(No Model.)

3 Sheets—Sheet 1.

T. A. WESTON.

HOISTING MACHINE.

No. 333,906. Patented Jan. 5, 1886.

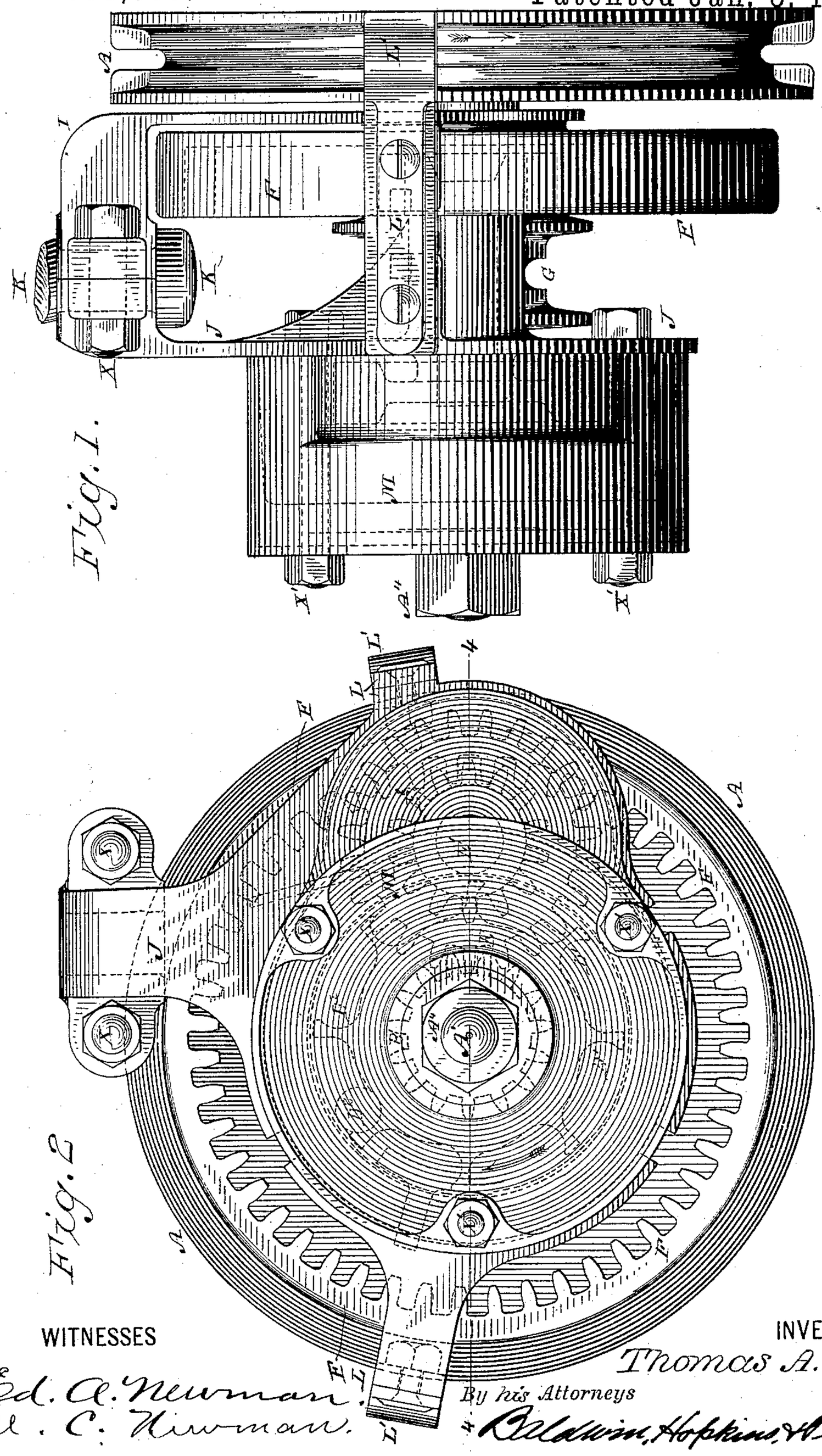

Fig. 1.

