

No. 644,190.

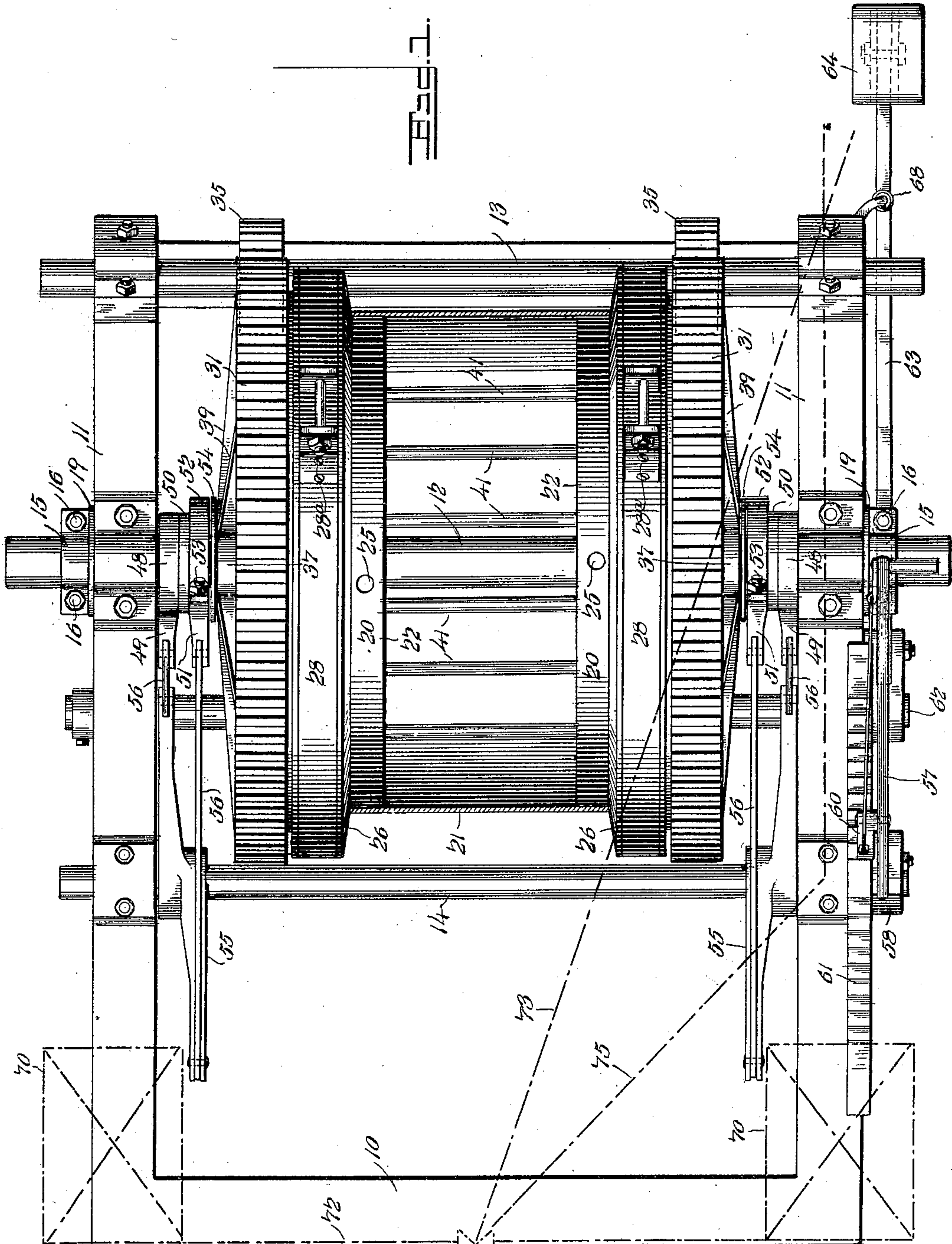
Patented Feb. 27, 1900.

