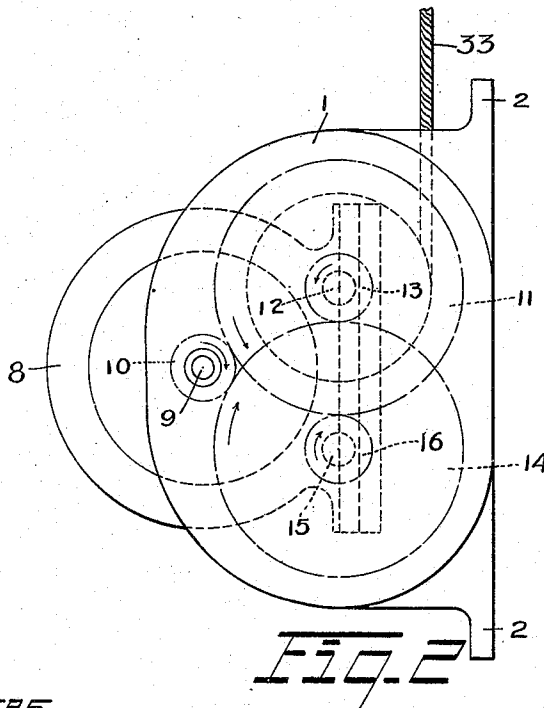
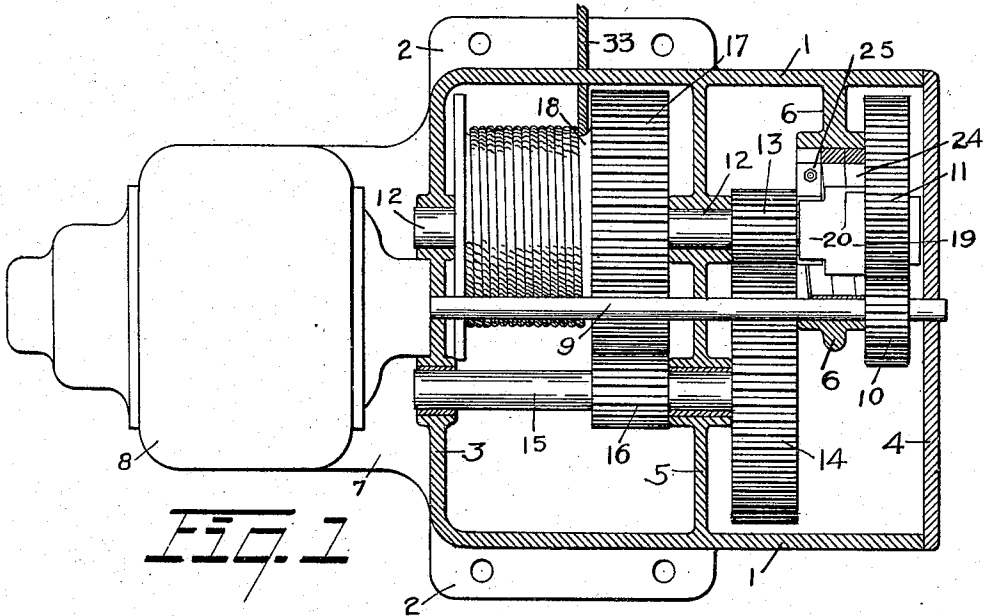


G. A. ARMINGTON.
HOISTING MECHANISM.
APPLICATION FILED AUG. 24, 1908.

933,356.

Patented Sept. 7, 1909.
2 SHEETS—SHEET 1.



Witnesses:

Brannon B. West.
Arthur S. Resenberg.

