No. 736,572. PATENTED AUG. 18, 1903.

W. A. BARKER.

HOISTING MACHINE.

APPLICATION FILED MAY 1, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

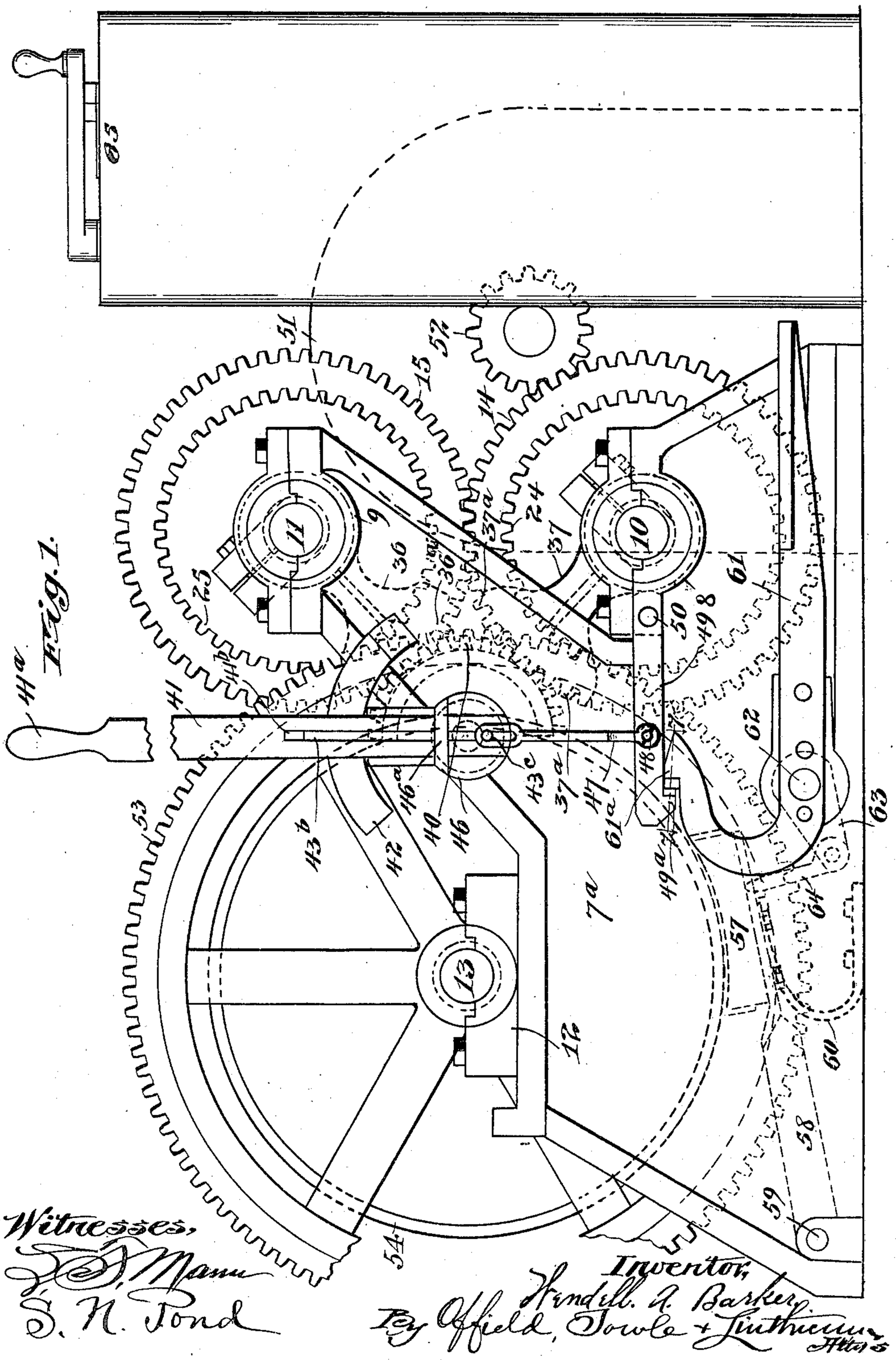

Fig. 1.