J. B. SIMPSON.  
HOISTING MACHINE.

(Application filed May 3, 1899.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses

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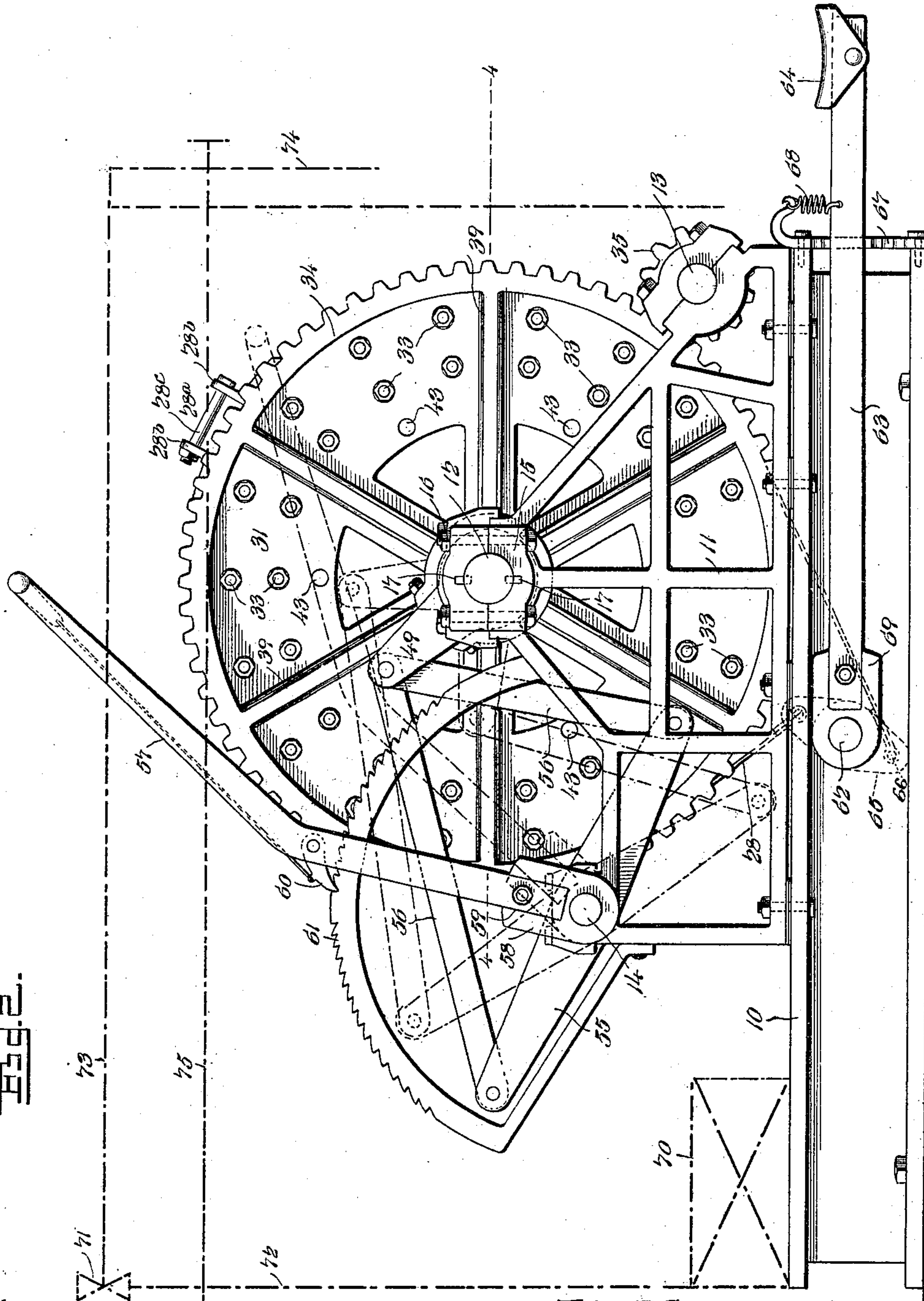