Fig. 2.

WITNESSES

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(No Model.)

3 Sheets—Sheet 2.

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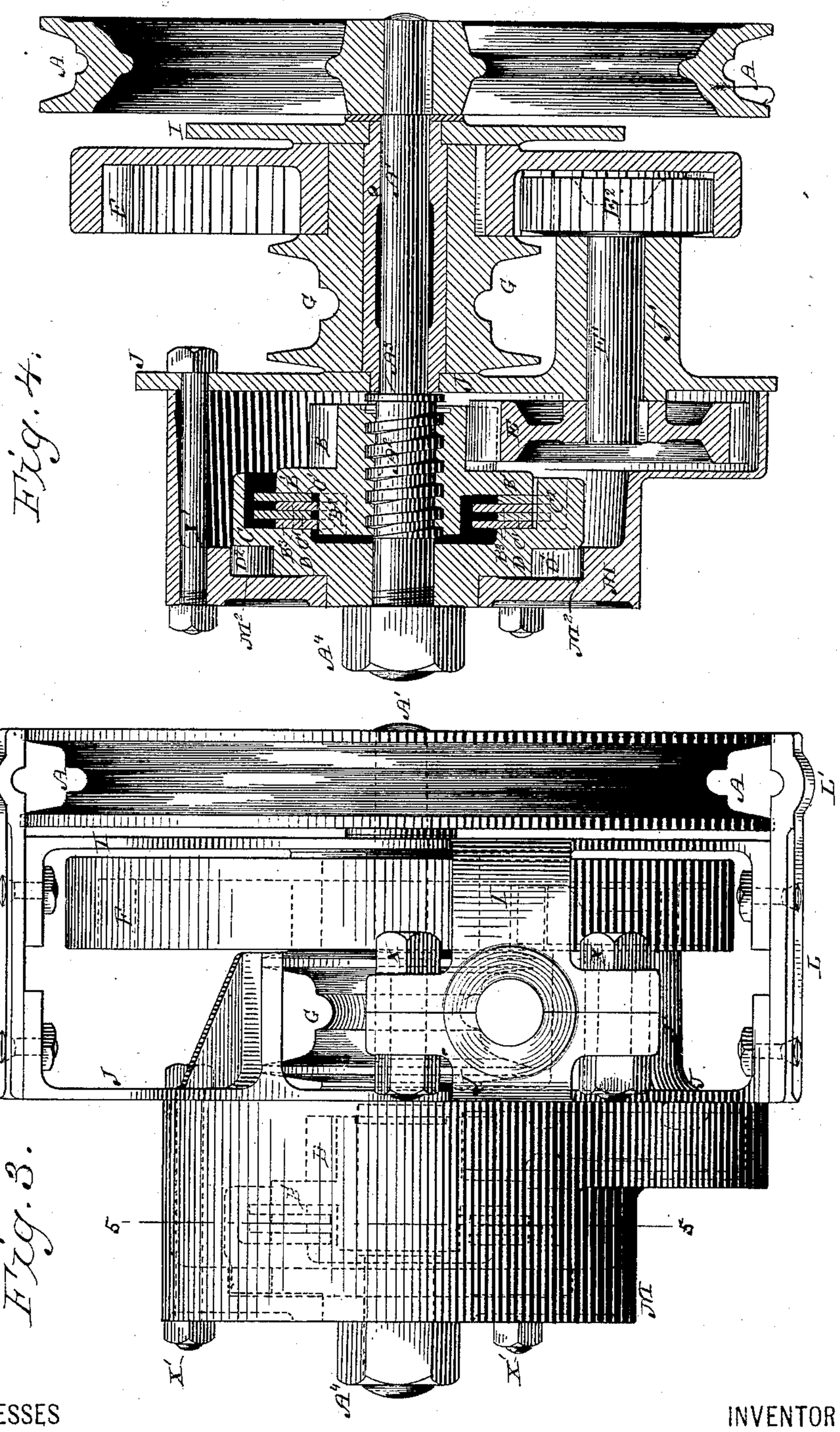

Fig. 4.

