

(No Model.)

C. J. APPLEBY.

5 Sheets—Sheet 1.

CRANE.

No. 306,711.

Patented Oct. 21, 1884.

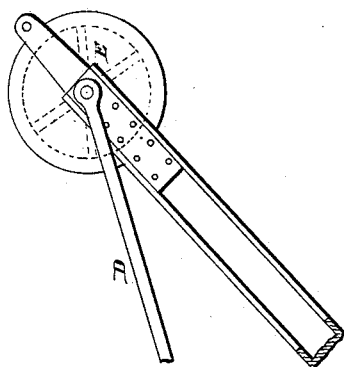
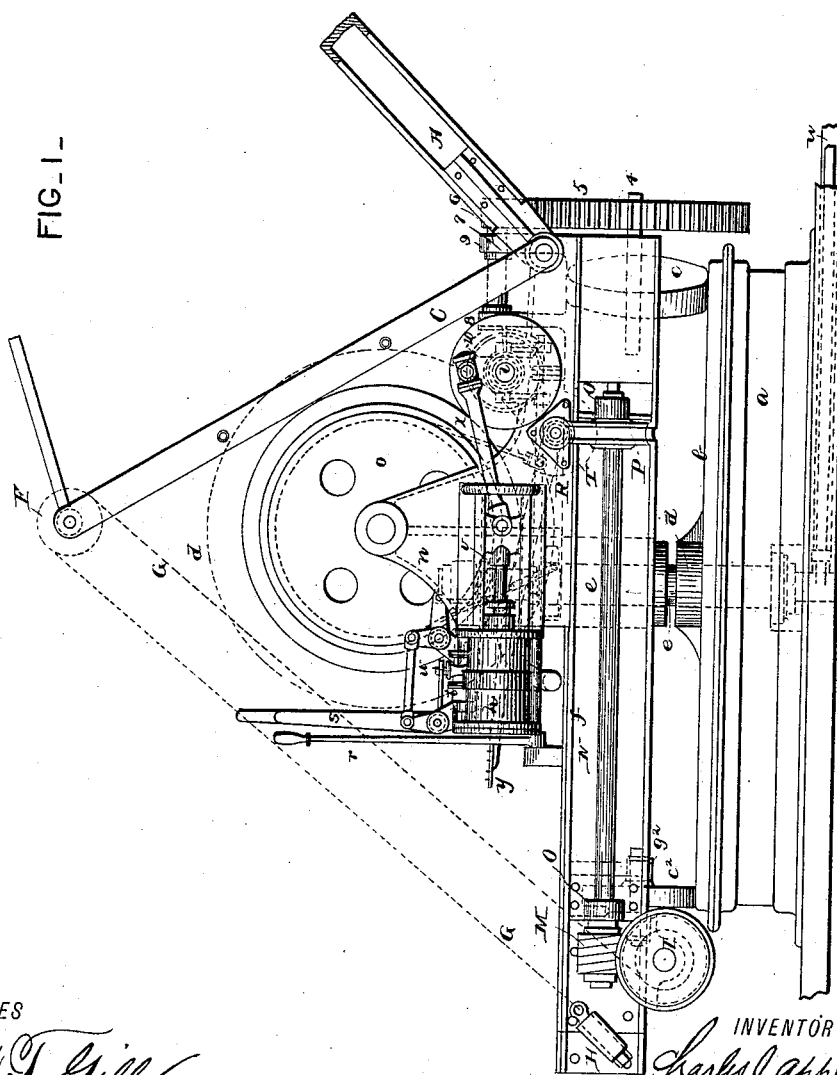


