S. T. SJOBERG.

COUNTERBALANCED CRANE.

APPLICATION FILED DEC. 26, 1919.

1,344,659. **Patented June 29, 1920.**

2 SHEETS—SHEET 1.

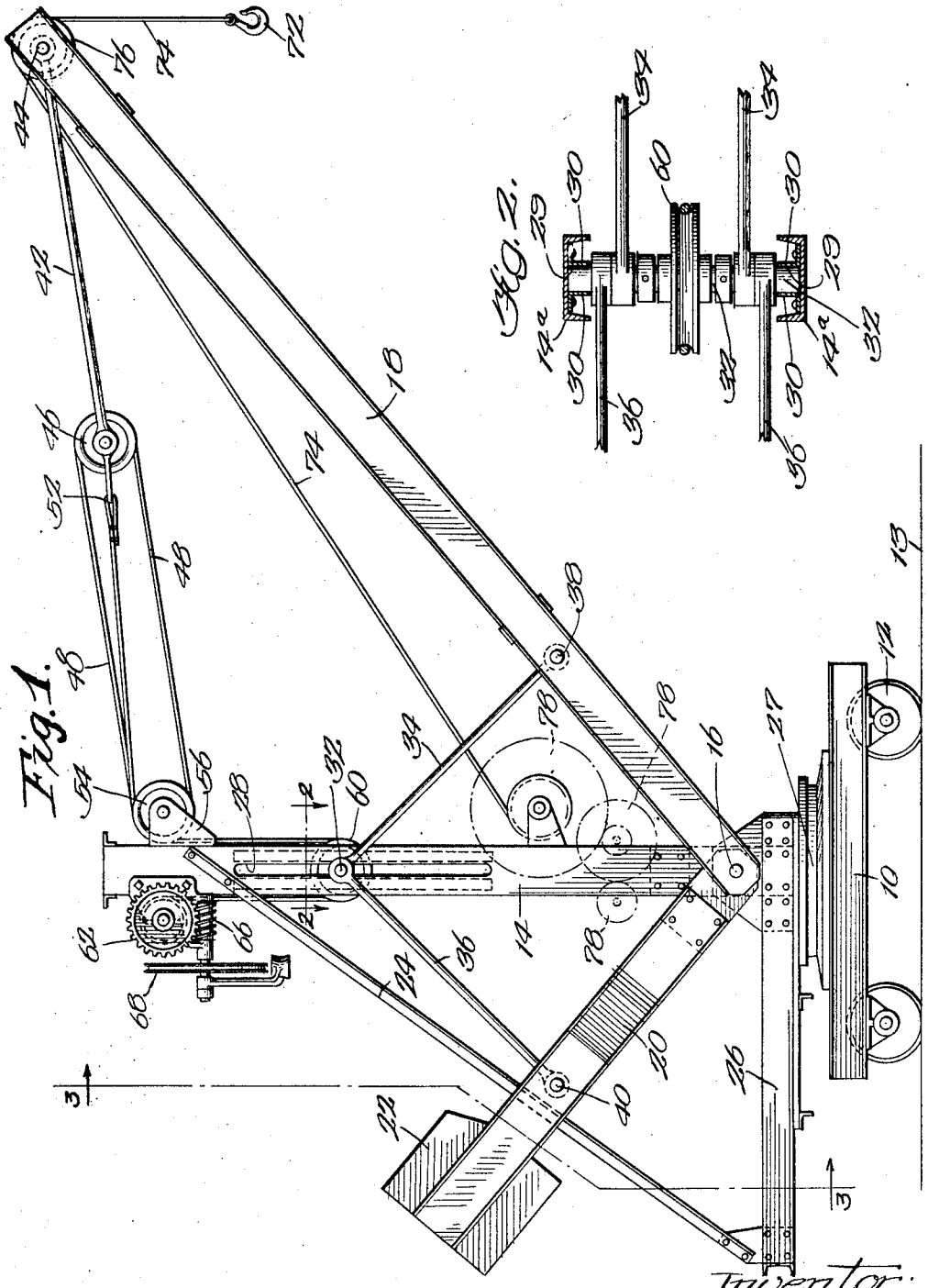


Fig. 1.

