(No Model.)

4 Sheets—Sheet 1.

W. H. LOTZ.

HOISTING MACHINE.

No. 314,696. Patented Mar. 31, 1885.

Fig. 5.

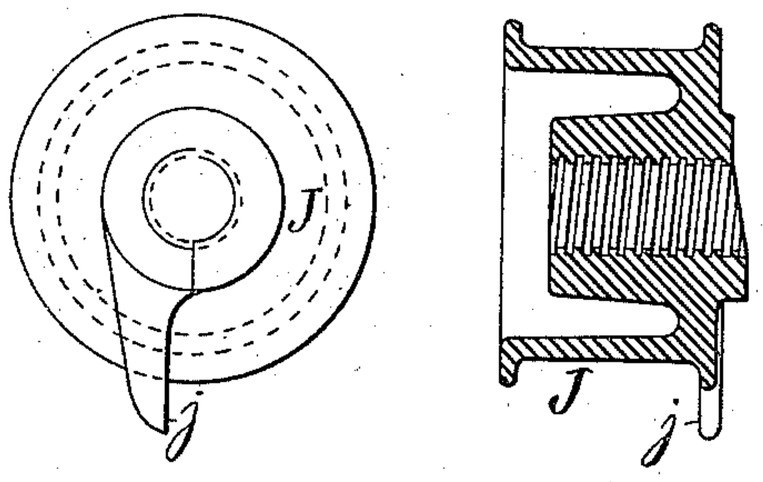


Fig. 6.

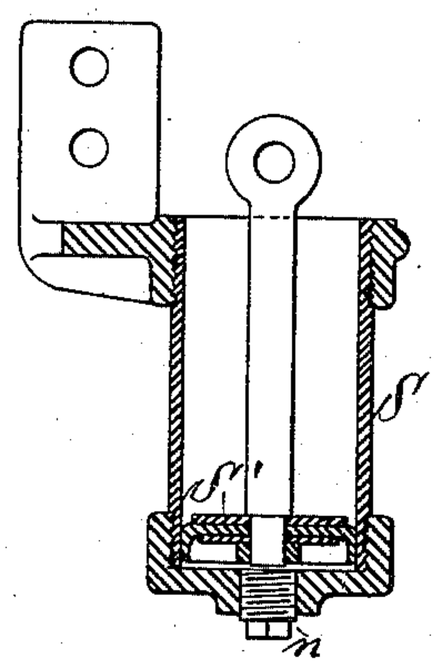
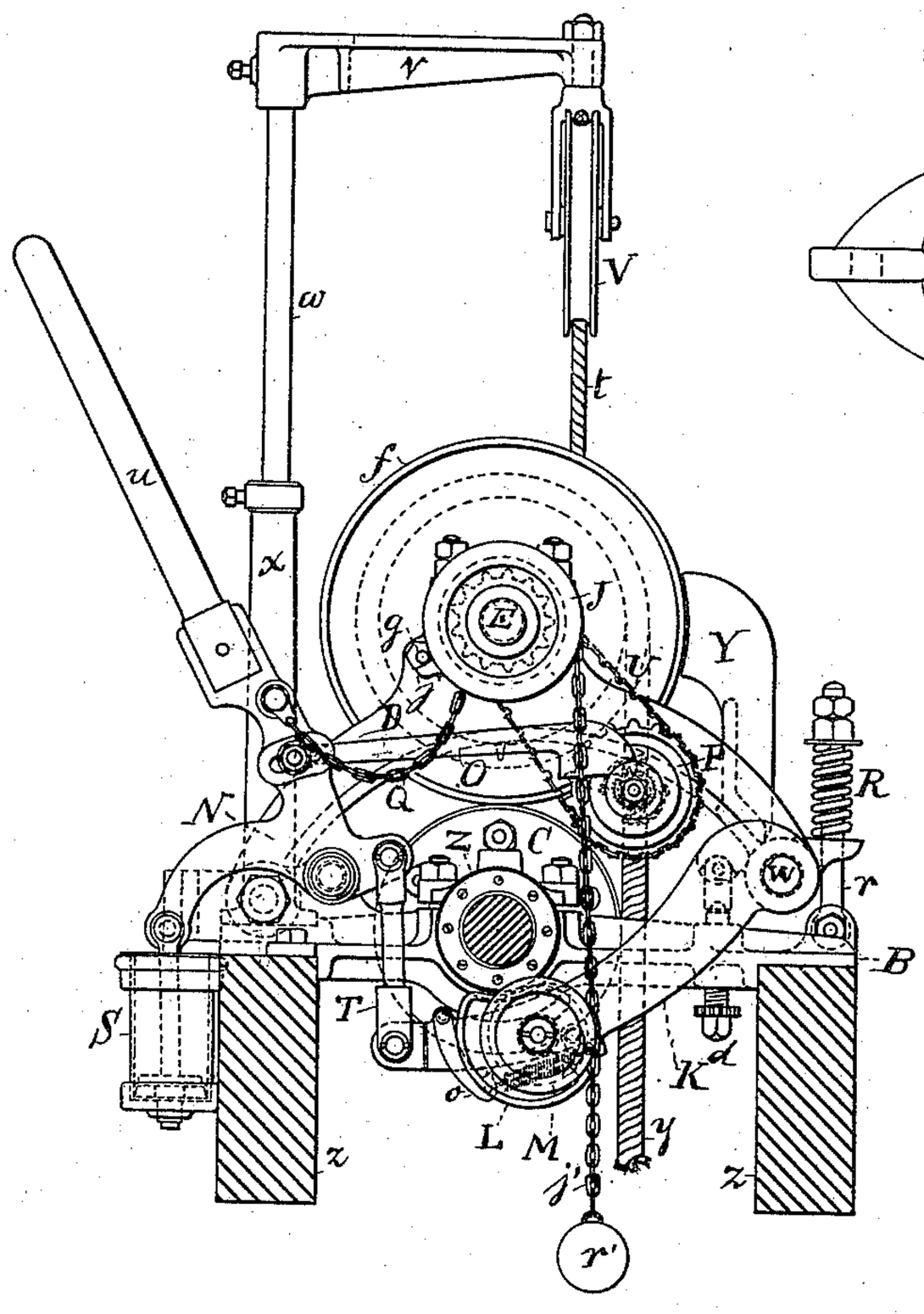


Fig. 1.