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

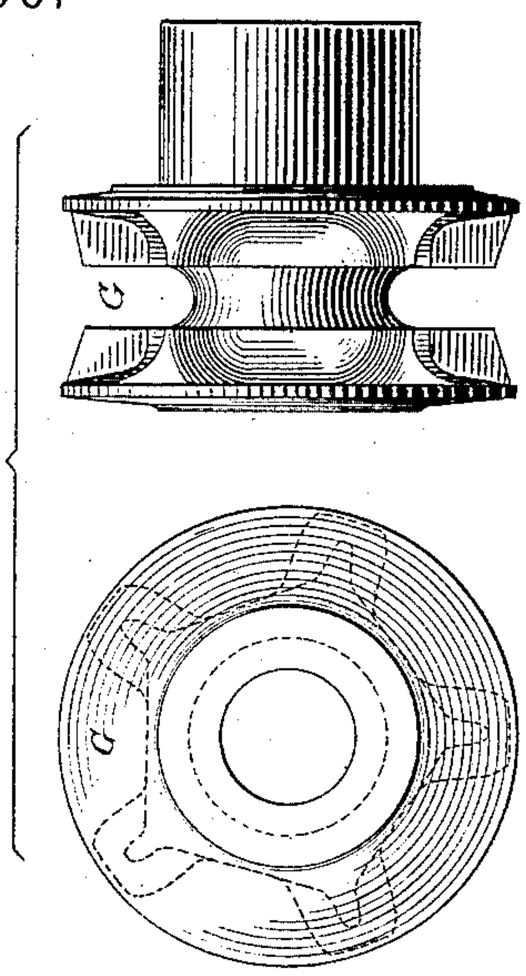


Fig. 6.

