W. A. BARKER.

CLUTCH MECHANISM.

APPLICATION FILED NOV. 13, 1911.

1,054,666.

Patented Mar. 4, 1913.

2 SHEETS—SHEET 1.

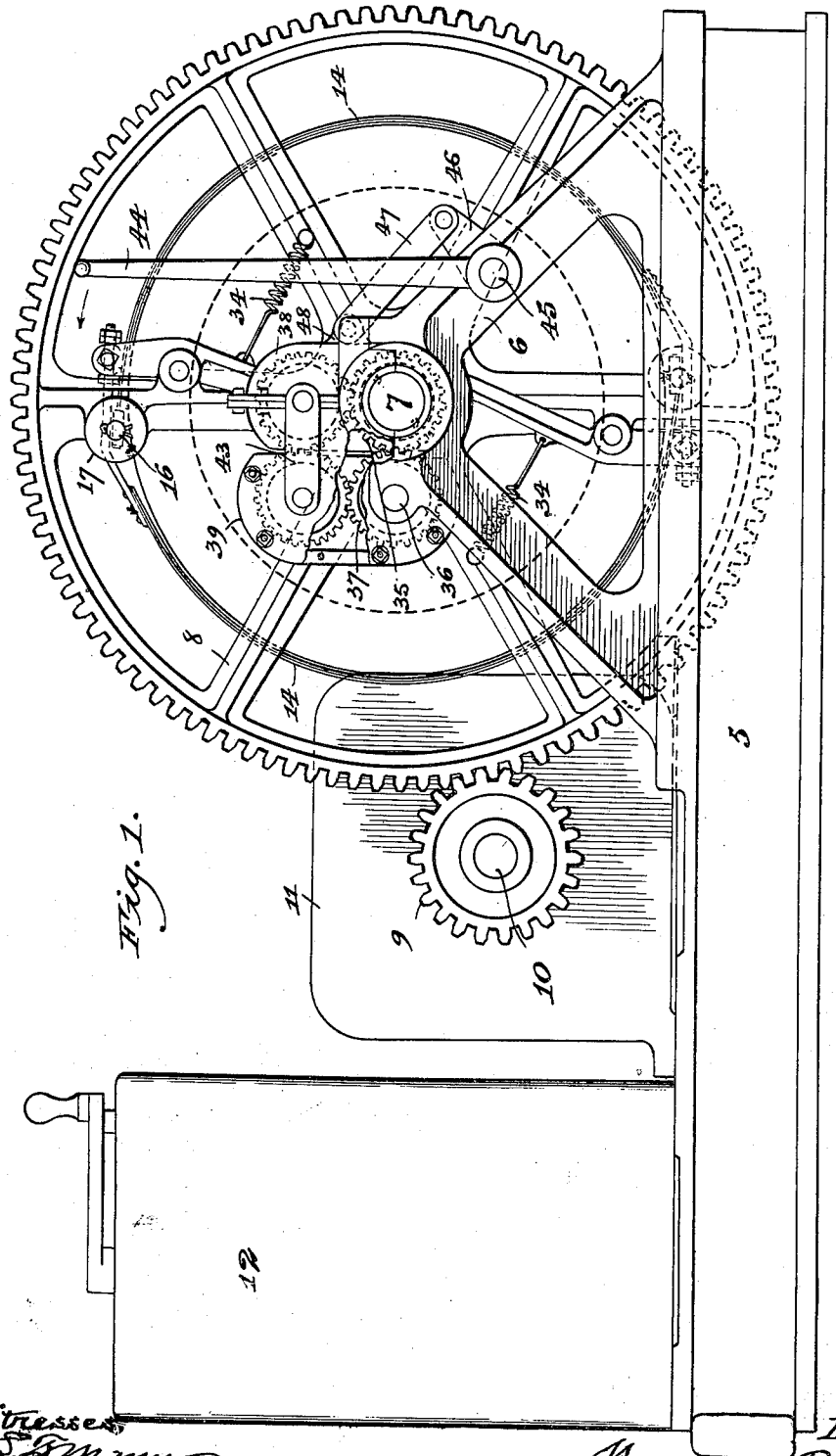

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

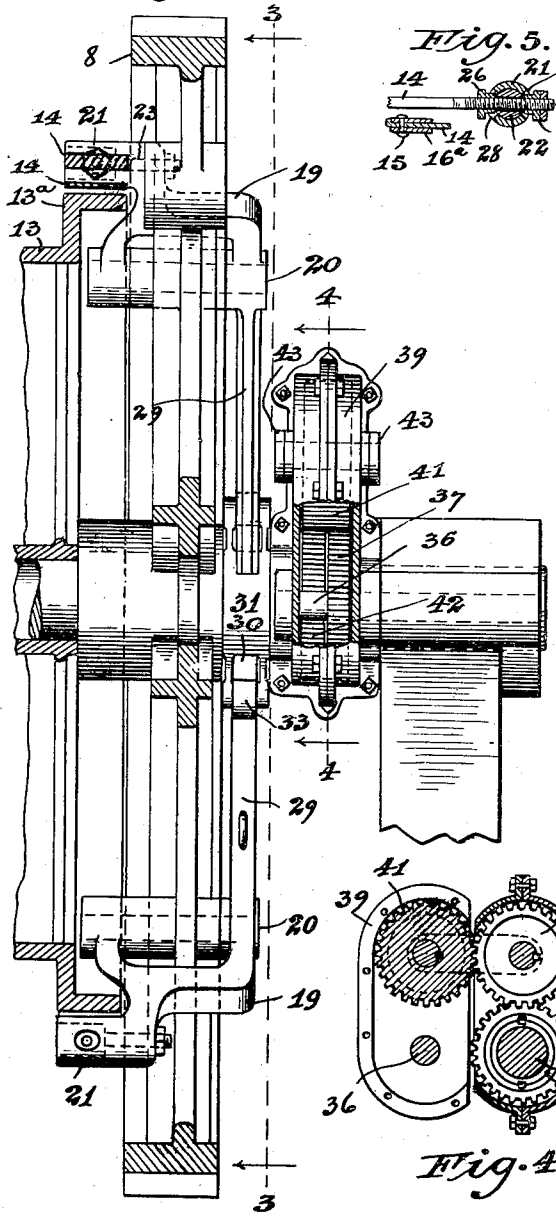

Fig. 5.

Fig. 3.

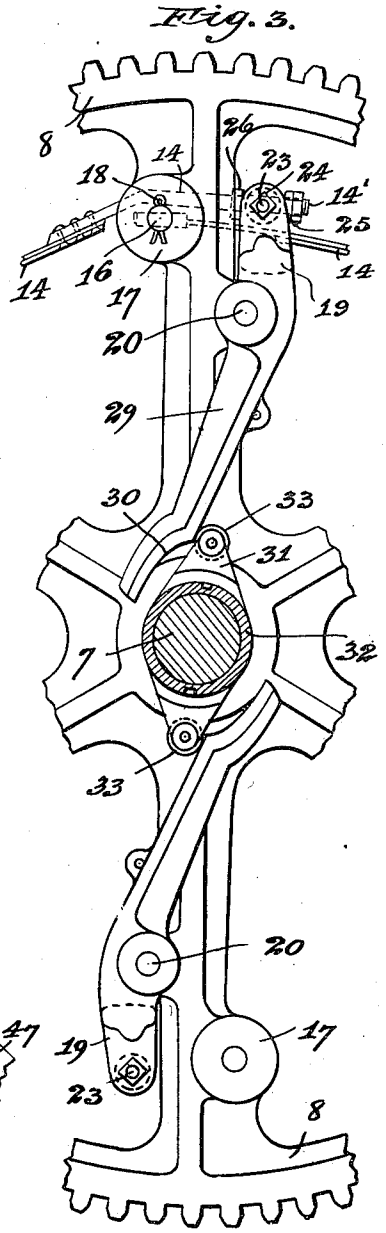

Fig. 4.

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UNITED STATES PATENT OFFICE.

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CLUTCH MECHANISM.

1,054,666. Specification of Letters Patent. Patented Mar. 4, 1913.

Application filed November 13, 1911. Serial No. 660,092.

To all whom it may concern:

Be it known that I, WENDELL A. BARKER, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Clutch Mechanisms, of which the following is a specification.

My invention relates to the art of clutches for transmitting rotary movement from a driving to a driven member.

The device of the invention has been designed more particularly for use in connection with hoisting machines employing a rotary drum or windlass on which a cable is wound, but the device is capable of application and use in other relations and may advantageously be employed wherever it is desired to quickly and easily establish and disestablish a driving connection between a rotary driving and a rotary driven member.

In the accompanying drawings I have illustrated my improved clutch mechanism as applied to a hoisting machine; and referring thereto, Figure 1 is a side elevational view of a hoisting machine embodying my improvements. Fig. 2 is an enlarged detail view partly in elevation broken out, and partly in vertical section, of the main drum-driving gear and the clutch mechanism associated therewith. Fig. 3 is a fragmentary enlarged side elevation of the parts of Fig. 2 appearing to the left of the line 3—3 of the latter figure. Fig. 4 is a vertical sectional detail on the line 4—4 of Fig. 2. Fig. 5 is a sectional detail through the attaching devices of the clutch bands or straps.

