(No Model.) 2 Sheets—Sheet 1.

T. A. WESTON.

WORM WHEEL MECHANISM.

No. 486,814. Patented Nov. 22, 1892.

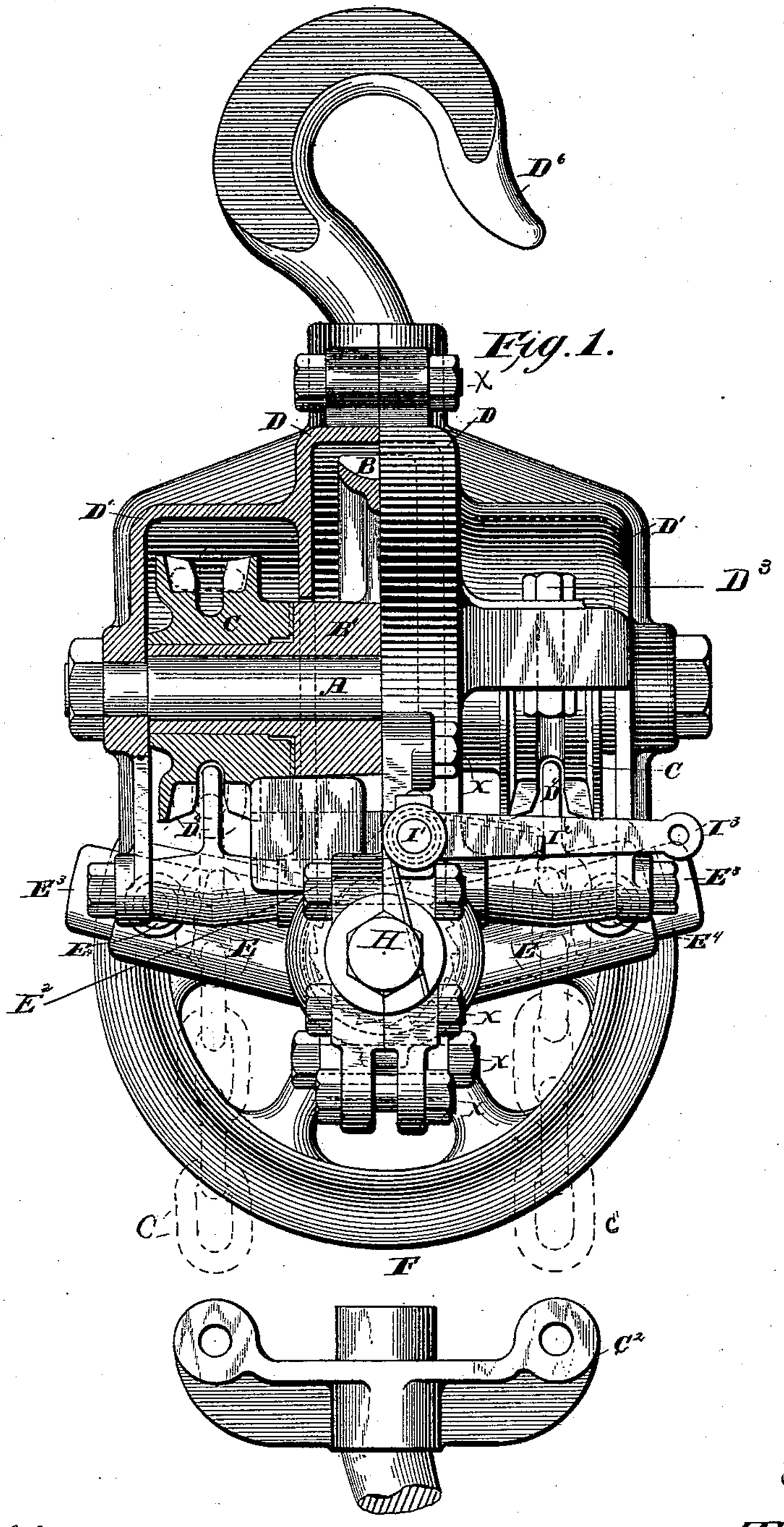

Fig. 1.

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Fig. 2.

