F. W. BORKES.

POWER TRANSMITTING MECHANISM.

APPLICATION FILED MAY 1, 1918.

1,323,245.

Patented Dec. 2, 1919.

2 SHEETS—SHEET 1.

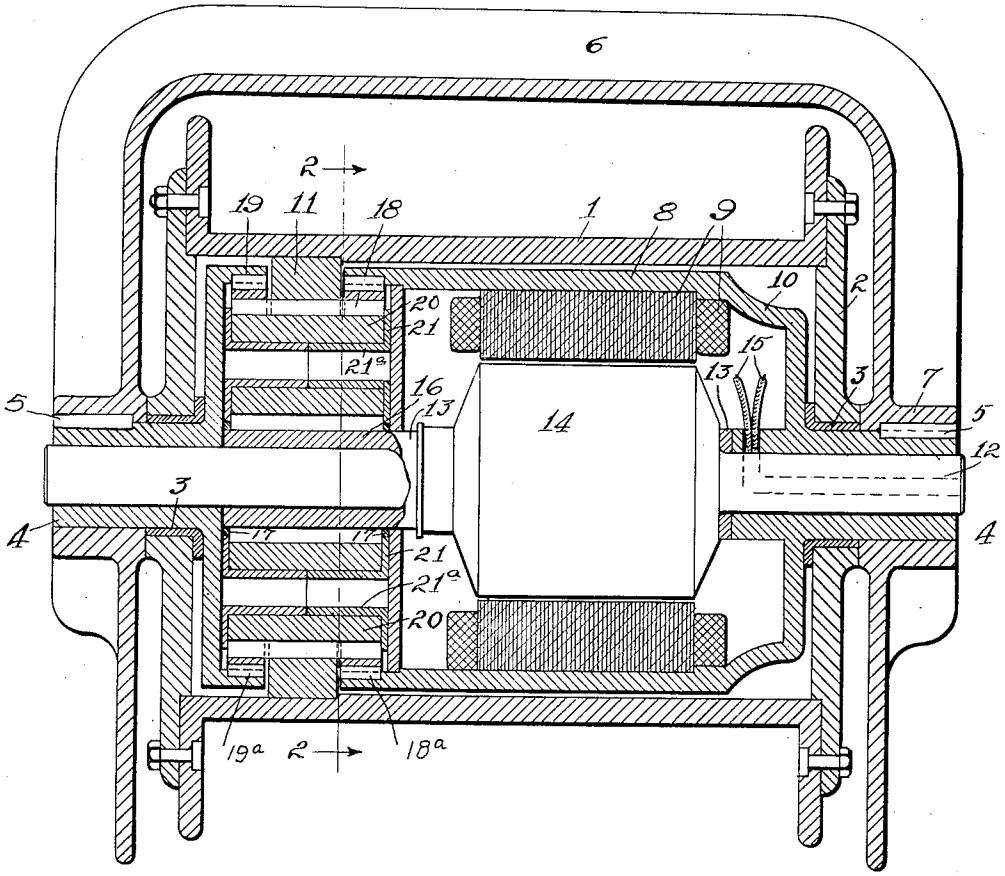


Fig-1

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Fig-2

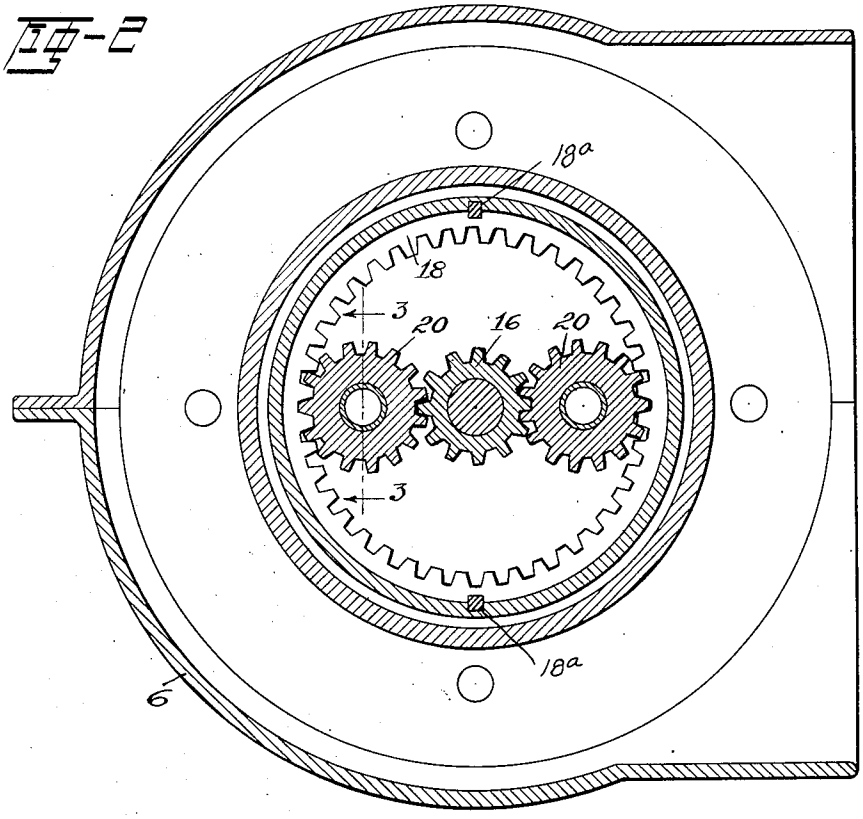
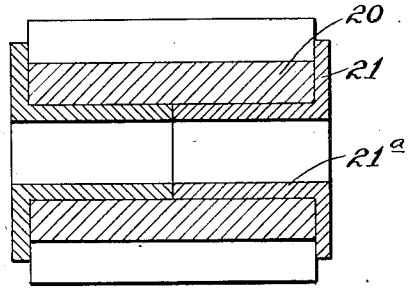


Fig-3



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UNITED STATES PATENT OFFICE

FRANCIS W. BORKES, OF CLEVELAND, OHIO.

POWER-TRANSMITTING MECHANISM.

1,323,245. Specification of Letters Patent. Patented Dec. 2, 1919.

Application filed May 1, 1918. Serial No. 231,830.

To all whom it may concern:

Be it known that I, FRANCIS W. BORKES, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Power-Transmitting Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to power transmitting mechanisms and more particularly to driving mechanisms such as are employed with hoisting drums. It is the general object of the invention to provide a driving mechanism for objects such as hoisting drums whereby the drum may be rotated in a particularly efficient manner and without the necessity for the employment of a brake to prevent the unwinding of the drum through the rotative effect of the unbalanced load applied to the cable and wound upon the drum. Further and more limited objects of the invention will appear hereinafter and will be secured in and through the construction illustrated in the drawings and the combination of elements embodied in the claims forming a part hereof.

In the drawings, Figure 1 represents a longitudinal sectional view through a hoisting drum having my driving mechanism applied thereto, certain parts being shown in elevation; Fig. 2 is a transverse sectional view corresponding substantially to the line 2—2 of Fig. 1 and looking in the direction of the arrows; and Fig. 3 a sectional view through one of the pinions and corresponding substantially to the line 3—3 of Fig. 2.

Describing by reference characters the various parts illustrated herein, 1 denotes a hoisting drum generally said drum having heads 2 journaled on bushings 3 carried by sleeves 4 which are secured, as by keys 5, to the sleeve ends 7 of a housing 6. The sleeves 4 extend in opposite directions from a cylindrical casing 8 carrying the fields 9 of an electric motor. At one end the motor casing is provided with a concave depression 10 in order to accommodate the end of the cable (not shown) which is ordinarily secured to the hoisting drum by extending the end within the space between said drum 1 and the casing 8.

