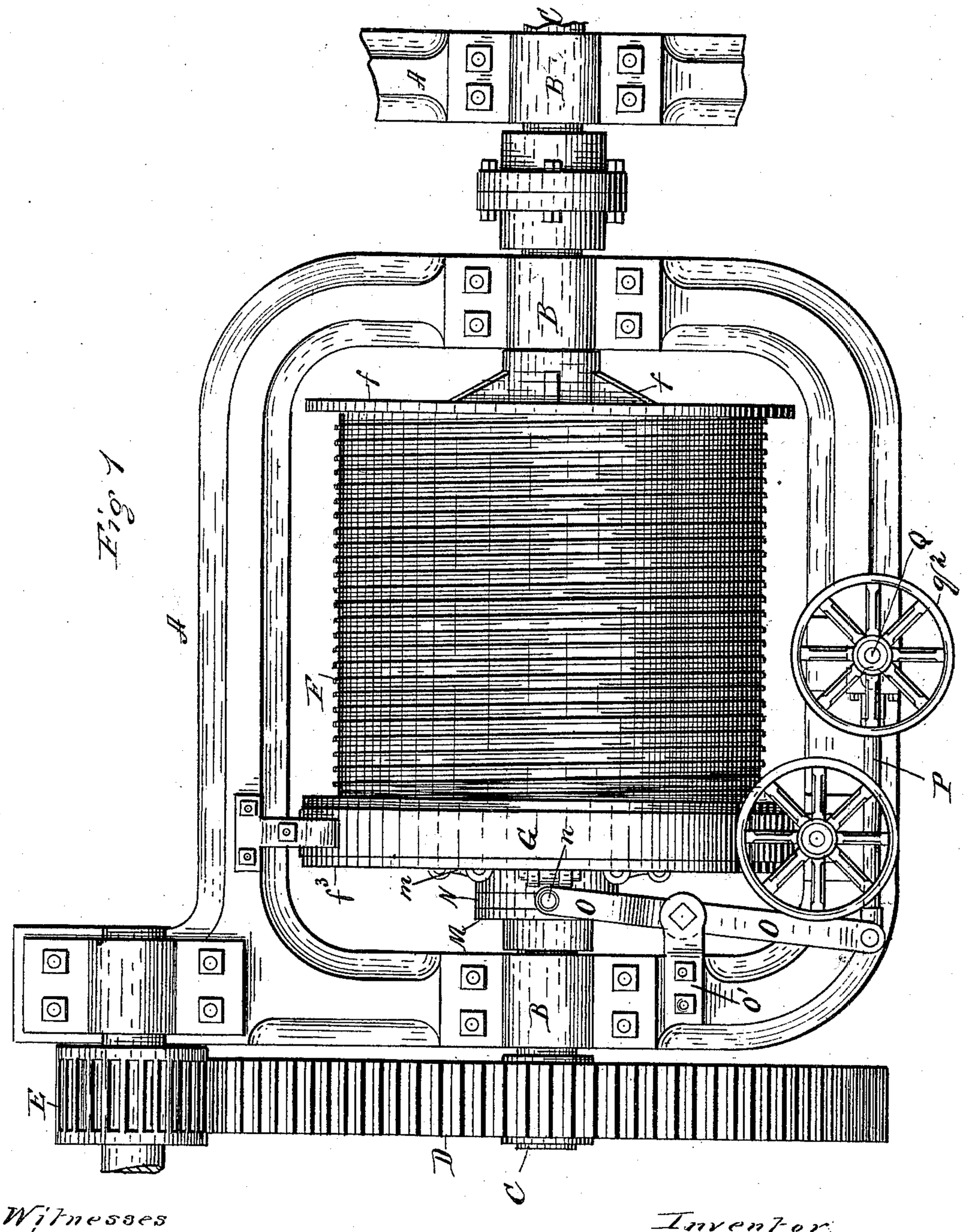
(No Model.)

4 Sheets—Sheet 1.

DE WITT C. PRESCOTT.

HOISTING APPARATUS.

No. 301,153. Patented July 1, 1884.



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(No Model.) 4 Sheets—Sheet 2.

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HOISTING APPARATUS.