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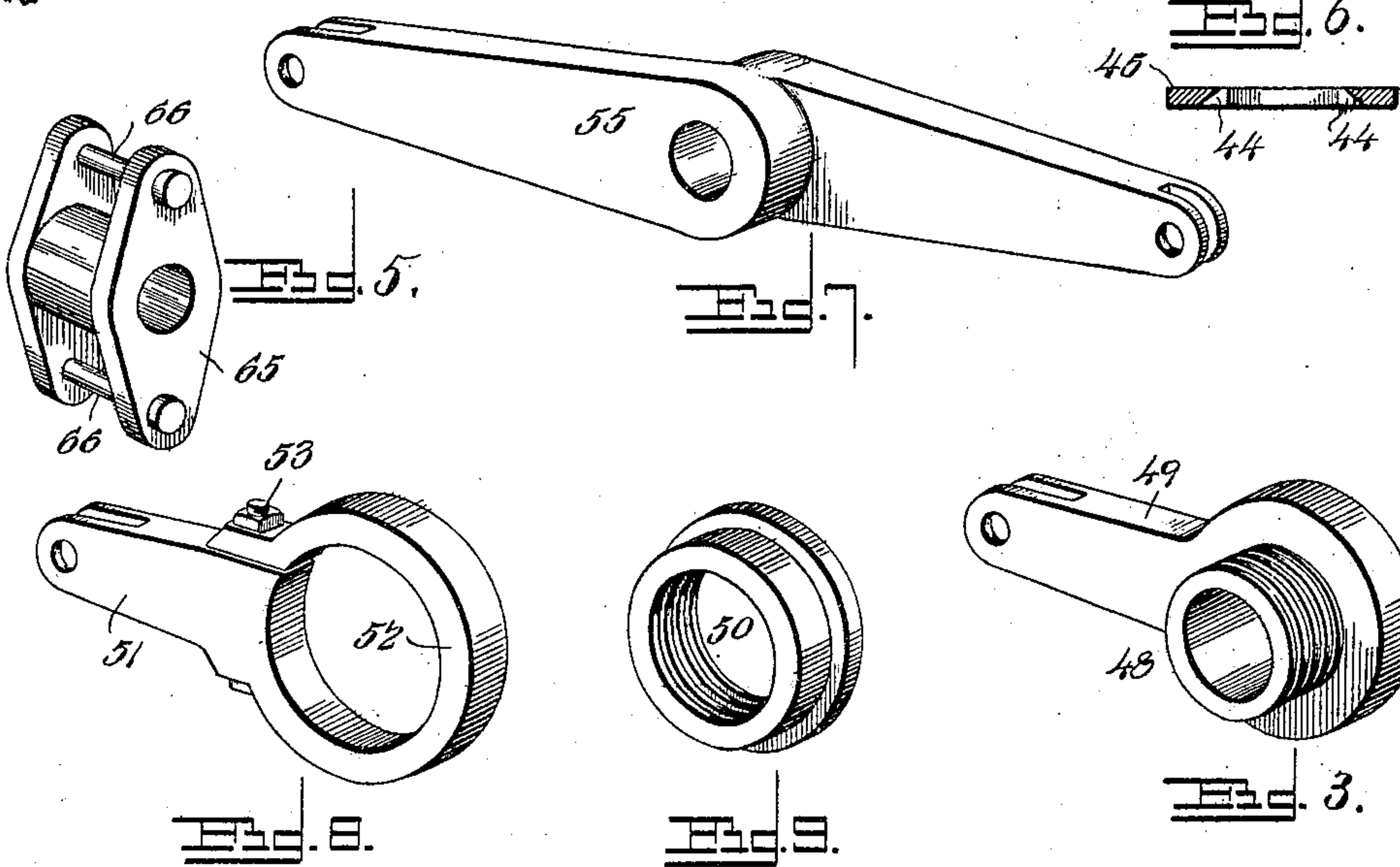
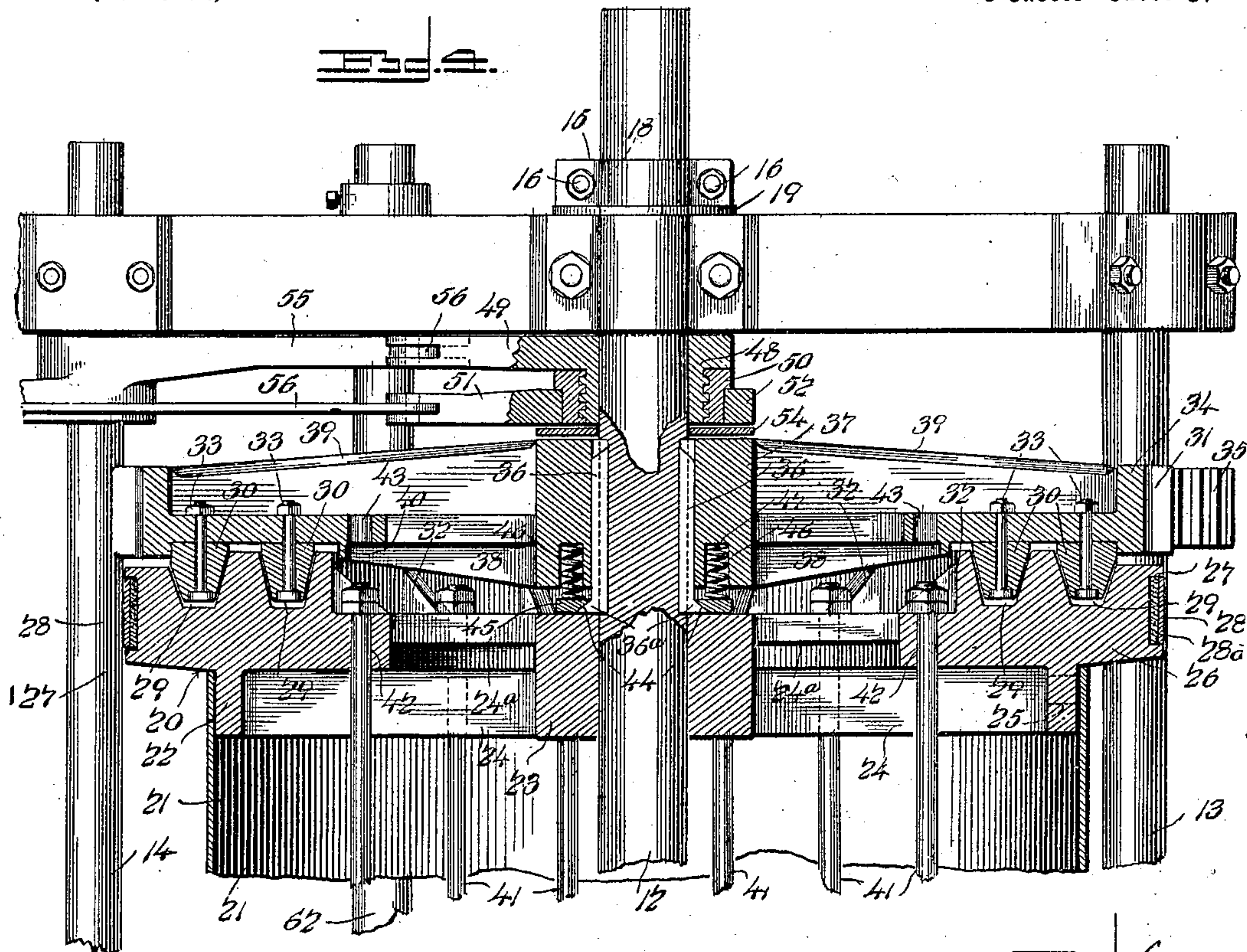
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# UNITED STATES PATENT OFFICE.