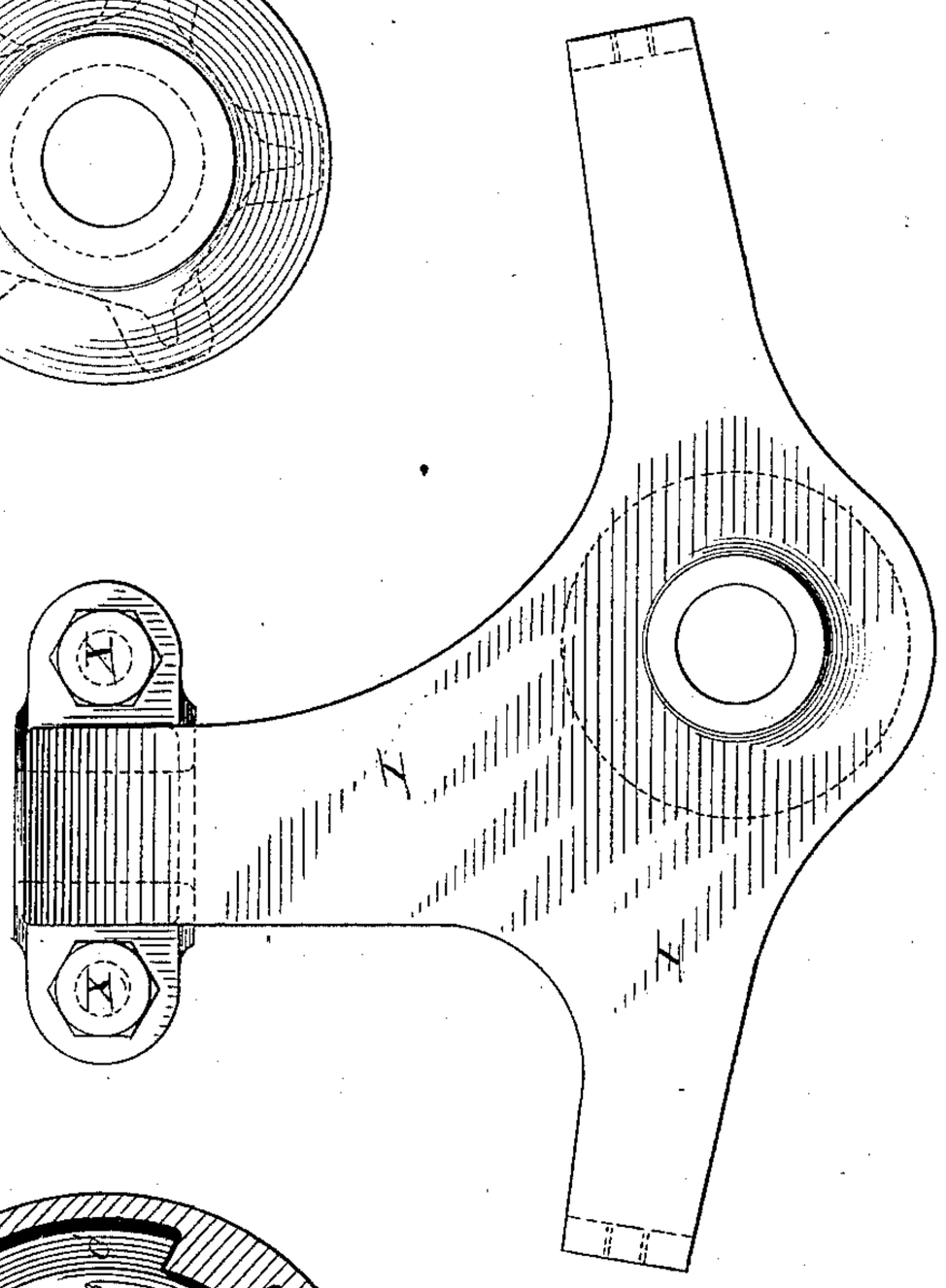
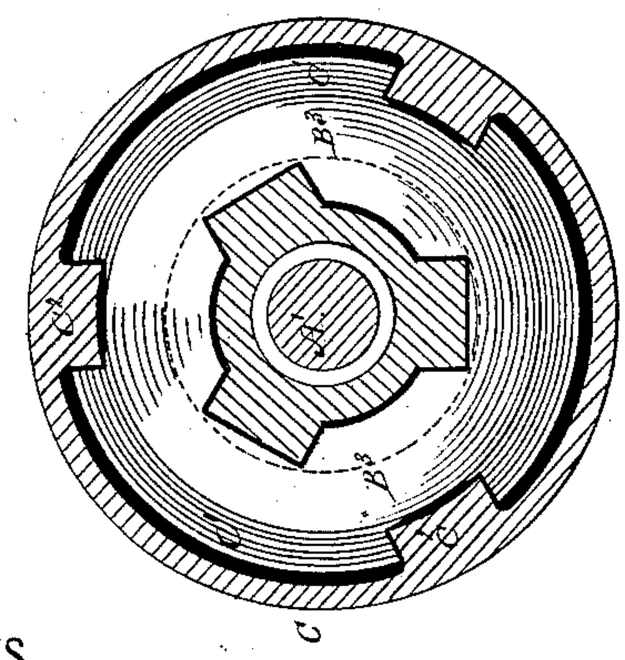


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS A. WESTON, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF SAME PLACE.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 333,906, dated January 5, 1886.

Application filed November 27, 1885. Serial No. 184,123. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. WESTON, of Stamford, Connecticut, have invented certain new and useful Improvements in Hoisting Mechanism, of which the following is a specification.

My invention relates primarily to geared pulley-blocks or portable suspended lifts wherein I obtain diminished friction by means of peculiarly-arranged plain spur-gearing. I also obtain increased facility for rapid self-checked lowering of the load, together with the secure retention of the load, without back-lash or lost motion at any point, either in lowering or lifting it.

My invention is further applicable to other forms of hoisting machinery, as I will explain.

In the accompanying drawings, Figures 1 and 2 are vertical elevations at right angles to each other. Fig. 3 is a plan. Fig. 4 is a horizontal section through the lines 4 4, Fig. 2. Fig. 5 is a vertical section through the line 5 5, Fig. 3. Fig. 6 is an elevation of the frame-side I. Fig. 7 shows the sprocket-lifting sheave in detail.