WITNESSES:

Adam Gro. White

Louis Nolting

INVENTOR

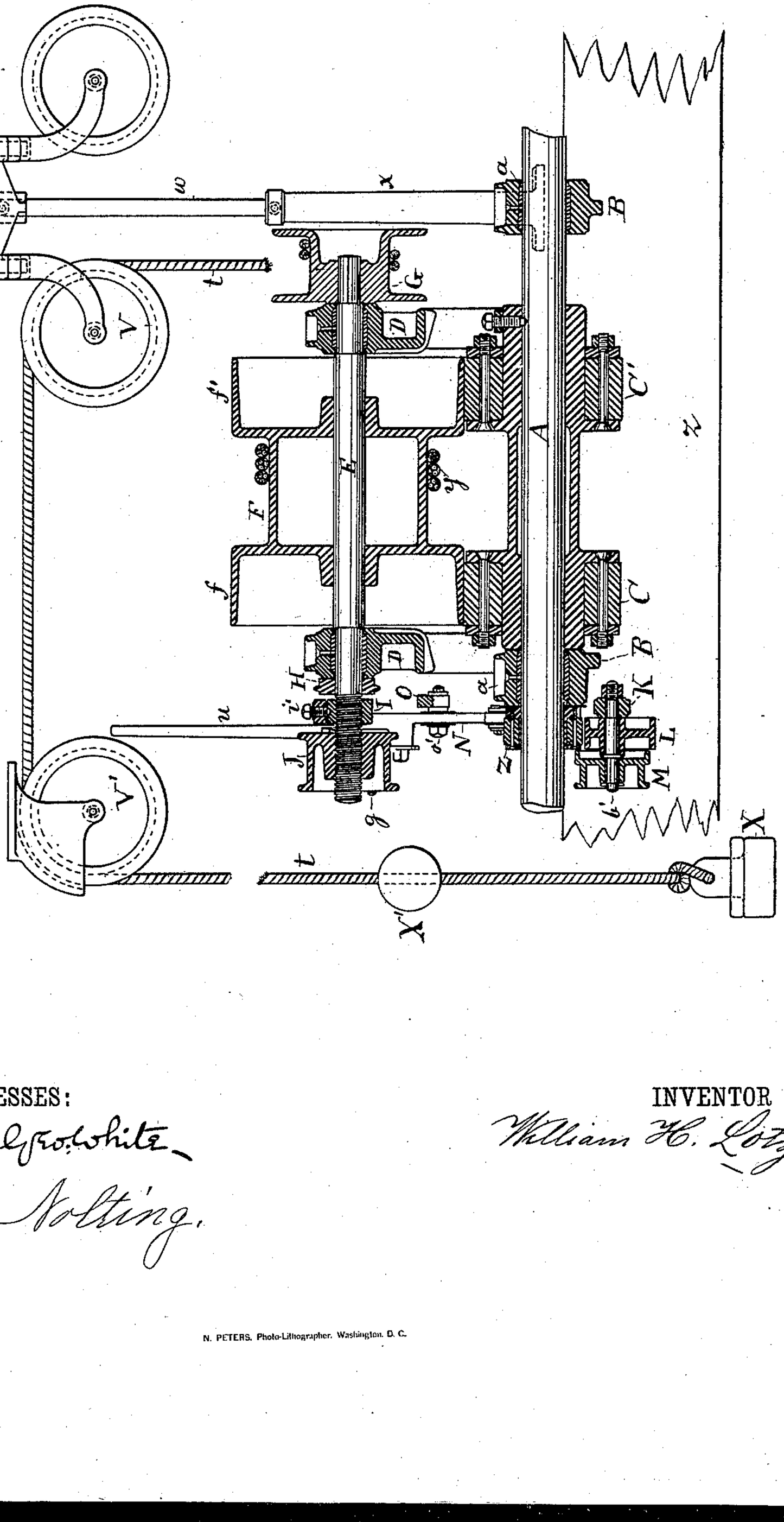
William H. Lotz

(No Model.) 4 Sheets—Sheet 2.

W. H. LOTZ.

HOISTING MACHINE.

No. 314,696. Patented Mar. 31, 1885.



WITNESSES:

Adam Gro. White

Louis Nolting.

INVENTOR

William H. Lotz

(No Model.)

4 Sheets—Sheet 3.

W. H. LOTZ.

HOISTING MACHINE.

No. 314,696. Patented Mar. 31, 1885.

