2 Sheets—Sheet 1.

C. C. LYMAN.

Steam Hoisting Derrick.

No. 222,142. Patented Dec. 2, 1879.

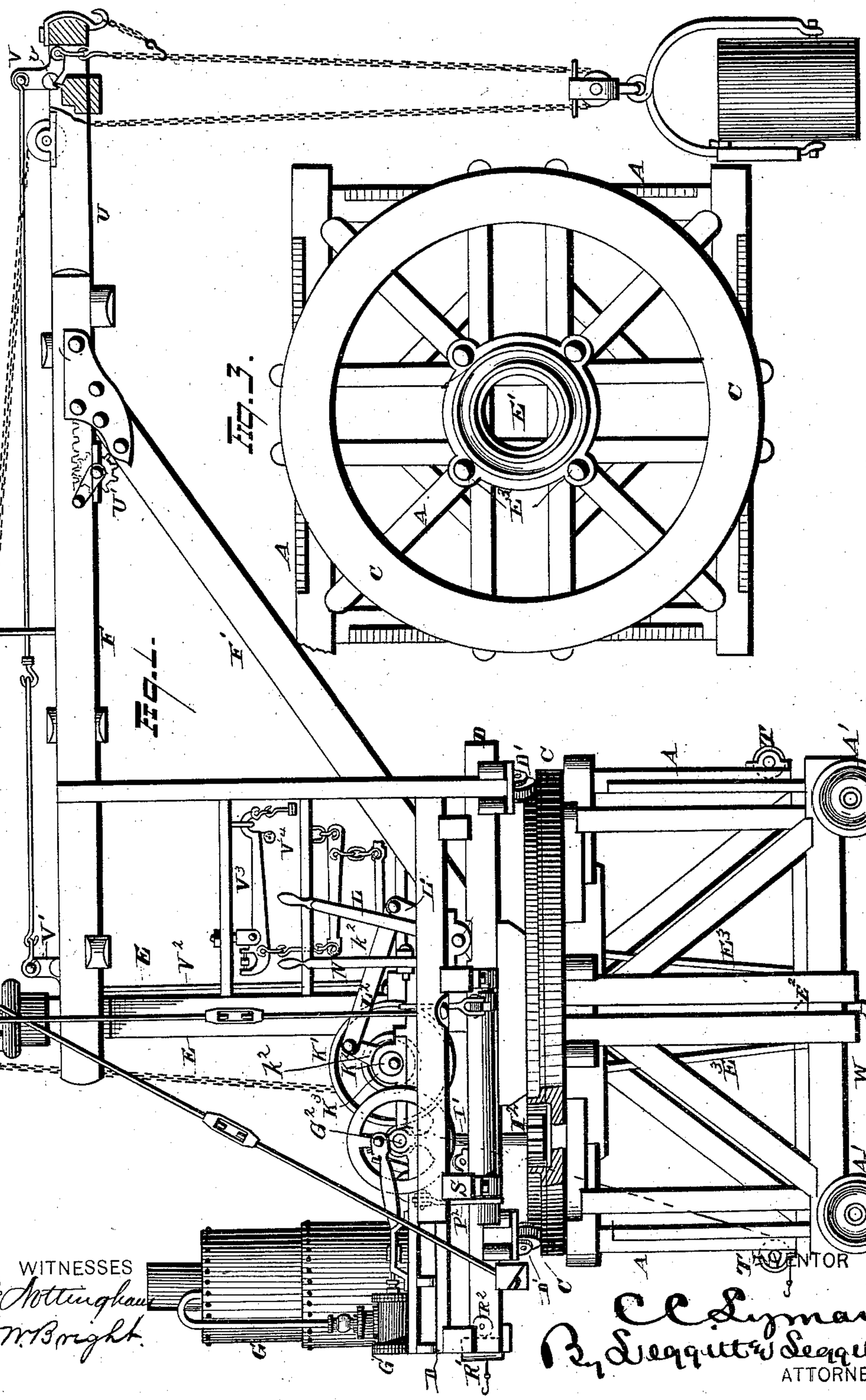

Fig. 3.

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2 Sheets—Sheet 2.

