(No Model.)

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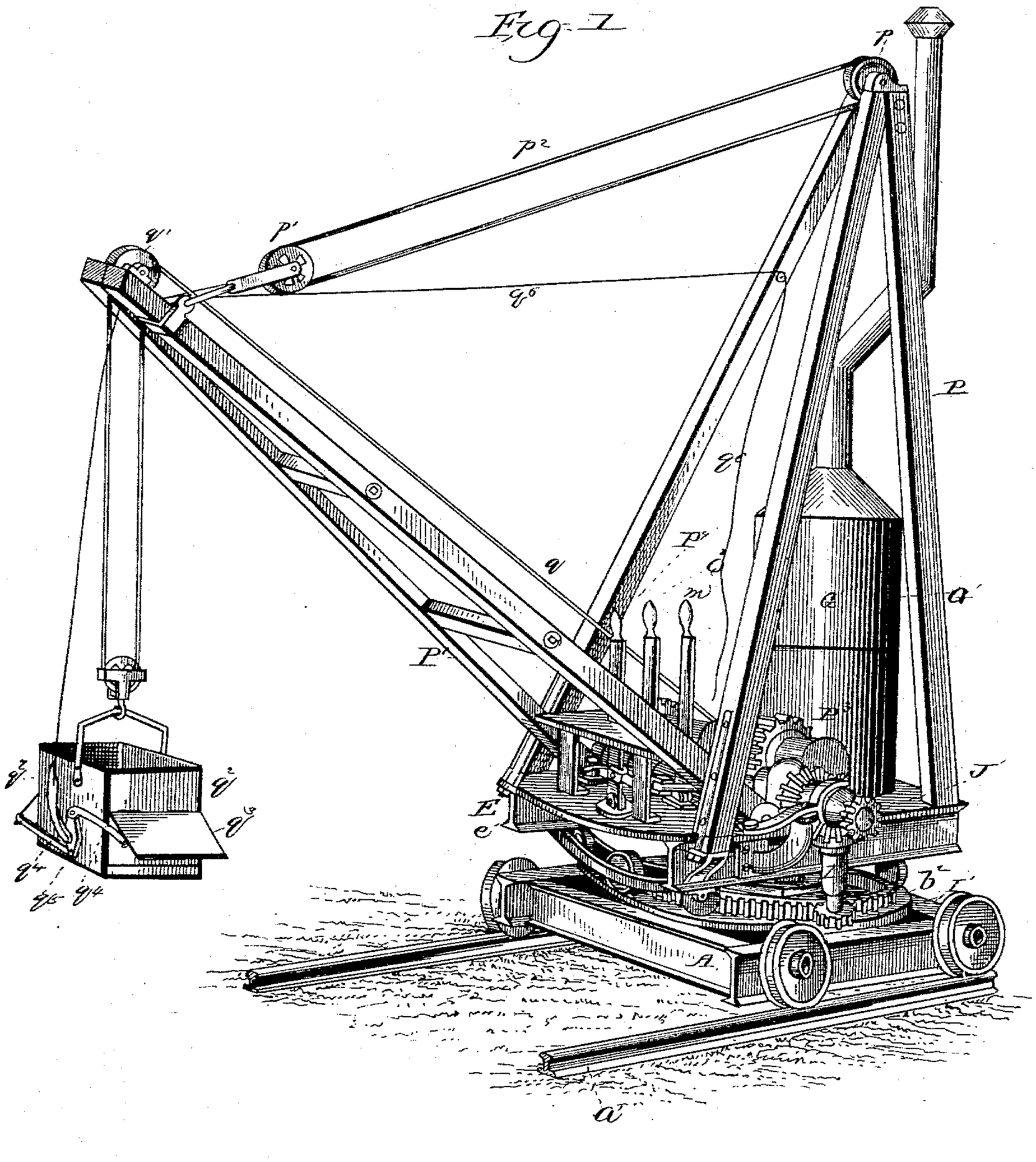
A. N. SIMMERLY.

REVOLVING DERRICK.

No. 323,538. Patented Aug. 4, 1885.

Fig. 1.



