W. A. BARKER.

HOISTING MACHINE.

APPLICATION FILED OCT. 8, 1913.

1,155,784.

Patented Oct. 5, 1915

3 SHEETS—SHEET 1.

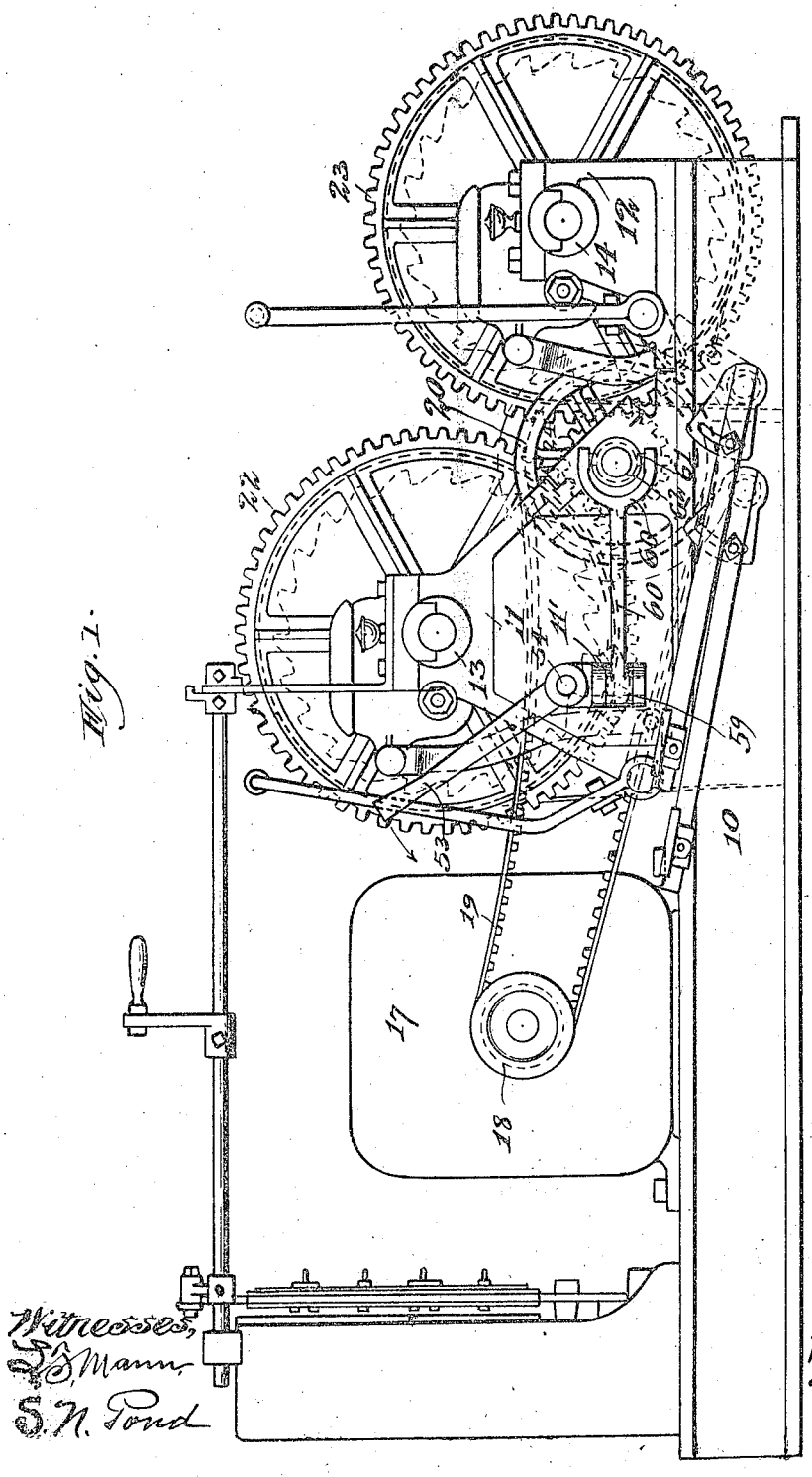


Fig. 1.

