T. S. MILLER.

ROPE DRUM.

APPLICATION FILED MAY 2, 1910.

1,148,609. Patented Aug. 3, 1915.

Fig. 2.

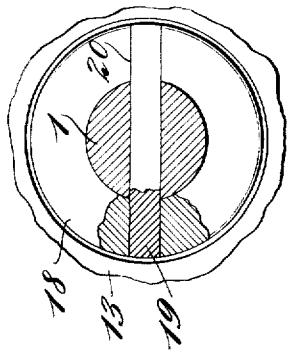


Fig. 1.

WITNESSES:

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THOMAS SPENCER MILLER, OF SOUTH ORANGE, NEW JERSEY.

ROPE-DRUM.

1,148,609. Specification of Letters Patent. Patented Aug. 3, 1915.

Application filed May 2, 1910. Serial No. 558,863.

To all whom it may concern:

Be it known that I, THOMAS SPENCER MILLER, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rope-Drums, of which the following is a specification.

My invention relates to new and useful improvements in rope drums in which there is provided a drum upon which a rope is to be wound, and a driving member engaging the drum by means of which the latter is rotated, and more particularly to that type in which the drum is connected to its driving member by a slipping connection which is sufficiently positive to drive the drum under ordinary loads but which permits a slip or relative movement between the drum and driving element whenever the drum is subjected to an overload which is liable, if continued, to derange or wreck the parts.

In constructions of the character set forth it has been usual to mount the drum and its driving member upon a shaft, said drum and member being adjusted and held in close frictional driving engagement by suitable thrust mechanism, but all constructions of this general type of which I am aware are at times unsatisfactory when subjected to overloads causing slip for the reason that the great heat generated by the friction between the parts expands the drum to such an extent that the force of its frictional engagement with the gear is increased so as to practically lock the drum to the gear, thereby preventing the slip which is desired and possibly resulting in the breaking of the rope or of damage to the apparatus.

It is, therefore, the object of my invention to provide means for placing the drum and its driving means in the proper slipping engagement, and in the provision of features which will compensate for the expansion of the drum, and insure the proper slip of the drum irrespective of such expansion.

Other objects of my invention will appear as the detail description hereinafter given progresses.

The invention consists in the improvements to be fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein:

Figure 1 is a central longitudinal view through a slip drum construction embodying my invention. Fig. 2 is a section on the line 2—2 of Fig. 1.

Referring to the drawings by characters of reference, 1 designates a driving shaft mounted in bearings in standards 2—2 and held against longitudinal movement thereof by shoulders 2^a, 2^a, engaging the inner faces of the standards. Mounted upon this shaft is a driving element in the form of a spur gear 3 of suitable size, said gear 3 being preferably keyed to the shaft as at 4. This gear is formed on one of its plain faces with a friction surface 5 arranged in a plane at right-angles to its axis of rotation.

6 designates a hollow drum formed with a chamber 6^a, said drum being mounted on the shaft 1 and being free to turn relative thereto under conditions to be presently set forth. This drum is formed or provided with suitable end flanges 7 and 8, the end flange 7 having secured thereto a friction element 9 of suitable material having a face 9^a in a plane at right angles to the longitudinal axis of the shaft 1 and the drum and arranged to coöperate with the friction face 5 on the gear 1 to connect the gear and drum whereby the latter is driven.

The drum 6 is formed at the end adjacent the gear 3 with a hub 10 integral with said drum, which hub turns upon the shaft 1 and at its opposite end said drum is provided with a separate hub which also turns upon the shaft 1, but which is so connected to the drum that said drum and hub may have movement relative to each other longitudinally of the shaft 1. This hub just referred to consists of a cylindrical element 11 housed within a circular opening 12 formed within the end of the drum opposite to that adjacent the gear 3, said cylindrical element being arranged to turn upon the shaft 1, and being formed at its outer end with an annular laterally projecting flange 13 which extends outward from the shaft over the end of the drum. It will be noted that the hub 11 serves as the support for the end of the drum away from the driving element, the diameter of the drum and of the circular opening 12 being such that the outer surface of the hub slidably contacts the surface of the opening 12. Formed in this annular

flange 13 are a plurality of openings 14 through which extend adjusting and limiting bolts 15 which are threaded into sockets formed in the end of the drum, the outer ends of the bolts being provided with adjusting nuts 16 by means of which the drum and separate hub may be adjusted relative to each other longitudinally of the shaft so as to determine the amount of movement which the drum and the hub may have relative to each other. The outer end of the cylindrical member 11 is formed with a recess 17 to receive an annular thrust collar 18 surrounding the shaft 1 and slidably mounted thereon, said collar being engaged by a cross piece 19 extending through a transverse slot 20 extending longitudinally of the shaft 1, said cross piece 19 being engaged by a pin 21 arranged within a central bore in the shaft 1, said pin being engaged by a threaded thrust bolt 22 which is threaded into the outer end of the shaft 1 and engages said pin 21. The thrust bolt 22 may be engaged by a lock nut 23 for holding it in the positions to which it may be adjusted. Between the annular thrust collar and the inner face of the recess 17 are arranged a plurality of bearing collars or disks 23^a which may be of bronze or any other suitable material calculated to reduce friction between the parts.

Arranged within the chamber formed in the hollow drum is an expansive helical spring 24, the ends of which bear against the hub 10, which is integral with the drum and the inner end of a separate hub 11, respectively, the force of the spring being exerted to normally thrust the drum toward the gear 3, the said hub 11 being held against movement away from the gear by means of the thrust mechanism heretofore described, except when the thrust mechanism is operated to relieve the friction between the drum and the driving element.