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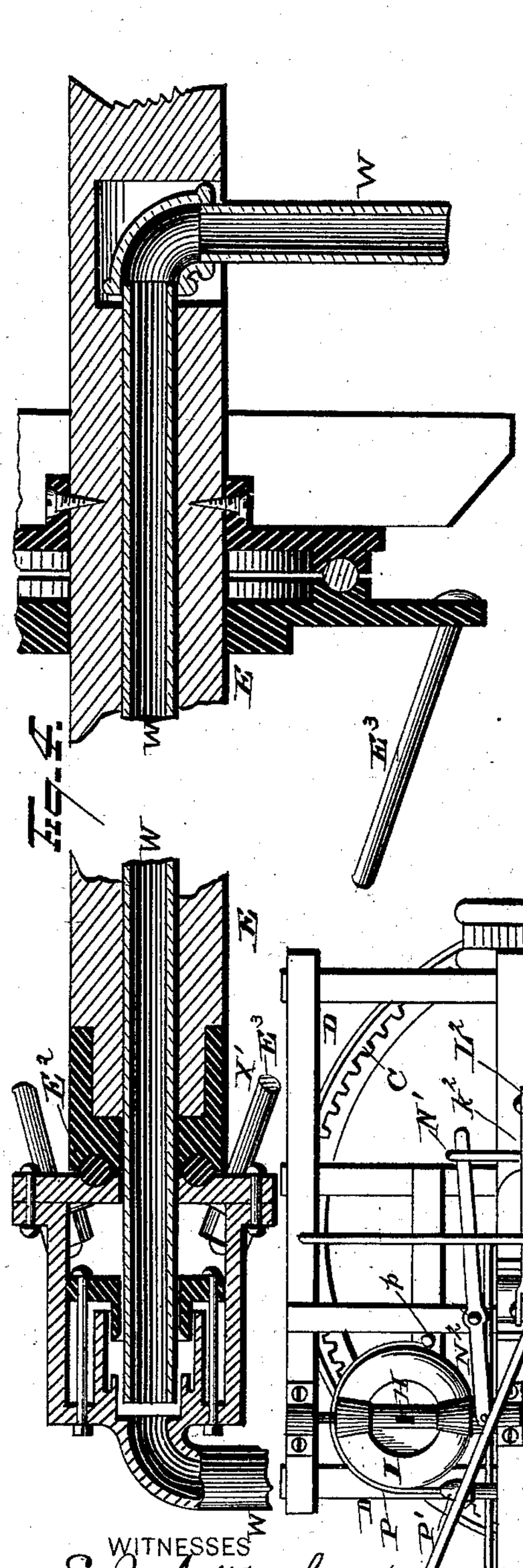

FIG. 4.