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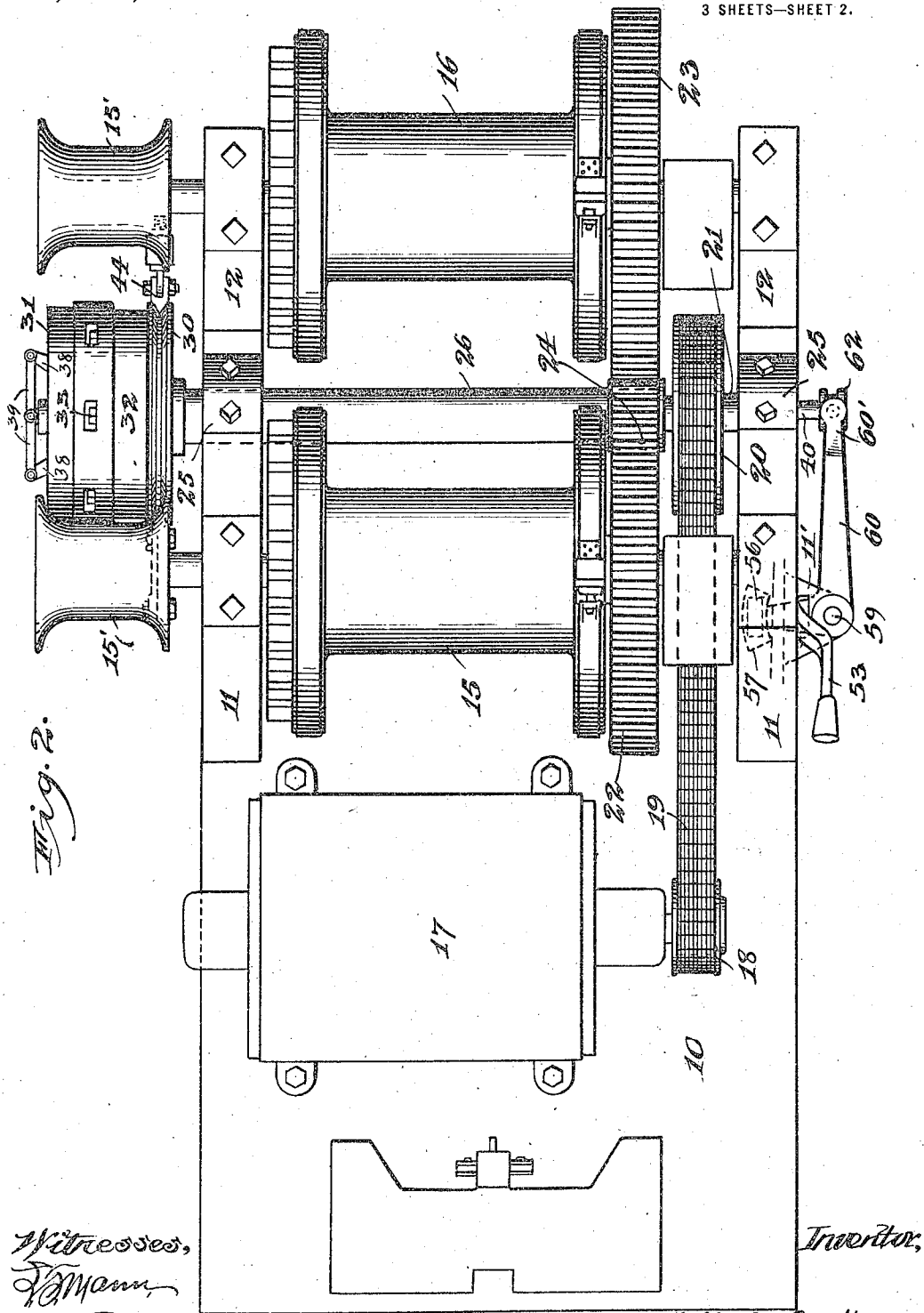


Fig. 2.

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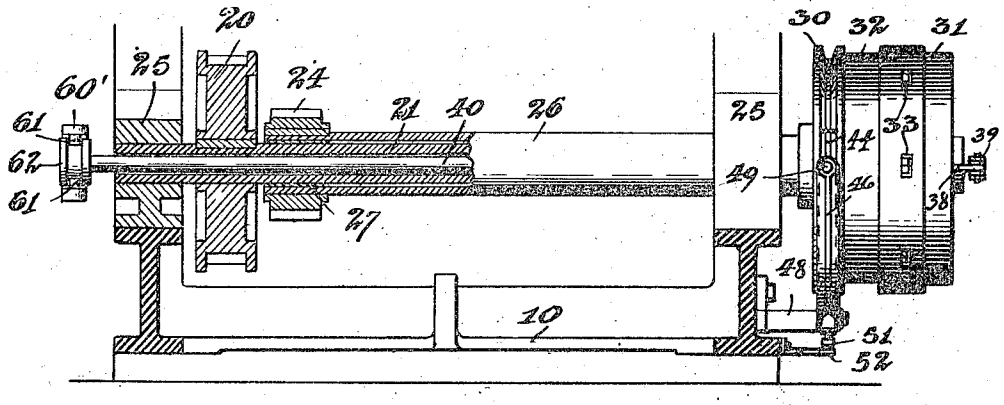
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Fig. 3.