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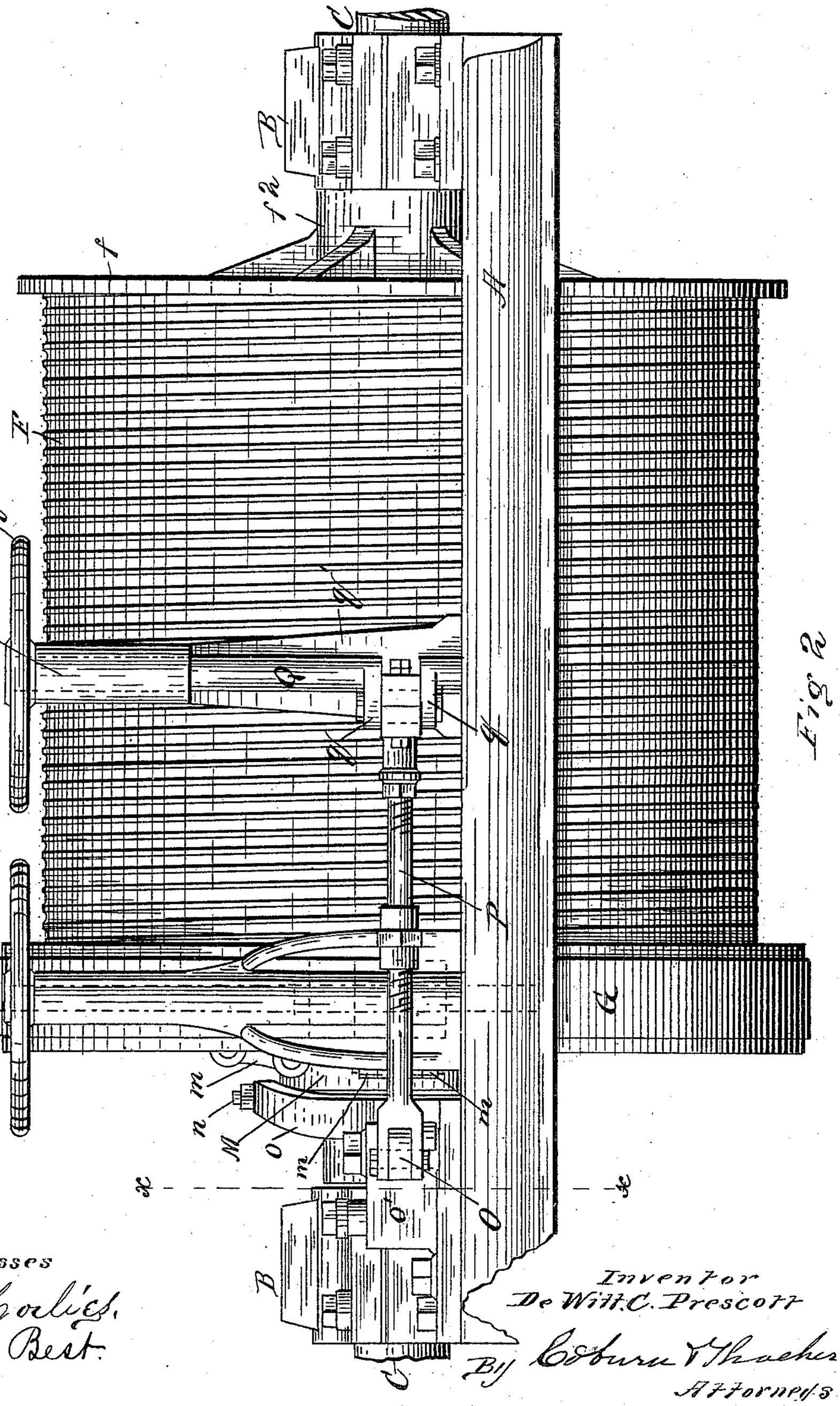

Fig. 2.