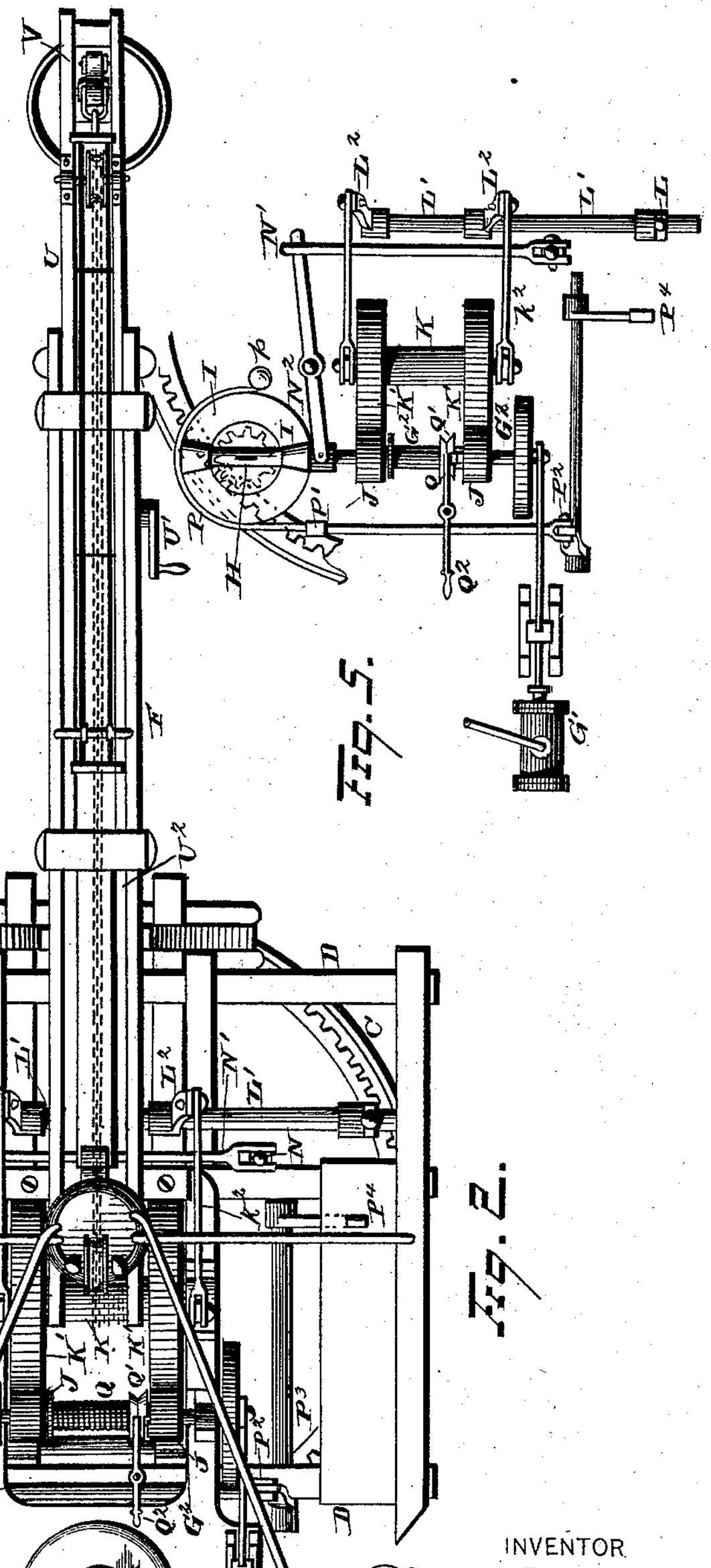

FIG. 5.