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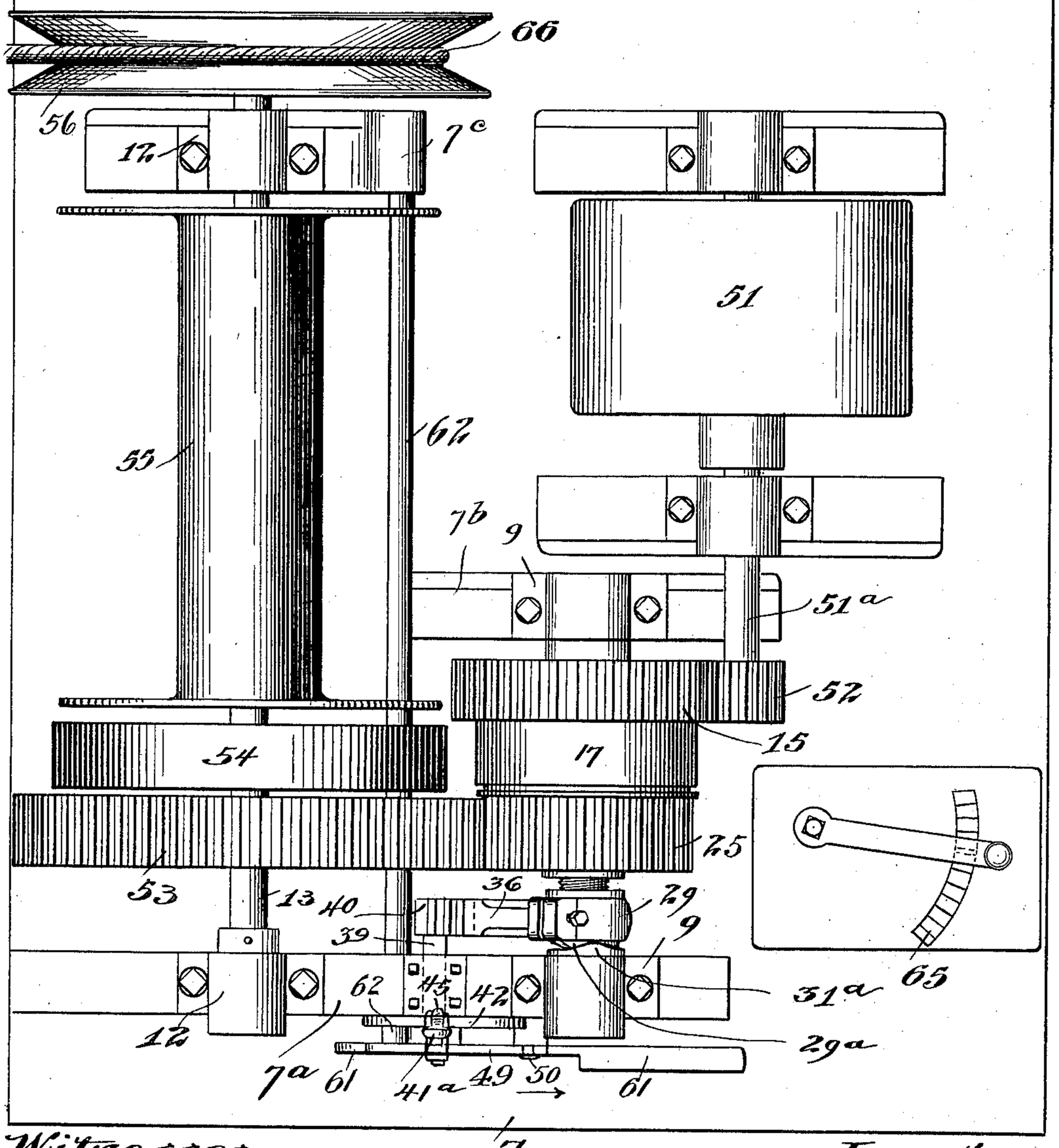
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

