Sept. 16, 1969 P. DURAND 3,466,723

METHODS FOR ERECTING TOWER CRANES

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FIG. 1

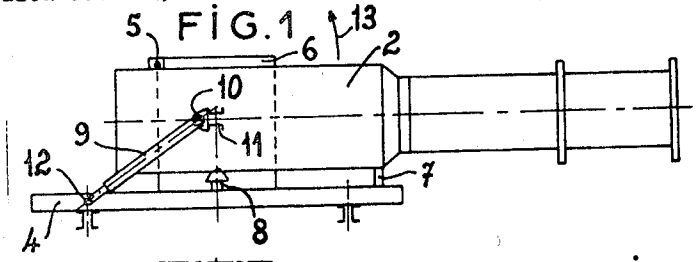


FIG. 2

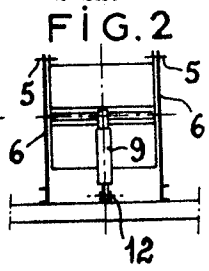


FIG. 3

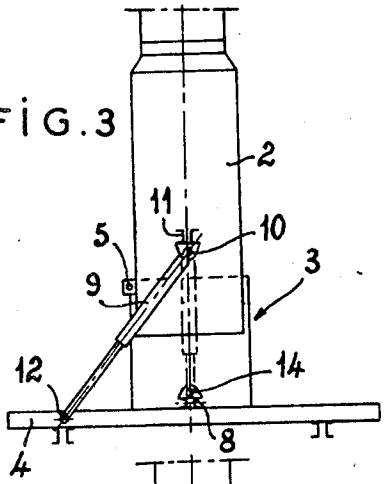


FIG. 4

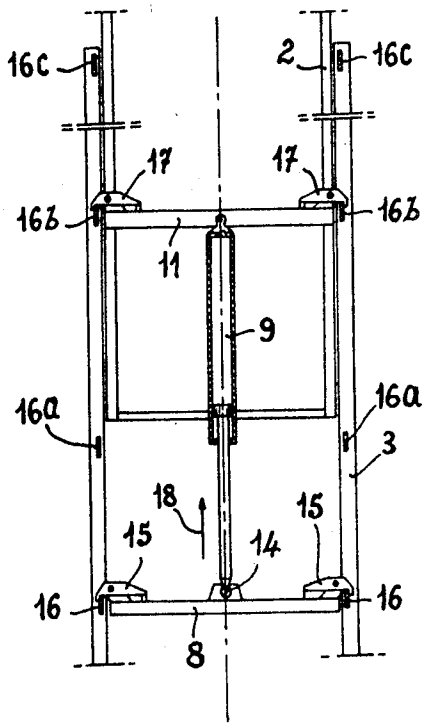


FIG. 10

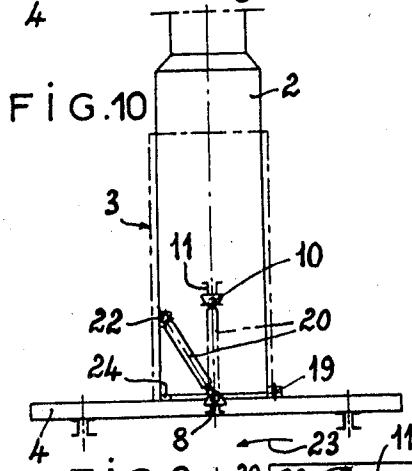
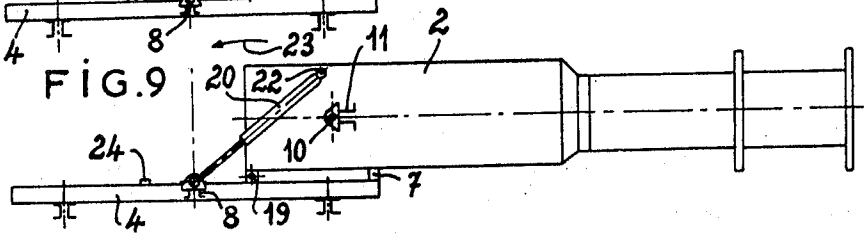