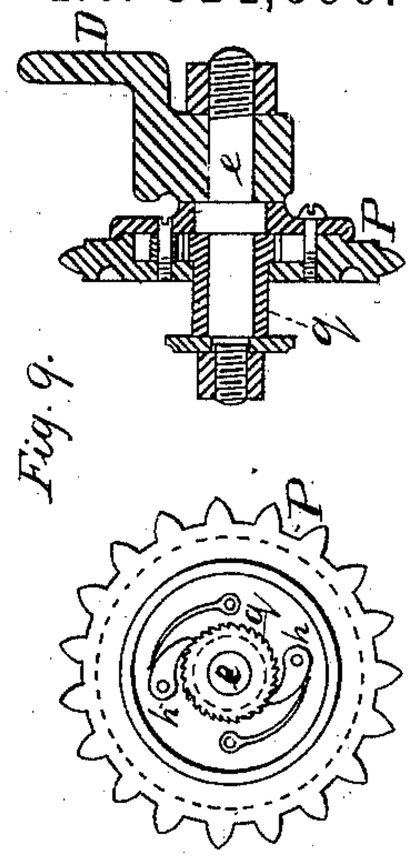


Fig. 9.

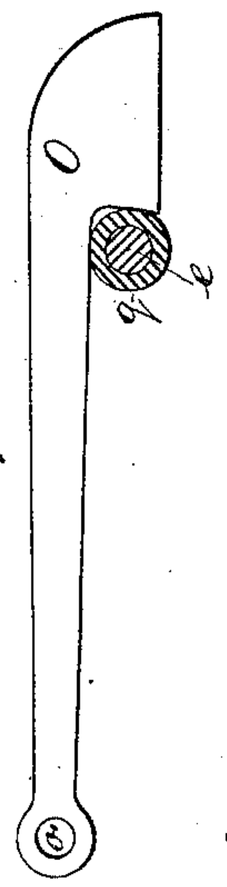


Fig. 8.

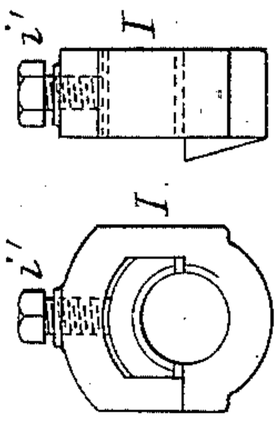


Fig. 7.

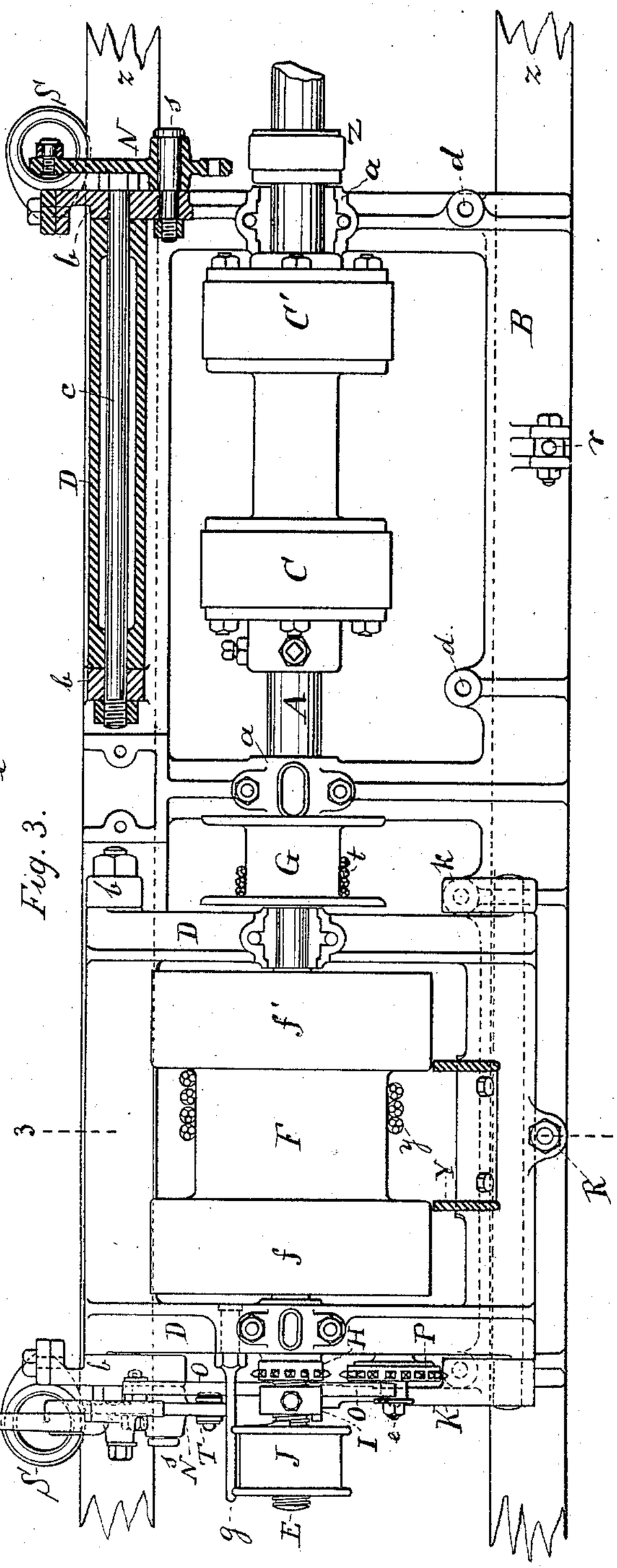


Fig. 3.

WITNESSES:

Adam Geo. White.

Louis Kolting.

INVENTOR

William H. Lotz

(No Model.)

4 Sheets—Sheet 4.

W. H. LOTZ.

HOISTING MACHINE.

No. 314,696. Patented Mar. 31, 1885.

Fig. 10.