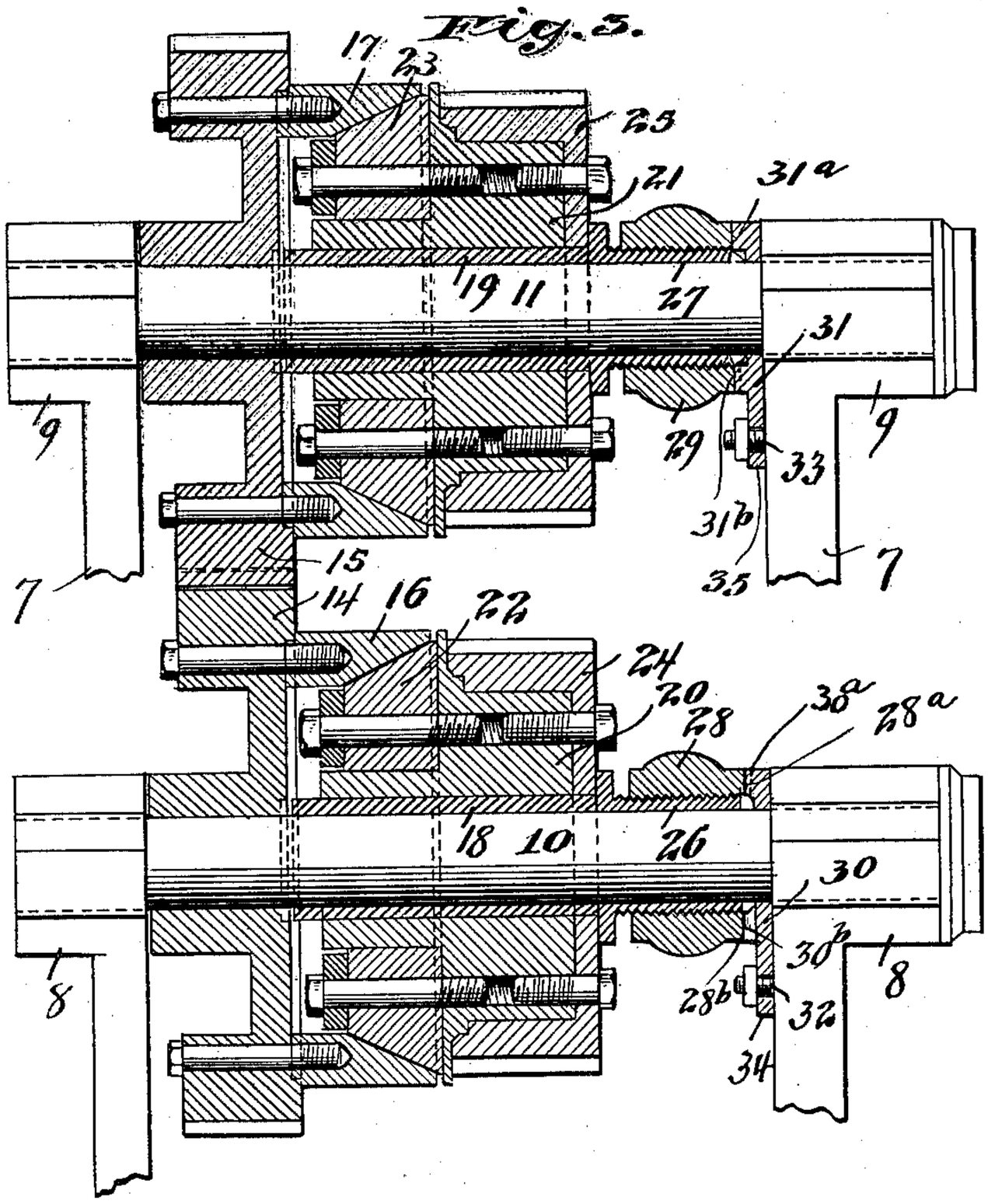


Fig. 4.