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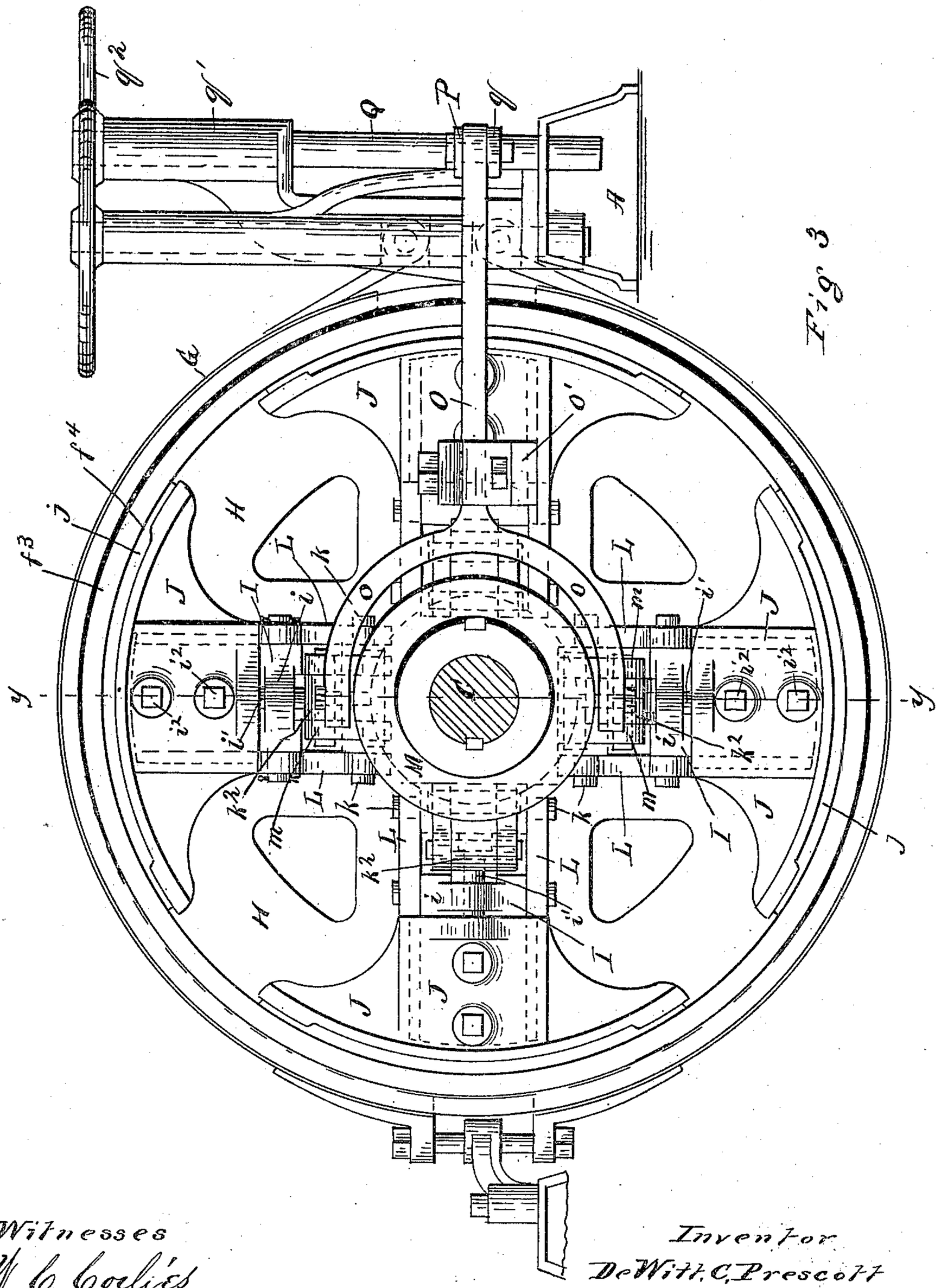

Fig. 3.

