Sept. 18, 1928. 1,684,679

J. D. NIXON

POWER TRANSMITTING APPARATUS

Filed Feb. 16, 1925 5 Sheets-Sheet 1

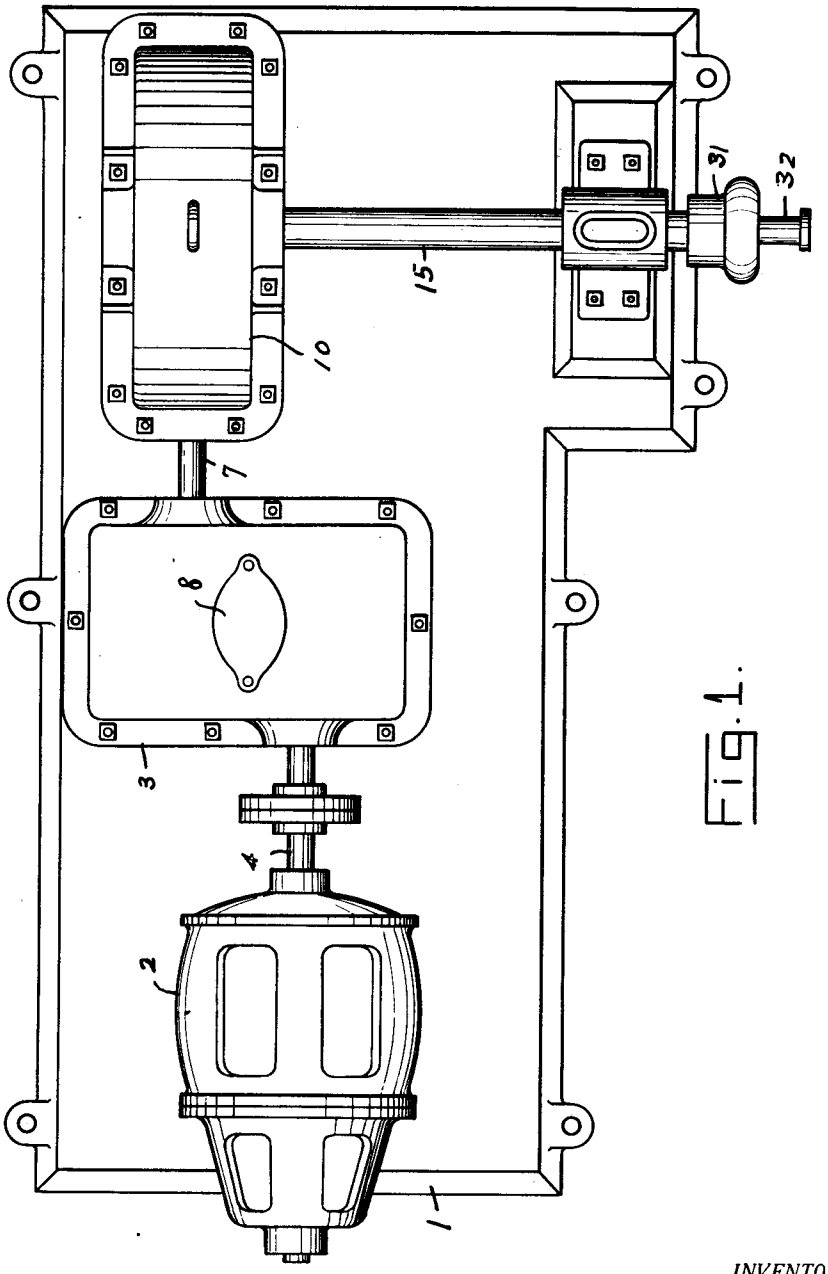

Fig. 1.