Fig. 2.

Inventor:
Sidney T. Sjoberg
By Cheever & Cox Attys

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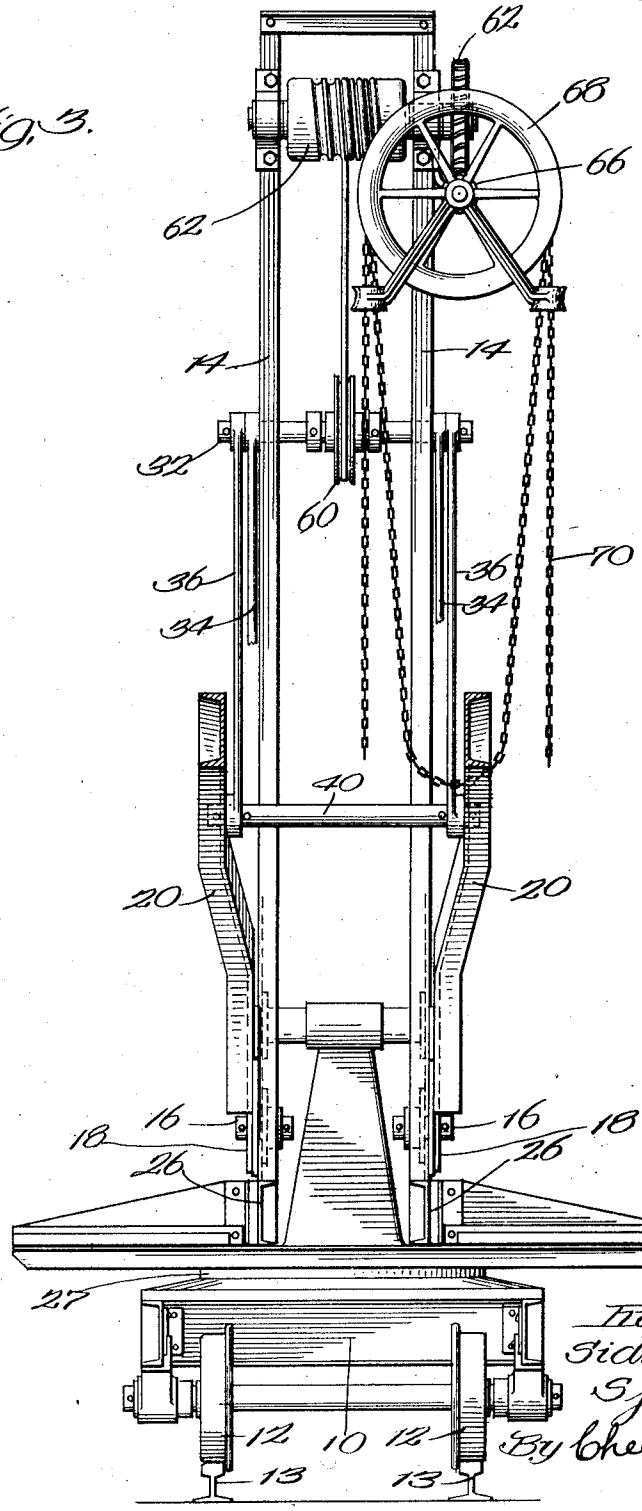
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2 SHEETS—SHEET 2.

Fig. 3.



Inventor:
Sidney T.
Sjoberg
By Cheever & Cox
Attys

UNITED STATES PATENT OFFICE.

SIDNEY T. SJOBERG, OF CHICAGO, ILLINOIS, ASSIGNOR TO WHITING FOUNDRY EQUIPMENT COMPANY, OF HARVEY, ILLINOIS, A CORPORATION OF ILLINOIS.

COUNTERBALANCED CRANE.

1,344,659. Specification of Letters Patent. Patented June 29, 1920.

Application filed December 26, 1919. Serial No. 347,355.

To all whom it may concern:

Be it known that I, SIDNEY T. SJOBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Counterbalanced Cranes, of which the following is a specification.