JOHN B. SIMPSON, OF ZINCITE, MISSOURI, ASSIGNOR OF ONE-FOURTH TO  
WILLIS T. HOWERTON, OF SAME PLACE.

## HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 644,190, dated February 27, 1900.

Application filed May 3, 1899. Serial No. 715,414. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN B. SIMPSON, a citizen of the United States, residing at Zincite, in the county of Jasper and State of Missouri, have invented a new and useful Hoisting-Machine, of which the following is a specification.

My invention relates to hoisting-machines, and has for its object to provide an efficient and durable mechanism embodying a compact arrangement of parts, whereby the communication of motion from a driving-shaft to the drum and the independent movement of the drum, as in unwinding the hoisting-cable, are under the complete control of the operator, and in this connection to provide such a combination and arrangement of parts as to accomplish the adjustment of the controlling members, levers, &c., within reach of an engineer stationed at any desired point adjacent to the machine—as, for instance, adjacent to either of the corners of the bed or frame which may be preferred.

A further object of my invention is to provide an improved construction of friction-clutch and means for actuating the axially-movable member thereof, such improvement including the increase of the frictional surfaces and the means for effectively bringing them into contact to communicate motion to the drum, and in this connection to provide improved and efficient means for accomplishing the release of the drum by the disengagement of the friction-faces of the clutch members.

