or latching has been safely engaged with the beams 3. The safety device can be of such a construction that the electromagnetically operated valves, or the lock bolts for instance of the crane bracket 6, are out of circuit in latched position and can be supplied with current to release the latching only when the lock bolts of the further bracket 10 have taken the correct position, securely latching said bracket.

After finished erection of the pulp digester the crane 4 can be welded or otherwise fastened to the uppermost part of the pulp digester for use in performing future maintenance and repair work. The details required for the climbing movement which are not needed any more after the pulp digester has been finished, are dismounted and can be used for the erection of other similar structures. It will be readily understood by those skilled in the art that the method and system according

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to the invention can be used also for the erection of lifting cranes or like implements.

What I claim and desire to secure by Letters Patent is:

1. A method for erecting a self-supporting tower-like building structure composed of a plurality of superimposable segments, each segment being provided with a vertically extending track secured to its outer periphery for guiding a crane and an associated lifting means for raising the crane to elevated positions along the track, said crane and lifting means being separately movable along the track, comprising mounting at least one of the segments with its attached track at the lowermost position and at the desired location, mounting the crane and lifting means on the track of the at least one lowermost segment with the crane above the lifting

means, locking the crane to the track, raising another segment of the building structure with its attached track by the crane onto the previously erected at least one segment so that the track thereon is coextensive and aligned with the track of the erected segments, securing the new segment to the at least one lower segment, locking the lifting means on the track, raising the crane along the track by the locked lifting means a distance substantially equal to the vertical height of the new segment, locking the crane on the track at its new raised position, unlocking the lifting means, raising the lifting means to a position beneath the crane substantially equal to the original distance therebetween, the repeating the steps until the erected building structure has been completed.

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