INVENTOR.
Jeddy D. Nixon

BY
Handway & Carter
ATTORNEYS

Sept. 18, 1928. 1,684,679

J. D. NIXON

POWER TRANSMITTING APPARATUS

Filed Feb. 16, 1925 5 Sheets-Sheet 2

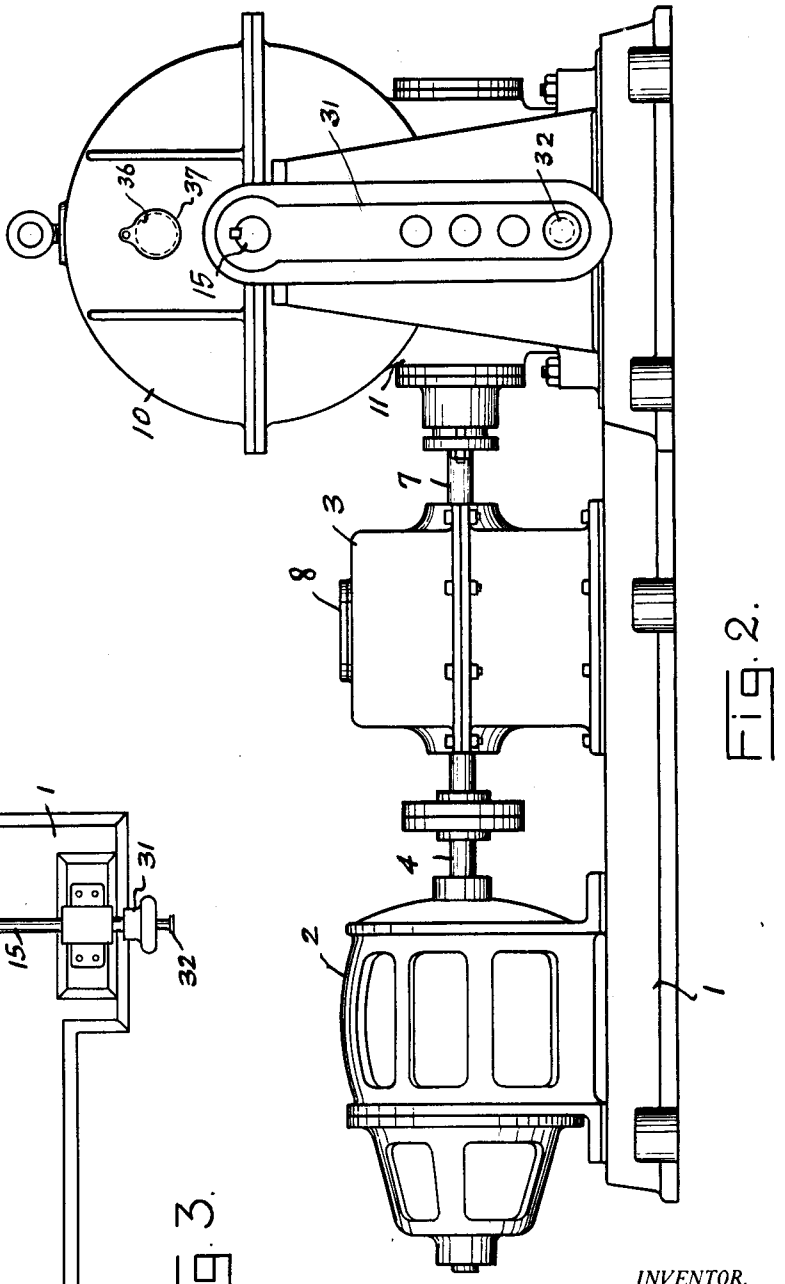

Fig. 2.

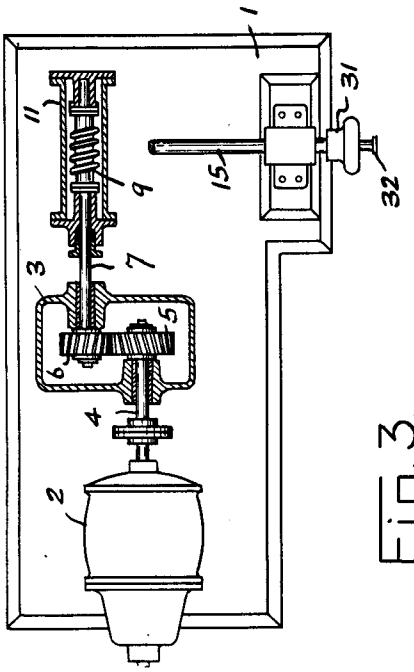

Fig. 3.