A further object of the invention is to improve the construction of the drum and increase the efficiency of the direct braking devices by which the backward rotation of the drum is controlled and to provide means whereby the drum may be connected with the driving-gear for simultaneous motion therewith when the loose feature of the drum is not required.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of a hoisting-machine constructed in accordance

with my invention. Fig. 2 is a side view of the same. Fig. 3 is a detail view of one of the feed-screw members. Fig. 4 is a horizontal section of a portion of the machine on the plane indicated by the line 4 4 of Fig. 2. Fig. 5 is a detail view in perspective of the rocker whereby the brake-band is actuated. Fig. 6 is a detail sectional view of the bearing-washer which receives the pressure of one member of the feed-screw. Fig. 7 is a detail view in perspective of the cross-head or counter-arms whereby motion is communicated to the arms of the feed-screw members. Figs. 8 and 9 are detail views in perspective of the parts of one of the feed-screw members.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

Erected upon the side members of the rectangular base or bed frame 10 are side frames 11, provided with bearings for the drum-shaft 12, driving-shaft 13, and counter-shaft 14. The drum-shaft extends beyond the side frames and is practically unobstructed to provide for the attachment thereto of a winch, should such become necessary or desirable, and to prevent end thrust of the shaft I provide it outside of each of the side frames with a thrust-collar 15, preferably constructed in sections, connected by bolts 16 and provided with keys or pins 17 for engagement with depressions in the shaft. Also, to insure the maintenance of these collars in a fixed position, the shaft is preferably turned down or reduced to form annular seats 18, in which the collars are fitted. Washers 19, of brass or equivalent material, are interposed between the collars and the adjacent bearing-boxes.

Loosely mounted upon the drum-shaft at an intermediate point between the side frames is a drum consisting of the parallel spaced drumheads 20 and the drum band or shell 21, said band or shell being seated upon shoulders 22, formed upon the heads and consisting of the outer surfaces of rims, which are connected with the hubs 23 by spokes 24. These rims are preferably perforated, as shown at 25, to facilitate the engagement therewith of a rope or cable. (Not shown.)



These drum-heads are also constructed to form clutch members 26, of which the outer edges or peripheries are flanged to form brake-drums 27, upon which are seated the brake-bands 28. Also the outer faces of these clutch members are channeled, as shown at 29, a plurality of annular channels being formed in each clutch member and each channel being of cross-sectionally tapered contour to receive the cross-sectionally tapered or wedge-shaped ribs 30 of cooperating clutch members carried by driving-gears 31, which are keyed upon the drum-shaft. The inner edges of the clutch members are braced by spoke-enlargements 24<sup>a</sup> and by triangular bracing-blocks 32.

The clutch members, which are carried by the gears 31, consist of continuous bent-wood strips secured at intervals to the web of the gear by means of bolts 33, whereby each clutch-block presents its side grain-surfaces to the side walls of the clutch-channels 29, a sufficient difference in the cross-sectional areas of the blocks and channels being made to prevent the former from extending to the bottoms or floors of the latter, and thus providing for transverse shrinkage of the blocks or wearing of the contacting surfaces without immediately affecting the efficiency of the clutch. These clutch-blocks, which should be made of hard wood, such as hickory, may be replaced when worn sufficiently to render them inefficient. The rim 34 of each gear-wheel carries peripheral gear-teeth which mesh with the teeth of a driving-pinion 35 on the shaft 13, it being understood that two of these pinions are employed to communicate simultaneous motion at a uniform speed to the two driving-gears.

The driving-gears are fitted upon the drum-shaft for axial movement toward and from the drumheads and are provided in their hub-openings with keyways for engagement with keys 36, fitted in similar keyways in the shaft, and extending from the hub 37 of each gear-wheel to strengthen the spokes of the wheel are inner and outer braces 38 and 39, the former of which extend to a stiffening-rim 40, which is arranged parallel with the annular clutch-blocks, and the latter of which extend to the toothed rim, this construction being designed to provide in a comparatively-light wheel a strength which is sufficient to resist the strain due to the thrust of the parts in operation and enable me to apply gear-actuating pressure to the outer ends of the gear-hubs, as hereinafter fully explained. Furthermore, the drumheads are connected transversely by tie-bolts 41, engaging the registering openings 42, arranged near the inner edges of the flanges forming the female clutch members; but as it is desirable under certain circumstances to communicate motion directly from the operating devices to the drum without the intervention of the clutch mechanism I have provided the gears with openings 43, adapted for registra-

tion with those of the drumheads for the reception of other tie-bolts similar to the tie-bolts 41, but of a length sufficient to extend from the outer side of one driving-gear to that of the other.