FIG. 1 -



WITNESSES

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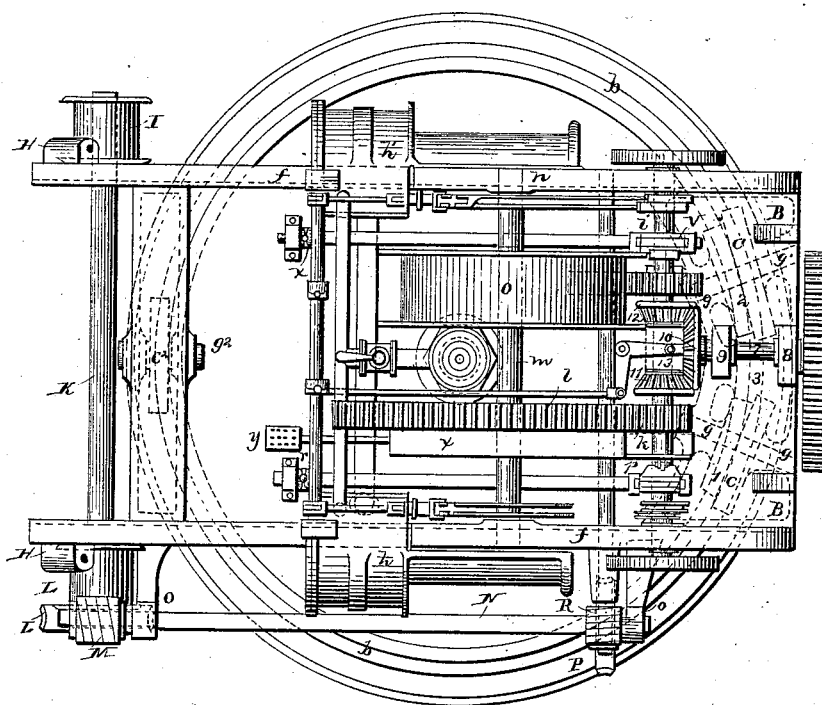
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FIG. 2.



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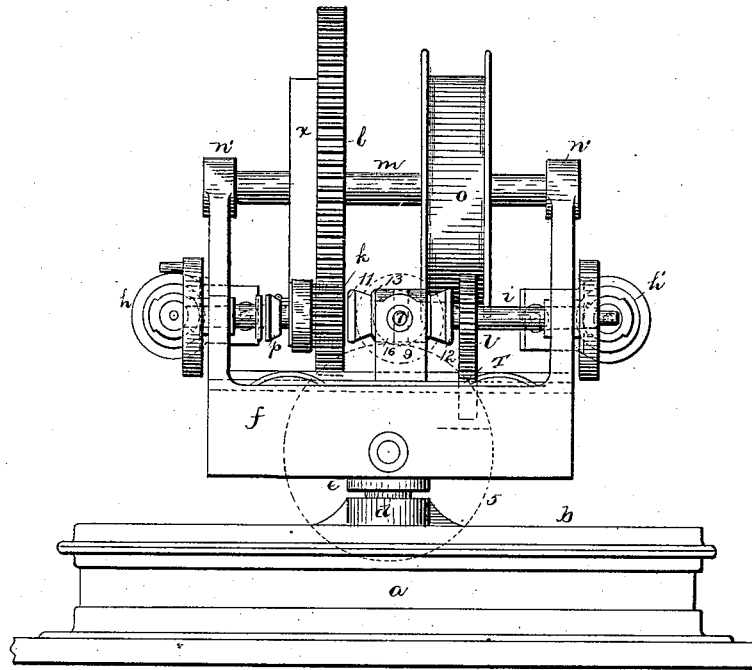
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FIG. 3.