WITNESSES

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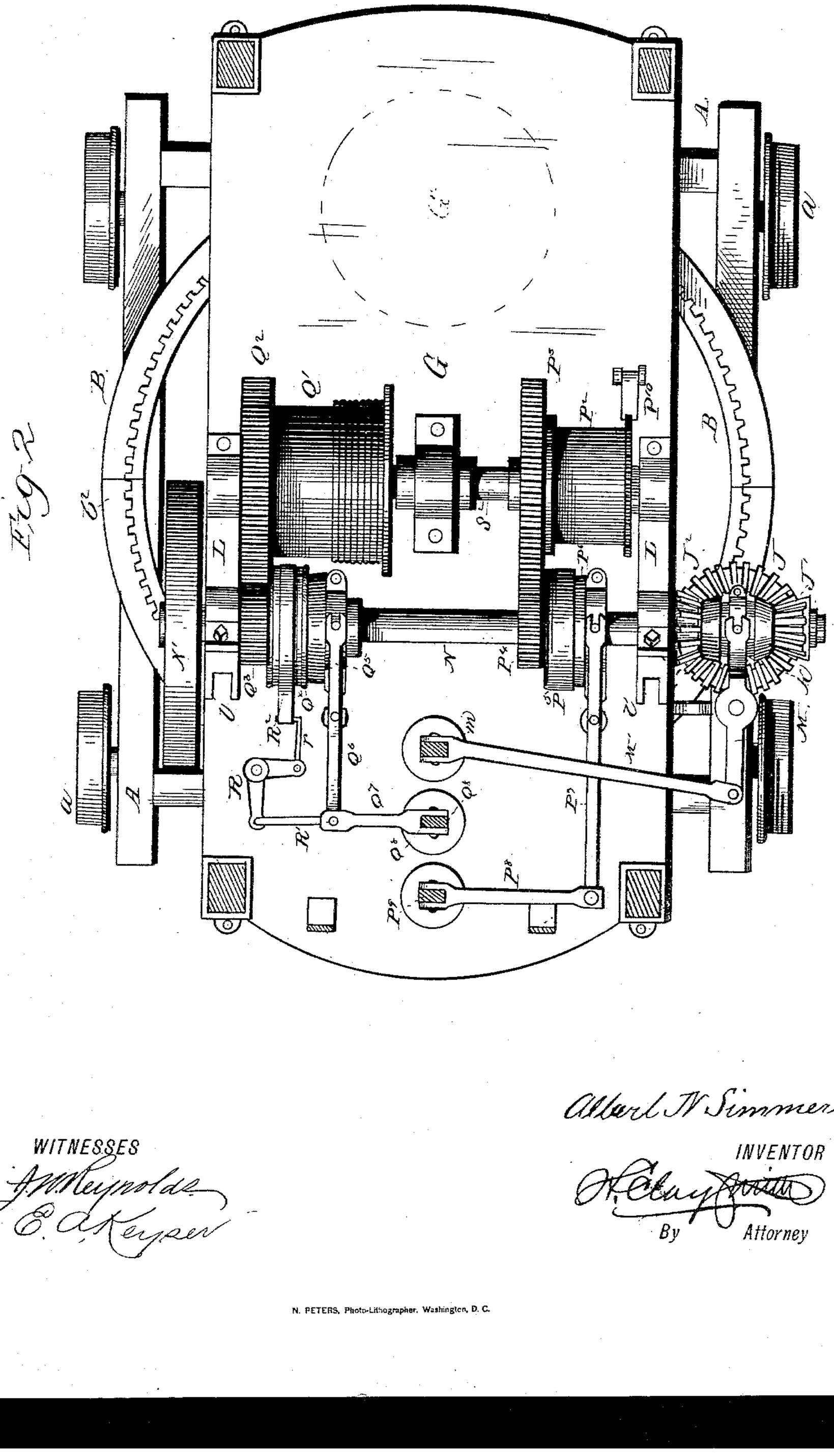

Fig. 2.