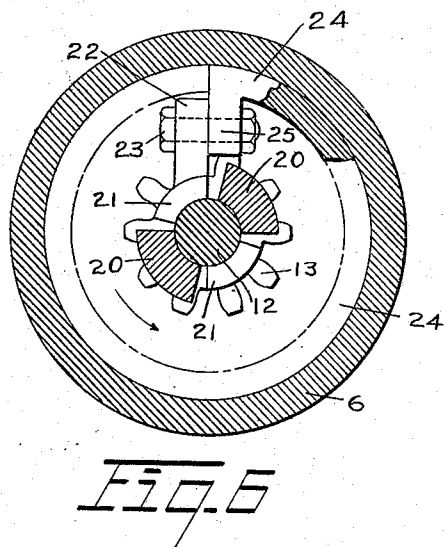
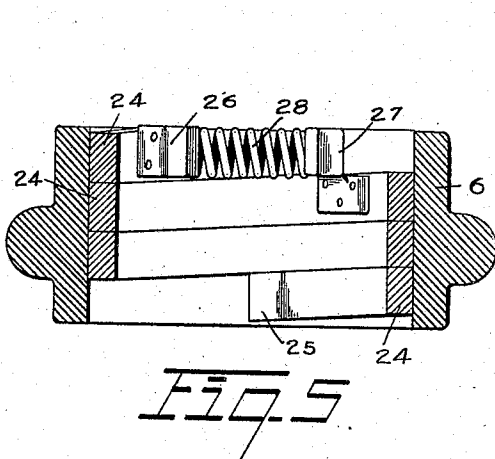
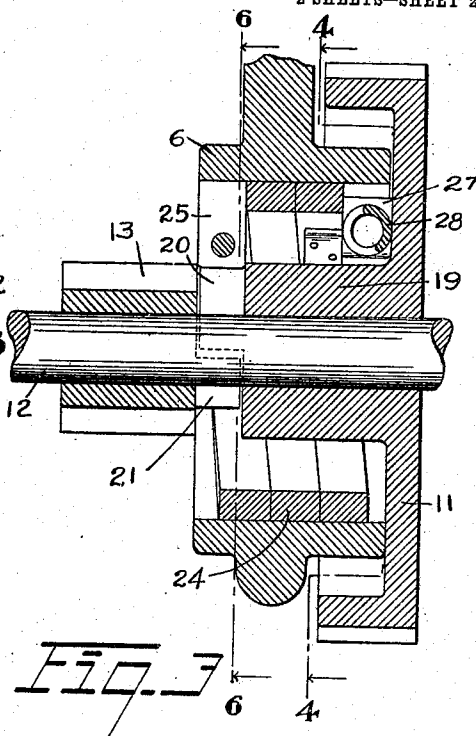
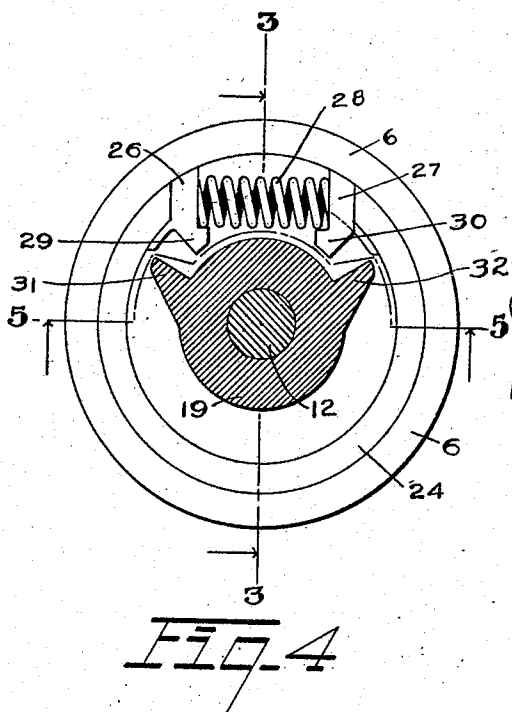
Inventor.

George A. Armington,
By Bates, Ford & Hull
Attys

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2 SHEETS—SHEET 2.



Witnesses:

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Arthur S. Resneberg.

Inventor.