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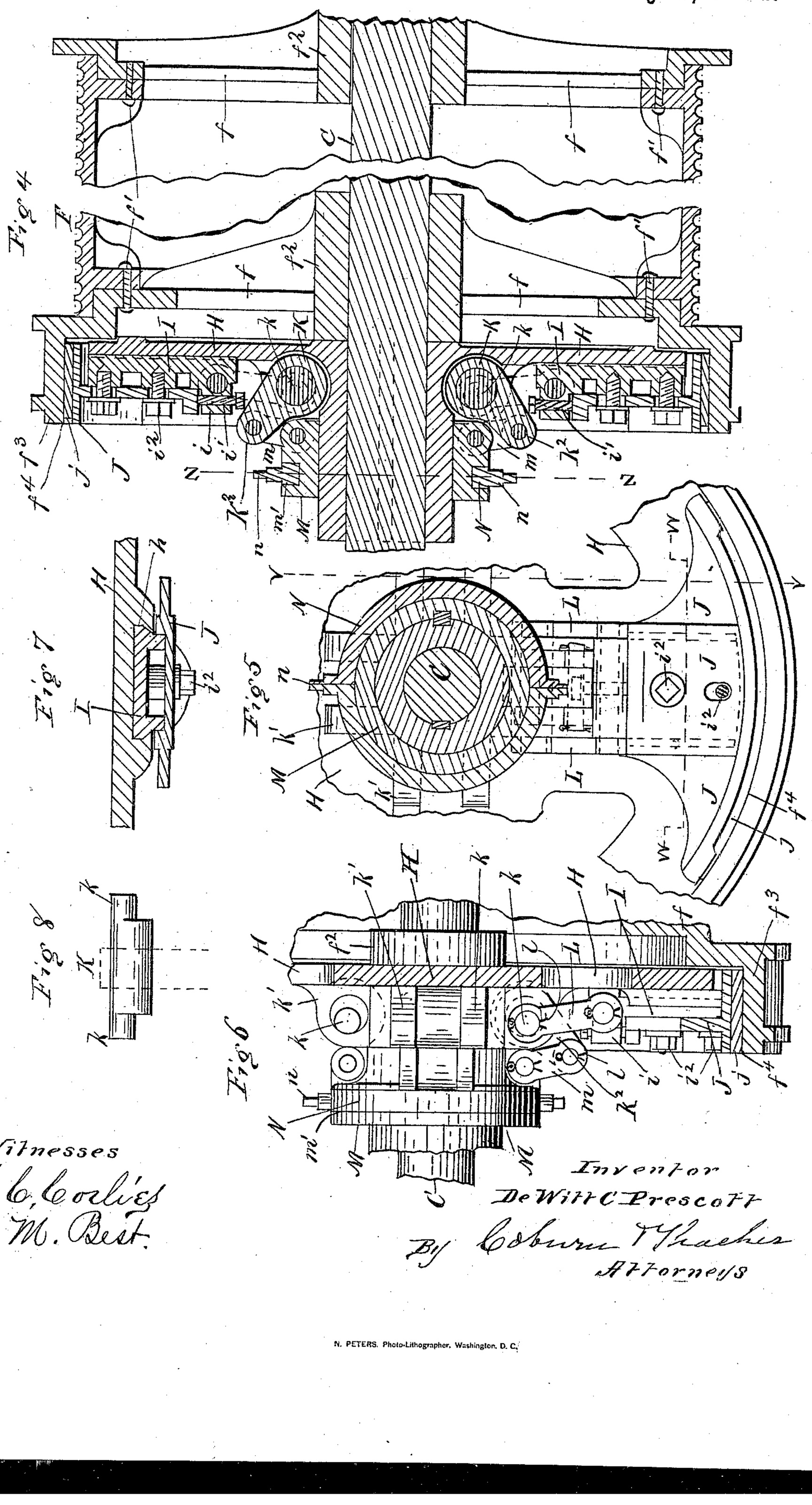

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UNITED STATES PATENT OFFICE.

DE WITT CLINTON PRESCOTT, OF MARINETTE, WISCONSIN.

HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 301,153, dated July 1, 1884.

Application filed December 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, DE WITT C. PRESCOTT, a citizen of the United States, and residing at Marinette, in the county of Marinette and State of Wisconsin, have invented certain new and useful Improvements in Hoisting Apparatus, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of a hoisting apparatus embodying my improvements; Fig. 2, a front elevation of the same, with the driving-gears removed, and on an enlarged scale; Fig. 3, a cross-section taken on the line *x x*, Fig. 2, and on the same scale. Fig. 4 is a longitudinal section of the same, but broken away in the center, taken on the line *y y*, Fig. 3, and on the same scale; Fig. 5, a detail section taken on the line *z z*, Fig. 4; Fig. 6, a detail section taken on the line *v v*, Fig. 5; Fig. 7, a detail section taken on the line *w w*, Fig. 5; and Fig. 8, a detail plan of the eccentric pin or shaft which operates the driving-plates.