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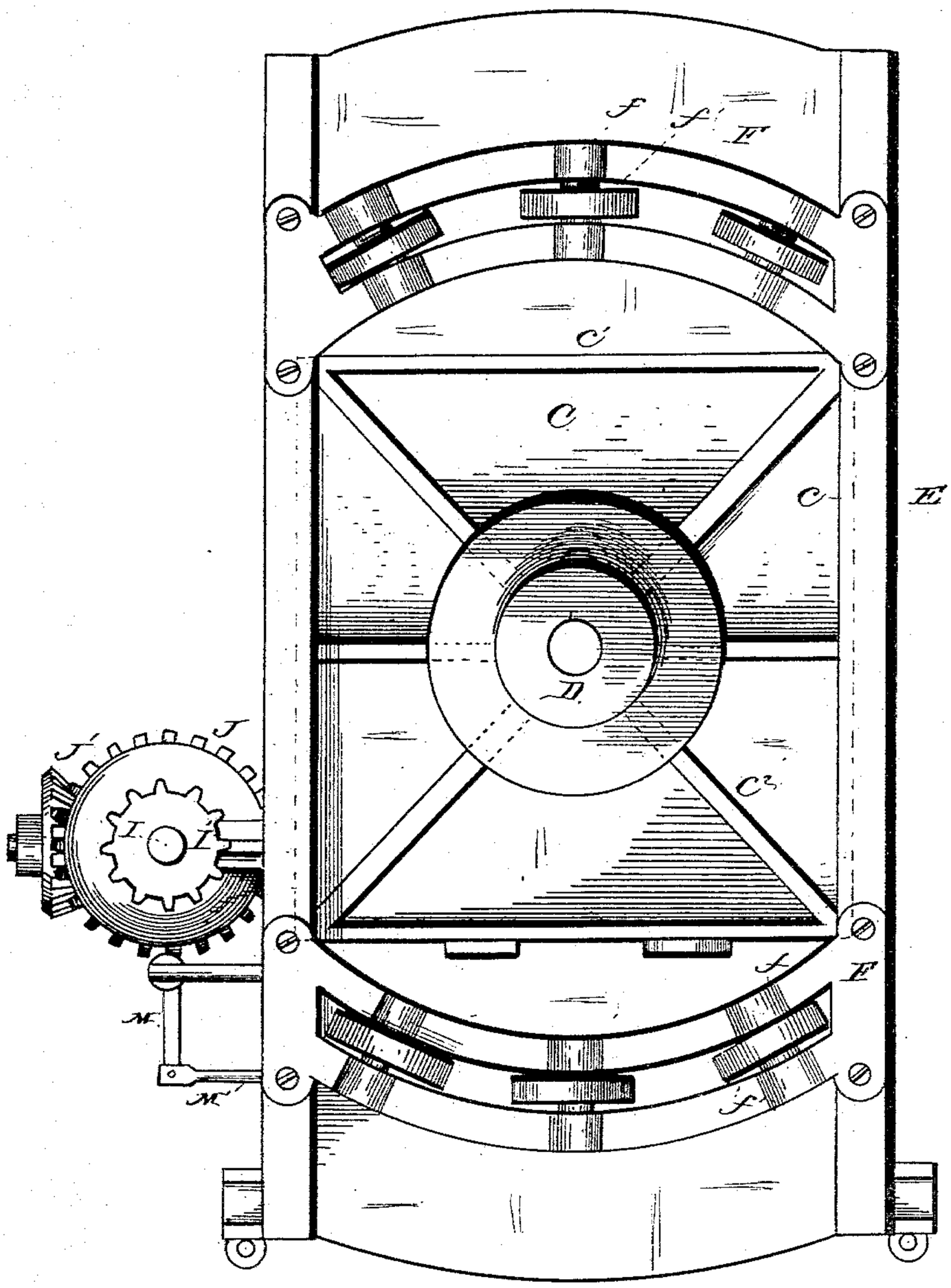
Fig. 3.



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No. 323,538. Patented Aug. 4, 1885.

Fig 4.