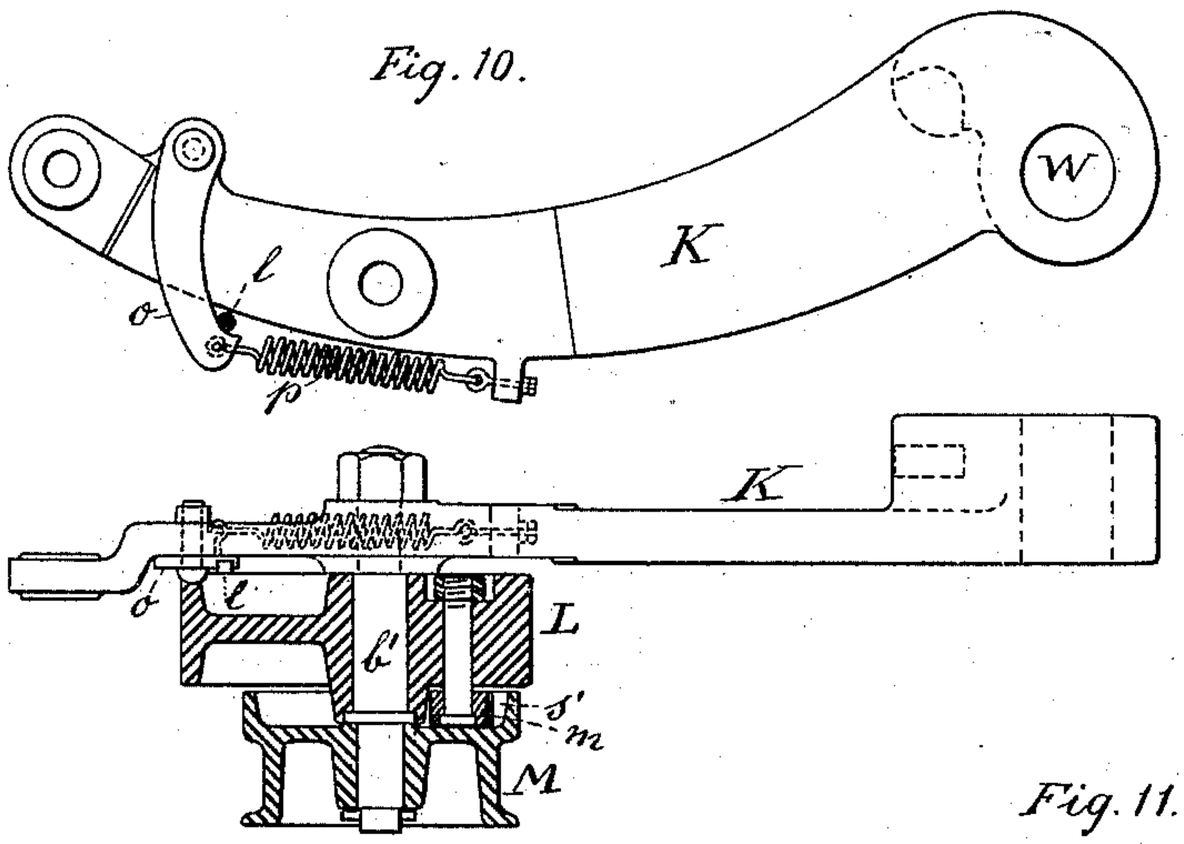


Fig. 11.