My invention relates to that class of machines used in mines for hoisting ore therefrom; and with my improvements are combined some features of construction which are common in other machines of the same class, and which, therefore, though fully shown in the drawings to exemplify the application of my improvements, are not claimed as of my invention.

The present invention relates to an improvement upon the invention of Duncan Gilchrist, as described and shown in an application for Letters Patent filed of even date herewith, to which reference is made for information as to the general construction and operation of this class of machines.

The particular object of my improvements is to provide mechanisms for engaging the drums with the driving-shaft and disengaging them therefrom, which will perform the work quickly and certainly, and which are so constructed and arranged as to be accessible at all times for quick adjustment or for removal, in order that they may be easily repaired and replaced, and also to provide for automatically locking the mechanism when the engagement between the driving shaft and drum is complete, and at the same time in large measure relieve the clutch-collars and grooves from the usual wear.

I will proceed to describe one way in which I have embodied my invention in practical form, and will then point out more definitely in the claims the special improvements, which I believe to be new and wish to protect by Letters Patent.

In the drawings, A represents the base-plate of a hoisting-machine, and B boxes which rest on the plate, and which support a suitable driving or drum shaft, C, mounted therein. A large spur-gear wheel, D, is securely keyed to this driving-shaft C, and a driving spur-pinion, E, is arranged to engage with this gear-wheel to impart motion thereto in one continuous direction. The driving-pinion is on the engine-shaft, or on some shaft having power imparted to it sufficient to do the work required. A spool or drum, F, is mounted loosely on the driving-shaft, and in general features is of any approved form of construction adapted to the winding of the hoisting-rope around it in the operation of hoisting the ore bucket or skip. That part of the drum which is changed from the ordinary construction in the application of my invention will be described presently. A brake, G, is applied to the drum for the purpose of retaining it in a fixed position, or of controlling its rotation when released, and permitted to revolve freely on the shaft to lower the ore bucket or skip into the mine. This brake may be of any suitable and approved form or construction adapted to the purpose. In the drawings it is shown as a friction-band applied to a grooved rim at one end of the drum and operated by a hand-wheel and screw-shaft. All of these parts mentioned thus far are common to hoisting-machines generally in use, and do not require more specific description here, it being understood, however, that in this statement I speak of the drum in a general way, and do not include some peculiarities of construction which I will now proceed to describe.

The main body of the drum is secured to iron-spoked flanges *f* by means of bolts *f'*, one of these flanges being located at each end of the drum, and being fitted loosely to the driving-

shaft C by elongated hubs f^2, as shown in Fig. 4 of the drawings. It will thus be seen that the drum is free to revolve in either direction on the driving-shaft, except as engagement is made with the latter by means of certain devices which enter into my invention. A flange, f^3, at one end of the drum is extended outward in a horizontal direction over the driving-shaft, so as to provide a straight projecting rim, f^4, as shown in Fig. 4 of the drawings. This rim is also constructed so as to provide a seat for the friction-brake band, which passes around the outside of the flange between annular ribs or projections which hold it in place. This arrangement is, however, merely incidental, and the brake may be applied as just described, or in any other way and to any other part of the drum. As the body or barrel of the drum is securely fastened, as described above, to these flanges at the ends, the latter practically form a part of the drum itself, and in a general way may be considered as such.