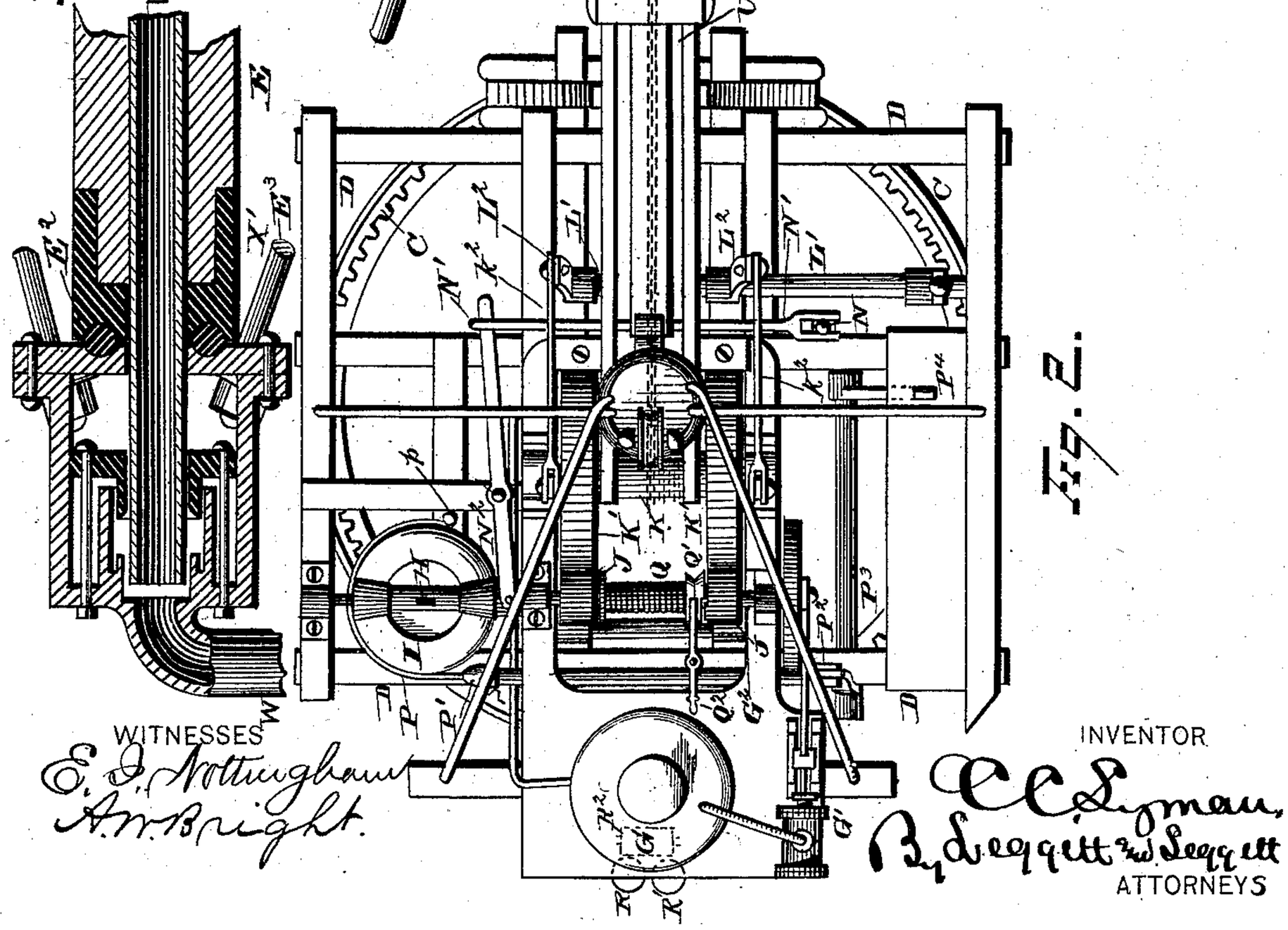

FIG. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

CHESTER C. LYMAN, OF CLEVELAND, OHIO.

IMPROVEMENT IN STEAM HOISTING-DERRICKS.

Specification forming part of Letters Patent No. **222,142**, dated December 2, 1879; application filed April 12, 1879.

To all whom it may concern:

Be it known that I, CHESTER C. LYMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Steam Hoisting-Derricks; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in steam-derricks; and it consists, first, in mounting the steam mechanism for operating the derrick upon an elevated platform and adapting it to make a complete revolution; also, in supporting the spar by two bearings, one in the vicinity of the elevated platform, and the other by a step near the ground; also, in supporting the lower end of the spar by a suspended step; also, in locating upon the elevated platform the stand of the person who operates the derrick; also, in locating upon said elevated platform, made substantially as described, the engine, boiler, and machinery for operating the derrick; also, in combining with a derrick weighing apparatus, formed substantially as described, adapted to weigh the material hoisted as it is suspended from the crane; also, in providing for the lengthening and shortening of the crane-arm and a corresponding adjustment of the weighing apparatus; also, in passing the water-pipe through which water is conveyed to the boiler up through the center of the spar, together with suitable stuffing-box joint at the base, whereby the crane might be turned without disturbing the water-pipe connections; also, in a truck-frame below, adapted to transmit the strain as near as may be directly to the corners.

In the drawings, Figure 1 is a view, in elevation, of a steam hoisting-crane embodying the principles of my invention. Fig. 2 represents a plan view of the same. Fig. 3 is a view looking down upon the supporting-frame with the crane removed. Fig. 4 is a separate view of the hollow spar, showing the water-pipe connections and the center bearing and suspended step. Fig. 5 is a separate view, representing the lever mechanism.

A is a frame-work, provided with suitable truck-wheels A′, adapted to travel upon a suitable track, B. The frame A is provided with suitable uprights, which support a circular rack, C.

D is an elevated platform, consisting of a strong frame-work, rigidly attached, so as to move with the spar E. The spar has a central bearing at E′, adjacent to the elevated platform, and its lower end rests in a step, E^2, which is preferably suspended by rods E^3.

F is the crane-arm, and F′ is a suitable brace.

Beneath the elevated platform are suitable bearing-wheels D′, which, in a great degree, support the weight and cause the spar to move easily without binding in its bearings.

G is a suitable boiler, which furnishes steam to an engine, G′, which in turn drives the shaft G^2. On the shaft G^2 is a sleeve, H, which has a conical surface at each end adapted to mesh with a corresponding bevel-wheel below, so that should the sleeve be shifted longitudinally, so as to bring one of its shoulders against the bevel-wheel, it would cause that wheel to move in one direction, while if the sleeve is shifted in the opposite direction, so as to bring its other conical shoulder to bear upon the opposite portion of the bevel-wheel, it would cause the wheel to move in the opposite direction, as indicated in Fig. 2 of the drawings.