INVENTOR.
Jeddy D. Nixon
BY
Hardway & Tait
ATTORNEYS

Sept. 18, 1928. 1,684,679

J. D. NIXON

POWER TRANSMITTING APPARATUS

Filed Feb. 16, 1925 5 Sheets-Sheet 3

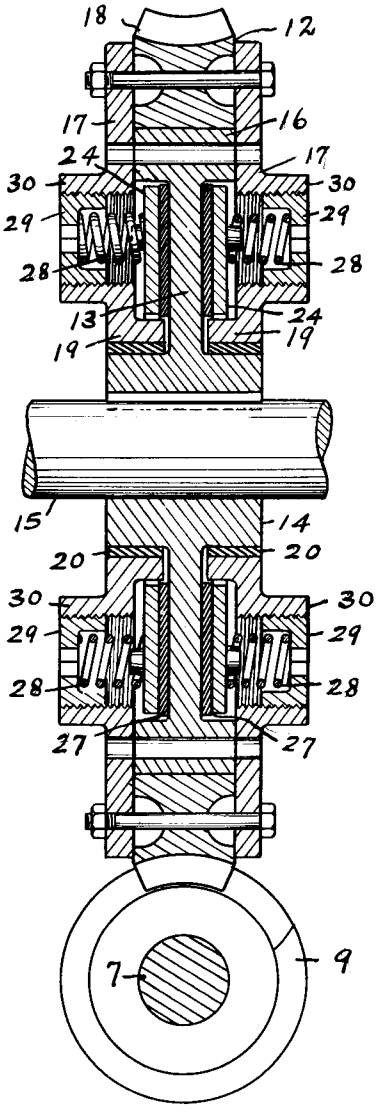

Fig. 4.

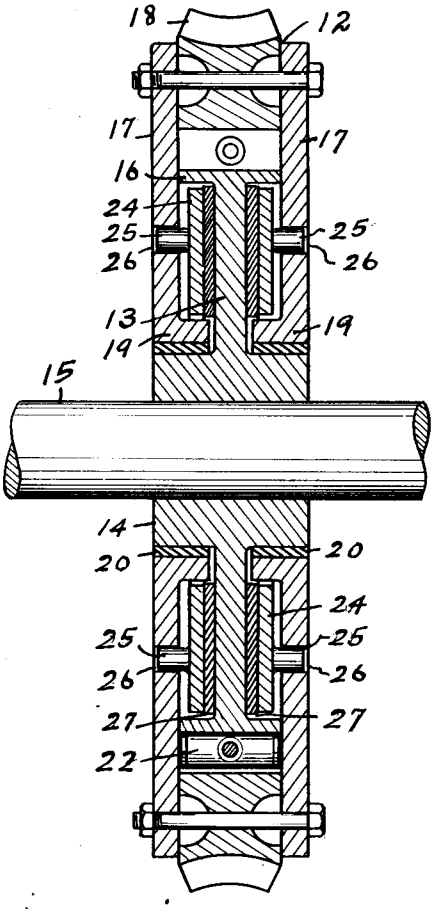

Fig. 5.

INVENTOR.
Jeddy D. Nixon

BY

Hardway & Cathey
ATTORNEYS.