A is the sprocket driving-wheel operated by an endless hand-chain. It is keyed to the shaft A′, upon which is formed a screw, A^2, and a collar, A^3, A^4 being a nut at its end.

B is a pinion screwed internally to engage with the screw A^2, and is provided with a flange, B′, and a disk-hub, B^2, the latter carrying, by keys, the friction-disks B^3. The said disks are part of a friction-brake made according to the specification of my United States Letters Patent No. 75,227, dated November 3, 1868.

C is a disk-box or cylinder, cast with a frictional check-wheel, D. The latter has its rim formed into a polygon of short eccentric faces or pockets D′, each of which contains a disk-formed roller, D^2, and all backward motion of the disk-box C is thereby prevented, through the eccentric or wedge action of the disk-rollers upon the inside or rim of the recess M^2 containing them. The disk-box C contains and holds, by keys C^2, the friction-disk C′.

The disks C′ and B^3 together constitute the frictional portion of the before-named friction-brake. The pinion B engages with the spur-wheel E. The latter is keyed to the shaft E′, which is cast in a piece with the pinion E^2. The pinion E^2 engages with the annular wheel F. The wheel F is part of and a unit with the lifting-sheave G, either by being cast in a piece therewith or keyed solidly thereto, as shown in the drawings. The hollow stay fixed on the frame furnishes on its exterior a bearing for the main sheave G, and on its interior a bearing for the shaft A′. By thus placing the driving-shaft and wheel concentric to the main sheave, and by placing the counter-shaft E′ radially within the geared rim F of the main sheave G, all the shafts are circumscribed within the said chain-wheels or sheaves, making the machine symmetrical, compact, and approximately balanced. The said concentric arrangement of gearing is substantially that of my United States Patent No. 194,019, dated August 7, 1877; but I further improve its mechanical efficiency by placing the counter-shaft E′ horizontally to the driving-shaft, whereby the pinion E^2, when it is lifting, takes upon itself from the main sheave G and its bearing much of the suspended load, thus reducing largely the axle-friction of the said sheave G. The main frame is made in halves I J, which clasp the neck of the suspending-hook K, and are there united by bolts X X. The frame-sides I J are also united by short beams L L, the ends of which, L′ L′, form keepers or guards to retain the hand-chain in the groove of the sprocket-wheel A. The frame-side J has cast thereon a long boss, J′, to form a support and bearing to the shaft E′.

M is a housing or cover attached to the frame-side J by bolts X′ X′ X′. The cover M also has an annular recess, M^2, inclosing the frictional check-wheel D and its disk-formed roller D^2. A single lifting-chain, with a hook at its end, is placed upon the lifting-sheave G, the loaded or hook side of the chain being in a vertical line through the axis or shank of the suspension-hook K.

By grouping the moving parts of my invention as represented, I obtain a symmetrical machine, practically balanced and in equilib-

rium around the line of suspension, the safety lowering device and parts within the box M upon one side of the main frame tending to balance the weight of the sprocket-wheel and hand-chain on the other side.