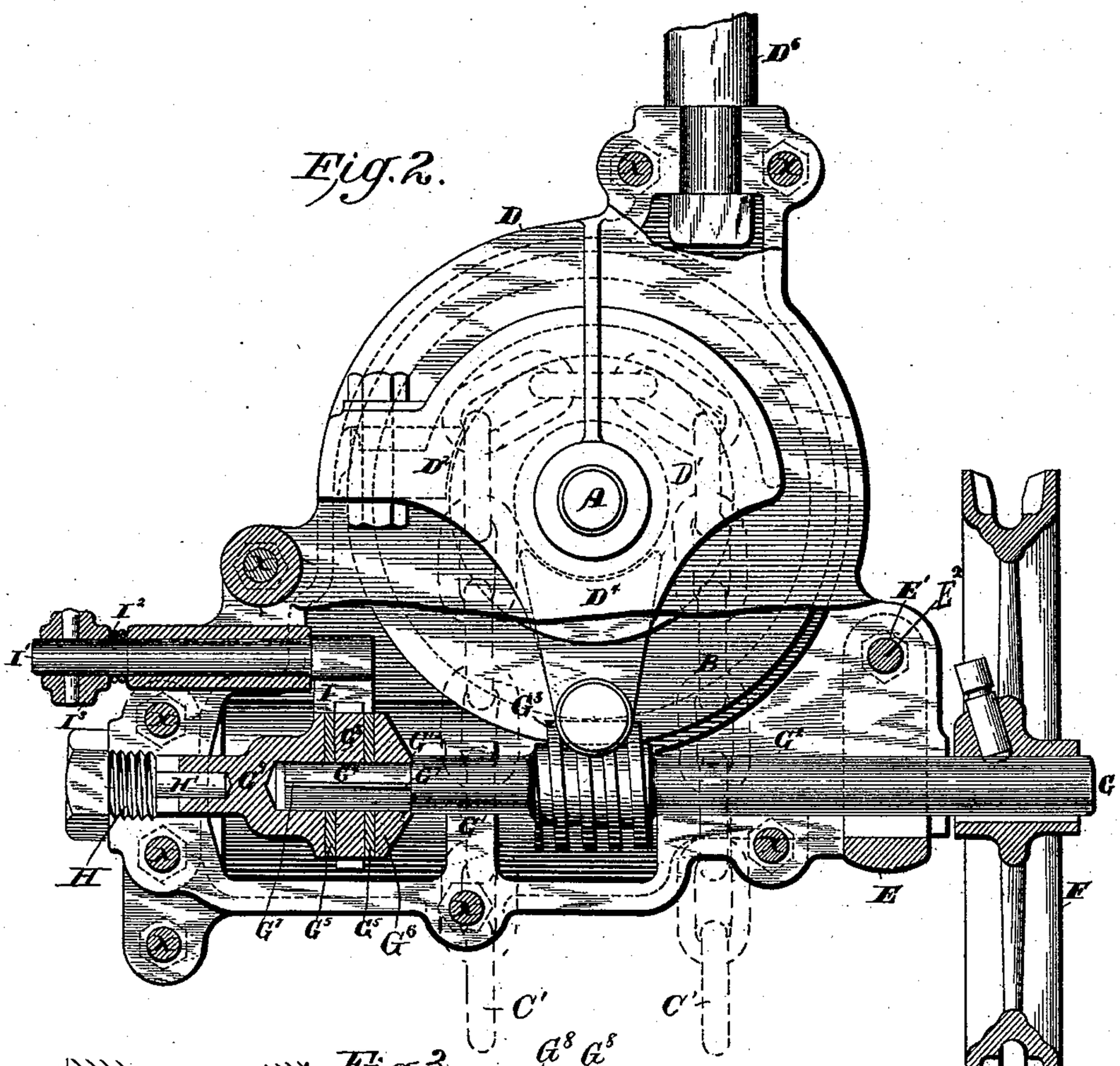
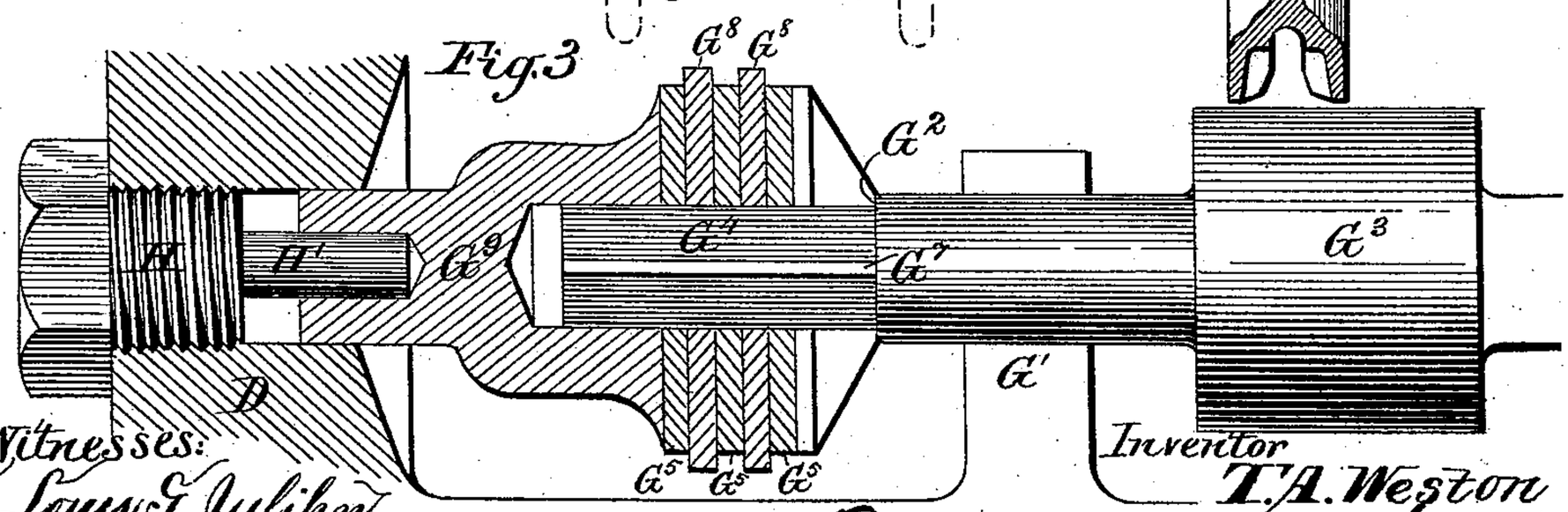