Sept. 18, 1928. 1,684,679

J. D. NIXON

POWER TRANSMITTING APPARATUS

Filed Feb. 16, 1925 5 Sheets-Sheet 4

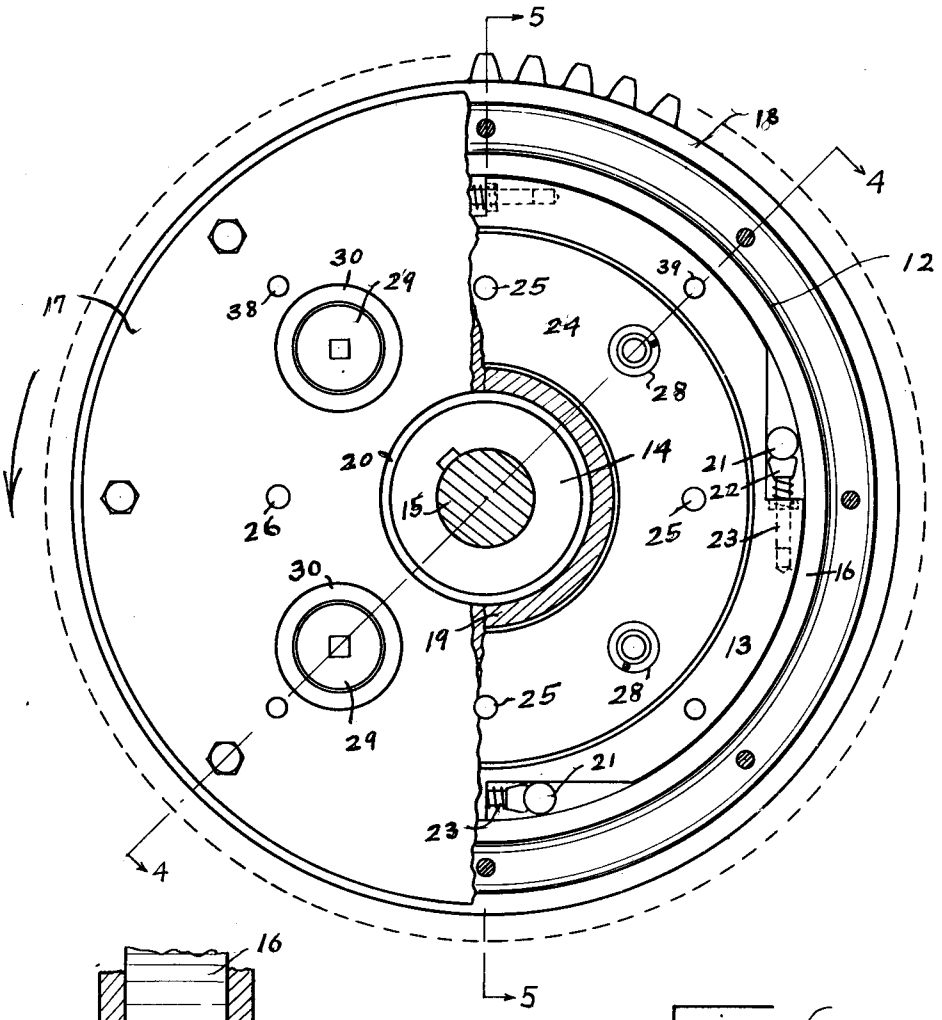

Fig. 6.

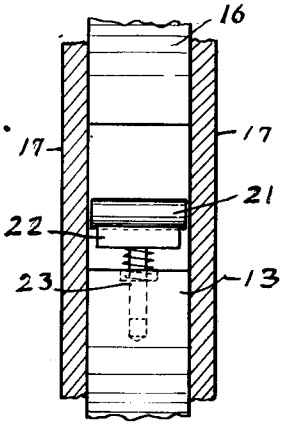

Fig. 7.

Jeddy D. Nixon INVENTOR.

BY

Hardway & Cathey ATTORNEYS.

