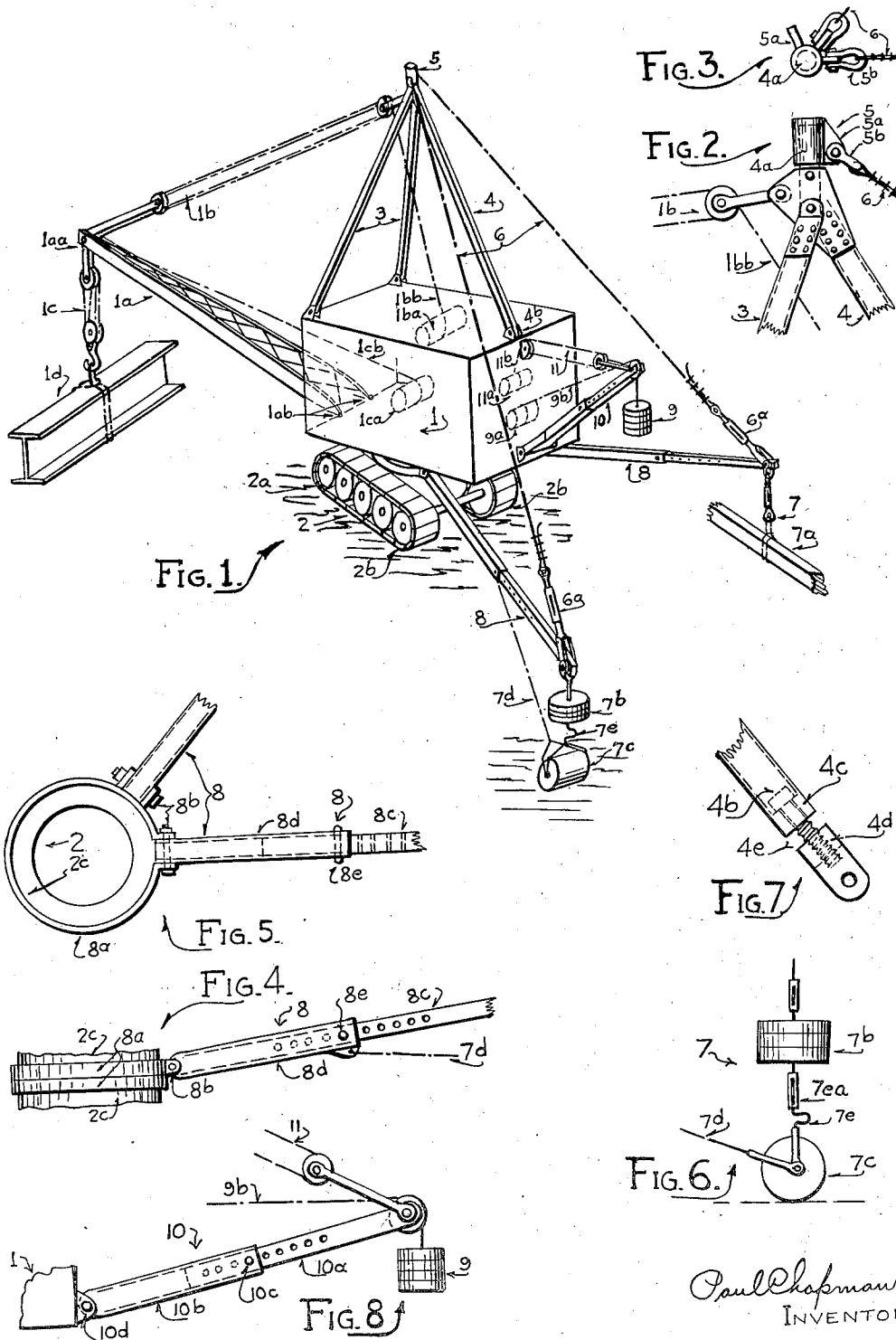


Jan. 19, 1937.