FIG. 9



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FIG. 5

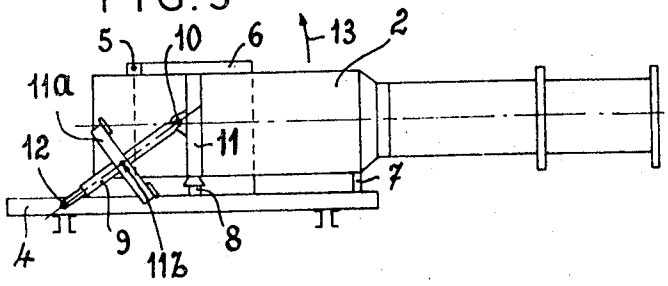


FIG. 6

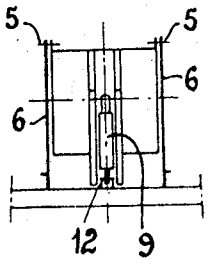
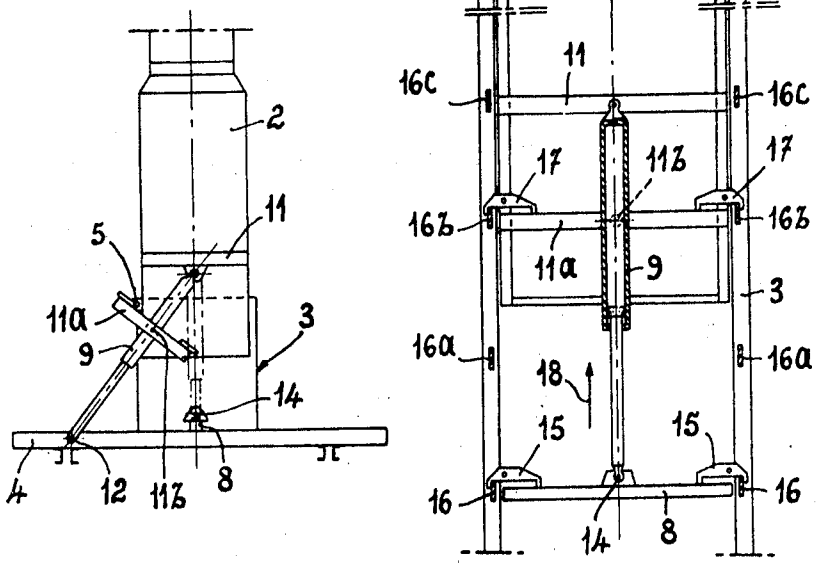


FIG. 8

FIG. 7



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METHODS FOR ERECTING TOWER CRANES

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Int. Cl. B23p *19/00;* B25j *3/00*
U.S. Cl. 29—155 7 Claims

ABSTRACT OF THE DISCLOSURE

A tower crane is erected from a horizontal and collapsed position by interconnecting a double-acting hydraulic jack pivotally to the base of the crane and to a portion of the crane to be swung up, with the axis of the jack spaced from the axis of vertical swinging movement of the crane. The crane is swung to vertical position, and then one end of the hydraulic jack is disconnected and reconnected so that the hydraulic jack interconnects and extends the relatively extensible portions of the crane, with the jack acting along a line parallel to the axis of the crane.

The present invention relates to improvements in erection methods for tower cranes.

Tower cranes adapted to have their height raised are generally constituted by two tower members having different sections, a lower one rigid with the base of the crane, and an upper one including the jib or jibs.

In order to be erected, such towers are first set up vertically, by means of a jack or a tackle block, from the vertical position they had during transportation, and their height is then raised by successive operations consisting in making the upper member of smaller section slide, by means of another jack, within the lower member, adding then an extension member to said lower member, and so forth, till the required height is obtained.

Such raising operations, originally carried out by means of cables and pulleys and more recently, by means of a screw jack, is now sometimes carried out by means of a hydraulic jack, but hydraulic jacks, while they are safer and more powerful and occupy less space, present drawbacks in that they are fairly expensive; moreover, the use of two separate mechanical systems results in heavy expenses of equipment.

