Aug. 16, 1966 A. A. KALUPIN ETAL 3,266,637

BUILDING CRANE FOR ERECTION OF TOWER-TYPE STRUCTURES

Filed June 15. 1965 4 Sheets-Sheet 1

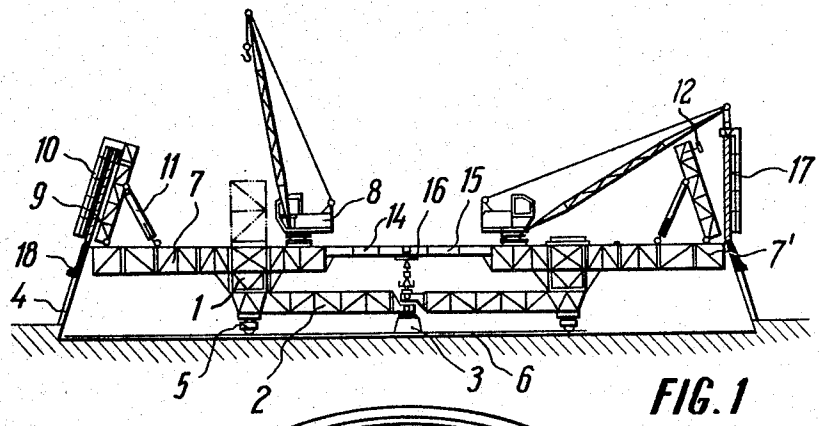



FIG. 1

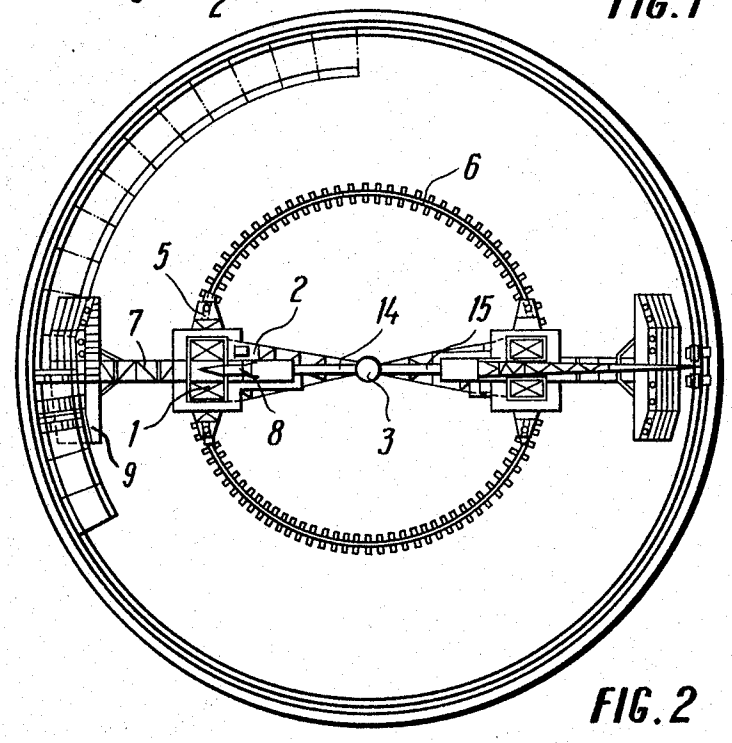
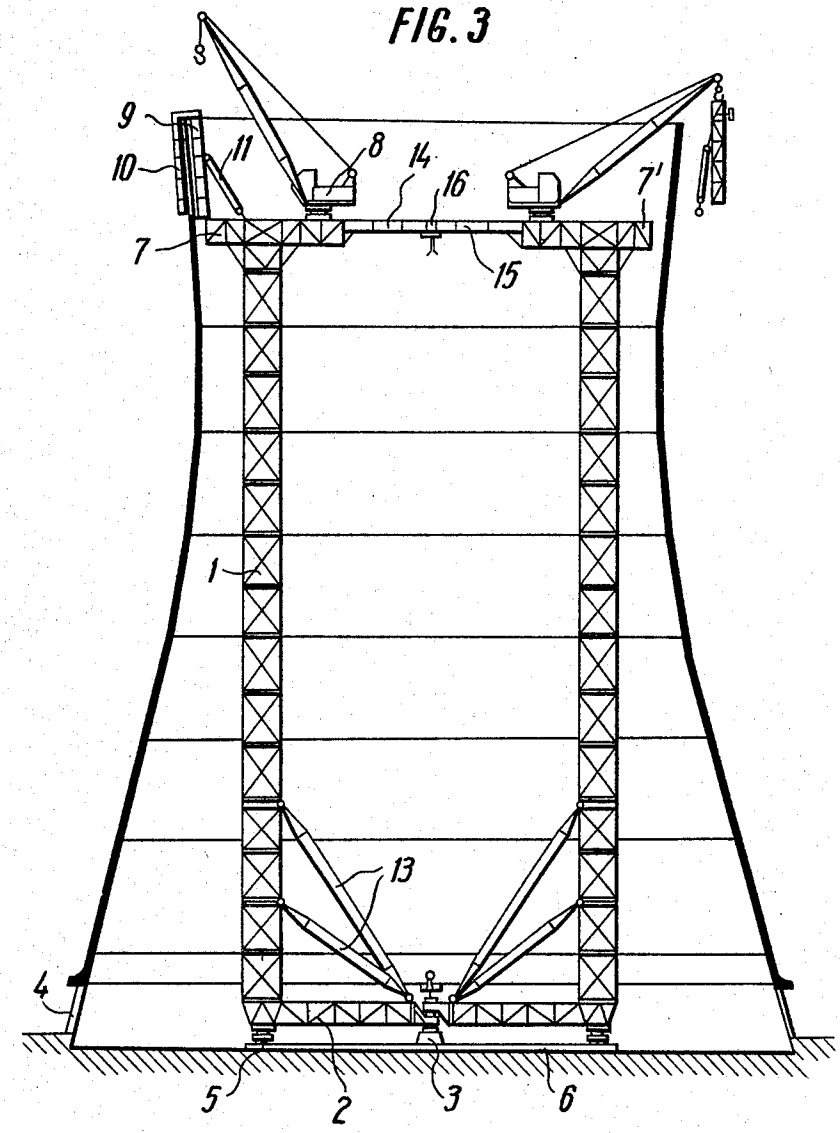