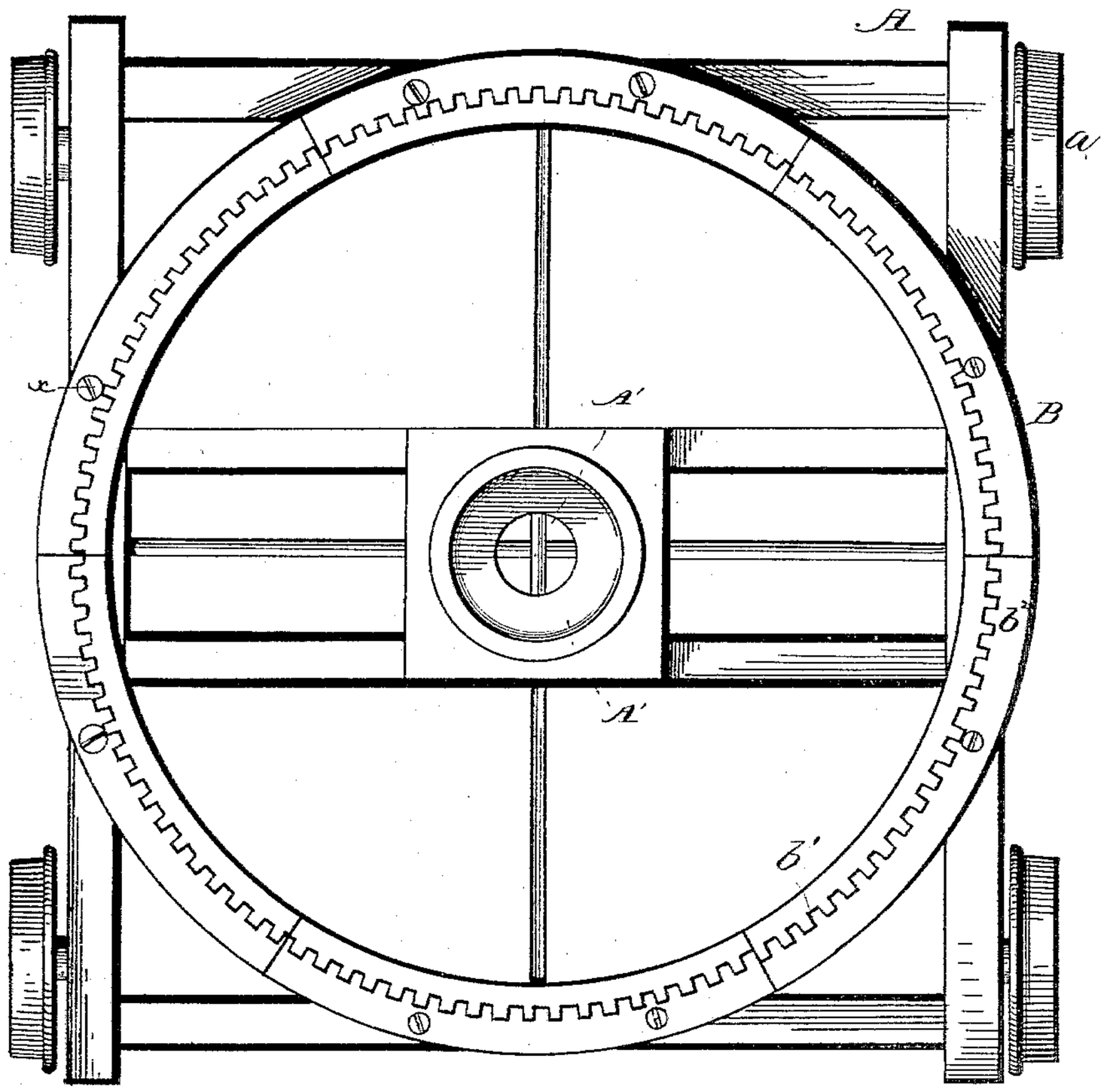
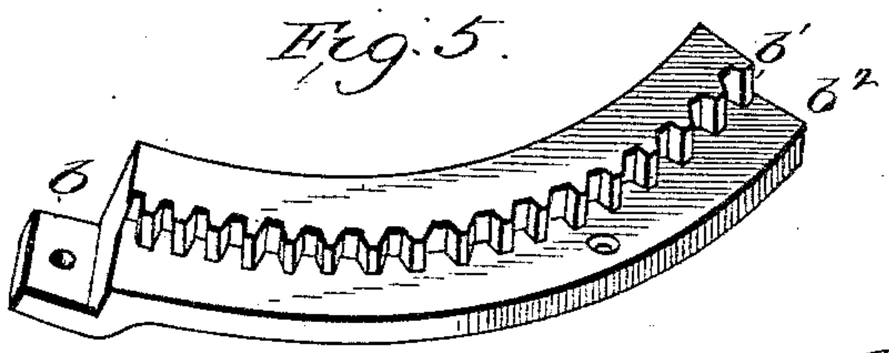


Fig. 5.



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(No Model.) 5 Sheets—Sheet 5.

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Fig. 6.