Sept. 18, 1928. 1,684,679

J. D. NIXON

POWER TRANSMITTING APPARATUS

Filed Feb. 16, 1925 5 Sheets-Sheet 5

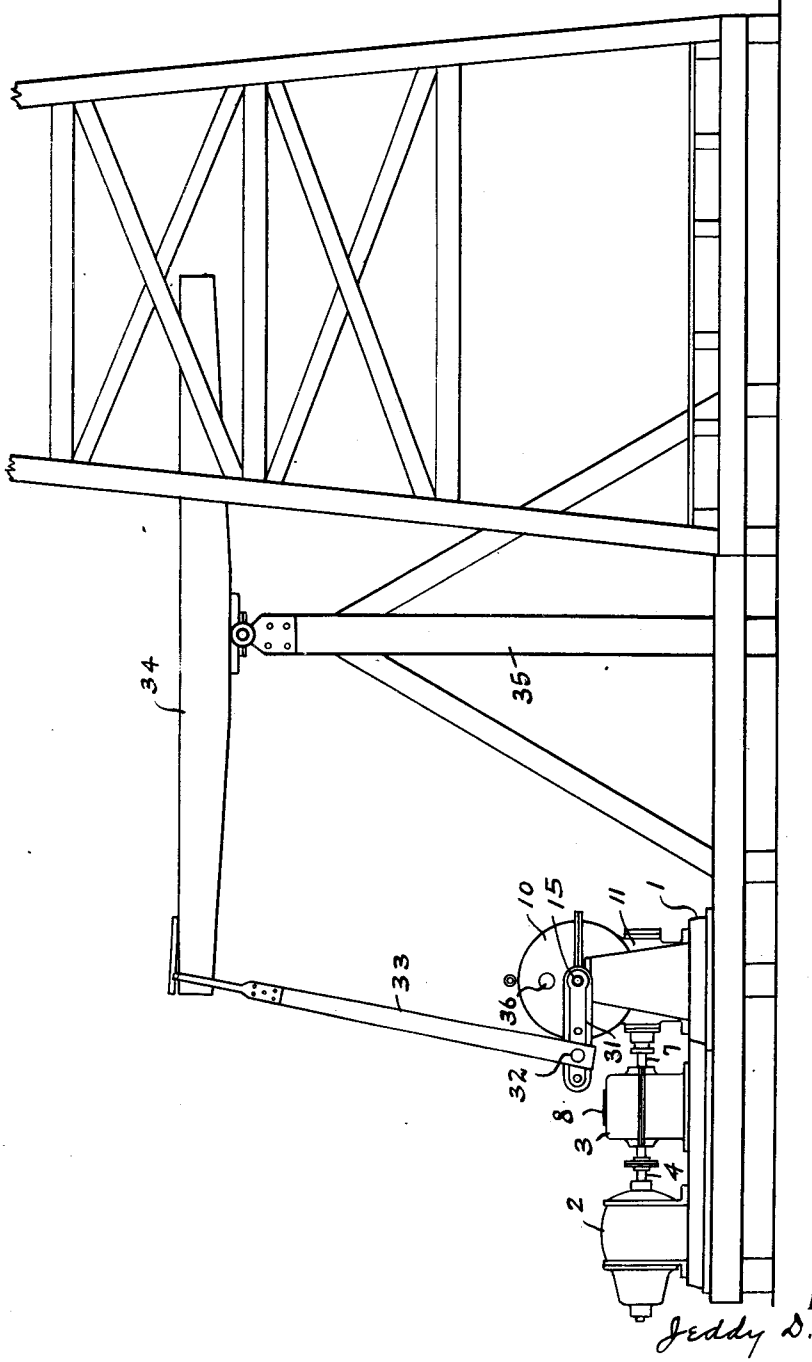

Fig. 8.

INVENTOR.
Jeddy D. Nixon

BY
Hardway & Cather
ATTORNEYS.

Patented Sept. 18, 1928. 1,684,679

UNITED STATES PATENT OFFICE.

JEDDY D. NIXON, OF HOUSTON, TEXAS, ASSIGNOR TO HUMBLE OIL & REFINING COMPANY, A CORPORATION OF TEXAS.

POWER-TRANSMITTING APPARATUS.

Application filed February 16, 1925. Serial No. 9,655.

This invention relates to new and useful improvements in power transmitting apparatus.

One object of the invention is to provide an apparatus of the character described whereby a motor, or other prime mover having a constant speed, may be employed in handling loads through a transmission mechanism permitting the load to move at variable rates of speed.

Another object of the invention is to provide an apparatus of the character described whereby power may be transmitted from a prime mover, in accomplishing work involving variable loads on the prime mover and the transmitting mechanism, in such manner that the transmitting mechanism will be subjected to uniform wear, throughout its parts.

Another object of the invention is to provide an apparatus of the character described embodying a prime mover, such as an electric motor, having a constant speed, a rocking member, such as a pivotally mounted walking beam adapted to carry variable loads, and a transmitting mechanism through which the motor is operatively connected with the walking beam; said transmitting mechanism being of such novel construction that the wear on its parts will be substantially uniform, irrespective of the variation of the loads to which the walking beam is subjected.

A further feature of the invention resides in the provision of an apparatus of the character described which includes a transmitting mechanism including means for restraining, or minimizing, the shock imparted thereto by load variation.

The apparatus herein described is specially adapted for use, among other things, in pumping wells, and in manipulating cable tools, where variable loads are handled, and may also be used in lifting and lowering constant loads, as well.

With the above and other objects in view this invention has particular relation to certain novel features of construction, operation and arrangement of parts an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1 shows a plan view of the device.

Figure 2 shows a side elevation thereof.

Figure 3 shows a fragmentary plan view, partly in section.

Figure 4 shows a sectional view of the transmitting mechanism, taken on the line 4—4 of Figure 6.

Figure 5 shows a sectional view thereof, taken on the line 5—5 of Figure 6.

Figure 6 shows a fragmentary side elevation of said transmitting mechanism partly in section.