Referring to the drawings, 5 designates the machine-bed carrying on either side a side frame 6, in the upper portion of which is suitably journaled a shaft 7, fast on which latter is the large spider-gear 8 driven by a pinion 9 on the armature shaft 10 of an electric motor indicated at 11 and controlled by an ordinary electric controller 12. Loose on shaft 7 is the winding drum or spool of the hoisting machine, a fragment of which is shown at 13 in Fig. 2. Cooperating with the head or flange 13^a of the winding drum are a pair of duplicate clutch-straps 14 mounted on the inner face of the large gear 8. Each of these straps is anchored at one end to the inner face of the large gear, which may conveniently be accomplished by riveting the end of the strap, as shown at 15 (Fig. 5), to and between the forked end 16^a of a stud 16 that is mounted in a boss 17 formed on one of the spokes of the spider-gear, and is conveniently secured in place by a cotter-pin 18. The other end of each strap is pivotally secured to the outer end of the short arm 19 of a lever that is pivoted at 20 to the gear-wheel 8; a convenient means of attaching the clutch-strap to the lever arm consisting, as shown in Fig. 5, of a hollow boss 21 on the free end of the lever arm 19, a transversely apertured cylindrical bearing member 22 fitted within the boss 21 and having a threaded stem 23 extending through the inner end of the boss and confined by a nut 24, and nuts 25 and 26 engaging the threaded end 14′ of the strap or opposite sides of the bearing member 22, the inner ends of said nuts 25 and 26 being permitted a limited angular play within slots 27 and 28 formed in opposite sides of the boss 21. The long arm 29 of the said lever extends inwardly toward the hub of the spider-gear, and preferably terminates in a curved or cam-shaped end portion 30, these latter being engaged and actuated to swing the levers and apply the friction clutch straps to the head or flange of the drum when the latter is to be rotated by a yoke member 31 that is fast on a sleeve 32 loosely mounted on the shaft 7; said yoke member preferably carrying at its outer ends anti-friction rollers 33 for engagement with the lever arms. The lever arms 29 are normally held inwardly in a position in which the clutch straps 14 are in non-driving relation to the drum by springs 34 (Fig. 1).

Referring now to the means for actuating the yoke 31, 35 designates a driving gear that is fast on the driven shaft 7. 36 designates a counter-shaft suitably journaled in the side frame member 6 alongside and parallel with the main driving shaft 7. Fast on the counter-shaft 36 and meshing with the driving gear 35 is a gear 37 that constitutes one of a train of intermediate gears between the driving gear 35 and a driven gear, hereinafter described, that is loose on the shaft 7 alongside the driving gear 35. Pivotally mounted on the shafts 7 and 36, respectively, are a pair of gear-carriers 38 and 39, herein taking the form of gear casings that are open on their proximate edges. In the upper portions of these pivoted gear-carriers 38 and 39 are journaled other inter-

mediate gears 40 and 41 which mesh with each other, as best shown in Fig. 4. The gear 41 is a broad faced gear, as is shown in Fig. 2, and meshes with and is driven by the underlying gear 37, said gear 41 in turn driving the intermediate gear 40. This latter gear 40 meshes with and drives a driven gear 42 (Fig. 4) that is keyed to the sleeve 32, which latter, it will be remembered, is loose on the shaft 7 and carries the yoke or spreader 31. As the gears 35, 37, 41, 40 and 42 are all of the same diameter and have the same number of teeth, it follows that the driven gear 42 is rotated in the same direction and at the same speed as the driving shaft 7 and the driving gear 35 carried thereby. Hence, the yoke or spreader 31 normally rotates synchronously with the large gear 8 that carries the levers 19, 29, so that normally the yoke or spreader 31 exerts no effect upon the arms 29 of said levers.

The gear-carriers 38 and 39 are pivotally connected for simultaneous and equal angular movement about their respective pivot centers by a duplex link 43, and the gear-carrier 38 is connected to a lever 44 through a rock-shaft 45 journaled in the frame 6, a crank-arm 46 on one end of said rock-shaft, and a link 47 connecting the outer end of the crank-arm 46 with a lug 48 on the gear-carrier 38. From this it will be evident that when the operating lever 44 is swung in the direction indicated by the arrow in Fig. 1, the gear-carriers 38 and 39 will be simultaneously and equally swung in the same direction about their pivotal centers, thus bodily displacing the pivot centers of the intermediate gears 40 and 41, and this results in an angular shift of the driven gear 42, while the latter is rotating, which swings the yoke from the position shown in Fig. 3 to a position in which the lever arms 29 are spread by the engagement of the ends of the yoke 31 with the cam extensions 30 of the lever arms 29. This instantly applies the friction clutch-straps to the head or flange of the winding-drum, so that the latter is at once picked up by the large gear 8 and partakes of the rotary movement of the latter. The winding-drum is released from the grip of the clutch-straps 14 by simply returning the operating lever 44 to the normal position shown in Fig. 1, which, through the described mechanism, effects a return angular shift of the driven gear 42 and the yoke or spreader 31 fast therewith, permitting the springs 34 to draw the lever arms 29 inwardly and thus releasing the clutch straps 14 from the drum. The curvature or inclination of the cam portions 30 of the lever arms 29 is preferably made such as will impart a relatively rapid swinging movement to the levers during the first part of the movement of the latter, and a slower or more gradual swinging movement during the latter part of their swinging movement when the straps are being tightened upon the drum.