Near one end, the casing 8 is provided with an annular slot for the reception of an internal gear 11 which is rigidly secured to the interior of the drum 1. The sleeves 4 are mounted upon a central non-rotative shaft 12 which forms a support and bearing for the hollow shaft 13 of the motor armature 14. The shaft 12 is shown as provided with a bore extending in from one end thereof for the reception of the field wires 15, which may be extended laterally through a perforation in one of the sleeves 4.

Carried by the armature shaft 13 and preferably formed integral therewith is a pinion 16, there being annular bearing rings 17 mounted on said shaft at each end of said pinion, the periphery of each bearing ring corresponding to the pitch line of said pinion. Keyed to and located within the casing 8 and on each side of the internal gear 11 are the internal gears 18 and 19, the keys being indicated at 18^a and 19^a. Interposed between the pinion 16 and the gears 11, 18 and 19 are the pinions 20, each of said pinions being shown as provided with an annular bearing ring 21, preferably carried by a hub member 21^a projecting into the interior of the pinion. The hub portions of the bearing rings are shown as hollow and as extending substantially half the distance of the bores through their respective pinions, the peripheries of the bearing rings 21 extending out to the pitch line of their respective pinions. The peripheries of the rings 21 are adapted to engage the peripheries of the rings 17, thereby to prevent the embedding or bottoming of the teeth of the pinions.

The purpose of the gearing arrangement shown and described is to provide an efficient reduction drive between the armature shaft and the drum. For instance, the pinion 16 may be provided with twelve teeth, as shown, while the pinions 20 may be provided each with fifteen teeth, as shown. Each of the internal gears 18 and 19 may be provided with forty teeth while the gear 11 may be provided with forty-two teeth. The teeth on the gear 11 may be on a true pitch line, the teeth on the gears 18 and 19 being approximately a true pitch line, because of the large number of said teeth, the internal diameters of all three gears 11, 18 and 19 being the same.

In operation, the rotation of the armature shaft is transmitted through the pinion 16 to the two diametrically opposed floating pinions 20. These floating pinions rotating about the pinion 16 will, during each revolu-

tion, impart a movement to the drum corresponding to the excess of two teeth on the gear 11 over the teeth on the gears 18 and 19. By the construction and arrangement of the gears 11, 18 and 19 and the pinions 20 operating simultaneously on all of said gears, there is a balanced thrust on both sides of the armature shaft and on its pinion, as well as a balanced thrust on both sides of the gears 11, 18, and 19; the use of the bearing rings 17 and 21 prevents the embedding or bottoming of the teeth beyond their respective pitch lines, the said bearing rings providing a rolling contact between the said pinions.

The driving mechanism as a whole is extremely simple and comparatively inexpensive of production, eliminating the employment of shafting for the gears, taking care of the thrust due to heavy loads on the drum, and dispensing with the necessity for a brake, as the teeth of the gears 11, 18 and 19 are all on the same pitch diameter whereby any leverage due to the load will be ineffective to rotate the drum.

While I have shown the pinion 16 as driven by the armature shaft of an electric motor, it will be evident that other driving means may be employed; and, generally, I do not propose to limit myself to the details of construction shown and described in connection with the particular embodiment of my invention described herein except as such limitations may be positively included in the claims and may be rendered necessary by the state of the prior art.

Having thus described my invention, what I claim is:—

1. In a device of the character described, the combination of a drum, an internal gear within and secured to said drum, a casing within said drum, an internal gear mounted within and rigidly connected to said casing and located on each side of the first mentioned gear, all of said gears having substantially the same internal diameter and the two last mentioned gears having the same number of teeth, such number being different from the number of teeth on the first mentioned gear, a shaft within said gears, a pinion carried by said shaft, and floating pinions interposed between the first mentioned pinion and said gears.