FIG. 2

BUILDING CRANE FOR ERECTION OF TOWER-TYPE STRUCTURES

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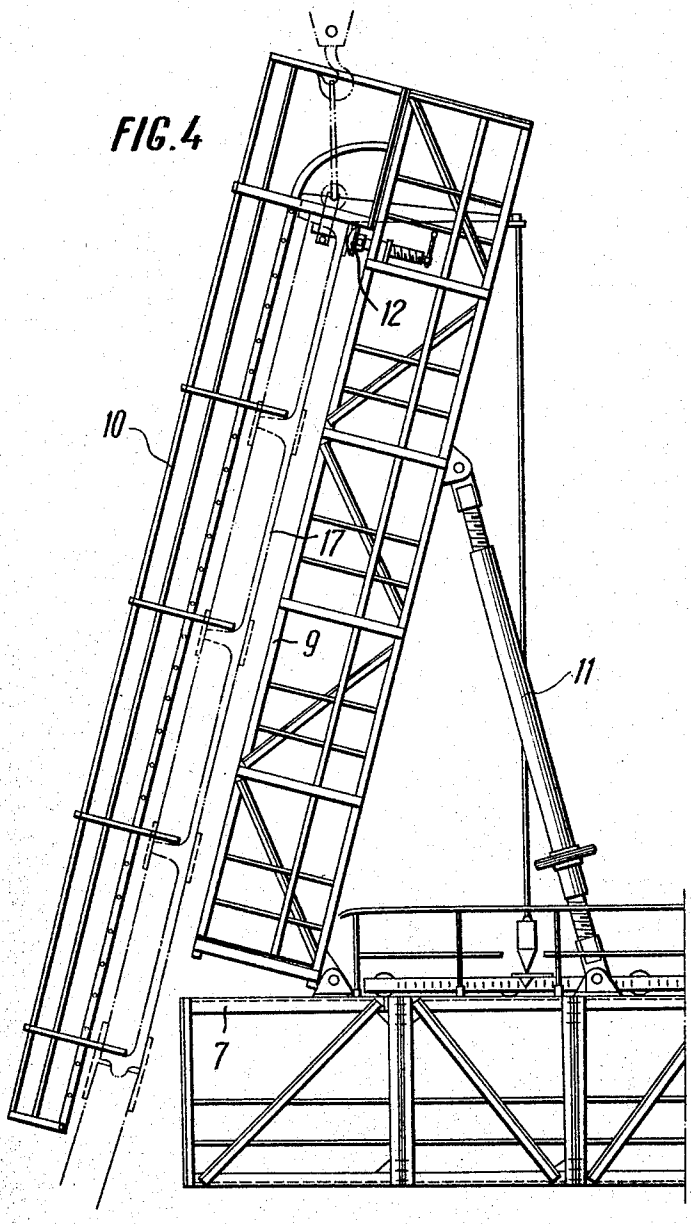
FIG. 3



BUILDING CRANE FOR ERECTION OF TOWER-TYPE STRUCTURES

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FIG. 4



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# BUILDING CRANE FOR ERECTION OF TOWER-TYPE STRUCTURES

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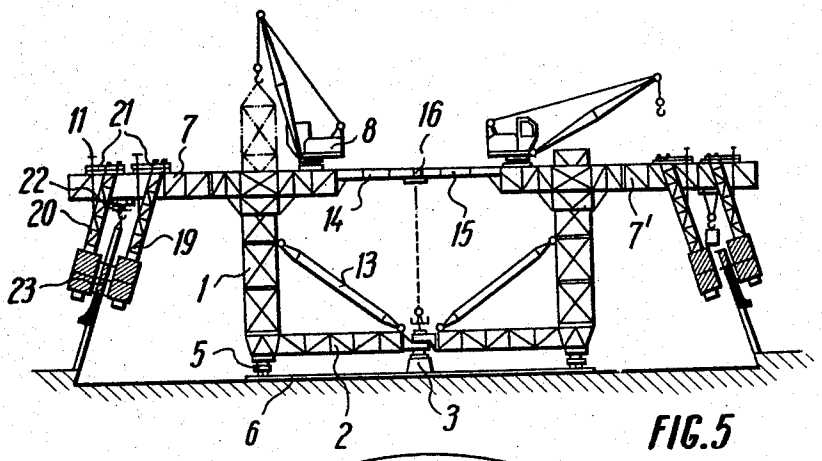