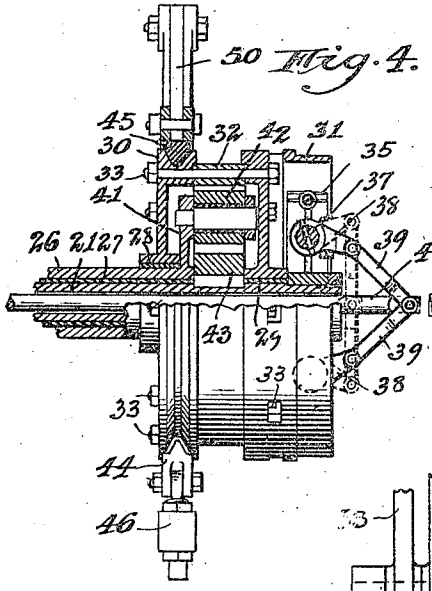


Fig. 4.

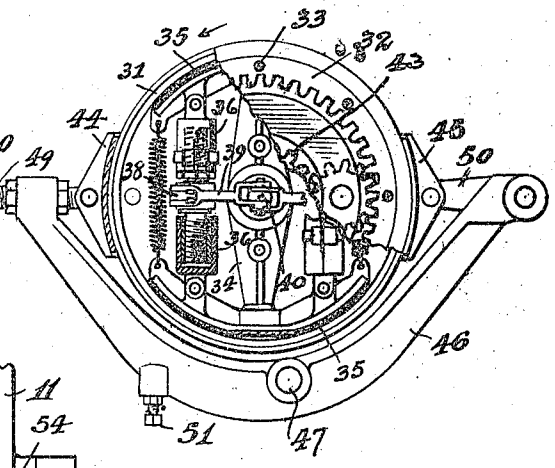


Fig. 5.

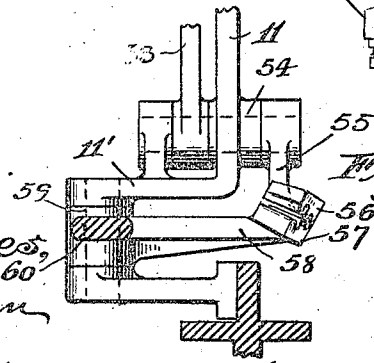


Fig. 6.

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UNITED STATES PATENT OFFICE.

WENDELL A. BARKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THOMAS ELEVATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HOISTING-MACHINE.

1,155,784. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed October 3, 1913. Serial No. 794,089.

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.

This invention relates to the art of hoisting machines, and has reference more particularly to a new and improved speed-changing mechanism whereby the winding drums may be rotated either at full speed or at a reduced speed.

The invention will be readily understood when considered in connection with the accompanying drawings forming a part of this specification and illustrating one practical embodiment of the invention, and in which—

Figure 1 is a side elevational view of the complete machine. Fig. 2 is a top plan view thereof. Fig. 3 is a view partly in elevation and partly in vertical section through the speed-changing gear. Fig. 4 is a view partly in elevation and partly in horizontal section through a portion of the speed-changing gear. Fig. 5 is an end elevational view of the parts shown in Fig. 4 as seen from the right of the latter figure and partially broken away. Fig. 6 is a detail view of a portion of the actuating mechanism of the speed-changing gear.

Referring to the drawings, and first briefly describing the common and well known parts of the apparatus, 10 designates the base-plate on which are mounted side-frames 11 and 12 carrying the journals 13 and 14 of the winding drums 15 and 16 to which are attached the lead and boom lines. On the base is also mounted an electric motor conventionally shown at 17, on the armature shaft of which is a pulley 18 that, through a belt 19 drives a pulley 20 keyed to an intermediate shaft 21. Fast with the drums 15 and 16 are rigid spur gears 22 and 23, respectively, that are drivingly engaged by a spur pinion 24. Heretofore it has been the common practice to key the spur gear 24 directly on the shaft 21, so that but a single speed of rotation of the drums was possible under a uniform motor speed.