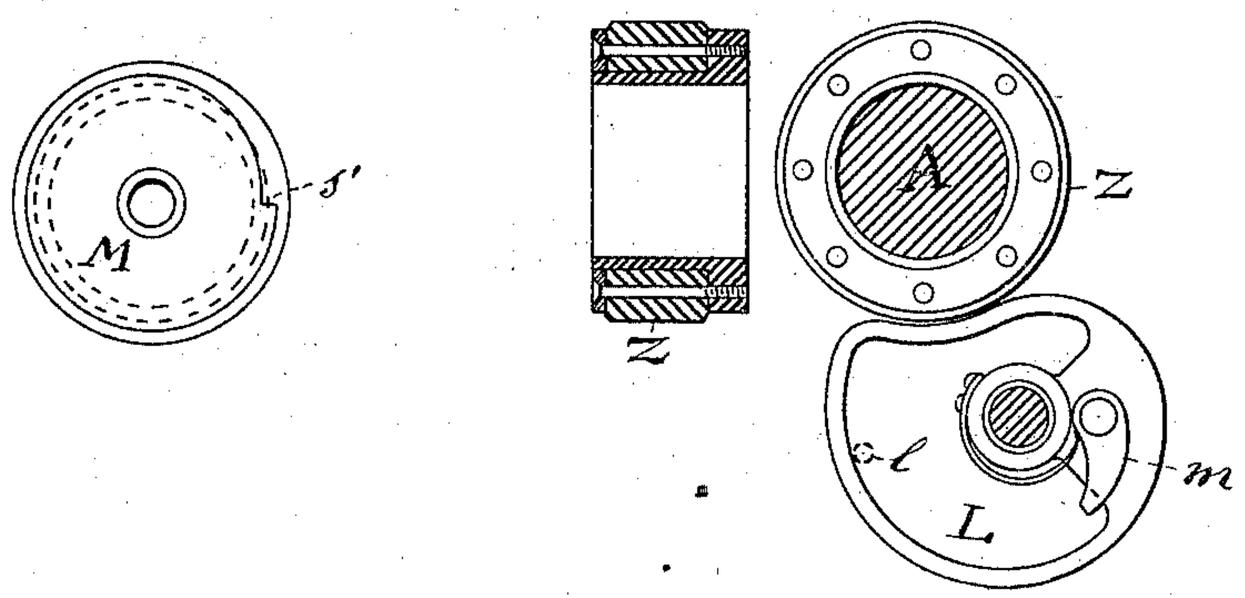
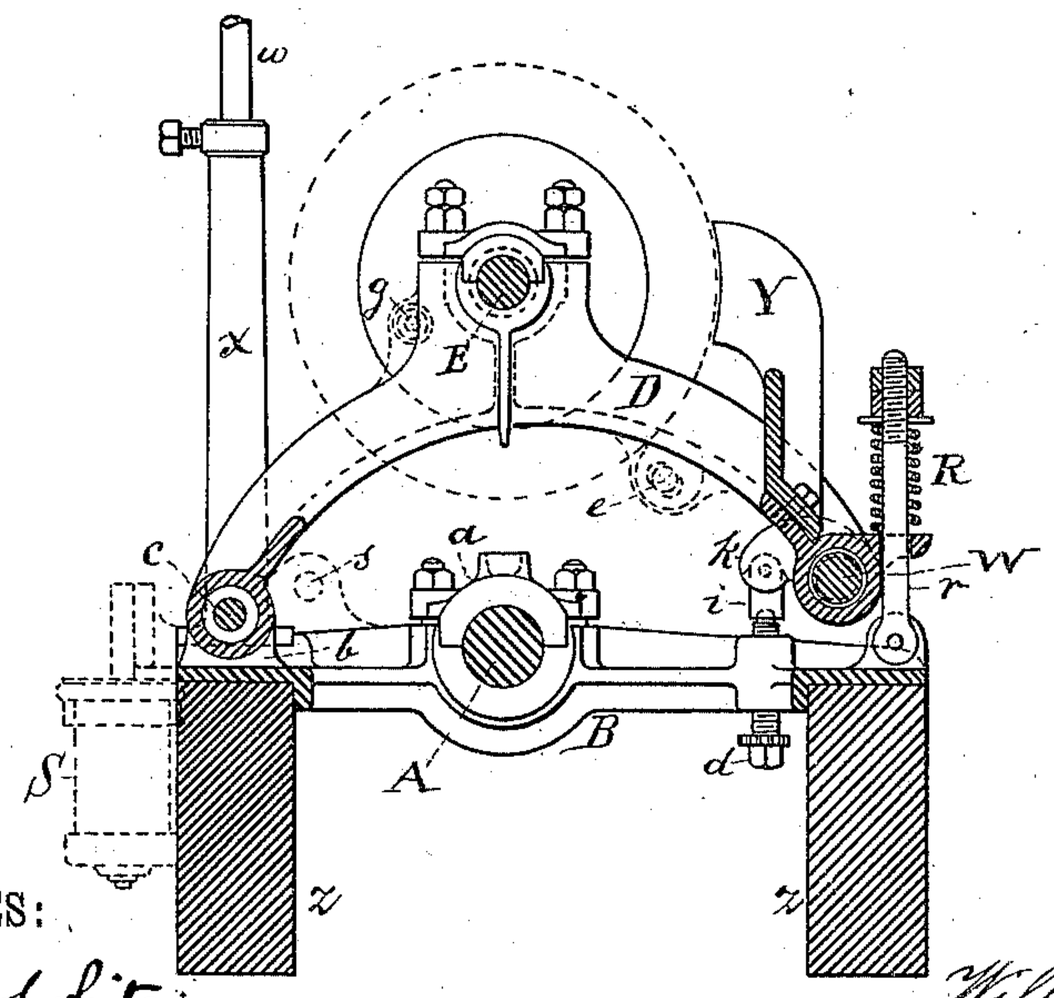


Fig. 4.



WITNESSES:

Adam Geo. White

Louis Nolting

INVENTOR

William H. Lotz

UNITED STATES PATENT OFFICE.

WILLIAM H. LOTZ, OF CHICAGO, ILLINOIS.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 314,696, dated March 31, 1885.

Application filed August 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LOTZ, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hoisting-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements upon the hoisting-machine for operating shovels or scoops to empty grain-cars and clear malt-floors upon which Letters Patent of the United States Nos. 234,714 and 235,366 were granted to me on November 23, 1880, and on December 14, 1880, respectively; and the object I have in view is to provide more reliable and positive movements for automatically throwing the hoisting-drum out of contact with the friction-wheels on the line-shafting after a certain length of rope has been wound thereon, and for moving the hoisting-drum into contact with the friction-wheels at any point of its revolution where it may be desired for winding the hoisting-rope, all which movements to work noiseless and with great certainty.

My invention therein consists in the peculiar devices for operating the cam-lever that raises the frame in which the hoisting-drum is journaled after a certain length of rope has been wound upon such drum; in the peculiar means for locking the cam-lever to hold the hoisting-drum in an elevated position, and for releasing the lever when the hoist-rope is slackened; in the application of a spring for forcing the hoisting-drum end rims upon the friction-wheels to insure the desired force of traction; in a safety-chain that in case of derangement of the automatic devices for raising and holding the hoist-drum off the friction-wheels will wind upon a pulley and will counteract the down-pressure of the drum and stop the motion of the same, and thus obviate breakages, and, furthermore, in the various combinations of the operative parts, all as fully hereinafter explained and specifically claimed.

In the accompanying drawings, Figure 1 represents an end elevation of the machine; Fig. 2, a longitudinal vertical section through the center of the machine; Fig. 3, a plan view of two machines built on one main frame with the hoisting-drum and swinging frame of one machine being removed and some of the operating parts being shown in section. Fig. 4 is a vertical cross-section on line 3 3 in Fig. 3; and Figs. 5, 6, 7, 8, 9, 10, and 11 are detached views of some of the machinery parts.

Corresponding letters in the several figures of the drawings designate like parts.

A denotes the driving-shaft or line-shafting journaled in boxes *a* of a frame, B, that is supported on timbers *z*. C C′ are paper friction-wheels mounted upon the driving-shaft. These paper wheels are made in the usual manner, the paper being clamped between the metal flanges of a sleeve or long hub, and turned down to the proper diameter.