The keys 36, by which the driving-gears are mounted for axial movement upon the drum-shaft, are provided at their inner ends with enlargements or heads 36<sup>a</sup>, which limit endwise movement of the drum and have beveled surfaces for engagement with radial-seats 44 in a bearing ring or washer 45, one of which is arranged adjacent to the outer end of the hub of each drumhead. These bearing-plates are designed to receive the thrust of return-springs 46, which are arranged in sockets 47 in the inner ends of the hubs of the driving-gears, and the function of said springs being to impart outward axial movement to the gears when otherwise released to disengage the clutch members. The heads or enlargements of the keys 36 receive the inward thrust of the bearing-rings 45, which are out of contact with the extremities of the drum, and communicate said thrust to the drum-shaft, whereby the drum is relieved of friction due to the disengagement of the clutch members.

The clutch-setting devices which I have illustrated consist of cooperating interlocked feed-screws interposed between each side frame and the adjacent driving-gear and means for turning said feed-screws in opposite directions to advance said driving-gear toward the adjacent drumhead. The male feed-screw 48 is fitted for rocking movement on the drum-shaft and is provided with an operating-arm 49, and the female feed-screw 50 is fitted upon and engaged with the male feed-screw and is carried by an operating-arm 51, said female feed member consisting of a ring which is adjustably and removably fitted in a contractile collar 52, formed on the operating-lever, and provided with a bolt 53, by which it may be tightened to secure the screw 50 in place at the desired adjustment. A wear-plate or washer 54 is interposed between the female feed member and the adjacent end of the gear-hub, and upon moving the operating-arms 49 and 51 in opposite directions to oppositely actuate the screws it will be seen that the device will be extended axially to bear against said washer 54, and thus communicate pressure to any desired extent to the gear.

The means which I have illustrated for actuating the feed members consist of cross-heads or counter-arms 55, secured to the counter-shaft 14, connecting-rods 56 between the extremities of said arms and the operating-arms, and a clutch setting or operating lever 57, also fixed to the counter-shaft by means of a socket-clip 58. This clip is suitably keyed to the counter-shaft and is provided with a socket 59 for the reception of the adjacent end of the setting-lever. Also said setting-lever is provided with a detent or



pawl 60 to cooperate with a toothed segment 61. In the construction illustrated this segment is provided with duplicate sets of teeth to provide for the reversal of the clutch-setting lever to adapt it to be operated from the other end of the machine, and it will be understood, furthermore, that said lever and segment may also be moved to the opposite end of the counter-shaft to provide for controlling the mechanism from the side opposite to that indicated in the drawings. Of course such a reversal or change of the setting-lever constitutes a corresponding change in the relative positions of the feed-screw-operating arm and counter-arm, as will be understood by those skilled in the art to which the invention appertains. Adjustability of the female feed member 50 provides for the necessary compensation for wear to insure an efficient setting of the clutch members. Also mounted, preferably, in the base-frame is a brake-shaft 62, having an attached brake-lever 63, provided with a treadle or foot-rest 64, and attached to said brake-shaft is a rocker 65, having its arms provided with transverse pins 66, with which are engaged the extremities of the above-mentioned brake-band 28, the movement of the rocker in one direction, as by the depression of the brake-lever, serving to tighten the brake-band upon the flanged peripheral surface 27 of the adjacent drumhead to enable the operator to retard the backward rotation of the drum to the desired extent. It will be understood that the number of rockers corresponds with the drumheads and that they are keyed upon the common brake-shaft to provide for simultaneous actuation thereof. A ratchet 67 serves to secure the brake-lever at the desired depression, and I preferably employ a spring 68 for supporting the weight of the lever and returning the same to its elevated position when disengaged from the rack. A socket-clip 69 serves to attach the end of the brake-lever to the brake-shaft. It will be understood that when it is desired to control the mechanism from a different position, as at one of the other corners of the bed or base frame, the brake mechanism may be reversed or applied to the other end of the brake-shaft. The brake-band 28 is preferably of sectional construction, with its members connected by a coupling 28<sup>a</sup>, of which the members are provided with perforated ears 28<sup>b</sup>, connected by an adjusting-bolt 28<sup>c</sup> to provide for varying the tension of the band and compensating for wear. Also to reduce wear to the minimum and at the same time produce an efficient frictional surface I preferably provide it with a lining 28<sup>d</sup>, of leather. Furthermore, in Figs. 1 and 2 I have indicated in dotted lines and in diagram the positions of the engine-cylinders 70, throttle-valve 71, feed-pipes 72, throttle-valve spindle 73, and hand-lever 74, and at 75 I have also shown an air-valve pipe leading from the steam feed-pipe to a point near the engineer's

position, said air-valve pipe being provided with an ordinary throttle-valve to provide for using compressed air in the engine to facilitate the lowering of a weight when too great to be controlled properly or safely by means of a foot-brake. This feature of construction is well known in devices of this class, and hence requires no detailed description or illustration in connection with my improved apparatus. 70 75