My present invention provides a mechanism through which the pinion 24 may be driven either at the same speed as the pulley 20, or at a reduced speed relatively to that of the pulley 20; and this mechanism I will now describe.

The shaft 21, as will be seen by reference to Figs. 3 and 4, is a hollow or tubular shaft and is journaled in bearings 25 mounted on the plate 10. Surrounding the shaft 21 is an outer tubular shaft 26 adapted to rotate upon and independently of the inner shaft 21 by means of interposed wear sleeves or bushings 27. Referring to Figs. 4 and 5, journaled upon the outer end portions of the shafts 21 and 26 through interposed wear sleeves or bushings 29 and 28 is an assembled hollow circular structure comprising friction brake and clutch rings 30 and 31 respectively and an interposed internal gear 32 all securely united by through-bolts 33. Keyed on the extreme outer end of shaft 21 is a spider 34, on the outer ends of the arms of which are slidably mounted a pair of clutch-shoes 35 capable of a limited bodily movement in a radial direction. These clutch-shoes coöperate with the inner surface of the clutch-ring 31. The two clutch-shoes are connected on opposite sides of the spider 34 by sleeve nuts 36 pivoted to the clutch-shoes and engaging a rod 37 having right and left screw threads. On each threaded rod 37 is an arm 38, said arms being connected by toggle links 39 to the outer end of a rod 40 that extends through the inner tubular shaft 21 beyond the opposite bearing. From this it will be seen that when the rod 40 is moved to the left in Figs. 3 and 4, the toggle links 39 will be straightened and the threaded rods 37 rotated in a direction to force the sleeve nuts 36 outwardly, whereupon the clutch-shoes 35 are forced into frictional holding engagement with the clutch-ring 31.

Integral with or secured to one end of the outer tubular shaft 26 is a disk 41 lying within the brake-ring 30 and having mounted thereon a series of planetary pinions 42 which mesh with the internal gear 32 and also with a central gear 43 that is keyed on the inner tubular shaft 21. The brake-ring 30 has a grooved periphery, as shown, that is adapted to be engaged by a pair of brake-shoes 44 and 45 carried by the opposite ends of a brake-beam or yoke 46 that is pivoted at 47 on a bracket support 48 secured to the bed of the machine. The brake-shoe 44 is directly carried by a threaded stem 49 mounted in one end of the yoke 46,

so as to render the shoe 44 adjustable toward and from the brake-ring. The other shoe 45 is directly carried by a pivoted link 50 mounted on the other end of the yoke 46. The brake-beam or yoke 46 is pivoted at 47 at one side of its longitudinal center so that the end thereof carrying the brake-shoe 44 tends to swing downwardly until an adjustable lug 51 thereon rests upon a stop 52 (Fig. 3) secured to the machine bed. In such position of the parts, the link 50 carrying the brake-shoe 45 is inclined slightly upwardly from its pivotal connection with the yoke to its pivotal connection with the shoe, and, the brake-ring 30 at such time turning in a counter clock-wise direction, the brake-shoe 44 is disengaged from the brake-ring, while the brake-shoe 45 idly rests upon the brake-ring. In the above described positions of the parts the rod 40 has been moved endwise to shift the toggle-links 39 and crank-arms 38 to the position shown in Fig. 2 and in dotted lines in Fig. 4, at which time the clutch-shoes 35 have been thrown into operative engagement with the clutch-ring 31, thereby imparting rotation to the rings 31 and 30, internal gear 32, planetary disk 41 and outer tubular shaft 26 that carries the pinion 24. Said pinion 24, therefore, is, in such case, driven at the same speed as the pulley 20, which is high speed. When the shaft 40 is shifted endwise in the opposite direction, shifting the links 39 and arms 38 to the full line positions shown in Fig. 4, the clutch-shoes 35 are retracted, and thereupon the central gear 43, acting through the planetary pinions 42, turns the internal gear 32 and the brake-ring 30 in opposite, or clock-wise direction, as seen in Fig. 5. This forces the brake-shoe 45 downwardly, moving the link 50 to substantially horizontal position and slightly outwardly, rocking the yoke 46, and thus forcing both brake-shoes 44 and 45 into holding engagement with the brake-ring 30. The instant the brake-shoes 44 and 45 arrest the back-turning movement of the internal gear 32, the planetary pinions begin a bodily movement within said internal gear, imparting to the disk 41 and shaft 26 a reduced speed of rotation relatively to that of the inner shaft 21 that is directly driven by the pulley 20, said reduced speed of rotation being transmitted through the pinion 24 to the winding drums.