The object of the present invention is to obviate such drawbacks. To this end, it relates to an improvement in methods for erecting tower cranes, according to which a single double action hydraulic jack ensures successively the erection of the tower and the raising of the height thereof, said jack being adapted to be first linked to the base of the crane and the lower end of the movable portion of the tower for the erection thereof, and then moved to be linked to the movable upper portion and the stationary lower portion of said tower for the raising of the height thereof.

According to an embodiment of the invention, the rod of the double action hydraulic jack is linked to the lower frame of the crane, outside the tower post, for the erecting operation, while for the raising of the height of the tower said rod is linked to a cross beam along the axis of the tower, the body of said jack being continually linked to the telescopic movable portion of said tower itself linked to a post.

According to another embodiment of the invention, the body of the double action hydraulic jack is linked close to the upper surface of the telescopic movable portion of the tower for the erecting operation, while

for the raising operation said body is linked along the axis of said movable portion, the rod of said jack being continually linked, along the axis of the tower base, to a cross beam locked on said base for the erection of the tower and unlocked for the raising of the height thereof, said tower being linked to its base.

Such an arrangement removes the need for most of the conventional equipment required for the erection of the tower and allows the use of a device including both the erecting means and the raising means, at a cost equal to the conventional raising means alone.

The invention will be clearly understood from the following description, with reference to the appended diagrammatic drawings which illustrate, by way of non-limiting examples, three embodiments of crane towers incorporating the improvement of the invention. In said drawings:

FIGURES 1, 2 and 3 are respectively a side elevation and a front elevation, before the erection, and a side elevation, after the erection, of a first embodiment of the invention in which, on the erection, the hydraulic jack has a thrust action;

FIGURE 4 is a front view, on an enlarged scale and partly in section, showing the way the hydraulic jack is linked for raising the height of the tower;

FIGURES 5, 6 and 7 are respectively a side elevation and a front elevation, before the erection, and a side elevation, after the erection, of a modified embodiment in which, on the erection, the hydraulic jack has still a thrust action;

FIGURE 8 is a front view, on an enlarged scale, showing the linking of the jack for raising the height of the tower according to said modified embodiment;

FIGURES 9 and 10 are side elevations before and after the erection of the tower respectively, showing another modified embodiment of the invention in which, during the erecting operation, the hydraulic jack has a hauling action.

In said drawings, **2** indicates the movable post or upper portion of the tower, **3** is the stationary post or lower portion of the tower, and **4** is the base of the tower.

According to a first embodiment of the invention, shown in FIGURES 1, 2 and 3, the movable post **2** is linked at **5** to two trestles **6** integral with the base and formed by two of the lateral surfaces of the lower portion of the stationary post **3**.

A stop **7** holds the movable post **2** in horizontal position.

A cross beam **8**, which will be used later on for raising the stationary post **3**, rests on the lower stop blocks of the trestles **6**.

A hydraulic jack **9**, the body of which is linked at **10** to a cross beam **11** of the movable post **2** while its rod is linked at **12** to the base of the tower, enables the erection of the latter to be carried out in the following way:

When the piston side of the jack **9** is supplied with fluid, said jack extends and causes the movable post **2** to rock around the point **5**, in the direction of the arrow **13** in FIGURE 1, so as to bring said movable post into the vertical position shown in FIGURE 3, said post being then held fast in said position by known means such as pins, bolts or the like devices.

When the erection has been completed, the linking point of the rod of the jack **9** is shifted and brought to **14**, along the axis of the cross beam **8**, as shown in FIGURE 4; the trestles **6** are then connected so as to form the starting element from which the stationary post **3** is built. As shown in FIGURE 4, the cross beam **8** rests, through locking devices **15**, on stop blocks **16** integral with the stationary post **3** and evenly spaced upwards.

The movable post **2** is also provided with locking devices **17** which enable it to be fixed in position in the stationary post **3**.