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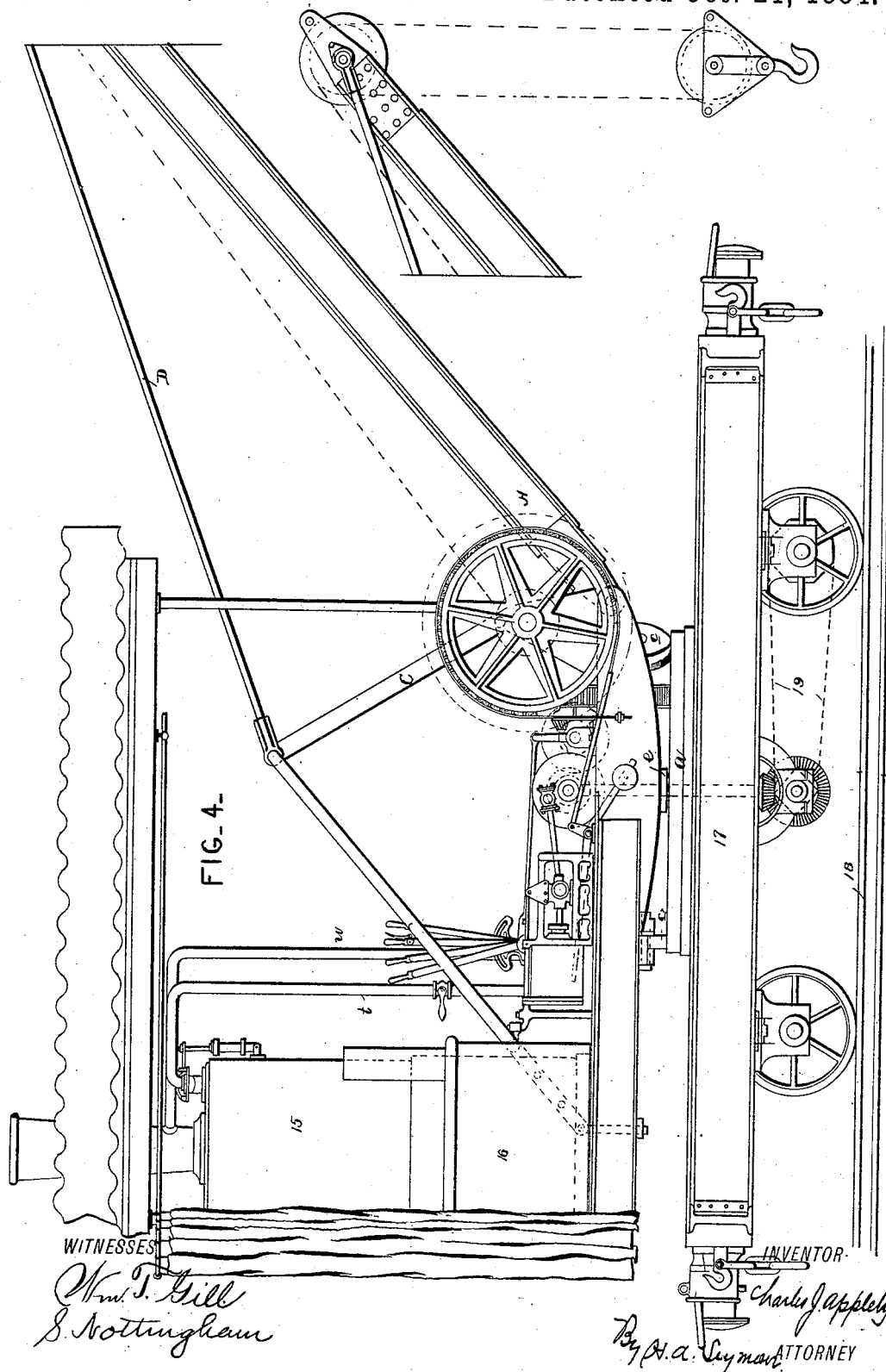
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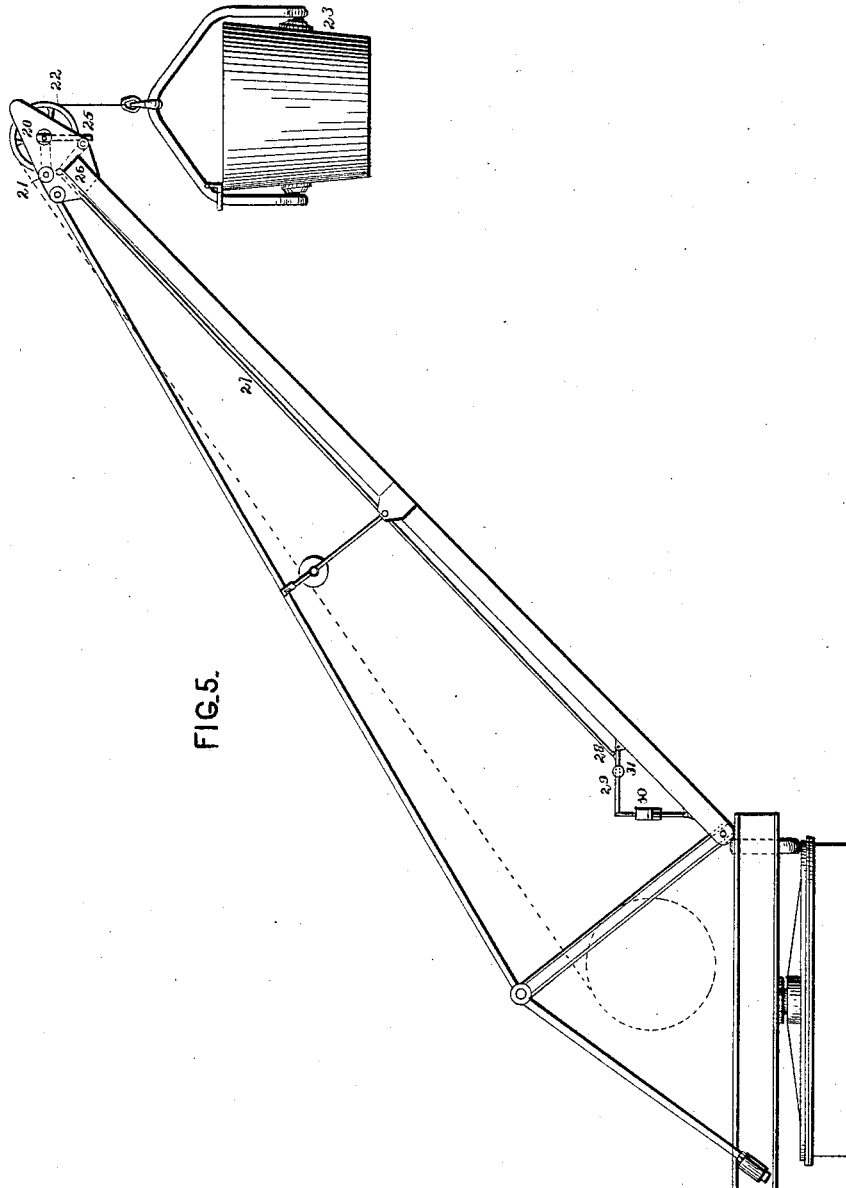