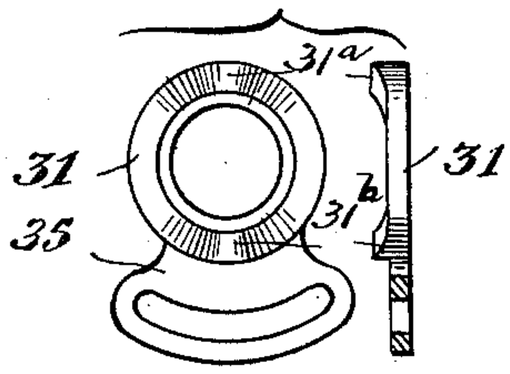
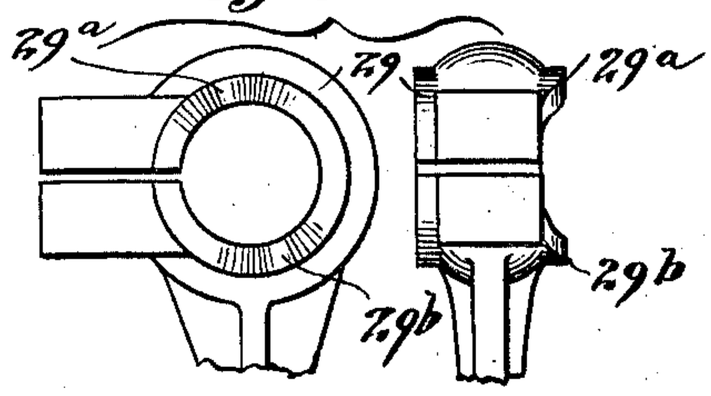


Fig. 5.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.