Fig. 3



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UNITED STATES PATENT OFFICE.

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

WORM-WHEEL MECHANISM.

SPECIFICATION forming part of Letters Patent No. 486,814, dated November 22, 1892.

Application filed July 9, 1891. Renewed October 26, 1892. Serial No. 450,036. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. WESTON, a citizen of the United States, and a resident of Stamford, county of Fairfield, and State of Connecticut, have invented certain Improvements in Worm-Wheel Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to provide an improved checking or retaining device for such worm-shafts as are in themselves not self-holding against backward rotation in consequence of the quick pitch of their worm-threads.

In worm-gearing it is well known that the pitch or angle of the worm-thread determines the efficiency or the economical use of the applied force as to friction, the greatest efficiency occurring when the angle is such that the device is not self-holding and the least efficiency when the angle is such that the device is self-holding, the latter being the case in common worm-wheel hoists and jack-screws which do not run back under the load. By means of my invention the first-named and more efficient type of worms and worm-wheels which are not self-holding in themselves are made so in effect.

In the accompanying drawings, Figures 1 and 2 illustrate my invention as embodied in a portable hoist, shown in rear elevation in Fig. 1 and in side elevation in Fig. 2, both views being partly sectional. Fig. 3 is a view of a modification of my checking device, shown partly in longitudinal section.

The drawings illustrate a supporting-frame in two parts, centrally united in the plane of revolution of the worm-wheel, and side extensions upon the two parts providing supports for the chain-guards and chain-strippers. They also show a hand-chain guide provided with a central eye, whereby the frame-sections are clamped together, and the worm-wheel having an integral sleeve or extended hub and lifting-sheaves secured to the exterior surface thereof. All these parts are incident to a complete worm-gear hoist such as illustrated; but they form no part of my invention, which is limited to frictional disk mechanism and its related parts, as more particularly specified in my appended claims.

In Figs. 1 and 2, A is the center stay of the machine, binding together the two frame-sections D D and supporting the worm-wheel B and its attached load sheaves C C. These sheaves are to carry the usual chains C′ C′ (shown in dotted lines) and the joining-yoke C^2 with its hook. The frame-sections are united in part by sundry bolts X and are made with overhanging hoods D′ D′, which protect the chain-sheaves and support the chain-guards D^2 D^2 and chain-strippers D^4 D^4.

D^6 is an ordinary suspension-hook located according to usage in the earliest blocks having a plurality of parts in the chain or rope—viz., in line with the lower hook which receives the load, which line is of necessity the center line of the tackle as a whole.

E is the hand-chain guard, made with a central eye E′ and provided with a bolt E^2, which clamps together the frame-sections at that point.

F is the usual driving-sheave, adapted to carry and be operated by an endless hand-chain (not shown) and being secured to the worm-shaft G. The shaft G is carried at right angles to the stay A by bearings G′ G^2 in the frame.

G^3 is a worm fastened to or made integral with shaft G and is of quick pitch, so that it can be driven backward by the reaction of the load unless suitably checked.

G^4 is a squared part in the shaft G, having its corners G^7 rounded or turned to a circular contour.