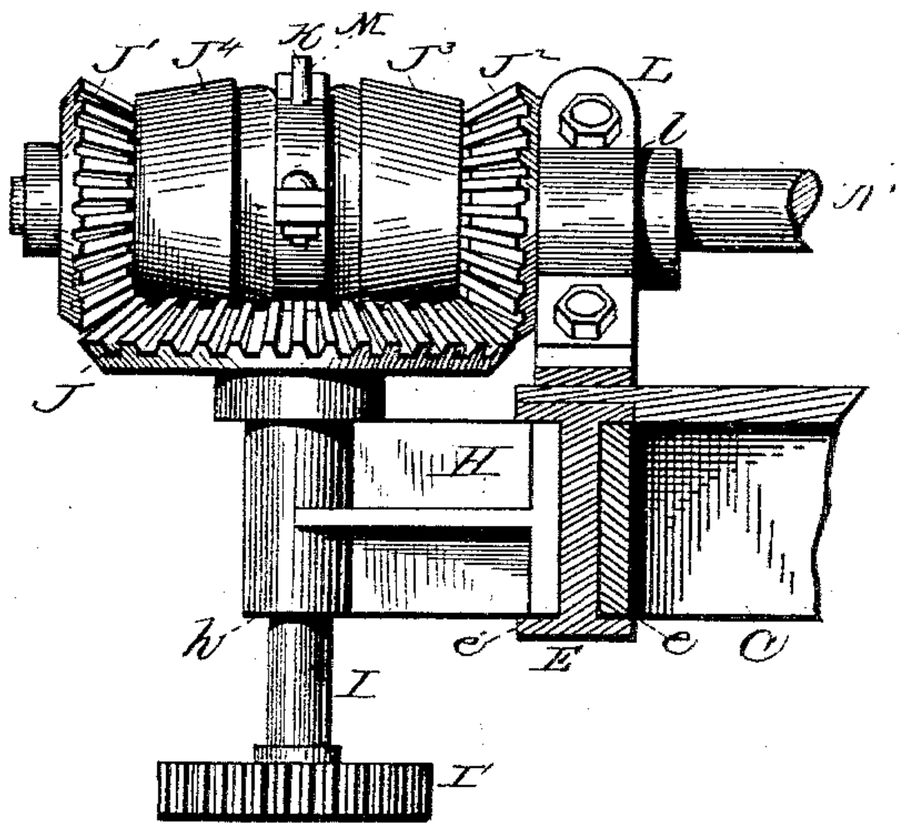
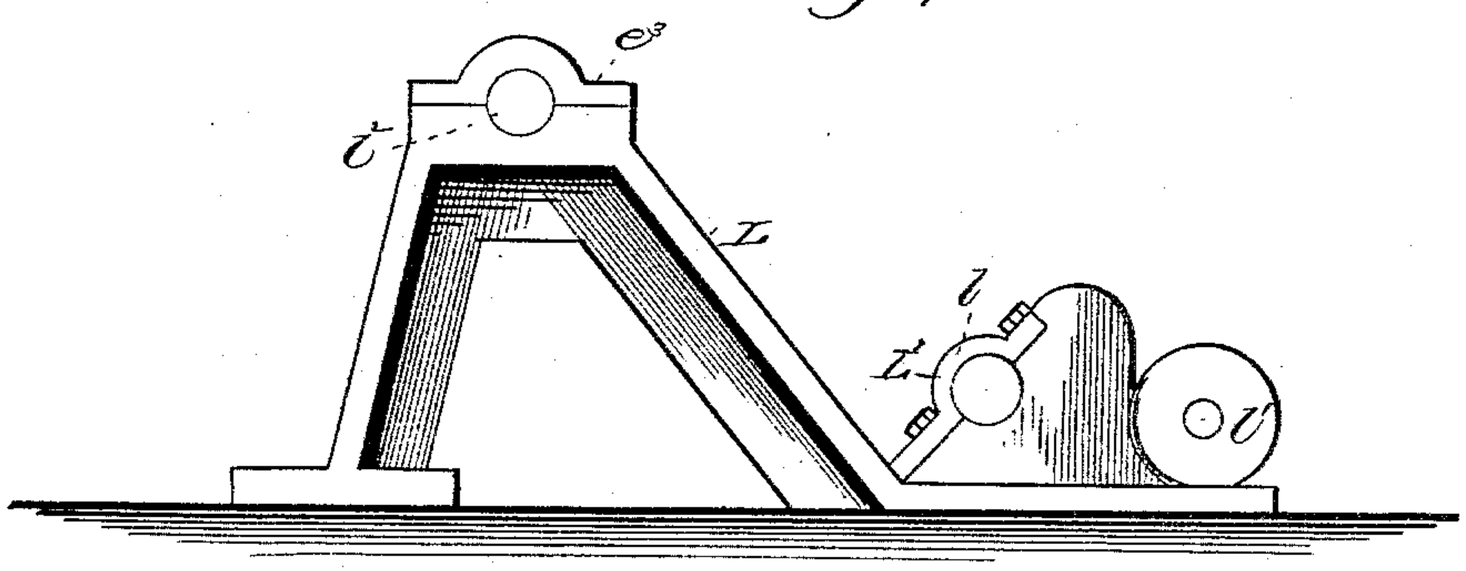


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALBERT N. SIMMERLY, OF CLEVELAND, OHIO.