FIG. 5.

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# UNITED STATES PATENT OFFICE.

CHARLES JAMES APPLEBY, OF LONDON, COUNTY OF MIDDLESEX, ENGLAND.

## CRANE.

SPECIFICATION forming part of Letters Patent No. 306,711, dated October 21, 1884.

Application filed August 2, 1884. (No model.) Patented in England May 4, 1883, No. 2,284.

*To all whom it may concern:*

Be it known that I, CHARLES JAMES APPLEBY, of London, in the county of Middlesex and Kingdom of Great Britain, have invented certain new and useful Improvements in Cranes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in cranes, and especially cranes actuated by steam-power and adapted for use in discharging coal or other cargo from vessels, the object of the same being to construct and arrange the several parts of a crane in a novel manner, so that they are very strong and accessible, easily put together and worked, and at the same time durable and effective for the purposes to which they are to be applied; and with these ends in view my invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation, Fig. 2 a plan, and Fig. 3 a front view, showing my invention applied to a steam-crane, which is supposed to be fixed upon the edge of a wharf or in other convenient position, and used for the purpose of lifting and moving coal or other goods to or from vessels moored against the wharf, the boiler actuating the steam-engines being situated in any convenient position in the neighborhood.

$a$  is a bed or foundation of wrought-iron plates riveted to angle-irons and bolted to stone, wood, or other suitable support, such as a cast-iron bed-plate with a flat ring on its upper surface at or near the edge of the wharf. Upon the top of this bed  $a$ , I bolt or fix a circular path or rail,  $b$ , preferably of steel, upon which the wheels  $c$   $c'$   $c''$ , supporting the crane itself, travel when the latter is slewed or made to revolve round its central axis. Inside the bed  $a$ , arranged as described, I fix a frame, preferably of cast-iron, and consisting of a center,  $d$ , with sufficiently strong radial arms or ribs, and through the center  $d$  passes the hollow vertical post or pivot  $e$  of iron or steel, round which the carriage of the crane and the crane itself revolve. The carriage of the crane consists of a horizontal frame-work,  $f$ , pref-

erably of iron beams bolted together, arranged above the bed  $a$ , and provided with bearings at  $g$ ,  $g'$ , and  $g''$ , in which are fitted the radial axles of the wheels  $c$   $c'$   $c''$ , which are supported by and run upon the circular steel path  $b$ . Two of these wheels,  $c$  and  $c'$ , are arranged at a sufficient distance apart at the front of the crane, as shown in Fig. 2, and the third,  $c''$ , at the back, and the part of the frame which carries the two front wheels,  $c$   $c'$ , is preferably made separate from the remainder, to which it is fitted and bolted, as shown in Fig. 2, so that it can very easily be removed together with the wheels  $c$   $c'$ , if the latter at any time require repair or adjustment.