FIG. 5

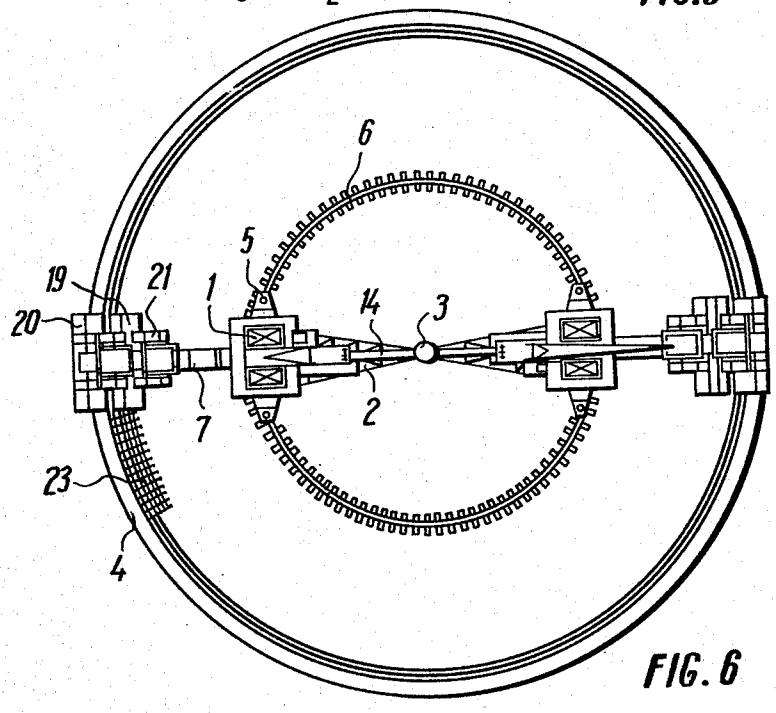



FIG. 6

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3,266,637

# BUILDING CRANE FOR ERECTION OF TOWER-TYPE STRUCTURES

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3 Claims. (Cl. 212—29)

The present invention primarily relates to building cranes for the erection of tower-type structures.

Currently employed cranes for tower-type structures comprise a column mounted at the center of the foundation of the structure being erected. A rotary slewing unit is installed in the upper part of the column which can be gradually jointed. The slewing unit includes two cantilevers in opposition; the cantilevers carry load-lifting mechanisms and erecting stages that enclose the structure shell from both sides.

Heavy weight and limited manoeuvrability are drawbacks of the existing building cranes for the erection of tower-type structures.

It is an object of the present invention to provide a building crane of a simpler design and smaller weight.

Another object of the invention is to provide a crane of better manoeuvrability. Also an object of the invention is to provide a device which makes it possible to control the contour of the structure shell.

A further object of the invention is to provide a device that ensures free communication between several operating cranes. Other objects and advantages will be apparent from the following description of the proposed crane and appended drawings wherein:

FIG. 1 shows paired cranes complete with erecting stages at the commencement of the erection of a precast reinforced concrete structure;

FIG. 2—ditto (top view);

FIG. 3 shows paired cranes when the structure is completed and the crane is to be dismantled;

FIG. 4 shows erecting stages of the crane with screw-type positioning stops;

FIG. 5 shows paired cranes (with erecting stages) for erection of a monolithic reinforced concrete structure;

FIG. 6—ditto (top view).

Column **1** comprised of separate sections jointed in the course of erecting the structure, rests on bearing truss **2** whose one end is fixed so as to make the truss slewable on trunnion **3**, which is positioned in the geometric center of the foundation of structure **4**. The other end of the truss rests on balanced crabs **5** running along circular rail track **6** laid inside the structure.

Extension of column **1** is followed by the displacement of cantilever **7** along the column by means of an elevating gear (not shown in the drawing), said cantilever consisting of separate sections. Mounted on cantilever **7** are swinging load-lifting boom **8** and erecting stages **9** and **10** which enclose the shell of the structure from both sides. Erecting stages **9** designed for use inside the structure are pivoted to the self-supporting end of cantilever **7**. In order to set stages **9** at a desired angle of inclination, use is made of telescopic bars **11** (FIG. 4) for coupling the stages to cantilever **7**.

In order to obtain the required contour, erecting stages **9** are fitted with screw-type positioning stops **12** (FIG. 4). Erecting stages **10** designed for operations on the face of the structure are mounted in the upper part of stages **9**.

To impart stiffness to column **1** and to relieve the bending moment, recourse is had to braces **13** which connect the column to bearing truss **2**.



If several similar cranes are operated simultaneously, passage from one crane to another is effected by connecting cantilevers **7** and **7'** with foot bridges **14** and **15** whose ends are coupled by hinged joint **16**.