REVOLVING DERRICK.

SPECIFICATION forming part of Letters Patent No. 323,538, dated August 4, 1885.

Application filed May 29, 1885. (No model.)

To all whom it may concern:

Be it known that I, ALBERT N. SIMMERLY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Revolving Derricks; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to revolving derricks; and the novelty consists in the construction, arrangement, and adaptation of parts, as will be more fully hereinafter set forth, and specifically pointed out in the claims.

A great fault with this class of devices lies in the fact that, due to the intense strain to which they are subjected, and to the further fact that this strain is exerted in alternately-opposite directions, the bearings and the structure of the platform or revolving body soon work loose and the working-surfaces become disconnected. To raise a ton of coal or ore to the end of a long boom or crane, and then to revolve the platform so as to throw the load over some other point for deposit, requires great strength and absolute reliability in the working parts. These working parts are strained in one direction to throw the load to the place of deposit, and in the opposite direction to bring the device back to the loading-point. These contrary strains create havoc with the working-bearings as these devices are ordinarily constructed, and not only do the bearings become loose, endangering the proper operation of working-surfaces, but the entire structure becomes shaky and in time useless.

I construct my derrick with especial strength in those parts which receive the greatest strain, and provide especial strength and peculiar adaptations to the parts which support the journals of the working devices.

The revolving portion of my device is provided with a base of metal cast in a single piece. This base supports the platform and all the journal-supports. I-beams are securely bolted to the base to form a platform, and the journal-supports are securely bolted to the base.

I provide single castings which afford the journals for the shafts of the gears being operated upon, and also for the gears which operate them from the motive power. Unless these castings break, it is not possible for the working parts to shift their relations to each other, and these castings being secured to the body-base they are prevented from working shaky. I provide that the supporting-rollers shall be journaled in sets of three upon each side of the derrick in single castings made in segments to agree with the arc of the circle described by the track upon which the rollers or wheels travel, and I secure these journal-castings direct to the body-base. I provide a circular way made in sections having peculiar supporting-joints. Each section or segment has a rack and a track exterior thereto, the teeth of the rack extending outward. I provide a convenient arrangement of clutch-shifting levers and devices for raising or lowering the boom, for raising the load to the end of the boom, and lowering the same, by a friction-brake, at will, and for revolving the derrick in opposite directions, all of said operating-levers being arranged in such juxtaposition that a single operator may direct either of the operations with ease, without changing the position of his feet upon the platform. These features and others of minor importance are fully illustrated in the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the entire derrick. Fig. 2 is a top plan view, with all the standing parts and the operating-levers cut away, and with the boom removed. Fig. 3 is a bottom plan view of the revolving platform. Fig. 4 is a top plan view of the supporting-frame, showing the circular way and rack, with the central step or socket for the derrick-pivot. Fig. 5 is a detail perspective of one of the segments which form the way. Fig. 6 is a detail view of the mechanism for revolving the platform, and showing in section the manner of securing the main base to the I-beams of the platform. Fig. 7 is an elevation, showing the seat for the drum-shaft,

the power-shaft, and the step for the boom, all made in a single casting.

Referring to the drawings, A designates the base-frame. It is formed of **I**-beams properly bolted and braced to support a central step, A′, in which the central pivot-leg, D, of the derrick is loosely supported, and is mounted on the wheels *a*, which traverse distant tracks *a′*. This base-frame A supports a circular way, B, formed in sections, having each upon one end an off-set, *b*, to support the opposite end of the succeeding or adjacent section. Each section or segment is cast with a track-bearing, b^2, for supporting wheels F, and with a rack, *b′*, having its teeth projecting outwardly, as seen in Fig. 5, to engage the pinion I′. The several sections are formed to make an exact circle of proper diameter, and the whole is secured to the base-frame by bolts *x*.