Upon the outer parallel sides of the frame  $f$ , arranged as described, or on the revolving bed-plate are fixed two horizontal steam-cylinders,  $h$   $h'$ , driving in the usual way a transverse horizontal shaft,  $i$ , upon which is fitted a toothed pinion,  $k$ , which gears with and drives a corresponding toothed wheel,  $l$ , fixed upon a parallel transverse shaft,  $m$ , arranged above and revolving in brackets or bearings  $n$   $n'$ , fixed or formed upon the frame-work or platform of the crane. This shaft  $m$  also carries a winding-drum,  $o$ , round which is wound a wire rope or chain, by which the weight is lifted or lowered, as desired. This method of arrangement allows the use of a winding drum and gear of large diameter. The toothed pinion  $k$  is provided with a friction-clutch box,  $p$ , or any other suitable kind of clutch, by which it can be connected to the engine-shaft  $i$  or disconnected, as desired, by means of a handle arranged in a convenient position, as shown at  $r$ . Reversing-gear operated by a handle,  $s$ , near the handle  $r$ , is provided to the engines, and the steam-pipes  $t$  and exhaust-pipes  $u$  from the engines are carried down through the hollow central post,  $e$ , the steam-pipe  $t$  passing through the exhaust-pipe  $u$  and being carried to and connected to the boiler, and the exhaust-pipe  $u$  being conducted to any convenient position for the discharge of the exhaust-steam, suitable stuffing-boxes being provided at  $v$   $v'$ , so that the crane can be slewed or turned round upon its central pivot or post,  $e$ , when desired. A third handle and valve at  $w$  are also provided, by which the supply of steam to the engines is regulated, and a brake,  $x$ , is fitted upon the drum-shaft

*m* and provided with a handle or foot-lever at *y*, by which it can be operated, the lever being preferably provided with a ratchet and pawl, by means of which it can be held in any desired position. Each of the axles of the front bearing-wheels, *c c'*, has fixed upon it a beveled toothed wheel, 1 2, between which and gearing with them is arranged a third beveled toothed pinion, 3, fixed upon a horizontal shaft, 4, running in bearings at right angles to the engine-shaft *i*, and having fixed upon its outer end a spur-wheel, 5, gearing with and driven by a corresponding pinion, 6, upon the shaft 7, which revolves in bearings 8 9 upon the upper side of the frame. The other or inner end of the shaft 7 has fixed upon it a beveled toothed wheel, 10, gearing into two corresponding beveled toothed pinions, 11 12, which revolve freely upon the engine-shaft *i*, but are fitted with friction-coupling boxes, so that either of them, as desired, can be connected with and driven by the engine-shaft *i*, a movable coupling, 13, upon the latter being connected to a handle, 14, arranged in the neighborhood of the other handles already described. In this way the two front bearing-wheels, *c c'*, of the crane can be made to turn in either direction, and the crane is thus slewed round its central post or pivot, *e*, either to the right or left, as desired.

In order to effect the raising or lowering of the jib of the crane, I use the following novel method of construction and arrangement: I make the lower end, A, of the jib turn in the usual way upon horizontal pivots B at the front of the frame-work of the crane, and upon the same pivots I fit the lower ends of sufficiently strong struts C, arranged at or about at right angles to the jib, their upper ends being attached to the lower ends of tension-rods D, the upper outer ends of which are fixed to the outer end of the jib E. The struts C are provided with transverse stays, and at their upper end is fitted a pulley, F, round which passes a chain or rope, G, by means of which the entire jib can be raised or lowered, as desired. One end of the chain G is fixed to a lug or attachment, H, at the back end of the frame-work of the crane, and its other end, after passing round the pulley F, is brought back and attached to the hoisting pulley or drum I, fixed upon a transverse shaft, K, turning in bearings below the back end of the frame-work. The transverse shaft K has also fixed upon it a tangent toothed wheel, L, gearing with and driven by an endless screw, M, fixed upon the longitudinal shaft N, which revolves in bearings O O, carried upon the frame-work of the crane, the front end of the shaft having fixed upon it a second tangent toothed wheel, P, gearing with and driven by an endless screw, R, fixed upon the transverse shaft S, also revolving in bearings carried by the frame-work of the crane, and having fixed upon it at a convenient part of its length a toothed wheel, T, gearing into a corresponding toothed wheel, U, fitted upon the engine-

shaft, and provided with a clutch-box, V, as shown in Fig. 2, by which it can be connected to or disengaged from the latter, the clutch-box V being operated by means of a handle, X, situated in the neighborhood of the other handles already described. By the means described and shown, therefore, the drum or pulley I can be connected with or disconnected from the engine-shaft, and the jib raised or lowered, as desired. A hoisting drum or pulley and chain are fixed at each end of the transverse shaft K, as shown in Fig. 2.