It will be understood from the foregoing description that the drum is relieved of frictional contact and pressure except when the members of the clutch are in operative engagement, owing to the means specified for receiving the thrust of the return-springs, whereby the axially-movable clutch members carried by the driving-gears are removed from engagement with the drum clutch members, and, furthermore, that when the clutch-setting devices are operated an equal pressure in opposite directions is applied to the drum, whereby the thrust is equalized and the drum is allowed to run true. Furthermore, the engagement of the clutch members is accomplished without affecting the position of the drum, and the thrust caused by the movement of the axially-adjustable clutch members is communicated to the drum-shaft through the thrust-collars 15, which are efficiently held against axial displacement. The described double arrangement of the hoisting mechanism thus provides for equalizing, and to a great extent neutralizing, the strain upon the mechanism and also for shifting the location of the operating devices, including the clutch-setting lever, the brake-lever, and valve-operating means, to occupy either of a plurality of positions or to enable the engineer stationed at either of a plurality of points to conveniently manage the operation of the apparatus. 80 85 90 95 100 105

A further advantage of the construction described resides in the fact that the drum-shaft at opposite sides of the frame is unobstructed, and hence is adapted for the attachment of auxiliary mechanism which it may be desired to operate simultaneously with the hoisting apparatus and from the same source of power, said projecting portions of the shaft being designed to receive winches or belt-pulleys or other means of communicating motion. 110 115

Various changes in the form, proportion, size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. 120

Having described my invention, what I claim is— 125

1. In a hoisting apparatus, the combination with a continuously-revoluble drum-shaft, of a drum loosely mounted upon said shaft and having opposite clutch members, driving-gears fitted upon the shaft at opposite ends of the drum, keys for maintaining said gears against independent revoluble movement with relation to the shaft, said keys being 130



provided at their inner ends with enlargements or heads, thrust-collars engaged with the heads or enlargements of the keys, return-springs terminally bearing against said thrust-collars and the hubs of the driving-gears, and means for simultaneously moving the gears in opposition to said return-springs, substantially as specified.

2. In a hoisting apparatus, the combination with a drum-shaft and a drum having a clutch member, of a driving-gear keyed to the shaft for axial movement thereon and having a cooperating clutch member, a ring mounted upon the keys of the gear intermediate it and the drum, springs bearing upon said ring and upon the gear, and a clutch-setting device adapted to impart axial movement to the gear and against said springs, to engage the clutch members.

3. In a hoisting apparatus, the combination with a base, a bed-frame, and side frames provided with bearings, of a drum-shaft mounted in bearings in the side frames and extending terminally beyond the plane thereof, a drum loosely mounted upon the drum-shaft between the side frames and held from end-wise movement thereon, driving-gears keyed for axial movement upon the drum-shaft, rings mounted upon the keys of said gears, clutch members carried respectively by the drum and gears, springs arranged interme-

diating the rings and the adjacent gears and tending to hold the clutch members separated, a clutch-setting device having pairs of cooperating feed-screws interposed between said gears and the planes of the side frames, and means for simultaneously actuating the feed-screws to impart axial movement to the gears.

4. In a hoisting apparatus, the combination with a drum-shaft and a drum having a clutch member, of a driving-gear keyed to the shaft for axial movement thereon and having a cooperating clutch member, a ring mounted upon the keys of the gear between it and the drum, springs bearing upon said ring and upon the gear, a fixed object, a clutch-setting device interposed between the gear and the fixed object and adapted for extension to impart axial movement to the gear and against said spring, said fixed object having a clutch member adapted for engagement with the first-named clutch member, means for engaging and disengaging the clutch members, and means for retarding the speed of the drum when the clutch members are disengaged.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN B. SIMPSON.

Witnesses:

C. W. FARWELL,  
W. T. HOWERTON.