C designates the body-base. It is a single casting with side bars, *c*, end bars, *c′*, and radial bars c^2. It is cast with or has secured to it the pivot-leg D of the derrick, and the several parts are of such depth as to give it great strength, the side bars, *c*, fitting neatly and closely within the space *e* formed in one side of the **I**-bars E, as seen in Fig. 6. By this construction a close joint is formed between the **I**-bars and the body-base along the whole area of its side, both above and below, and when securely bolted together they form practically a solid body. The **I**-bars form the longitudinal sills of the platform G, which may be of metal plates, and this platform supports the boiler and engine G′.

F designates stout metal castings having journals *f* for the shafts of the supporting-wheels *f′*, and they are of such size as to bring the several wheels *f′* in the arc of a circle corresponding to the track b^2. These castings F are secured rigidly to the bottom bars of the **I**-beams E, close to or directly below the body-base C, and when these parts are in position for use the base C, the side beams, E, and the journal-castings F comprise, practically, a solid body. A stout metal casting, H, is fitted to the outside of one of the **I**-bars E, and it has a journal, *h*, which receives the vertical shaft I, carrying upon its lower end the pinion I′, which meshes with the rack *b′*, and upon its upper end the bevel-gear J. The securing-bolts, (not shown,) which secure the casting H to the bar E, pass through the side rail, *c*, of the base, so as to secure all together at that point.

N designates the power-shaft having connections N′ with the engine, (not shown,) and upon this shaft are hung loosely the bevel-pinions J′ and J^2, which mesh with the bevel-gear J. Cast in one piece with each of the pinions J′ J^2 is a cup-shaped portion, the concave sides of which face each other. These are the female portions of clutches, and are designated in Fig. 6 by the marks J^3 and J^4. A male clutch, K, forced to revolve with the shaft N, but having a limited longitudinal movement thereon, is controlled by a shipper, M, which by a link, M′, is connected to the hand-lever *m*. (Shown in position in Fig. 1.) By forcing said lever *m* in one direction the clutch and pinion J′ is forced to partake of the motion of the shaft N, and this, operating through the gear J, pinion I′, and rack *b′*, serves to revolve the derrick in one direction. By forcing the lever in the opposite direction the pinion J is similarly thrown into service to revolve the derrick in the opposite direction, the pinion J′ meanwhile revolving idly. A bevel friction-wheel and a bevel-clutch have been before proposed for a similar purpose; but in such construction it has not been found possible to secure sufficient friction, as only the peripheries of circular parts come into contact. I provide positive gear-connections between the beveled surfaces and utilize the entire area of friction-surfaces to accomplish the revolution or partial revolution of the derrick by making them male and female. This latter idea is not new with me, as the same has been before practiced in friction-clutches for various purposes.

Referring to Fig. 1, P designates a standing frame or mast. It is composed of four timbers suitably and strongly secured to the platform. It forms no part of this invention, being common in this class of machines. Upon its top is secured a pulley; *p*, and a rope, p^2, passing from the head of the mast outward through a pulley, *p′*, loosely secured to the free end of the boom P′, passes back over said pulley *p*, and thence down over a drum, P^2, to which it is secured. The drum P^2 is hung loosely on a shaft, S, and has a rigid gear-wheel, P^3, which meshes with a pinion, P^4, mounted loosely on the power-shaft N, and having the female part P^5 of a clutch, the male part P^6 of which engages therewith. The male part P^6 has a limited longitudinal movement on the shaft N, but is forced to revolve therewith in the ordinary way, and it is connected by shipper P^7 and link P^8 with the operating-lever P^9. (Seen in Fig. 1.) The drum P^2 is held from a backward movement by a pawl, as P^{10}.

Q′ designates another drum mounted loosely on the shaft S, and it carries a gear-wheel, Q^2, which meshes with a gear-pinion, Q^3, having a brake-body, Q^4, with female friction surface. This gear and collar Q^3 and Q^4 is mounted loosely on the power-shaft N, and is engaged by a friction-clutch, Q^5, hung loosely upon a lever, Q, connected by link Q^7 with operating-lever Q^8. The clutch part Q^5 has longitudinal movement on the shaft N, but is forced to revolve therewith, and is thrown into gear to revolve the drum Q′ by a movement in one direction of the operating-lever Q^8. A brake-band, R^2, operates over the body Q^4, and is connected to a bell-crank lever, R, by a link, *r*, another link, R′, connecting said lever to the shipping-lever Q^6. The drum Q′ carries the hoisting-rope *q*, which, passing over a pulley, *q′*, serves to raise and lower a bucket, q^2; hence, when the lever Q^8 is forced in one