Over the friction-wheels is mounted a swinging metal frame, D, constructed of two arch-bars united at their ends by tubular longitudinal bars, the whole being a single casting. This frame D is pivotally secured between lugs *b* on one side of frame B by a bolt, *c*, passed through the tubular bar of one side of frame D, in a manner that such frame can be swung around such bolt *c*. The tubular bar at the opposite side of frame D is bored out for a shaft, W, passed through the same. Upon the rear projecting end of this shaft W is secured a toe-cam, *k*, and upon its forward projecting end is rigidly mounted a curved lever, K, the hub of which is provided with a toe of corresponding shape with that of cam *k*. In the under side of both these toes of lever K and cam *k* are pivotally secured vibratable blocks *i* that are socketed in their bottom ends, each to rest upon the rounded end of a set screw, *d*, tapped through a protuberance of frame B. One side of frame D, thus being supported on the toes of lever K and cam *k*, will be lifted by depressing such lever K.

In boxes at the top of swinging frame D is journaled a short shaft, E, extending at each end beyond the frame. On this shaft E, within the frame, is keyed the hoisting-drum F, having enlarged extensions *f f′* to each end that form the friction drums or wheels, which engage with the paper friction-wheels C C′.

Upon the drum F, between the extensions *f f′*, is wound the hoisting-rope *y*, extending downwardly to be passed under a sheave, and thence over guide-sheaves to the scoop or

shovel to be operated by the machine in the manner described in my application for a patent for an improvement in grain-elevators, filed August 9, 1883, being Serial No. 103,216.

Between lugs of frame B is pivotally secured the eyebolt *r*, passing through a hole in a projecting lug longitudinally in the center of the swinging end of frame D. A heavy spiral spring, R, is placed over this bolt *r*, and is contracted to give to it the desired tension by two nuts screwed upon the end of bolt *r* and upon an interposed washer. The spring R will thus exert its elastic power to push the frame D downward, and thus force the extensions *f f'* of spool F upon the paper wheels C C', for the purpose of increasing their frictional hold thereon. The frame D being lifted with depressing-lever K, the spring R is contracted while the extensions *f f'* of spool F are raised to be out of contact with the friction-wheels C C'. The forward-projecting end of shaft E is screw-threaded, and upon it, close to the journal-box, is rigidly mounted a small sprocket-wheel, H. Upon the screw-threaded portion of this shaft E is adjustably secured a screw-nut, I, which is made in halves, and is arranged to be clamped upon the shaft, so as to be rigid therewith, by a set-screw, *i'*. To its front face this clamp-nut has a radially-projecting shoulder to engage with a similar shoulder on the rear end of the hub of a flanged pulley, J, which is screw-threaded to fit upon the screw-threaded portion of shaft E and to travel thereon in the manner of a screw-nut. This pulley J has a radial arm, *j*, shouldering against a stud, *g*, which is rigid with frame D and projects on a parallel line with shaft E. The arm *j* and stud *g* will hold the pulley from turning with shaft E, and tend to make it travel to and fro on the screw-threads as the shaft is turned in one direction or another, and will permit such pulley to be carried by the clamp-nut I part of a revolution after the radial shoulders of the pulley J and clamp-nut I engage each other. A small paper wheel, Z, is mounted upon the driving-shaft A close to journal-box *a* of frame B, and below this is loosely pivoted upon a projecting pin, *b'*, of lever K a cam, L, of volute-shaped periphery, which cam L is vertically in line with wheel Z, and in front of cam L is pivoted upon pins *b'* a flanged pulley, M. The cam L has pivoted against its front face a pawl, *m*, that is pushed outward by a spring to engage with a single ratchet-tooth, *s'*, provided in the rim of pulley M. A chain, *j'*, is secured with one end to the rim of pulley J, is thence passed downward and wound once around pulley M, to the rim of which one of its links is secured by a hook or staple to prevent slipping, and has suspended to its pending end a weight, *r'*. This weight *r'* serves to put sufficient tension to chain *j'* for causing both pulleys J and M to return simultaneously to their starting position when the clamp-nut I releases the pulley J, and for holding the arm *j* in contact with stud *g* while such pulley J travels on the screw-thread of shaft E. As spool F is rotated by the contact of its extensions *f f'* with the friction-wheels C C' to wind the hoist-rope, the pulley J will travel toward the clamp-nut I until the radial shoulders or clutch-teeth of both are in contact, when the pulley J will be carried by the clamp-nut I to make a partial revolution, whereby the chain *j'* will begin to wind upon such pulley J and will transmit the motion of pulley J to pulley M. This pulley M being coupled to cam L by pawl *m*, the cam will be turned with its volute periphery into contact with paper wheel Z, which, by its traction and motion, will continue the rotation of such cam until the same has made an entire revolution. The volute radial increase of cam L, thus rotated, will push the lever K downward, thus lifting the frame D, and with it the drum F, until its extensions *f f'* entirely clear the friction-wheels C C'. The cam L has a rearward-projecting crank-pin, *l*, engaging with a pending hook, *o*, that is pivotally secured to lever K, and is pulled toward the fulcrum of cam L by a spiral spring, *p*. This hook *o* will engage with pin *l* and will check the motion of the cam after completing its revolution, and will yieldingly hold it in its proper position out of contact with wheel Z while at rest, and that with unwinding the hoisting-rope from the drum F, the pulleys J and M being returned by weight *r'* to their first position, the pawl *m* will drop behind the shoulder or tooth *s'* in the rim of the pulley M, ready for the next movement again. The end of lever K is coupled by a connecting-rod, T, to the end of the short arm of a three-armed bell-crank, N, the hub of which is pivoted on a pin, *s*, projecting from the end of frame B. The vertical arm of this bell-crank N is arranged for fixing against its end a wooden lever, *u*, for stopping the machine by hand while first adjusting it. This vertical arm of bell-crank N has a slotted hole for adjustably securing the screw-bolt pin *o'*, that forms the pivot-pin for a hook-bar, O.