Referring now to the mechanism for effecting endwise movement of the rod 40, 53 (Figs. 1 and 2) designates a hand-lever located within convenient reach of the operator on one side of the machine and secured at its lower end to a short shaft 54 journaled in the side-frame 11. Fast on the inner end of the shaft 54 (Fig. 6) is an arm 55 terminating in a short bevel segment gear 56 that engages a coöperating bevel segment gear 57 on the short arm 58 of an elbow lever. This elbow lever is mounted on a vertical pivot shaft 59 journaled in an offset extension 11′ of the side-frame 11; and the long arm 60 of said elbow lever has a forked outer end 60′ carrying inwardly projecting lugs 61 that engage a peripherally grooved head 62 (Fig. 3) on the end of the rod 40. From this it will be apparent that when the lever 53 is swung to the left in the direction indicated by the arrow in Fig. 1, the rod 40 will be shifted endwise from the position indicated by full lines in Fig. 4 to the position indicated in Figs. 2 and 3 and by dotted lines in Fig. 4, changing the gearing from low to high speed; while, when the lever 53 is shifted in the opposite direction, the rod 40 will be moved endwise in the opposite direction shifting the gear from high to low speed. As the rod 40 is tied through the toggle-links 39 to the revolving parts which support and actuate the clutch-shoes 35, said rod 40, of course, partakes of the turning movement of the tubular shafts 21 and 26 during the operation of the parts.

As the entire speed-changing mechanism described is located between the winding drums 15 and 16 and the capstan drums 15′ (Fig. 2), it occupies only otherwise unused space in the machine, and therefore does not materially increase the bulk or space requirements of the latter. At the same time, it greatly promotes the efficiency and usefulness of the hoisting machine by enabling the speed of the winding drums to be instantly increased or reduced, as circumstances may require, independently of the motor speed.

It will be evident to those skilled in the art that minor modifications and variations in the mechanism described may be made without involving any departure from the principle of the invention or sacrificing any of the advantages and benefits secured thereby. Hence, the invention is not limited to the precise mechanism shown and described except to the extent clearly indicated in specific claims.

I claim—

1. In a hoisting machine, the combination with a motor, and a winding drum, of an outer tubular shaft journaled alongside and parallel with the axis of said drum and at one end geared to the latter, an inner tubular shaft extending through said outer tubular shaft and geared to said motor at its corresponding end, a planetary gear driving connection between said shafts at the other end of the latter, a clutch driving connection between said shafts operating through the parts of said planetary gear, an endwise movable clutch-actuating rod extending through said inner tubular shaft, and means for actuating said rod.

2. In a hoisting machine, the combina-

tion with a motor, and a winding drum, of a tubular shaft geared to said drum, a drive shaft extending through said tubular shaft and geared to said motor, a brake ring, a planetary gear driving connection between said shafts including an internal gear fast with said brake ring, a brake automatically engaging said brake ring when the latter is turned in one direction and automatically disengaging said brake ring when the latter is turned in the opposite direction, and a mechanical clutch directly connecting said power shaft with said internal gear.

3. In a hoisting machine, the combination with a motor, and a winding drum, of a tubular shaft geared to said drum, a power shaft extending through said tubular shaft and geared to said motor, a brake ring, a clutch ring, a planetary gear driving connection between said shafts including an internal gear fast with said brake and clutch rings, a brake automatically engaging said brake ring when the latter is turned in one direction and automatically disengaging said brake ring when the latter is turned in the opposite direction, a clutch shoe operative to directly connect said power shaft with said clutch ring, and manually operable mechanical means for throwing said clutch shoe into and out of engagement with said clutch ring.

4. In a hoisting machine, the combination with a motor, and a pair of winding drums disposed side by side with their axes parallel, of an outer tubular shaft journaled between and parallel with said drums and at one end geared to both of said drums, an inner tubular shaft extending through said outer tubular shaft and geared to said motor at its corresponding end, a planetary gear driving connection between said shafts at the other end of the latter, an automatic brake for rendering said planetary gear driving connection operative to transmit a low speed movement, a clutch driving connection between said shafts operating through the parts of said planetary gear to transmit a high speed movement, and means extending through said inner tubular shaft for operating said clutch driving connection.

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