P. CHAPMAN
CRANE CONSTRUCTION
Filed June 1, 1935

2,068,397



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UNITED STATES PATENT OFFICE

2,068,397

CRANE CONSTRUCTION

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Application June 1, 1935, Serial No. 24,459

9 Claims. (Cl. 212—70)

This invention in crane construction provides readily attachable members for automotive revolving cranes, whereby much greater loads at greater distances from the cranes, may be hoisted and maneuvered into desired positions.

Referring to the accompanying drawing, Fig. 1 is a perspective view of the members of the construction attached to an automotive crane. Fig. 2 is an elevational view showing the top of the revolving portion of the crane and its connection to the non-revolving guy lines. Fig. 3 is a plan view of the swivel shown in Fig. 2. Fig. 4 is an elevational view of the extension sills connecting to the portion of the crane that does not revolve. Fig. 5 is a plan view of the same. Fig. 6 is an elevational view of one of the anchorages consisting of a free weight and a rolling anchorage weight. Fig. 7 is an elevational view showing the connection and means of adjustment of the rear tie member of the construction above the crane proper. Fig. 8 is an elevational view showing the counterbalancing weight at the rear of the revolving portion of the crane, and its supports and adjustments. Referring to Fig. 1, the upper portion 1 of the crane including the boom 1a, the top lift 1b, the load lines 1c, and the load 1d, is revolvable horizontally about the center of the lower portion 2 of the crane, so that the load 1d may be placed in the desired position radially from the center of revolution. By operating the load line drum 1ca around which the load line 1cb winds, the load 1d is raised or lowered. By operating the top lift drum 1ba around which the top lift line 1bb winds, the end of the boom 1aa is moved along an arc centered on the hinge 1ab of the boom thereby moving the load 1d both vertically and horizontally. The top lift 1b is attached to the top of a tripod placed on the top of the revolving portion of the crane and revolving with it, the tripod consisting of two front struts 3 and a back tie 4. At the top of the tripod a projecting cylindrical member 4a attached to the back tie 4, (Fig. 2) revolves in a cylindrical hole in the stationary cap member 5 to which the guys 6 are attached. The vertical component of the tension in the top lift 1b is resisted by the tripod, and the horizontal component by both the tripod and the guys 6. The vertical components of the guys 6 are resisted by the tripod at the top and by the anchors 7 at the bottom. The horizontal components of the tension in the guys 6 at the bottom are resisted by the extension sills 8. One or both the anchors 7 may be attached to fixed anchorages as shown by 7a, or to a weight anchorage 7b with or without a safety rolling an-

chorage 7c. When the entire construction with the load 1d and weight anchorages 7b, is moved as a unit, in order to avoid tilting, the center of gravity of the entire mass must be above the rectangle formed by the two forward supports 2a and the two rear supports 2b of the lower portion of the crane. When moving over uneven surfaces the load 1d is moved out so that the center of gravity lies nearer the forward supports 2a to avoid tilting backward, and the rolling anchorages as 7c attached by the towlines as 7d and the slack anchor lines 7e are used to prevent tipping too far forward, the lines 7e becoming taut and supporting a part of the rolling anchorage 7c when the forward tilting is excessive. A counterbalance weight 9 is attached to the revolving portion of the crane by a hinged extension strut 10 and a strut fall 11. The weight 9 is raised or lowered by operating the drum 9a over which the weight line 9b winds. The weight 9 is moved toward or away from the center of the crane by operating the drum 11a over which the fall operating line 11c of the fall 11 winds.