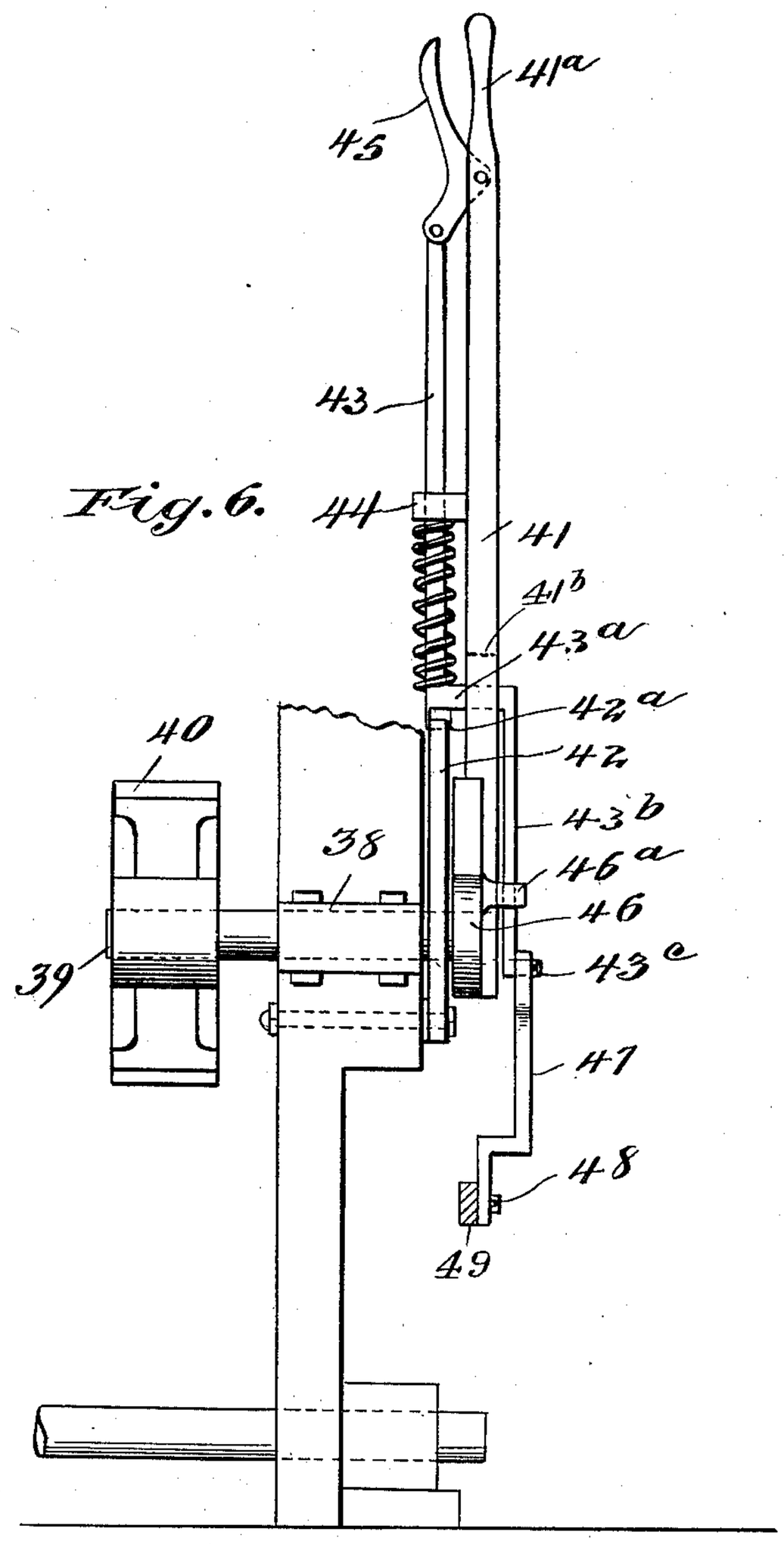

Fig. 7.

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No. 736,572. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

WENDELL A. BARKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO EMMET A. THOMAS, OF CHICAGO, ILLINOIS.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 736,572, dated August 18, 1903.

Application filed May 1, 1903. Serial No. 155,186. (No model.)

To all whom it may concern:

Be it known that I, WENDELL A. BARKER, a citizen of the United States, 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.

My invention relates to improvements in hoisting-machines, more particularly such as are designed primarily to be driven by an electric motor and are provided with reversing devices whereby the hoisting drum or sheave may be rotated in either direction or may be maintained idle while the motor is continuously operating in one direction, the primary object of such a construction being to avoid the necessity of reversing the motor every time the direction of rotation of the winding or hoisting element of the machine is to be reversed.

My invention has for its primary object to produce a hoisting-machine of this type of greater simplicity and reliability in operation as compared with other machines for the same purpose with which I am acquainted, and consequently involving a less expense in their production and maintenance.

To this end my invention resides in a novel and simplified motion-reversing mechanism between the power-shaft of the motor and the drum-shaft of the machine, whereby while the motor-shaft rotates in one direction the drum-shaft may be rotated in either direction or maintained idle, as desired.

My invention further consists in a new and improved brake mechanism for the drum-shaft and connections therefrom, including a foot-lever, to the reversing-lever of the machine, whereby when said reversing-lever is in the intermediate position, representing the idle position of the winding-shaft, the brake may be locked and held in engaging position to prevent the rotation of said winding-shaft through a depression of said foot-lever and the automatic engagement of a hook-and-latch mechanism between said levers and may be released by manipulating the latch connected to the reversing-lever prior to throwing said reversing-lever into a position to positively connect the winding-shaft with the power-shaft of the motor through one or the other of a pair of oppositely-driven counter shafts.