Upon a stud, *e*, rigidly secured to frame D is pivoted a hub, *q*, having a ratchet-wheel formed to one end, and upon this hub *q* and the collar of stud *e* is loosely pivoted a sprocket-wheel P, the body of which is made of two sections to form a shell that incloses the ratchet-wheel of hub *q*, and is provided with spring-pawls *h*, that engage with the teeth of such ratchet-wheel. This sprocket-wheel P is driven from sprocket-wheel H, mounted on shaft E by an endless chain, U, so as to turn with drum F. The pawls *h* will couple the ratchet-wheel of hub *q* when turning with the drum F in the direction only for winding the hoisting-rope, and will leave the hub stationary during the reverse motion of the drum or while unwinding the hoisting-rope. The hub *q* projects sufficient distance from sprocket-wheel P for the hook of bar O to drop over and catch hold thereon, and thereby hold the drum in its elevated position. The hook-shoulder of this bar O being fitted to be on a

concentric line with the pivot-eye of the hook-bar the hub *q* being rotated in the direction of the drum for winding the hoist-rope will throw off the hook by its rolling motion, so as to cause the least amount of friction and to require hardly any power.

On the rear overhanging end of shaft E is mounted a small spool, G, upon which is wound a cord, *t*, in the direction opposite to that of hoisting-rope *y* upon drum F. This cord is passed over sheaves V and V′, and has suspended to its end two weights, X and X′. The sheave V is pivoted in a bracket pending from a yoke or arm, *v*, that is secured to the upper extremity of a standard-bar, *w*, which standard is inserted into a hollow column, *x*, bolted upon frame B, and is secured therein by a set-screw to be vertically adjustable. The cord *t* will be wound upon its spool G while the hoisting-rope *y* is being unwound, and vice versa will the cord *t* be unwound with winding the hoisting-rope *y* upon its drum F until such hoisting-rope has been wound almost its desired length, or until the coupling-shoulder of pulley J engages with the shoulder of clamp-nut I, when the weight X should have reached the floor or another rigid support, and then with the further rotation of drum F sufficient for starting the cam L that portion of the cord *t* between weights X and X′ will become slack, the ball-weight X′ only being for the purpose of putting a sufficient tension to the cord while in this slack condition to prevent its leaving the annular grooves in the sheaves. The weights X and X′ are to be sufficiently heavy for overbalancing the hoisting-rope *y* and for starting the hoisting-drum while the hoisting-rope is perfectly slack. With taking the scoop into the car, and thereby unwinding the hoisting-rope, the weights X and X′ are elevated, and then before inserting the scoop into the grain by jerking the rope so as to be slack the weights X X′ will start the drum F to wind the hoist-rope, and thereby will turn the hub *q* in the direction to throw off the hook *o* for releasing the lever K and allowing the frame D and drum F to drop, when the drum-extensions *f f′* will engage with the friction-wheels C C′, and will wind the hoist-rope with the necessary force to pull the scoop to the car-door. The slackening of cord *t* between weights X and X′ is necessary for the purpose, that, with unwinding the hoisting-rope, the arm *j* of pulley J will first be brought in contact with stud *g* for the pawl *m* of cam L to be in position for engagement with the ratchet-tooth *s′* in pulley M before the weight X begins to be lifted, as otherwise, after a little unwinding only of the hoisting-rope, the weight X could cause the throwing off of hook *o* and start the machine before the several parts would be in proper relative position for stopping the machine again by lifting frame D and engaging hook *o* with hub *q*. When hook *o* releases its hold from hub *q*, the weight of spool F and the power of spring R will cause the frame D to drop with great force, and would vibrate the lever K with such velocity that it would rebound, and such a rebounding would cause a noise and be injurious to the machinery parts. To prevent this rebounding, I secure to frame B a cylinder, S, that is closed at its bottom, where it is tapped for a set-screw, *n*, having a tapering groove that forms an adjustable air-vent, and to one of the arms of the bell-crank N, I pivotally connect the end of the rod of a piston or plunger, S′, that forms a close joint with the bore of such cylinder and reciprocates therein. The atmospheric air captured in the cylinder by its elasticity and small outlet will form a cushion and brake to regulate the speed of motion of bell-crank N and lever K. A safety-chain, Q, connects the vertical arm of bell-crank N with pulley J, which chain is sufficiently slack not to come in use, unless any of the automatic parts should become deranged or be prevented from operating in conjunction by an incidental obstruction, so as not to be able to perform their function of lifting the drum F out of contact with the friction-wheels after the hoisting-rope has been wound upon such drum the desired length and of locking the drum in its elevated position. In such a case chain Q will be wound upon pulley J, and by the great compound leverage of bell-crank N and lever K will counteract the weight of the drum and the power of spring R for the drum to float loosely upon the friction-wheels while being held from turning by chain Q. A bracket, Y, is bolted to frame D, the side flanges of which are in close proximity to the extensions *f f′* at each side of drum F, so as to form a guard for guiding the hoisting-rope to wind upon the drum, and for preventing such rope from catching between the friction-wheels C and *f*.