The bevel-wheel is shown at I, and is fixed to the top of a vertical shaft, I′, which is provided with a pinion, I^2. This pinion, in turn, meshes with the circular rack C, at the top of the frame A.

It will thus be seen that while the engine drives the shaft G^2 always in the same direction, yet by shifting the sleeve H the crane is, by the frictional gears H I, caused to move around the axis of the spar as a center, and that this movement is unlimited—that is, the crane may move around the complete circle and in either direction.

J J are collars fixed rigidly to the shaft G^2. K is a shaft, to which are rigidly attached friction-wheels K′. The shaft K is journaled at its ends eccentrically within a sleeve, K^2 which sleeve, in turn, is journaled within sta

tionary boxing K^3. k^2 is a lever-arm projecting from the sleeve K^2, which is united with the arm L′ of the hand-lever L by connecting-rod, L^2.

Now it is apparent that by pressing the hand-lever L in one direction the friction-wheels K′ will be forced against the collars J, causing a contact between them sufficient to revolve the shaft K.

The shaft K is enlarged at its central portion, so as to constitute the drum, upon which the hoisting chain or rope is so wound that when the collars J and K′ are in contact the shaft K′ is turned in a direction to wind up or lift the weight. When the weight is lifted to a suitable height the frictional contact is broken by shifting the lever L in the other direction by a quick movement, which, at the same time the contact is broken, forces the frictional wheels K′ against the brake-shoes k'. Then, when the crane is turned to the proper point for delivering the load, the load may be eased down by means of the lever L, by gradually relieving the frictional contact between the friction-wheels K′ and the brake-shoes.

N is a lever, adjacent to the lever L, so that both may be within reach of the operator. The lever N is connected with a rod, N′, which operates the lever N^2, which lever, in turn, shifts the sleeve H so as to obtain its frictional bearing upon either side of the bevel frictional pinion I, so that the operator may thereby govern the turning of the crane.

The sleeve H may be so shifted that neither one of its beveled surfaces shall bear against the bevel-wheel—in other words, so that it shall be out of gear therewith, and that would be its position whenever the crane was at rest and the engine running.

In order that the crane may be turned quickly to any point and then quickly stopped, a brake is provided in the form of a strap, P, surrounding the edge of the bevel-wheel I. This strap is attached to the frame at *p*, and at its free end to a rod, P′. This rod, in turn, is connected with the arm P^2 of the shaft P^3, which is governed by a foot-treadle, P^4, so that at any time the braking-strap P may be closed upon the bevel-wheel I by pressing the foot upon the foot-treadle P^4, so that it is apparent that an operator may stand within reach of the levers L and N, and by means of them may govern the raising and lowering of the weight, the turning of the derrick, and the stopping of the revolution through means of the brake-treadle.

On the shaft G^2 is a loose sleeve, Q, which may at any instant, by a suitable clutch, Q′, be thrown in or out of gear with the shaft G^2 by any suitable lever Q^2. Upon the drum Q is coiled a suitable rope or chain, the end of which passes down and out between suitable rollers R, R′, and R^2, and thereby the weight to be lifted might be drawn up within reach of the crane. So, also, instead of passing the rope out between the rollers R R′, &c., it might be passed down over the roller S and beneath the roller T at the base of the frame. Then by attaching the rope to any suitable distant fastening the whole derrick might be caused to traverse along the tracks B, thereby changing its position. If it is desired to move the derrick in the opposite direction, all that is necessary will be to turn the crane one hundred and eighty degrees, then pass the rope beneath the pulley at the base of the frame upon the other side.

U is an adjustable section of the crane-arm, whereby the arm may be lengthened or shortened. U′ is suitable crank-and-gear mechanism for running out or drawing back the adjustable section U. U^2 are suitable pieces which serve as stops when the arm may have been adjusted to the proper length. The crane end of the lifting chain or cable, instead of being attached to the end of the crane-arm, is attached to the horizontal arm of a bell-lever, V, the lever being preferably provided with a notch and poised upon an edge, *v*. A rod connects the upright arm of this lever with the upright arm of a corresponding lever, V′. The horizontal arm of this lever is in turn connected with the upright or lifting rod V^2 of a suitable weighing-scale mechanism, V^3, whereby the weight suspended at the end of the crane is measured upon the scales V^3.