The operation is as follows: A load being placed upon the hook of the lifting-chain, and the sprocket-wheel A turned in the direction for hoisting, as indicated by the arrows, the screwed portion A^2 of the shaft A′ will turn within the hollow screw of the pinion B, carrying the latter and its flange B′ toward the disk-box C until the said parts and the disks C′ and B^3 are all in close contact and pressed against the retaining-nut A^4. When the pinion is incapable of further motion toward the nut A^4, any further rotation of the shaft A′ will carry with it the pinion B, and raise the load, through the medium of the gears E E^2 F and the lifting-sheave G. Such hoisting motion in the direction of the arrows is permitted by the check-wheel D. All backward rotation is prevented by the wedge action of the roller-disks D^2 between their eccentric or cam-faced bearings in the check-wheel D and the annular recess M, around which they travel. The load is thus automatically suspended when hoisting ceases. Upon turning the shaft A′ backward, the consequent unscrewing action upon the pinion B retires it slightly from the disks and box C, removing partly their frictional connection. The load then lowering turns backward the pinion B, and the latter follows the backward rotation of the shaft A′ so long as it is turned. This safety lowering motion is fully explained in the specification of my United States Patent No. 98,000, December 14, 1869, the novel feature I now introduce being the frictional check-wheel D and its rollers. This, I am aware, is found in many prior patents, the said rollers, however, being spheres or elongated cylinders, whereas I employ rollers of disk form, their diameter being much greater than their axial length. I also confine them by their flat disk-sides between the back of the disk-box C and the parallel inner face of the cover M. Between the parallel walls thus formed these roller-disks cannot turn except upon their proper axes. They can only roll freely upon the eccentric faces provided for them in the check-wheel D. By thus constructing the said frictional checking device it is made effective in any position as to gravity. Thus when the machine is placed with the shaft vertical, the disk-formed rollers are still guided by their flat sides from warping, so that they can be swept around freely one way, or exert their locking action the other way, as in any other position of the machine.

For sustaining very heavy loads by this device I employ concentric sets of the roller disks and cam-faces, differing from each other only in diameter, all being similar to the description foregoing. Many points of resistance are thus obtained by the many rollers, with corresponding diffusion of the strains.

I have described my invention as embodied in a hoist of portable form, but it is obviously applicable also to hoists and other machines having fixed frame-work.

When it is required to manipulate a load through the medium of a toothed rack-bar, in the manner of the well-known rack-lifting jack, the chain-wheel G may be toothed around its periphery to adapt it to the said rack-bar teeth instead of to a chain. Such a rack-bar or toothed ram can obviously exert force to compress a bale of wool or hay as readily as to lift a load of any kind. My invention is therefore generally applicable where such lifting, retaining, and lowering mechanism is needed.

I claim as my invention—

1. In a hoisting-machine, the combination of a driving-pulley exterior to the frame on one side, a driving-shaft, and a friction-brake or lowering device exterior to the frame on the other side, and operated by means of the said driving-pulley through said shaft.

2. In a hoisting-machine, a driving-shaft passing centrally through the main hoisting-sheave of said machine, and provided at one end exterior to the frame with a driving device or wheel and at its other end exterior to the frame a frictional lowering and retaining device.

3. The combination, with a portable or pulley-block frame, of a driving-pulley exterior to the frame on one side, a driving-shaft and a friction-brake or lowering device exterior to the frame and operated by means of the said driving-pulley.

4. The combination, with a portable or pulley-block frame, of a driving-shaft passing centrally through the main hoisting-sheave of the said hoisting-machine, and provided at one end and exterior to the main frame with a driving device or wheel and at the other end exterior to the main frame with a frictional lowering and retaining device.

5. The combination, with a portable or pulley-block frame, of a driving and a counter-shaft, and connecting gearing arranged approximately on the same horizontal plane.

6. In a hoisting-machine, the combination, with an automatic safety friction-brake or lowering device, of a frictional check-wheel, as and for the purposes described.

7. In a hoisting-machine, a frictional check-wheel provided with rollers of disk form and parallel guiding-surfaces therefor, as and for the purposes set forth.

8. In a hoisting-machine, the combination of the screwed or helically-formed driving-shaft A′ A^2, the nut or abutment A^4, the pinion B, disks C′ and B^3, disk-box C, frictional check-wheel D, and the cover or housing M, substantially as and for the purposes set forth.

9. In a pulley-block or portable lift, a

lifting-sheave, G, provided with a spur-toothed flange or rim, F, and a driving-pinion E^2, both placed inside the main frame, spur-gears E and B on the exterior of the said frame on one side and a driving-wheel exterior to the said frame on the other side, substantially as and for the purposes set forth.

In testimony whereof I have hereunto subscribed my name.

THOS. A. WESTON.

Witnesses:
SCHUYLER MERRITT,
GEO. E. WHITE.