It is seen that the overturning moment caused by the load 1d is resisted by both the tripod and crane and the guys and anchors, when the load is in a forward position. The maximum portion that can be resisted by the tripod and crane occurs when the rear supports of the crane 2b are about to raise off the ground. With fixed anchorages as 7a this condition may cause excessive stresses in the crane, and to apportion the desired amount of overturning moment to be resisted by the tripod and crane, the length of the back tie 4 is made adjustable by means of a headed bolt 4b passing loosely through a smooth nut 4c fixedly attached to the shaft of the back tie 4 and screwed into a threaded nut 4d attached to the lower part of the back tie connected to the crane proper, thus providing an adjustable gap 4e in the back tie, all as shown in Fig. 7. The portions of the overturning moment resisted by the tripod system and the guy system, is inversely proportional to the horizontal deflections of a unity horizontal load at the top of the tripod for each system. If the guys 6 are tightened by means of the turnbuckles 6a until the gap 4e is reduced, the guy system will then resist the entire overturning moment, any additional moment being divided between the two systems only when the head of the bolt 4b is in contact with the smooth nut 4c. Conversely, if the guys 6 be loosened, the tripod system will resist the entire overturning moment until the elasticity

of that system under additional moment makes the guys taut again.

As the load 1*d* is revolved with the upper portion of the crane, the guys 6 resist less of the overturning moment and the crane tends to tip over the supports 2*a* 2*b*. This tendency to tip is reduced by moving the counterbalance 9 away from the center of the crane by operating the drum 11*a*. The counterbalance 9 is then returned to its former position after the load 1*d* is placed in position but before it is cut loose, if the counterbalance as placed would tip the crane in the opposite direction.

Referring to Figs. 1, 2, and 3, the cap member 15 is provided with more than two lugs 5*a* for connecting the two guys 6, so that when the angle between the sills 8 is changed a selection of two lugs 5*a* may be made so that the angle between them may correspond more closely to the angle between the sills, with correspondingly less side bending on the connection shackles 5*b*.

Referring to Figs. 1, 4, and 5, the sills 8 are connected to the central ring 2*c* of the lower portion 2 of the crane, by circular bands 8*a* each of which is revolvable about the ring 2*c* so that the sills 8 may be placed at any angle radially from the center of the crane. The shafts of the sills 8 consisting of an outer portion 8*c* and an inner portion 8*d*, are connected to the bands 8*a* by hinge bolts 8*b* so that the outer ends of the sills may be raised or lowered to suit the anchors 7. The sills are made adjustable in length by the outer portions 8*c* telescoping into the inner portions 8*d*, the desired length being obtained by inserting pins 8*e* through holes in the portion 8*d* and selected holes in the portion 8*c*. It is thus seen that the anchorage for the crane may be obtained over a considerable range vertically and horizontally.

Referring to Figs. 1 and 6, as hereinbefore shown the slack anchor line 7*e* attached to the rolling weight 7*c* provides a safety factor when the entire construction is moved. A turnbuckle 7*e**a* provides means of making the line 7*e* taut when the construction is stationary and the weight 7*c* is required for additional anchorage in picking heavy loads.

Referring to Figs. 1 and 8, the length of the strut 10 is varied by telescoping the outer portion 10*a* into the inner portion 10*b*, the length being fixed by inserting a pin 10*c* into a hole in the portion 10*b* and a selective hole in the portion 10*a*. The inner end of the strut 10 is hinged on a bolt 10*d* so that the outer end may be raised or lowered. In conjunction with the operation of the strut fall 11 and the weight line 9*b* as hereinbefore described, it is seen that the counterbalance 9 may be picked up and held in a wide range of positions.

From the foregoing, it is seen that this invention enlarges the field of usefulness for revolving cranes.

When the load 1*d* is further revolved so that the vertical plane of the boom 1*a* passes beyond a position perpendicular to the vertical plane of the far guy 6, the guys 6 then have no stress from the load and the only increase in carrying capacity over that of the original crane is derived from the counterbalance weight 9 operated as hereinbefore described.

I claim:—

1. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of

said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, an adjustable length guy attached to said cap member, an adjustable length sill attached at one end to said guy and at the other end to said non-revolving section of the crane, and an anchor member attached to said sill, substantially as described.

2. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, two adjustable length guys attached to said cap member, two adjustable length sills attached at one end to said guys and at the other end to said non-revolving section of the crane, and two anchor members attached to said sills, substantially as described.

3. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, two adjustable length guys attached to said cap member, two adjustable length sills adjustable radially and attached at one end to said guys and at the other end to the lower section of the crane, an adjustable length leg of said tripod, anchor members attached to said sills, and said adjustable guys and said adjustable leg serving to apportion the amounts of overturning moment resisted by said guys and said tripod with the upper portion of the crane revolved in various positions, substantially as described.

4. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, adjustable length guys attached to said cap member, a circular portion of the non-revolving section of the crane, adjustable length sills attached at one end to said guys and at the other end to said circular portion, circular parts at the end of said sills concentric with said circular portion of the non-revolving section of the crane, and means of adjusting said sills radially from the non-revolving section of the crane said means comprising said circular portion and said circular parts, substantially as described.

5. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, adjustable length guys attached to said cap member, adjustable length sills adjustable radially about the lower section of the crane and attached at one end to said guys, circular parts of said sills attached to the lower section of the crane, shafts on said sills, hinge bolts connecting said circular parts to the shafts of said sills said hinge bolts allowing the outer ends of said sills to be raised or lowered, anchor members attached to said sills, and said guys and sills serving to connect said anchor members to an-

chorages in various locations vertically and horizontally, substantially as described.

6. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, adjustable length guys attached to said cap member, adjustable length sills adjustable radially and attached at one end to said lower section of the crane and at the other end to said guys, anchors attached to said sills, said anchors consisting of weights hung from said sills together with weights supported on the ground and rolling thereon when the entire construction is moved over substantially even ground, and slack lines connecting said hung weights to said rolling weights which slack lines become taut and furnish additional anchorage when the entire construction is tilted sufficiently in moving over uneven ground.

7. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top of said tripod, a non-revolving cap member in which said cylindrical projection revolves, two guys attached to said cap member, two sills adjustable radially from the lower section of the crane and attached at their outer ends to said guys, plural lugs extending radially from the center of said cap member for connecting said guys to the cap member, and each of said two guys being kept substantially in the same plane with the sill to which it is connected through selective attachment of the upper ends of said guys to said lugs such that the angle of separation of the lugs approximates the angle formed by the sills with each other, substantially as described.

8. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, a cylindrical projection at the top

of said tripod, a non-revolving cap member in which said cylindrical projection revolves, two adjustable length guys attached to said cap member, a back tie forming the rear leg of said tripod, a shaft on said back tie, a smooth hole nut fixedly attached to the lower end of the shaft of said back tie, a threaded nut fixedly attached to the lower end of said back tie connected to the revolving section of the crane, a headed bolt passing loosely through said smooth hole nut and screwed into said threaded nut, an adjustable gap between said smooth hole nut and said threaded nut, said gap existing only when the back tie is under tensile stress but with the smooth hole nut and the threaded nut being in contact when the back tie is under compression, turnbuckles on said guys for tightening them until the back tie is in compression, and means to cause said guys to resist all the overturning moment from the load on the crane until the elastic deformation of all parts under stress causes the said gap to appear in the back tie and the back tie to begin to be under tensile stress, substantially as described.

9. In crane construction, a crane having a revolving upper section and a non-revolving lower section, a tripod attached to the top of said revolving section, a top lift attached to the top of said tripod, adjustable length guys pivotally attached to the top of said tripod, adjustable length sills pivotally attached at one end to said non-revolving section and at the other end to said guys, anchors attached to said sills, means to increase the forward lifting capacity of the crane comprising said guys said sills and said anchors, a counterbalancing device attached to the rear of said revolving section comprising a hanging weight having vertical and horizontal adjustments, said counterbalancing device with its adjustments serving to increase the rearward lifting capacity of the crane, and the combination of said counterbalancing device and its adjustments with said tripod said guys said sills and said anchors serving to increase the operating capacity of the crane in all directions, substantially as described.

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