direction it throws the drum Q′ into connection with the power, and the bucket q^2 will be raised. When the bucket and load has reached a sufficient height, the lever Q^8 may be thrown in the opposite direction, which operation throws the clutch Q^5, and consequently the drum Q′ out of connection with the power, and throws the brake-band R^2 into such connection with the drum that the load may be lowered at will, the friction being controlled at all times by the lever Q^8. This combined clutch and brake is covered by a patent granted to me February 24, 1885. The construction shown in the bucket is also patented to me, No. 311,789, of 1885, and both it and the clutch and brake are only important in this instrument in their relation to the operating-levers and other parts. The bucket has a bottom with a double incline and hinged doors, q^3. These doors q^3 are by links q^4 connected to a lever, q^5, hung on a central rock-shaft, the pivot-points between the links and the lever q^5 being carried past the center of motion of the rock-shaft, when the doors q^3 are closed. The weight of the load thus serves to make the lock secure, but the load may be deposited at will by means of a rope, q^6, secured to the free end of a lever, q^7, (rigid with the rock-shaft,) and leading to a point adjacent to the levers m Q^8 P^9. A tension upon the rope q^6 throws the pivot-points upon the other side of the axis of motion of the rock-shaft, and the weight of the load forces open the doors q^3. Intense strains are exerted between the power-shaft N, its transmitting-gears and the shaft S. I provide that these two shafts shall retain a fixed relation with each other and with the bearings of the boom by providing seats for the three in the same castings.

L designates such casting, (shown clearly in Fig. 7,) having journaled bearing at L′ for the power-shaft, and at l^2 for the shaft S. A cap, l, completes the journal of the box L′, and a cap, l^3, for that of the box l^2. As the strains between these shafts tend to force them apart, I place the box L′ upon the inclined side of the casting to relieve the cap from strain and to throw the force against the solid body of the casting L. The step for the boom is formed in the same casting, as seen at l'.

By my arrangement of the operating parts a single operator may elevate the boom (lever P^9) to any desired point, may elevate the bucket sufficiently by the lever Q^8, and then throw the drum out of gear and put the brake R^2 into operation to hold the load with one hand. With the other hand he may (lever m) revolve the derrick as far as necessary. He may lower the load at will, (brake R^2,) dump the load, (rope q^6,) elevate the bucket, return the derrick, and lower the bucket without changing his position on the platform.

I attach much importance to the body-base C and to the castings F and L. These are rigidly secured together, and but few parts are made, rendering looseness difficult. The castings L and F are held firmly to a main-body base cast in a single piece, and their relations with each other allow great strains in opposite directions without working the parts loose or changing their relations.

What I claim as new, is—

1. In a revolving derrick, substantially as described, the body-base C, cast in a single piece with bars c c', and radial arms, and the I-beams E, jointed and secured together, as shown, the said body-base furnishing bearings for the several journal-supports, and the whole adapted to serve, as and for the purposes set forth.

2. The combination, with the body-base C, and a circular way, as B, of castings F, furnishing journals f for the wheels f', and secured directly to said base, as set forth.

3. The combination, with the way b^2 and step A′, of the body-base C, the eye-bars E, and the segmental castings F, and pivot-leg D, as set forth.

4. In a revolving derrick, as described, the combination, with the power-shaft N, drum-shaft S, and boom, of the castings L, having step l', and journals L′ and l^2, as and for the purpose set forth.

5. The casting L, having the journals l^2 and L′, arranged as described, whereby the pressure upon the journal L′ will be directly upon the casting, and the cap l relieved, adapted to serve with the shafts N S and their gears, as set forth.

6. The way B, formed in sections, each section formed with track b^2, offset-support b, and rack b', with teeth projecting outward, as set forth.

7. The combination, with the dumping-bucket q^2 and drum Q′, the boom and its drum P^2, the way B, shaft I, having pinion I′, and gear K, of the operating levers m Q^8 P^9, arranged adjacent to each other and to the rope q^6 and their respective connections, as and for the purposes set forth.

8. In a derrick, substantially as described, the combination of the I-bars E, with the body-base C, secured in a recess, e, upon one side, and the bracket H, secured in a recess, e' upon the other side and all secured together, as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT N. SIMMERLY.

Witnesses:
FRANK W. WAGNER,
JACOB ZIEBERT.