This invention relates to lifting cranes of the jib type.

The object of the invention is to provide an automatic counterbalancing mechanism for a jib crane particularly when mounted on a truck or other loose support to take care of the load so that the load will not overturn. Another object is to provide such mechanism in which the counterweight, while swinging in unison with the jib is always above the wheel supports of the truck so that it can never interfere with movement of the loaded truck.

The invention consists in mechanism for carrying out the foregoing objects which can be easily and comparatively cheaply made, which is satisfactory in operation, and not readily liable to get out of order. More in detail, the invention consists in means for simultaneously lifting and supporting the jib of the crane and a counterweight therefor on the opposite side of the crane mast in such manner as to entirely prevent friction at the mast itself and for doing this by the same operating mechanism which normally lifts the load out at the end of the jib of the crane. More particularly, the invention consists in features and details of construction hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals represent the same parts,

Figure 1 is a side view of a jib crane so constructed as to illustrate this invention in its preferred form.

Fig. 2 is a detail plan view on the line 2—2 of Fig. 1, showing two alternative constructions of shaft mounting.

Fig. 3 is an end view of the machine taken on the irregular line 3—3 of Fig. 1.

The mechanism of this invention is perfectly applicable to a stationary crane with its mast rising from a fixed point in the floor and some of the claims are drawn to that scope but it is especially applicable to being mounted on a truck 10 carried by wheels 12 traveling either on the ground or floor or, if desired, on rails 13.

Suitably supported, in the particular case here illustrated, on the truck 10, is an upright mast 14 having at its base a pivot pin or bolt 16, near whose opposite ends are journaled, in the usual manner, the spaced side members of the jib boom 18 adapted to swing up and down on the right side of the mast. Similarly pivoted on a shaft 16, but extending to the opposite side of the mast 14, are members constituting the counterweight arm 20 carrying at its outer end the counterweight proper 22 designed to balance the jib 18 and some load and to swing up and down on the left side of the mast.

The mast is conventionally carried by frame 26 and braced thereto by the angular member 24. The mast and frame, as illustrated, are rotatable on a vertical pivot 27 in the frame 10. The mast itself is a metal column made up of two oppositely disposed channel members 14, Fig. 1, or 14^a, Fig. 2. Channel 14 is perforated in an elongated vertical slot 28 reinforced by angle irons 30. Channel 14^a shows an alternative construction in which a vertical passageway 29, corresponding in function to slot 28, is provided between angle irons 30 attached to the inside of channel 14^a, the channel itself being unperforated. Entering and sliding in the opposite guiding slots 28 or passages 29, according to which construction is used, is a vertically reciprocatable shaft 32, pivotally supported on oppositely disposed bars 34 and 36 connected respectively to the jib 18 at pivot 38 and to the counterweight arm 20 at pivot 40. Figs. 1 and 3 show these bars outside the mast, while in the alternative construction of Fig. 2 they are inside the mast. It is obvious that if, with only the parts thus far described, jib 18 were forced upward, the bar or bars 34 would tend to force shaft 32 upward, thus carrying the counterweight with it through the enforced action of bar 36, and it is further obvious that there would probably be so much friction between the shaft 32 and the sides of guiding passages 28 and 29 that no movement at all would be permitted.

The mechanism for lifting the outer end of jib 18, and consequently the load carried thereby, comprises a pull bar 42 pivoted to

the end of the jib at 44, carrying on its inner end a rotatable pulley 46 and a rope connection 52. Attached to this connection 52 is a rope 48 which passes first around pulley 54 on bracket 56; thence around pulley 46; thence again over the top of pulley 54; thence down the mast to and around pulley 60; thence up the mast to winding drum 62, mounted near the top of the mast, and driven through the gearing 66 and wheels 68 by the usual chains 70, without novelty in the art.