The raising of the height of the movable post **2** is carried out in the following way:

While the movable post is held in position in the stationary post **3** by the locking devices **17** bearing on the stop blocks **16***b*, the cross beam **8** is shifted in the direction of the arrow **18** of FIGURE 4, by means of the jack **9** supplied with fluid on its rod side, until the locking devices **15** take their bearings on the stop blocks **16***a* disposed above the stop blocks **16**. The piston side of the jack **9** is then supplied with fluid so as to make the movable post **2** rise until the locking devices **17** take their bearings on the stop blocks **16***c* disposed above the stop blocks **16***b* on which they were previously resting.

The two operations described hereinabove are then repeated as many times as necessary until the tower reaches the height required.

The modified embodiment shown in FIGURES 5 to 8 is based on the principle described with reference to FIGURES 1 to 4, the only difference being that the locking devices **17** are not carried by the cross beam **11** integral with the movable post **2**, but by a cross beam **11***a* linked at **11***b* to the body of the jack **9**.

In the modified embodiment shown in FIGURES 9 and 10, the movable post **2** is linked at **19** to the lower frame **4** and is held in horizontal position by a stop identical with the stop **7** of the previous example.

A jack **20**, which has its rod linked to the cross beam **8** positively locked on the lower frame **4** while its body is linked at **22** to the movable post **2**, enables the latter to be erected.

In fact, when the rod side of the jack **20** is supplied with fluid, said jack is retracted and, owing to the position of its joint **22**, imparts to the movable post **2** a rotary motion in the direction of the arrow **23** of FIGURE 9, which motion brings said post **2** into the vertical position shown in FIGURE 10, in which said post rests on a wedge secured to the lower frame **4**.

The body of the jack **20** is then removed from the point **22** and secured at **10** to the cross beam **11** of the movable post **2**, in the same way as the jack **9** in the previous example. The stationary post **3** is then built around the movable post **2**, and it is thus possible to proceed to the raising of the height of said movable post in the same way as in the previous example.

What I claim is:

1. A method for erecting a tower crane of the type having a base and a tower mounted on the base for vertical swinging movement about a horizontal axis from a lowered position to an upright position and in which the tower comprises parts that are extensible relative to each other to alter the height of the tower, comprising the steps of connecting a hydraulic jack at one end to the tower and at the other end of the base with the axis of the jack spaced from said horizontal axis, actuating the jack in a direction to swing the tower to said upright position, disconnecting and reconnecting an end of the hydraulic jack so that the jack now interconnects relatively extensible portions of the tower, and again actuating the jack to extend said relatively extensible portions thereby to increase the height of the tower.

2. A method as claimed in claim **1**, in which said jack is extended during both of said actuations.

3. A method as claimed in claim **1**, in which said jack is contracted during the first of said actuations and extended during the second of said actuations.

4. A method as claimed in claim **1**, in which the axis of said jack is vertical during the second said actuation.

5. A method as claimed in claim **1**, in which said reconnected end of the jack is the end of the jack which is connected to the base during said first actuation.

6. A method as claimed in claim **1**, in which said reconnected end of the jack is the end which is connected to the crane during said first actuation.

7. A method of erecting a tower crane of the type having a base and a tower mounted for vertical swinging movement on the base about a horizontal axis from a lowered position to an upright position, comprising connecting the rod of a double-acting hydraulic jack to the base, connecting the other end of the jack to a lower portion of the tower with the axis of the jack spaced a substantial distance from said horizontal axis, actuating said jack to erect the tower, holding the tower erect while shifting and securing the base end of the jack to a midportion of a cross beam under the bottom of an upwardly extensible tower portion, and extending the jack to raise the height of the tower.

References Cited

UNITED STATES PATENTS

1,839,578	1/1932	Morton	29—429
2,605,540	8/1952	Kroll et al.	29—429
2,968,410	1/1961	Hamilton et al.	214—1
3,373,473	3/1968	Keslin.	

THOMAS H. EAGER, Primary Examiner

U.S. Cl. X.R.

29—200, 429; 214—1