Referring to the accompanying drawings, which illustrate a preferred form of my invention, Figure 1 is a side elevational view of a hoisting-machine built in accordance with my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a central vertical sectional view through a pair of twin-motion reversing devices that are interposed between the driving-shaft of the motor and the drum-shaft of the machine and through which the direction of rotation of the latter shaft, as well as its starting and stopping, is controlled. Fig. 4 shows in face and side elevations one of a pair of stationary cam members affixed to the frame of the machine and operating the clutch devices of the intermediate reversing-shafts. Fig. 5 is a similar showing of one of a pair of oscillatory companion cams designed to coöperate with said stationary cams in operating the clutch mechanism. Fig. 6 is a side elevational view of the clutch-operating lever, showing also the connection therefrom to a pivoted latch which holds the brake mechanism in operative position when both clutches are disengaged; and Fig. 7 is a detail horizontal sectional view on the line 7 7 of Fig. 1 looking in the direction of the arrow.

Referring to the drawings, 7 designates a base-plate, and 7^a and 7^b a pair of parallel standards, each carrying a pair of superposed pillow-blocks 8 and 9, in which are rotatably journaled a pair of companion shafts 10 and 11, respectively. In the standard 7^a and another standard 7^c are a pair of pillow-blocks 12, in which is journaled a drum-shaft 13. Keyed or splined on the shafts 10 and 11 are a pair of intermeshing companion gears 14 and 15, these gears having fast on corresponding faces thereof internally-beveled collars 16 and 17, constituting female members of a pair of friction cone-clutches. Mounted to rotate loosely upon the shafts 10 and 11, respectively, are a pair of sleeves or bushings 18 and 19, fast on which are mounted hubs 20 and 21, to the inner faces of which hubs are bolted or otherwise secured fiber male cone-clutch members 22 and 23, while to the outer faces of said hubs are similarly secured gears 24 and 25. Loosely mounted on the shafts 10 and 11 are

also a pair of externally-threaded bushings 26 and 27, mounted on which to turn therewith are a pair of collars 28 and 29. The outer annular faces of said collars are formed with a pair of diametrically opposite cam points or elevations, such as are clearly shown at 29^a and 29^b in connection with the collar 29 in Fig. 5, it being understood that the collar 28 is provided with a similar pair of cam projections 28^a and 28^b. Secured to the inner faces of the pillow-blocks 8 and 9 are a pair of collars 30 and 31, respectively, the inner annular faces of which are provided with diametrically opposite cam points or projections 30^a 30^b and 31^a 31^b, respectively, designed for coöperation with the corresponding cam-points of the collars 28 and 29 to effect the engagement of the respective clutch members 22 16 and 23 17, respectively, in the manner hereinafter described. The collars 30 and 31 are adjustably secured in stationary position relatively to the pillow-blocks to which they are attached by means of clamping-bolts 32 and 33, engaging arc-shaped slots formed in segmental extensions 34 and 35, depending from the lower edges of said collars.

Fast with the collars 28 and 29 are radial arms 36 and 37, respectively, terminating in segmental racks 36^a and 37^a, respectively, through the actuation of which in the manner hereinafter described said cam-faced collars 28 and 29 are oscillated simultaneously to produce opposite movements of the upper and lower male members of the clutches.

Mounted in a suitable journal-bearing 38 in one of the side frame members 7 of the machine, in advance of and about equidistant from the clutch-shafts 10 and 11, is a short rock-shaft 39, fast on the inner end of which is a segmental gear 40, which meshes with both of the segment-gears 36^a and 37^a. Fast on the outer or opposite end of the shaft 39 is an operating-lever 41, terminating at its upper end in a handle 41^a. Secured to the outer face of the frame 7, opposite the bearing of the shaft 39, is a stationary quadrant 42, having a single notch 42^a, with which coöperates the lower end of a locking-rod 43, mounted to slide vertically in a perforated lug 44 on the inner face of the lever-arm 41, the upper end of this rod being pivoted to the toe of a corresponding lever 45, pivoted to the main-lever 41.