The *modus operandi* of the machine is as follows, to wit: The main shaft A being in continuous motion, driven by steam-power, the operator takes the scoop attached to the hoisting-rope into the grain-car to be unloaded as far as he desires to go, generally commencing to remove the grain from close to the car-door, and then by degrees the grain farther away from the door. By thus removing the scoop he unwinds a corresponding length of hoisting-rope. After reaching the intended point he gives the scoop a jerk that will slacken the rope, and then pushes the scoop into the grain. The weights X X′, having been elevated proportionally to the unwinding of the hoist-rope, will now by their gravity cause a reverse rotation of the hoisting-drum and of shaft E, which movement, by endless chain U, is transmitted to the sprocket-wheel P and hub *q*, causing the releasing of hook *o*, and thereby of lever K, when frame D is forced downward by spring R pressing the extension-rims *f f′* of drum F upon the friction-wheels C C′ when such drum is rotated to wind the hoisting-rope and to pull the loaded scoop toward the car-door. With turning the drum by unwinding the hoisting-rope the pulley J trav-

eled on the screw-thread of shaft E in the direction away from the clamp-nut I, and with rotating the hoisting-drum by its contact with the friction-wheels C C′ for winding the hoist-rope the pulley J advances again toward clamp-nut I until the radial shoulders or clutch-teeth of both clamp-nut I and pulley J are brought in contact to interlock when such pulley J turns with shaft E. This pulley J being connected with pulley M by chain *j′* in the manner described, such pulley M will also be rotated, and being coupled to cam L by a pawl, *m*, it will turn such cam until its radially-increasing face is brought in contact with friction-wheel Z, which then, by its adhesion, will continue the rotation of such cam until it has made an entire revolution. By the rotation of cam L lever K is depressed and the hook *o* is pushed over hub *q*, whereby the hoisting-drum is elevated and held out of contact with the friction-wheels. The scoop by this time having arrived at the car-door, where the grain it carried is dumped in the hopper or funnel below, the operator can move the scoop back into the car again for the next load.

What I claim is—

1. In an automatic hoisting-machine, substantially as described, the frame D, carrying the hoist-rope spool, supported by toes of cam *k* and lever K on set-screws *d*, substantially in the manner set forth.

2. In an automatic hoisting-machine, substantially as described, the frame D, pivotally connected to frame B and depressed by spring R, as and for the purpose set forth.

3. In an automatic hoisting-machine, substantially as described, the lever K, having cam L, that is rotated by wheel Z of driving-shaft A, as and for the purpose set forth.

4. In an automatic hoisting-machine, substantially as described, the lever K, connected by rod T with bell-crank N, and hook-bar O, pivoted to such bell-crank and engaging with hub *q*, rotated by drum-shaft E, substantially as set forth, to operate as specified.

5. In an automatic hoisting-machine, substantially as described, the lever K, having cam L with pin *l*, and hook *o* with spring *p*, as and for the purpose set forth.

6. In an automatic hoisting-machine, substantially as described, the lever K, having cam L and pulley M, both coupled by a pawl, *m*, substantially as and for the purpose set forth.

7. In an automatic hoisting-machine, substantially as described, the lever K, having cam L and pulley M, connected by chain *j′* with pulley J of drum-shaft E, substantially in the manner and for the purpose set forth.

8. In an automatic hoisting-machine, substantially as described, the lever K, having cam L and pulley M, connected by chain *j′* with pulley J, riding upon the screw-threaded end of shaft E and coupling with clutch-nut I, all substantially as and for the purpose set forth.

9. In an automatic hoisting-machine, substantially as described, the clutch-nut I and pulley J on screw-threaded end of shaft E, such pulley J having arm *j*, bearing against stud *g* of frame D, as and for the purpose set forth.

10. In an automatic hoisting-machine, substantially as described, the drum-shaft E, carrying upon its screw-threaded end the clamp-nut I, and pulley J, having arm *j* butting against stud *g*, and both having clutch-teeth to engage each other, such pulley J being connected with pulley M of lever K by a chain, *j′*, having weight *r′*, and pulley M being coupled with cam L by pawl *m*, in combination with driving-shaft A, having friction-wheel Z, all constructed and arranged to operate substantially in the manner set forth.

11. In an automatic hoisting-machine, substantially as described, the combination, with lever K, rod T, and bell-crank N, of cylinder S and piston S′, as and for the purpose set forth.

12. In an automatic hoisting-machine, substantially as described, the combination, with hook-bar O, of hub *q*, having ratchet-teeth engaging with pawls *h* of sprocket-wheel P, driven by endless chain U from sprocket-wheel H of drum-shaft E, all constructed and arranged substantially as and for the purpose set forth.

13. In an automatic hoisting-machine, substantially as described, the combination, with driving-shaft A, having friction-wheels C and Z, of swinging frame D above the driving-shaft, the hoist-drum F, mounted in such frame and having frictional connection with the wheels C, the drum-shaft E, having spool G for the starting-weight rope, sprocket-wheel H, for driving sprocket-wheel P and hub *q* by endless chain U, clamp-nut I, and pulley J, traveling on the screw-threaded end of such drum-shaft and being held from turning with such shaft by arm *j* and stud *g*, and chain *j′*, connecting pulley J with pulley M that is again connected by pawl *m* with cam L, pivoted to lever K, that controls the elevation of frame D, and is connected by rod T with bell-crank N, carrying hook-bar O, all constructed and arranged to operate substantially in the manner set forth.

14. In an automatic hoisting-machine, the combination, with lever K and bell-crank N, of pulley J, traversing on screw-threaded end of shaft E, coupling with clamp-clutch I, and being connected with bell-crank N by safety-chain Q, all substantially as and for the purpose set forth.

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

WILLIAM H. LOTZ.

Witnesses:
M. J. CLAGETT,
LOUIS NOLTING.