A driving-plate or carrier, H, is keyed firmly to the driving-shaft underneath or within the rim f^4, and consequently is revolved continuously with the shaft. In this plate are formed any number (but preferably four) of dovetailed grooves h, which are arranged radially, as shown in the drawings, on the outer face of the plate. In each one of these grooves is mounted a sliding block, I, which accurately fits the groove in which it is placed, but is free to move therein outward or inward with respect to the shaft. To the outer ends of these blocks are bolted quadrants or segmental pieces J, the outer rims or faces of which are of the same general curve as the inside of the drum-rim, and are provided with a covering, j, of wood, vulcanized fiber, or other material suitable for making frictional contact with the projecting rim of the drum. At the lower or inner ends of the sliding blocks I is a lug or boss, i, projecting to the front, and in this boss is set an adjusting-screw, i', arranged to act upon the lower or inner ends of the quadrants, so as to firmly support the latter and adjust them to the required position on the blocks, to which they are then securely fastened by bolts i^2. The holes in the quadrants through which the fastening screw-bolts pass are elongated somewhat, to permit adjustment of the quadrants on the blocks by the set-screw, as just described. A short circular cam, K, is mounted in the driving-plate or carrier, near the hub of the latter, directly underneath or inside of each sliding block. These cams are provided at each end with an eccentric-pin, k, and the body or central portion of the cam is mounted in boxes or holes k' on the driving-plate. The eccentric-pins project on each side beyond the boxes to receive one end of a connecting-link, L, which is mounted on or passes around its eccentric-pin, and is secured in place by any suitable device, preferably, however, by spring-cotters l, as shown in the drawings. The other ends of these connecting-links are fastened in any suitable manner to the lower or inner ends of the sliding blocks, there being one pair of links to each block. In the drawings the links are shown attached to the blocks by means of a pin passing through the block and the ends of the connecting-links. Each collar is provided with an arm, k^2, fastened in any suitable manner to the central portion of the cam, or made in one piece therewith and extending outward, as shown in Fig. 4 of the drawings. A collar, M, is feathered to the hub of the driving-plate, so as to be movable back and forth thereon lengthwise, but at the same time to turn therewith. Links m connect the outer ends of the arms k^2, respectively, to this collar, which is provided with bosses or lugs for this purpose. The collar is also provided with an annular groove, m', within which is fitted a clutch-collar, N, provided with pins or studs n. A forked lever, O, is connected to this collar in the usual way, each arm o of the fork being attached to one of the studs on the clutch-collar. The lever is pivoted to a suitable support or bracket, o', which is fastened to the base-plate a little in front of the forked lever. The clutch-collar may be dispensed with, if desired, and pins on the arms of the forked lever arranged to enter the annular groove on the sliding collar—a well-known construction in clutches.

A connecting-rod, P, is hinged at one end to the outer end of the forked lever O, and at the other to the crank of a vertical hand-shaft, Q, the crank q of which is arranged near its lower end about on a line with the outer end of the forked lever, and the connecting-rod is preferably attached to it by suitable boxes. The hand-shaft is mounted in an upright stand, q', which is attached to the base-plate in any suitable manner, and a hand-wheel, q^2, is fastened to the upper end of the shaft, by means of which it is operated.

The mechanism which I have just described is for the purpose of connecting the drum to the driving-shaft and disconnecting it therefrom, and the operation of my improvements is as follows: The horizontal driving-shaft being in continuous motion, and carrying with it the driving-plate, and revolving in a proper direction to hoist the ore-bucket whenever a signal is given from the bottom of the mine, the attendant, by means of the hand-wheel, throws the crank of the vertical shaft around toward the end of the forked lever in the position shown in Figs. 1 and 2 of the drawings. This movement will obviously push the outer end of the forked lever outward from the end of the drum through the rod by which it is connected to the crank, which vibration of the forked lever will move the sliding collar up toward the driving-plate. This movement of the sliding collar will throw upward the crank-arms on the cams, and the eccentric-pins on the latter are so arranged that the oscillation of the cams, caused by the upward throw of the crank-arms, will force the connecting-links upward, which are attached to the sliding

blocks, and so the latter are carried upward or outward, moving in the grooves on the driving-plates. This outward thrust of the sliding blocks also moves outwardly the quadrants or segmental pieces, which are adjusted so that only a slight movement in this direction will bring the wood or other outer covering on the respective faces into contact with the inner surface of the projecting rim of the drum with great force. To effect these movements it will be understood that the eccentric-pins will be arranged on the outside of the cams and approximately at right angles to the line of movement of the sliding blocks when the mechanism is thrown out of engagement with the drum and the latter is loose on the shaft. The parts are also so arranged that when full force is applied and the entire limit of their movement is obtained the connecting-links will be in the same plane as the sliding blocks, and about vertical to the plane of movement of the sliding collar. It is evident, then, that the action is that of a species of toggle-joint in bringing the ends of the connecting-links nearly on a line with their own centers when receiving the greatest strain, and so the power exerted to move the sliding blocks and segmental friction-pieces outward against the rim of the drum is greatly augmented. At the same time it will also be noticed that when the links are brought into this position, as shown substantially in the drawings, the mechanism is locked, so that the friction quadrants or segments are securely locked in position of contact with the rim of the drum, and there is no danger of any disengagement between the drum and the shaft until considerable force is applied to break this lock.