The locking-rod 43 is provided near its lower end with a lateral extension 43^a, which passes through a vertical slot 41^b, formed in the lever 41. Thence the lateral extension 43^a is continued in the form of a vertical depending extension 43^b, which passes through a guide-lug 46^a, projecting from and connecting the opposite sides of a vertical housing or guide 46, also fast on the outer end of the shaft 39 and partially embracing the lower end portion of the lever 41. On the lower end of the extension 43^b is a pin 43^c, on which is hung a bent rod 47, the lower end of which is secured, as by a pin 48, to a latch-bar 49, pivoted at its inner end at 50 to the pillow-block 8, the outer end of said latch-bar 49 having a hook 49^a, adapted to coöperate with a corresponding hook on a foot-operated brake-lever, as hereinafter described. The pin 43^c is so situated as to be in line with the center or axis of the rock-shaft when the rod 43 is raised out of engagement with the notch of the quadrant, as hereinafter described.

51 designates an electric motor the armature-shaft 51^a of which has a pinion 52 intermeshing the gear 14. The gears 24 and 25, constituting elements of the sliding male-clutch members, both intermesh a large gear 53, fast on the drum-shaft 13. On the said shaft are also rigidly mounted a brake-wheel 54, a winding-drum 55, and a grooved cable-driving sheave 56. In connection with the brake-wheel 54 I employ a friction brake-shoe 57, mounted on the free end of an arm 58, pivoted at 59 to the base of the side frame member 7^a. A leaf-spring 60, beneath the brake-shoe 57, serves to hold the latter in a disengaged position, preventing any pressure upon the brake-wheel. The brake is applied to the brake-wheel when desired through the agency of a foot-lever 61, fast on a shaft 62, rotatably mounted in and between the standards 7^a and 7^c, said shaft 62 also having fast thereon an arm 63, in the outer end of which is pivoted a finger 64, bearing against the back of the brake-shoe. The inner end of the foot-lever 61 is upwardly and reversely curved and terminates in a hook 61^a, that coöperates with the hook 49^a of the arm 49. These hooks preferably have their engaging surfaces oppositely beveled, as shown in Fig. 7, to prevent lateral separation when engaged.

65 designates an ordinary electric controller through which the current is supplied to and cut off from the motor 51.

The operation of the device is as follows: The current being supplied to the motor, the gears 14 and 15 are continuously rotated in opposite directions. When it is desired to rotate the drum-shaft in one direction, the lever 41 is swung to one side of its central position, which movement, through the segment-gears 40, 36^a, and 37^a, turns the upper collar 29 in a direction to force its cam-points 29^a and 29^b into coöperation with the corresponding cam-points 31^a and 31^b of the collar 31, whereby the clutch member 23 is jammed into frictional engagement with its companion member 17. The same movement of the segment-gear 40 which effects this coöperative engagement of the clutch members 23 and 17 at the same time produces such a relative turning movement between the collars 28 and 30 as to operate the cams thereof, thereby permitting a slip between the clutch members 22 and 16 of the lowermost clutch. Such being the case, the gear 25 is rendered operative to drive the large gear 53 and through the latter the drum-shaft and the drum and sheave carried thereby. When it is desired to reverse the direction of rotation of the drum-shaft, the controlling-lever 41 is swung to the opposite side

of its central position, which movement, through the segment-gears, simultaneously releases the upper clutch members 23 and 17 and forces into frictional engagement the lower clutch members 22 and 16, whereby the gear 24 is rendered operative to drive the large gear 53; but inasmuch as the gears 25 and 24 rotate in opposite directions the rotation of the drum-shaft imparted by the gear 24 will obviously be in a direction opposite to that imparted by the gear 25. The swing of the lever 41 to the intermediate position releases both clutches, so that the motor may operate idly. At such times when the drum-shaft is not under the control of the motor it is of course desirable and necessary in most situations that it be controlled by the brake, and therefore the brake is applied by the foot of the operator depressing the outer end of the lever 61 and thereby forcing the brake-shoe 57 into holding engagement with the brake-wheel 54. This movement of the foot-lever 61 automatically effects the engagement of the hooks 49[a] and 61[a], whereby the brake-shoe is locked into frictional engagement with the brake-wheel until such time as it is released by the raising of the arm 49 through the clamping of the corresponding lever 45, associated with the handle of the main operating-lever 41, and said lock is operative only when the vertical bar 43 is in the notch of the quadrant 42.