The clutch mechanism heretofore generally employed in hoisting machines has consisted of male and female clutch members that are brought into driving relation by a movement which imparts an undesirable endlong thrust upon the drum itself. My invention, as applied to hoisting machines, has the advantage of eliminating this objectionable feature, and constitutes a very powerful and quickly and easily manipulated means for drivingly connecting and disconnecting the drum to and from the large driven gear. The yoke-actuating mechanism, when operating as described, effects an angular movement of the yoke backwardly or in a direction opposite the direction of rotation; but it is manifest that if the centers of the gears 40 and 41 be shifted to the right in Fig. 1, instead of to the left, the opposite effect will be produced on the yoke, the angular shift in such case being forward or in the direction of rotation, in which case the levers and clutch straps would simply be reversed from their relative positions on the large gear herein shown.

I claim—

1. The combination with coaxially mounted rotary driving and driven members, of a friction clutch-band anchored at one end to said driving member and adapted to engage the periphery of said driven member, a lever pivoted on said driving member and connected to the other end of said clutch-band, a spring connected to and urging said lever in a direction to release said clutch-band, a lever-actuating device normally rotating synchronously with said driving member, and means for effecting an angular movement of said lever-actuating device relatively to said driving member whereby to move said lever in a direction to apply the clutch-band, substantially as described.

2. The combination with coaxially mounted rotary driving and driven members disposed side by side, of a friction clutch-band anchored at one end to one side of said driving member and disposed radially opposite the adjacent end of the driven member and adapted to engage the periphery of the latter, a lever pivoted between its ends on said driving member and having one arm thereof connected to the other end of said clutch-band, a spring connected to and urging said lever in a direction to release said clutch-band, a lever-actuating device adapted to engage the other arm of said lever and normally rotating synchronously with said driving member, and means for effecting an angular movement of said lever-actuating device relatively to said driving member

during rotation whereby to move said lever in a direction to apply the clutch-band, substantially as described.

3. The combination with coaxially mounted rotary driving and driven members disposed side by side, of a friction clutch-band anchored at one end to one side of said driving member and disposed radially opposite the adjacent end of the driven member and adapted to engage the periphery of the latter, a lever pivoted between its ends on said driving member and having an outwardly extending arm connected to the other end of said clutch-band, a spring connected to and urging said lever in a direction to release said clutch-band, a lever-actuating device mounted coaxially and rotating synchronously with said driving member and adapted to engage an inwardly extending arm of said lever, and means for effecting an angular movement of said lever-actuating device relatively to said driving member during rotation whereby to actuate said lever in a direction to apply the clutch-band, substantially as described.

4. The combination with a rotary shaft and a driving wheel fast thereon, of a rotary driven member mounted alongside said driving wheel and coaxially with said shaft, a friction clutch-band anchored at one end to the side of said driving wheel adjacent to said driven member and disposed radially opposite the end peripheral portion of the latter, a lever pivoted between its ends on said driving wheel and having an outwardly extending arm connected to the other end of said clutch-band, a spring connected to and urging said lever in a direction to release said clutch-band, a lever-actuating arm loosely mounted for rotation on said shaft, means for imparting to said arm a rotary movement of equal speed with that of said driving wheel, and means for effecting an angular shift of said lever-actuating arm relatively to the driving wheel during rotation whereby to actuate said lever in a direction to apply the clutch-band, substantially as described.

5. The combination with a rotary shaft and a driving wheel fast thereon, of a rotary driven member mounted alongside said driving wheel and coaxially with said shaft, a pair of friction clutch-bands anchored at one end at diametrically opposite points, respectively, on the side of said driving wheel adjacent to said driven member and disposed radially opposite and unitedly encircling the end peripheral portion of the latter, a pair of levers pivoted between their ends at diametrically opposite points on said driving wheel and having outwardly extending arms connected, respectively, to the other ends of said clutch-bands, spring means normally urging said levers in a direction to release said clutch-bands, a yoke loosely mounted for rotation on said shaft and adapted, under angular movement, to engage and spread the inwardly extending arms of said levers whereby to effect the application of the clutch-bands to the periphery of the driven member, means for imparting to said yoke a rotary movement of equal speed with that of said driving wheel, and means for effecting an angular shift of said yoke during rotation of the latter and of said driving wheel, substantially as described.

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