It will be seen that, by means of the thrust mechanism just described, whenever the bolt 22 is turned to force the pin 21 and crosspiece 19 toward the end of the drum, the thrust collar 17, the element 11 and the drum through the compresion of spring 24 will be moved toward the gear 3 so as to place the friction surfaces carried by the adjacent faces of the gear 3 and the drum 6 in frictional engagement to connect the drum and gear whereby the former is driven, it being understood that the degree of strength of friction is dependent upon the amount of force with which the drum is moved into engagement with said gear.

Arranged within the chamber formed in the hollow drum is an expansive helical spring 24, the ends of which bear against the hub 10 which is integral with the drum and the inner end of the separate hub 11, respectively, the force of the spring being exerted to normally thrust the drum toward the gear 3, it being understood that the separate hub 11 is fixed against movement away from the gear by means of the thrust mechanism heretofore described.

When the parts are assembled, the nuts on the bolts 15 are screwed up until the spring 24 is compressed within the drum until said spring is almost closed, the exact condition of compression of the spring being dependent upon the amount of pressure which is necessary to maintain the proper frictional engagement between the drum and the driving element to sustain a given load. Under these conditions the space between the flange 13 and the adjacent end of the drum will be equal to the extent of movement necessary to give to the slidable hub to completely compress the spring.

By means of the slidable hub 11, and the bolts 15 and the nuts 16, the spring 24 may be adjusted to, and maintained under, an initial normal compression so that, to place the drum in or out of frictional engagement with the driving element, it is only necessary to actuate the thrust bolt 22 to a very limited extent; that is, only sufficient to relieve or restore pressure between the flange 13 and the nuts 16 plus a small additional amount; say, one-hundredth of an inch, to connect or separate the friction surfaces of the drum and the driving member. The thrust mechanism heretofore described is then operated to move the drum into frictional engagement with the driving element and this is continued until it is apparent to the operator that the pressure between the flange 13 and the nuts 16 is relieved. When this pressure is relieved the force of the spring is then exerted to force the drum toward its driving member but it will be noted that there will be a space left between the end of the drum and the flange 13 on the slidable hub. If then, for any reason, the drum is subjected to an overload, causing the slip between the drum and driving element, and the drum became so highly heated, due to the friction between the clutch faces as to expand, it is free to do so longitudinally to an extent equal to the distance between the end of the drum and the flange 13, and this without increasing materially the total pressure on the friction surfaces.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a structure of the character described, a shaft, a driving member and a hollow drum mounted on the shaft, said member and drum having friction clutch surfaces operable by movement of the drum lengthwise of the shaft to connect said member and drum to drive the drum, thrust means, a member mounted on the shaft and movable by the thrust means toward said

drum, a spring housed within the drum and surrounding the shaft and abutting said member and drum at its opposite ends, and means whereby said spring is held normally under compression.

2. In a device of the character described, a shaft, a driving member and a drum mounted on the shaft having clutch surfaces whereby they are connected by movement of said drum toward said member, thrust means, a spring interposed between said thrust means and the drum whereby the drum is moved, and means independent of said thrust means whereby said spring is normally held under compression.

3. In a device of the character described, a shaft, a driving member and a drum mounted on the shaft having clutch surfaces whereby they are connected by movement of the drum toward the driving member, said drum being hollow and having a hub rotatably mounted on the shaft, thrust means, an element surrounding the shaft and movable by the thrust means, a spring housed within the drum and surrounding said shaft, the ends of said drum abutting said hub and said element, and means connecting said drum and element whereby said spring is normally held under compression and said element and drum are permitted to move relative to each other.

4. In a device of the character described, a shaft, a driving member and a drum mounted on the shaft having clutch surfaces whereby said elements are connected by movement of the drum toward a driving member, thrust means, an element surrounding the shaft and movable by the thrust means, a spring surrounding the shaft and abutting said element and drum whereby the thrust is communicated to the drum, and means for connecting the drum and said element whereby said spring is normally held under compression independently of the thrust means, and permitting relative movement between said drum and element when the drum is connected to the driving member.

5. In a structure of the character described, a shaft, a driving member having means whereby it rotates with the shaft, a hollow rope drum mounted on the shaft and capable of movement lengthwise thereof, said driving member and drum having friction surfaces adapted to be set by movement of the drum toward the driving member, said drum having at its end nearest the driving member a fixed hub bearing on the shaft, and at its opposite end a hub bearing on the shaft and movable longitudinally of the drum, a spring housed within the drum and engaging the said first hub and said movable hub, and thrust means acting on the movable hub.

6. In a structure of the character described, a shaft, a driving member keyed to the shaft, a hollow drum mounted on the shaft, friction surfaces for connecting the driving member and drum to drive the latter, said drum having a fixed hub adjacent to the driving member, a hub slidably engaging the drum and sleeved within the end thereof opposite to the fixed hub and forming a chamber within the drum, a spring housed within said chamber and surrounding said shaft and exerting its force expansively against said hubs, means between the drum and movable hub for compressing the spring to a normal compression, and thrust means operable on the movable hub.

In testimony whereof I have hereunto signed my name to this specification in the presence of two witnesses.

THOMAS SPENCER MILLER.

Witnesses:
ERNEST PULSFORD,
DANIEL P. POWERS.

Correction in Letters Patent No. 1,148,609.

It is hereby certified that in Letters Patent No. 1,148,609, granted August 3, 1915, upon the application of Thomas Spencer Miller, of South Orange, New Jersey, for an improvement in "Rope-Drums," an error appears in the printed specification requiring correction as follows: Page 3, line 62, claim 5, for the word "first" read *fixed;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D., 1915.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.