I have illustrated a winding-drum and a pulley or shaft as both mounted on the main operating-shaft of the machine. The machine has been designed primarily to operate material-elevators in connection with the erection of buildings where ordinarily a pair of elevating-platforms or carriers are employed and so connected to the hoisting apparatus as to travel simultaneously in opposite directions. In such cases a driving-cable 66, passed one or more times around the sheave 56, is passed over guide-sheaves and attached at its opposite ends to the two cars, respectively. When, however, the machine is used as a simple hoisting-machine, the hoisting-drum 55 is used, the operating-cable being wound and unwound thereon in a manner common in all hoisting-machines employing a cable-receiving drum of this sort.

I claim—

1. In a hoisting-machine, the combination with an electric motor adapted to be continuously driven in one direction and a cable-driving shaft, of a pair of clutch-shafts between said motor and said cable-driving shaft, intermeshing gears on said clutch-shafts, respectively, one of which is driven by said motor, clutch members fast with said gears, coöperating clutch members loose and slidable on said clutch-shafts, gears fast with said slidable clutch members, a gear on said cable-driving shaft intermeshed with both of said last-named gears, coöperating slidable and stationary cam devices on each of said clutch-shafts, a main operating-lever and connections therefrom to both of said slidable cam devices whereby one of the latter may be caused to effect the engagement of the members of one clutch and the other may simultaneously permit the disengagement of the members of the other clutch, substantially as described.

2. In a hoisting-machine, the combination with an electric motor adapted to be continuously driven in one direction and a cable-driving shaft, of a pair of clutch-shafts between said motor and said cable-driving shaft, intermeshing gears on said clutch-shafts, respectively, one of which is driven by said motor, cone friction-clutch members fast with said gears, coöperating cone friction-clutch members loose and slidable on said clutch-shafts, gears fast with said slidable clutch members, a gear on said cable-driving shaft intermeshed by both of said last-named gears, coöperating slidable and stationary cam-collars on each of said clutch-shafts, segment-gears on said slidable cam-collars, respectively, a lever-shaft and main operating-lever fast on one end thereof, and a segment-gear fast on the opposite end of said lever-shaft and intermeshing both of said segment-gears on the slidable collars, said parts being so arranged that a throw of the main operating-lever to one side of its central position, through said cam devices, connects the members of one clutch and simultaneously permits the separation of the members of the other clutch, while the movement of the lever to central position permits the separation of the members of both clutches, substantially as described.

3. In a hoisting-machine, the combination with an electric motor adapted to be continuously driven in one direction, a cable-driving shaft and a pair of oppositely-driven clutch-controlled driving connections between said motor and said cable-driving shaft, of a friction brake-wheel fast on said cable-driving shaft, a brake-shoe, and a foot-operated lever for forcing said brake-shoe into holding engagement with said brake-wheel, substantially as described.

4. In a hoisting-machine, the combination with a motor adapted to be continuously driven in one direction and a cable-driving shaft having a friction brake-wheel thereon, of a pair of oppositely-driven friction-clutches both geared to said motor and to said cable-driving shaft, and an operating-lever controlling said clutches, a brake-shoe, a foot-operated lever for forcing said brake-shoe into holding engagement with said brake-wheel, a hook or catch on said foot-operated lever, and a coöperating hook or catch slidably mounted on said clutch-operating lever, substantially as described.

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