In Fig. 4 is shown an elevation of a modified form of arrangement in which the boiler 15 is carried in the usual way upon the back of the platform 16 of the crane, the steam-pipe *t* and exhaust-pipe *u* being connected directly to the boiler. In this method of construction the platform *a*, upon which the crane turns, may be mounted, as shown, upon a carriage, 17, the wheels of which—preferably six—run upon a railway, 18, and these wheels may be coupled together, as shown, by endless chains 19 passing round suitable wheels upon their axles, one of the latter being actuated by an arrangement (not shown in the drawings) of beveled toothed wheels driven by a vertical shaft passing through the hollow center *e*, round which the crane turns, the upper end of the shaft being driven by toothed gear connected with the driving-shaft of the engine, a suitable clutch-box being arranged by which it can be thrown in or out of gear, so as to propel the entire apparatus in either direction along the railway 18 as and when desired. Where it is not required that the jib should be capable of being raised or lowered, as above described, the chains or ropes and the gear for actuating them for such purpose are omitted, and the upper ends of the struts C are connected directly to the back end of the platform by tension-rods.

In Fig. 5 is shown a novel method of arrangement which I sometimes adapt to the crane apparatus for the purpose of weighing the coals or other articles raised at the same time that they are suspended to the end of the jib, such apparatus consisting of a horizontal lever, 20, one end of which is pivoted in the end of jib at 21, while its other end carries a pin upon which the jib sheave or pulley 22 revolves, the ends of the pin moving freely within sufficient limits in vertical holes or slots in the jib ends. When the weight 23 is suspended from the pulley 22, it depresses a vertical rod, 24, the lower end of which operates upon the short end 25 of a bell-crank lever, to the longer arm of which, 26, a tension-rod, 27, is jointed, which passes down the jib, and is connected at its lower end to a short arm, 28, of a second bell-crank lever, the longer arm of which, 29, is provided with a spring-balance, 30, or equivalent device, by which the weight is indicated. The arm 29 is also provided with an adjustable weight, 31, by which the permanent weight of the levers and skip is balanced.

Having fully described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. In a crane, the combination, with a circular track, of a sectional carriage adapted to rotate thereon, said carriage carrying engines, jib, and winding-drum, substantially as set forth.
2. In a crane, the combination, with a circular track, of a two-part carriage adapted to rotate thereon, one part carrying two wheels and the other part one wheel, substantially as set forth.
3. In a crane, the combination, with a jib pivoted to a carriage, of struts pivoted at the foot of the jib, tension-rods leading from the struts to the upper end of the jib, a drum secured to the carriage, and devices connecting the drum and struts and the drum and operating-power, whereby the jib is elevated and lowered at the will of the attendants, substantially as set forth.
4. In a crane, the combination, with a jib pivoted to a carriage, and tension-rods connecting the struts and upper end of the jib, of a pulley secured to the struts, a drum secured to the carriage, a rope or chain passing from the carriage about the pulley and back to the drum, and devices for operating the drum and thereby lifting or lowering the jib at pleasure, substantially as set forth.
5. In a crane, the combination, with a rotary carriage carrying engines, of a winding-drum journaled in upwardly-extending brackets secured to the carriage, gear connecting the winding-drum and engine-shaft, a friction-clutch for operating said gear, and a friction-brake operated by a foot-lever, substantially as set forth.
6. In a crane, the combination, with a carriage mounted on a circular track, engines resting on the carriage, and bevel-pinions secured to the axle of two bearing-wheels, of bevel gear-wheels mounted on the engine-shaft and operated by a clutch, a horizontal shaft provided with a pinion in contact with the said gear-wheels, and a pinion in contact with a gear-wheel on a counter horizontal shaft, and a pinion on the latter-named shaft meshing with the pinions on the bearing-wheel axle, whereby the bearing-wheels are rotated in either direction on the track, substantially as set forth.
7. In a crane, the combination, with a carriage mounted on a track and engines resting on the carriage, of devices secured thereon for elevating and lowering the jib, elevating and lowering weights, and moving the carriage, all operated by the engine and under the immediate control of the attendant, substantially as set forth.
8. In a crane, the combination, with a jib and hoisting mechanism, of a weighing apparatus connected therewith, substantially as set forth.
9. In a crane, the combination, with a jib and hoisting mechanism, of a weighing apparatus consisting of a pivoted lever situated at the upper end of the jib, a spring-balance and adjustable weight secured to the jib within view of the operator, and devices connecting the said supporting-lever and spring-balance, whereby the weight of the object lifted is determined, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES JAMES APPLEBY.

Witnesses:

CHARLES HENRY NEWTON,  
ALEXANDER HENRY MATTHEWS.