I also prefer to attach to the scales a registering device, V^4, such as has been heretofore employed by me, so that if it is designed to raise with a bucket given weights of, say, one ton each, the weighing-scale may be set to measure ton weights, and the fractions above or below a ton may be indicated upon the indicator V^4 without the necessity of shifting the weight along the scales. So, also, I may or may not employ in the same connection counting mechanism for tallying the number of weights lifted.

W is a water-pipe for supplying water to the boiler. This pipe is passed up the center of the spar and provided with a joint and stuffing-box below, whereby the crane may be turned without disturbing the water-pipe connections at its base.

I do not limit myself strictly to this last construction, because it is apparent that the boiler may be located within the frame A beneath or outside the frame, in which case steam would be passed up in like manner through the center of the spar to the engine above. I prefer, however, to locate the boiler as shown in the drawings, whereby it acts as a counterpoise to the crane-arm and the weight that is being lifted.

As before explained, the spar has a bearing at or near the stationary platform, at which point I prefer that it shall bear upon friction-rollers or friction-balls located in a suitable channel; but at its bottom I prefer that it shall rest within a step, E^2, which step shall be suspended by suitable rods E^3, said rods passing through ears in the seat above, and

governed by nuts, in order that the length of the rods may be so gaged as to cause the spar to divide its bearing equally between the upper bearing and the lower step.

The end of the weighing-chain may be attached either to the arm or to the weighing apparatus. If to the former, then the crane will operate without operating the weighing-scales; but by simply changing the end of the chain to the weighing apparatus attachment the apparatus is adapted for weighing the weights hoisted; or there may be an extra length of chain attached near its end, which, being hooked upon the weighing attachment, would transfer the weight to that point without the necessity of breaking the permanent attachment to the crane-arm, as indicated in the drawings.

What I claim is—

1. In a steam-derrick, an elevated platform adapted to receive the engine and operative parts of machinery, substantially as and for the purposes described.

2. A hoisting-derrick provided with a bearing intermediate between the top and bottom of the spar, and in connection therewith a step for receiving the bottom of the spar, substantially as and for the purposes described.

3. The combination, with the lifting chain or cable, of the bell-crank levers or their equivalents and the connecting-rods, whereby the bell-cranks are caused to operate the weighing apparatus and measure the weight of the article suspended by the chain, substantially as and for the purposes described.

4. The combination, with a hoisting-derrick, of an elevated rotary platform which turns with the crane-arm, said platform provided with a boiler and engine located thereon as a counterpoise to the crane-arm, substantially as set forth.

5. In a steam hoisting-derrick, the combination, with the adjustable section of the crane-arm, of the crank-and-gear mechanism which runs out and draws back said section, substantially as set forth.

6. The combination, with the weighing apparatus, of an adjustable connection between the two bell-crank levers, in order that the said connection may be made to conform to the increased or decreased length to which the crane-arm may be adjusted, substantially as and for the purposes described.

7. The combination, with a steam-engine, of friction-gear mechanism for revolving the same about the axis of the spar, substantially as and for the purposes described.

8. In a steam hoisting-derrick, the adjustable sleeve with reversed conical heads governed by a lever, in combination, with the bevel-wheel I on the pinion-shaft, the whole constituting a frictional-gear mechanism for transferring the crane, substantially as and for the purposes described.

9. The combination, with a steam-derrick, of frictional-gear mechanism, substantially as described, for raising and lowering the weights.

10. The drum Q, adapted to be turned in or out of gear with the shaft G^2, together with its cable, whereby a load may be brought within reach of the crane-arm, or the derrick itself be moved along its track, substantially as and for the purposes described.

11. The combination, with the bevel-wheel on the shaft of the driving-pinion I, of the brake-band governed by foot or other treadle, substantially as and for the purposes described.

12. The combination, with the drive-shaft G^2, of two friction-collars adapted to mesh with a friction-collar at each end of the lifting-drum, substantially as and for the purposes described.

13. The combination, with the crane-arm and the weighing apparatus, of hooks or attachments for the end of the lifting-chain, whereby said chain may be at will either attached rigidly to the arm or to the weighing apparatus, substantially as and for the purposes described.

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

CHESTER C. LYMAN.

Witnesses:

JNO. CROWELL, Jr.,

WILLARD FRACKER.