From the foregoing, it will be seen that as chain 70 and consequently gearing mechanism 68—66 is operated to wind the rope onto drum 62, the very first result is to tighten the rope around drum or pulley 60, and thus lift it vertically upward. This movement supports shaft 32 on the lifting rope with the result first that the shaft is practically clear at the sides of guiding passages 28 or 29, thereby reducing, if not entirely eliminating, friction at that point, this because this movement tends to lift the jib through rods 34 and the counter-weight through rods 36. Further lifting movement of the rope acts through the reduction pulleys 46—54 to powerfully lift the outer end of the jib at pin 44.

As in all cranes of this type, the load to be lifted is suspended on a hook 72 on the end of a rope 74 passing over a pulley 76 on the end of the jib and manipulated by mechanism 78 of conventional form, without novelty, carried by the crane on the platform 26 or otherwise. The load is lifted by this mechanism independently of movement of the jib and load by chains 70 as heretofore described.

The result of the foregoing construction is that the counterweight 22 moves up and down automatically with the jib 18 and load thereon thereby holding the center of gravity of the loaded crane inside the truck wheels 12 thus preventing the trucks tipping over or in the case of stationary column relieving the strain on the foundation bolts. And furthermore, this movement of the counterweight takes place practically without friction along the mast guides 28 or 29 as the case may be.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. In mechanism of the class described, an upright mast, a jib pivoted to one side thereof, a counterweight mechanism pivoted to the other side thereof, a member slidable vertically of the mast, means connecting said slidable member to the jib and the counterweight respectively and means for moving said slidable member along the mast to simultaneously move the jib and counterweight.

2. In mechanism of the class described, an upright mast, a jib pivoted to one side thereof, a counterweight mechanism pivoted to the other side thereof, a member slidable vertically of the mast, means connecting said slidable member to the jib and the counterweight respectively and manually operated means for moving said slidable member along the mast to simultaneously move the jib and counterweight.

3. In mechanism of the class described, an upright mast, a jib pivoted to one side thereof, a counterweight mechanism pivoted to the other side thereof, a member slidable vertically of the mast, means connecting said slidable member to the jib and the counterweight respectively and means suspending the slidable member and attached parts practically clear of the mast and for elevating them up the mast.

4. In mechanism of the class described, an upright mast, a jib pivoted to one side thereof, a counterweight mechanism pivoted to the other side thereof, a member slidable vertically of the mast, means connecting said slidable member to the jib and the counterweight respectively and manually operated means suspending the slidable member and attached parts practically clear of the mast and for elevating them up the mast.

5. In mechanism of the class described, an upright mast, a member slidable up and down said mast, a jib pivoted to the mast to swing on one side thereof, a counterweight mechanism pivoted to the mast to swing on the other side thereof; supporting devices connecting the member reciprocatable in the mast to the jib and to the counterweight mechanism respectively, a lifting mechanism for the jib connected at approximately its outer end, and means operated by said lifting mechanism for moving the member reciprocatable in the mast, in unison with the jib.

6. In mechanism of the class described, a suitable support, a jib pivoted thereto, swinging in a vertical plane on one side thereof, a counterweight pivoted to the support, swinging in the same vertical plane on the other side thereof, means operatively connecting the jib and counterweight to move in unison, means for lifting the outer end of the jib and means operated by the same lifting means for simultaneously lifting the counterweight, and the jib at a point intermediate between its ends.

7. In mechanism of the class described, a vertical mast made from oppositely disposed separated members, a shaft slidable vertically in guides on said separated members, a pulley on said shaft between said members, a jib pivoted to said mast to swing in a vertical plane on one side thereof, a supporting rod mechanism connecting said jib intermediate between its ends to

said shaft, a counterweight arm mechanism pivoted to the mast, to swing in a vertical plane on the opposite side of the mast from the jib, a rod supporting mechanism between the counterweight support and said shaft, a load lifting mechanism located above said shaft consisting of a flexible member passing from a power operating device to the outer end of the jib, and means whereby said flexible power member on its way to the outer end of the jib passes around said pulley on the shaft and thereby supports and moves the previously mentioned devices connecting said shaft to the counterweight mechanism and the jib respectively.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

SIDNEY T. SJOBERG.

Witnesses:
DWIGHT B. CHEEVER,
ANNA ROSENTHAL.