2. In a device of the character described, the combination of a drum, an internal gear secured to the interior of said drum, a casing within said drum, an internal gear mounted in and rigidly connected to said casing, the said gears having substantially the same diameter but differing in the number of teeth thereon, a shaft located within said gears, means for driving the same, a pinion on said shaft, and pinions on opposite sides of the first mentioned pinion and interposed between the same and said gears, the said pinions having the same number of teeth and meshing respectively with the teeth of the first mentioned pinion and with both of said gears.

3. In a device of the character described, the combination of a rotatable member, an internal gear secured to the inside of said member, a fixed gear within and disconnected from said member and of substantially the same diameter as the first mentioned gear but differing therefrom in the number of teeth, a pinion in the center of the space inclosed by said gears, means for driving said pinion, and a floating pinion interposed between the first mentioned pinion and said internal gears.

4. In a device of the character described, the combination of a rotatable member, an internal gear secured to the interior of said member, a fixed gear located on each side of the first mentioned gear and of substantially the same internal diameter as the first mentioned gear, the last two gears having the same number of teeth and such number differing from the number of teeth on the first mentioned gear, a pinion located centrally within said gears, means for driving said pinion, and a floating pinion on each side of the first mentioned pinion and operatively interposed between said pinion and said gears, the two last mentioned pinions having the same number of teeth.

5. In a device of the character described, the combination of a rotatable member, an internal gear secured to the interior of said member, a fixed gear located on each side of the first mentioned gear and of substantially the same internal diameter as the first mentioned gear, the last two gears having the same number of teeth and such number differing from the number of teeth on the first mentioned gear, a pinion located centrally within said gears, means for driving said pinion, and a floating pinion operatively interposed between the first mentioned pinion and said gears.

6. In a device of the character described, the combination of a drum, a casing having a slot and provided with hubs from which said drum is rotatably supported, a non-rotative shaft extending through said hubs, an armature having a hollow shaft mounted on the first mentioned shaft, a pinion rigid with said armature shaft, an internal gear secured to the inner surface of said drum and projecting through said slot in said casing, an internal gear on each side of said slot within and connected to said casing, the said gears being of substantially the same internal diameter, the second and third gears having the same number of teeth and such number differing from the number of teeth on the first mentioned gear, and a floating pinion on each side of the first mentioned pinion and meshing with said pinion

and all three gears, the two last mentioned pinions having the same number of teeth.

7. In a device of the character described, the combination of a drum, a casing having a slot and provided with hubs from which said drum is rotatably supported, a non-rotative shaft extending through said hubs, an armature having a hollow shaft mounted on the first mentioned shaft, a pinion rigid with said armature shaft, an internal gear secured to the inner surface of said drum and projecting through said slot in said casing, an internal gear at one side of said slot within and connected to said casing, the said gears being of substantially the same internal diameter but differing as to the number of teeth thereon, and a floating pinion on each side of the first mentioned pinion and meshing with said pinion and both of said gears, the two last mentioned pinions having the same number of teeth.

8. In a device of the character described, the combination of a rotatable element having an internal gear secured to the inner surface thereof, a fixed internal gear arranged on each side of the first mentioned gear, the said last mentioned gears having the same number of teeth and such number differing from the number of teeth on the first mentioned gear and all of said gears being of substantially the same internal diameter, a pinion in the central portion of the space inclosed by said gears, a bearing ring carried by said pinion on each side of the teeth thereof, a floating pinion on each side of the first mentioned pinion and meshing therewith and with all three gears, the two last mentioned pinions having the same number of teeth, and bearing rings on each side of the teeth of the last mentioned pinions, the periphery of each bearing ring corresponding substantially to the pitch line of its corresponding pinion.

9. A gear having a central bore, and a pair of bearing rings each having a hub portion adapted to fit in said bore, the periphery of each bearing ring coinciding substantially with the pitch line of said gear.

In testimony whereof, I hereunto affixed my signature.

FRANCIS W. BORKES.