G^5 G^5 are two friction-disks or shaft-disks, having central openings conformed to the section of the part G^4 of the shaft, and thus irrevolubly fastened to it, but adapted to slide longitudinally.

G^6 is a pressure-transmitting disk supported by and capable of turning upon the rounded corners G^7 of the part G^4 and of receiving end-pressure from the shaft at the shoulder G^{12}, where the square part G^4 begins. The ratchet-disk G^8 and the thrust-disk G^9 are also both capable of rotary and longitudinal motion upon the rounded corners G^7 of the part G^4, that carries them.

H is a thrust-pin, preferably screwed into the frame and having an extension H′ of smaller diameter than and forming a dead-

center and end support to the thrust-disk G^9 to receive therefrom the continual thrust of the worm-shaft. The aforesaid running parts are in use submerged in oil retained in the case or frame D.

I is a pawl, and I′ the axle thereof, carried in a suitable bearing in the frame D.

I^2 is an ordinary spring wrapped around the axle I′ between the lever I^3 and the frame, and projecting outwardly at both ends. At one end it bears against the frame and at the other against the lever I^3 to keep it in an elevated position. The lever I^3 is fastened to the axle I′ and is adapted to operate the pawl I, which is also fastened to the axle. Pressure, therefore, upon the lever is communicated to the pawl, and the office of the spring is to press the pawl toward the teeth of the disk G^8. The said ratchet-teeth appear in dotted lines, Fig. 1, and in section, Fig. 2.

The thrust of the worm-shaft being always toward the dead-center H′, all the intervening parts, from the collar or pressure-disk G^6 to the thrust-disk G^9, are pressed together by a force varying as the load varies. When the worm-shaft is rotated in the direction for hoisting, the parts G^5 G^5 G^6 G^8 G^9 rotate with it, the pawl offering no resistance thereto. If the pawl were then lifted from the ratchet-teeth of the disk G^8 and the hoisting force withdrawn, the worm-shaft and aforesaid parts carried thereon would together run backward as a unit with accelerating velocity. If, on the contrary, the pawl were left in action with the ratchet-disk G^8, the latter would be thereby locked against backward rotation and would offer the frictional resistance of its two sides to the adjacent disks G^5 G^5, sufficing to hold the load at rest.

The load may be lowered gradually by driving the worm-shaft in the direction for lowering and against the friction of the now stationary ratchet-disk sides, or it may be lowered rapidly by use of the lever I^3 to hold the pawl out of action, but allowing the pawl to drop in again from time to time and stop the rotation of the disk G^8, thus preventing excessive speed in the descending load. By leaving the pawl in action the load quickly comes to rest, its momentum being absorbed by the friction of the running parts G^5 G^5 against the two sides of the ratchet-disk G^8 held stationary by its pawl I,

One advantage of my improved disk frictional device is its ready adaptation to the small diameters indispensable for the compactness necessary in portable hoists. In the example Figs. 1 and 2 both sides of the ratchet-disk G^8 are utilized for frictional brake action. Should this be insufficient when the worm is made of still quicker pitch, increasing its rotatory tendency under the reaction of the load, then the frictional resistance may be increased by increasing the surface of frictional contact without adding to the diameter of the disks, as shown in Fig. 3. In that figure are shown two ratchet-disks G^8 G^8 and three shaft-disks G^5, arranged alternately and introducing the alternated friction-disks of my United States patent, No. 75,227, of 1868.

I claim as my invention—

1. The combination, in worm-wheel gearing, of a worm-shaft, friction-disks, a ratchet-wheel loose thereon, and a pawl adapted to engage therewith, the said ratchet-wheel acting on both of its sides against the friction-disks slidingly engaged with the worm-shaft, substantially as set forth.

2. The combination, in worm-wheel gearing, of a worm-shaft and an automatic frictional checking device comprising a friction-disk loose upon the worm-shaft, friction-disks slidingly engaged with said worm-shaft, and means for engaging the loose friction-disk to prevent its revolving, substantially as set forth.

3. The combination, in worm-wheel gearing, of a worm-shaft and its supporting-frame with a friction-disk adapted to be engaged with the supporting-frame and friction-disks slidingly engaged to the worm-shaft, substantially as set forth.

4. The combination, in worm-wheel gearing, of a worm-shaft provided with the squared part G^4, rounded corners G^7, and shoulder G^{12}, rotatable disks G^6, G^8, and G^9, and non-rotatable disks G^5, the disk G^8 being provided with a ratchet and a pawl, substantially as and for the purpose specified.

In testimony of all which I have hereunto subscribed my name.

THOMAS A. WESTON.

Witnesses:

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