Figure 7 shows a fragmentary cross sectional view thereof, and

Figure 8 shows a side elevation of the complete device, in operative connection with a walking beam.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts throughout the several views, the numeral 1 designates a suitable base on which the apparatus is mounted, as a unit. Mounted on this base there is a motor 2, preferably an electric motor having a constant speed.

The numeral 3 designates a gear housing which is fastened to the base and within this housing, and fixed on the motor shaft 4, there is a screw gear 5, in mesh with a similar gear 6, fixed on the adjacent end of the drive shaft 7. The housing cover is bolted thereon and is also provided with a suitable opening, normally closed by the removable cover plate 8. Through the cover opening access may be obtained to the interior of the housing to the end that the gears 5 and 6 may be removed and other gears, of different gear ratios, substituted and the ratios between the motor shaft 4 and the drive shaft 7 thus varied.

The shaft 7 has a fixed worm gear 9 thereon which is in mesh with, and drives, the transmission gear, hereinafter to be described. This transmission gear runs snugly in a housing 10, the lower part of which is cylindrical to form, also, a housing 11, around said worm gear. The transmission gear is formed of two, independently rotatable sections, an outer or driving section, designated as a whole by the numeral 12, and an inner, or load carrying section designated by the numeral 13. The inner section is disc like in form, and has the hub 14, which is splined on the crank shaft 15, and its margin 16 is extended each way forming a comparatively wide bearing.

The outer section 12 is formed of the annular side plates 17, 17, and bolted between the outer margins of these plates there is the ring gear 18. The inner margins of these side plates are inwardly flanged, to form the bearings 19, 19, which run on the bushings 20, 20, preferably of brass or bronze, around the respective ends of the hub 14.

As clearly illustrated in Figure 6, the inner section 13 is confined to a one way, independent rotation, relative to the outer section by means of the conventional roller clutch members 21. These clutch members are mounted on the wide, yieldably mounted brackets 22 whose shanks 23 work in suitable sockets in the wide rim 16 of the inner section of the transmission gear.

Within the side plates 17, on opposite sides of the inner section 13, and confined between the rim 16, of said section, and the bearings 19, of said plates 17 are the annular friction plates 24, 24. These plates are caused to rotate with the outer, or driving section 12, by means of the integral pins 25, carried thereby, which work in the aligned bearings 26, in the side plates 17.

Annular fiber discs 27, 27 are located between these friction plates and the inner section 13 and are held in frictional contact with the latter by means of the coil springs 28 which are held yieldingly against the respective plates 24, by means of the adjusting nuts 29 which are screwed into the lateral tapped sleeves 30, formed integrally with the side plates 17 and forming housings for said springs, against the outer ends of which the nuts rest.

The outer end of the crank shaft 15 carries a crank arm 31, which has the wrist pin 32 to receive the end bearing of the pitman 33. At its other end the pitman is connected to one end of the walking beam 34 which is pivoted to rock on the standard 35. The other end of the walking beam is connected to the usual pump rod, in the conventional manner, or to the cable which carries the cable tools, or other load.

In operation the motor drives the transmission gear, and through it the crank shaft 15, and through the crank arm 31 thereof, the pitman is reciprocated, causing the walking beam to rock. Upon power stroke the load, carried by the walking beam, is lifted, and when the wrist pin passes center, at the end of power stroke, the load descends by gravity. Since the motor runs at substantially constant speed the load would be lifted each time by the same teeth, of gear 18, if the transmission gear were unitary, and as a result these load carrying teeth would wear away much faster than the others, with the result that when they have become worn the transmission gear would have to be discarded. To avoid this the sectional transmission gear hereinbefore described, has been provided. When it is employed as the load descends, by gravity, the load carrying section 13, of the transmission gear, accelerates, relative to the driving section of said gear, and at the beginning of the next power, or lifting stroke, of the walking beam, it is again clutched with the driving section by the roller clutch mechanism described. It is thus clear that the inner, or load carrying section 13 will intermittently advance, relative to the driving section 12, throughout the operation of the apparatus, with the result that the wear on the teeth of the ring gear 18 will be distributed around said gear and said teeth will be substantially equally subjected to the load carrying strain and wear.