It is evident that the engagement of the shaft with the drum is effected by frictional contact between two parts, and this kind of engagement is essential in the elevation of ore buckets or skips from mines, as they must be started slowly, and the movement increased after starting, until its full limit is reached, if desired. The friction engagement permits this to be done, because when first applied it is light, and the surfaces are allowed to slip on each other somewhat until the start is made, when the force applied to the engaging mechanism is increased until its full effect is finally felt in forcing the segments outward until locking takes place. The hoisting is then rapidly completed, when force is applied to the hand-wheel to immediately disengage the friction mechanism by reversing the movement of the parts described above, and then the brake is applied to the drum to stop and hold it until it is desired to lower the bucket again.

In this mechanism it will be seen that I have comparatively short frictional surfaces, and several of them, to engage the drum, instead of a continuous annular surface or a plate, and therefore the necessary contact can be made and maintained more readily. As an additional aid to prevent slipping, the friction-surfaces are plain in my apparatus, instead of being beveled, as in some instances, and the engagement of such plain surfaces is maintained more readily than the beveled surfaces.

It is also obvious that with the parts constructed and arranged as described above, the wood or other material used on the faces of the friction-segments, when it becomes worn, may be renewed very easily, and so, too, that if any of the parts—such as the segments, the sliding blocks, the cams, links, &c.—break or need repairs, they may be readily removed from the machine, repaired, and returned or replace by new corresponding pieces, and adjusted in proper place without disturbing other parts of the machine.

I have shown the connecting apparatus applied to only one end of the drum. It will be understood, however, that it may be applied to each end, if desired, and that this will be necessary for very heavy work, in this case the mechanism at each end being connected to some suitable device—like a double-crank wheel, for instance—by means of which both can be operated simultaneously. So, too, it will be understood that while I have described and shown but one drum several drums may be arranged on the same driving-shaft, as is frequently the custom in mining operations.

The mechanism has been mentioned above as especially adapted for mining purposes; but of course I do not wish to be understood as limiting myself to hoisting apparatus especially intended for such work, as my improvements may be applied to any hoisting-drums, being especially adapted for heavy work in any place.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hoisting-machine, the revolving driving-shaft, in combination with the drum mounted loosely thereon and provided at its end with a friction-rim, a driving-plate connected to the shaft and turning therewith, sliding blocks mounted on the driving-plate, frictional segments adjustably connected with the outer ends of the sliding blocks, and a toggle in immediate contact with the sliding blocks, substantially as and for the purpose described.

2. In a hoisting-machine, the drum mounted loosely on the driving-shaft and provided with the end projecting rim, f^4, the driving-plate H, secured to the driving-shaft, the sliding blocks I, mounted in suitable seats on the plate and movable radially thereon, the friction plates or quadrants J, adjustably secured to the sliding blocks, the actuating-cams K, provided with eccentric-pins k at their ends, and a crank-arm k^2, the sliding collar M, feathered to the hub of the driving-plate, the links m, connecting the collar with the crank-arms on the cams, the hand-shaft provided with a crank, the forked lever O, and the rod P, connecting the outer end of said lever with the crank on the hand-shaft, all in combination, substantially as and for the purposes set forth.

3. In a hoisting-machine, the hand-shaft provided with a crank, in combination with the forked lever O, rod P, connecting the outer end of said lever with the crank on the hand-shaft, the sliding collar M, driving-plate H, fastened to the driving-shaft, sliding blocks I, mounted on the plate, actuating-cams K, having eccentric-pins *k*, links *l*, connecting the cams with the sliding blocks, links *m*, connecting the sliding collar with crank-arms on the cams, and friction-plates on the sliding blocks, all constructed and operating substantially as and for the purposes set forth.

4. The driving-plate H, having the radial dovetail grooves *h* in its outer face, the sliding blocks I, shaped to fit the grooves, and each having at its inner end the projecting lugs *i*, the friction-segments J, arranged one upon each of the sliding blocks near its outer ends, and provided with an elongated bolt-hole, the adjusting-screws *i'*, arranged in the lugs, to bear upon the inner ends of the segments, and the bolts j^2, uniting the segments to the blocks, all in combination, substantially as and for the purpose described.

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