Erection of a precast reinforced concrete structure proceeds as follows: reinforced concrete slab **17** together with erecting stage **10** previously detected from stage **9** is installed upon support ring **18** by load-lifting boom **8** (FIG. 1). Then, slab **17** with erecting stage **10** is inclined by said boom **8** until the side surface of the slab contacts screw-type stops **12** in the upper part of erecting stages **9**. The length of stops **12** can be adjusted so as to set plate **17** at a desired angle of inclination. Then the slab is fixed on the support ring **18**, and the next slab (not shown in the drawing) is placed alongside the first one to form a butt joint. Slabs installed in this manner constitute the ring of the structure being erected. External joints are stopped from erecting stages **10**, whereas the stopping of internal joints is done from stages **9**.

A group of slabs placed in the shell of the structure, jointed together and to the thrust ring **18**, constitutes a part of the structure ring which is erected with the crane remaining in one and the same position.

Once the initial group of slabs has been put up and jointed, screw-type positioning stops **12**, which supported the slabs, are retracted and the crane travels to a new position for mounting the next group of slabs.

In this manner the crane travels until a complete ring or a semi-ring of the structure (provided paired cranes are in operation) is ready.

Once the first ring of the structure has been completed, erecting stages **9** and **10** are transferred to a new position, i.e. to cantilevers **7** by means of load-lifting boom **8**, while that part of cantilever **7** which is of no further use is dismantled by the same load-lifting boom.

Next, column **1** is jointed on top by means of load-lifting boom **8**, and the elevating gear (not shown in the drawing) effects the travel of cantilever **7** along column **1** to a new position from which the next ring of the structure will be erected.

The above operations of setting the slabs in the ring of the structure (FIG. 3) are repeated until the tower-type structure is completed. The crane undergoes dismantling in the course of construction operations.

The crane for the erection of tower-type monolithic reinforced concrete structures is furnished with erecting stages **19** and **20** (FIGS. 5 and 6) suspended from trolleys **21** that move stages **19** and **20** along the top flange of cantilever **7**. The bottom flange of cantilever **7** carries truck **22** which feeds concrete and reinforcement to formwork **23** of the structure being erected.

The procedure of assembling and dismantling the crane for the erection of reinforced concrete monolithic structures is similar to that described hereinabove—with reference to the crane for the erection of precast reinforced concrete structures.

We claim:

**1.** A building crane for the erection of tower-type structures, said crane being slewable about a trunnion accommodated in the geometric center of the structure foundation and movable along a circular rail track laid inside the structure, said crane comprising a bearing truss whose internal end rests upon said trunnion; balanced crabs running along said rail track and upholding the external end of said bearing truss; a column capable of being jointed on top and mounted on said bearing truss; a cantilever traveling along said column; a load-lifting boom installed on said cantilever; and erecting stages attached to said cantilever.

**2.** A building crane for the erection of tower-type

structures, said crane being slewable about a trunnion accommodated in the geometric center of the structure foundation and movable along a circular rail track laid inside the structure, said crane comprising a bearing truss whose internal end rests on said trunnion; balanced crabs running along said circular rail track and upholding the external end of said bearing truss; a column capable of being jointed on top and mounted on said bearing truss; a cantilever traveling along said column; a load-lifting boom installed on said cantilever; erecting stages attached to said cantilever; screw-type positioning stops accommodated on said erecting stages; a connecting foot bridge fixed to said cantilever, in case several cranes are to be operated at the construction site.

3. A building crane for the erection of tower-type structures, said crane being slewable about a trunnion accommodated in the geometric center of the structure foundation and movable along a circular rail track laid inside the structure, said crane comprising a bearing truss whose internal end rests on said trunnion; balanced crabs running along said circular rail track and upholding the external end of said bearing truss; a column capable of being jointed on top and mounted on said bearing truss; a cantilever traveling along said column; erecting stages attached to said cantilever; screw-type positioning stops accommodated on said erecting stages; a connecting foot bridge whose end, positioned above the geometric center of the structure, is pivoted to foot bridges of analogous cranes.




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