The friction clutch plates 24 have been provided to prevent the sudden acceleration of the load carrying section but to make the same gradual to absorb the shock and as the load being handled varies the tension on the springs 28 may be varied correspondingly. This is accomplished through the nuts 29 and access to said nuts, for this purpose, is gained through the side openings 36, of the housing 10, said openings being normally closed by the swinging shutters 37, to exclude foreign matter from the interior of said housing.

In handling constant loads the sections 12 and 13 of the transmission gear may be keyed together by passing suitable keys through the aligned keyways 38 and 39, of said sections, and said gear will then rotate as a unitary structure.

What I claim is:—

1. In power transmitting apparatus a driven shaft, a screw gear thereon, a transmitting gear formed of a driving section in mesh with said screw gear, a driven section, means clutching the driving section with the driven section, said clutching means being adapted to permit the acceleration of the driven section, and friction means housed within said transmitting gear adapted to frictionally engage the driven section on opposite sides for retarding said acceleration.

2. In power transmitting apparatus adapted to elevate a load and permit the load to drop by gravity, a transmitting gear formed of two concentric sections, roller clutches through which said sections may be clutched to rotate as a unit in one direction to lift the load, said clutches permitting an accelerated rotation of one section to permit the load to descend by gravity and friction means tending to retard said accelerated rotation, said friction means including friction plates yieldingly mounted in and enclosed by one section and adapted to frictionally engage the other section on opposite sides.

3. A power transmitting apparatus including a power transmitting shaft, a screw

gear thereon, a transmitting means including a driving member in mesh with said gear, a power delivery shaft, a driven member connected to the power delivery shaft, means through which said driving member may be connected with the driven member, said connecting means being adapted to permit an accelerated movement of the driven member, a gravity actuated device adapted to effect said accelerated movement, and yieldable friction means housed within one member and frictionally engaging the other member and adapted to retard such movement and means within the gear for varying the influence of said friction means.

4. A power transmitting apparatus including a motor, a power transmitting shaft, a transmitting gear formed of a driving section operatively connected with said motor, a concentric driven section fixed to said shaft, means through which a driving connection may be established between said sections, said connecting means being adapted to permit the acceleration of the driven section relative to the driving section, a gravity actuated device adapted to effect said accelerated movement, means in frictional contact with said driven section housed within and enclosed by the transmitting gear for retarding said accelerated movement of the driven section and means incorporated into the gear for varying the influence of said friction means on said driven section.

5. A power transmitting apparatus including a power transmitting shaft, a transmitting gear including two concentric sections, one being a driving section, the other being a driven section fixed to said shaft, means for clutching said driving section with the driven section, said means being adapted to permit the accelerated movement of the driven section relative to the driving section and yieldably mounted friction means enclosed within the gear for retarding such movement, said retarding means comprising annular friction plates carried by one section and frictionally engaging the other section.

6. A power transmitting apparatus including a motor, a power delivery shaft, a transmission mechanism through which rotation is imparted to said shaft, from said motor, said mechanism including a driving member operatively connected with the motor and rotatable at a constant rate of speed and a driven section connected to the shaft and capable of an accelerated rotation relative to the driving member, and friction means located between and enclosed by said members for retarding the accelerated rotation of the driven member.

7. A device of the character described adapted to elevate a load and to permit the load to drop by gravity, alternately, a power transmitting mechanism including a driving and a driven member, the latter of which is operatively connected with the load, means through which a driving connection may be established between said members, said connection being adapted to transmit rotation from the driving to the driven member to effect the elevation of the load and to permit an accelerated movement of the driven member during descent of the load and friction means housed between said members and adapted to control said accelerated movement, said friction means comprising friction plates carried by one member, yieldable means holding said plates in frictional engagement with the other member, said plates being enclosed by said members, and means for adjusting the tensions on said yieldable means.

8. In a device of the character described, a drive shaft, a worm gear thereon, a transmission gear formed of an outer or driving section, and an inner or driven section, a drive shaft on which the inner section is fixed, one way clutch members through which the outer section is clutched with the inner section, said clutch members permitting an independent accelerated rotation of the inner section, annular discs carried by and housed within said transmission gear, said discs being fixed against rotation relative to one section, yieldable members holding said respective discs in frictional contact with opposite sides of the other section, and means incorporated into said gear for adjusting the pressure of said yieldable members against said discs.

In testimony whereof I have signed my name to this specification.

JEDDY D. NIXON.