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By Bates, Foulk & Hull
Attys.

UNITED STATES PATENT OFFICE.

GEORGE A. ARMINGTON, OF WICKLIFFE, OHIO.

HOISTING MECHANISM.

933,356.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed August 24, 1908. Serial No. 449,898.

To all whom it may concern:

Be it known that I, GEORGE A. ARMINGTON, a citizen of the United States, residing at Wickliffe, in the county of Lake and State of Ohio, have invented a certain new and useful Improvement in Hoisting Mechanisms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to safety brakes for hoisting devices, the same operating somewhat on the principle of the brake shown in my Patent No. 871,552, but being adapted to more universal use, being simpler and more economical in construction, and being applicable to the use of a single line or cable, whereas the construction shown in the said patent is intended for use with a double cable, one end of which is attached to the hoisting drum and the other to the brake band.

The object of my invention is, therefore, to simplify the construction of safety brakes that have heretofore been devised and to provide a brake which will safely sustain a load in any position to which it may have been hoisted and to lower the same positively and without too rapid motion.

In the accompanying drawings forming a part of this application, Figure 1 is a front view showing the mechanism in elevation and the casing and brake band in section; Fig. 2 is an end elevation of the hoisting device looking toward the left in Fig. 1; Fig. 3 is a longitudinal section through the motor gear, the brake band and the pinion, the same being taken on the line 3—3 of Fig. 4; Fig. 4 is a transverse section through the brake mechanism taken on the line 4—4 of Fig. 3 and looking in the direction of the arrows thereon; Fig. 5 is a section taken on the line 5—5 of Fig. 4 looking in the direction of the arrows thereon, and Fig. 6 is a transverse section taken through Fig. 3 on the line 6—6 and looking in the direction of the arrows thereon.

Taking up a more detailed description of my invention by reference to the drawings, 1 represents the casing or frame in which the mechanism forming the hoisting device is inclosed, said casing being provided at its rear with projecting flanges 2 having holes therethrough so that the casing may be attached to a wall or any other suitable support. Near one of its ends the casing is pro-

vided with a side housing 3, the opposite end of the casing being closed by a suitable plate 4, said housing and plate being provided with journals in which certain of the shafts of the hoisting mechanism are mounted, as will hereinafter appear. Intermediate the housing 3 and plate 4, the casing is provided with a web 5 in which certain other shafts of the hoisting mechanism are journaled. Between the web 5 and the plate 4 the casing is also provided with an annular member 6 having its interior shaped so as to form a true surface against which the brake may engage.

Projecting from the casing 1 beyond the housing 3 is a plate 7, to which the motor 8 may be secured in any suitable manner. Any form of motor that is adapted to the purpose may be employed, the drawing showing by preference an electric motor, the armature of which, not shown, is secured to the drive shaft 9, which is journaled in the housing 3 and the end plate 4. Keyed, or otherwise secured, to the shaft 9 near the plate 4 is a pinion 10 which meshes with a gear 11 which I shall hereinafter term the motor gear. This motor gear is loosely journaled upon a stationary rod or shaft 12 that is mounted in the housing 3 and the web 5. Also loosely journaled on this rod is a pinion 13, said pinion meshing with a gear 14 that is secured to a shaft 15, said shaft being journaled in the housing 3 and the web 5. The shaft 15 has secured thereto a pinion 16 that meshes with a gear 17 that I shall hereinafter refer to as the drum gear, for the reason that said gear is integral with or rigidly secured to the hoisting drum 18, said drum and its gear being also loosely journaled on the rod 12. A train of gearing is thus provided between the motor and the drum whereby the latter is driven by the motor. As stated, the motor gear 11 and pinion 13 are loosely journaled on the rod 12, and the said pinion is driven by the motor gear in the manner now to be described.

Projecting from the gear 11 toward the pinion 13 is a hub 19 that forms an extended bearing on the rod 12, the end of said hub being provided with a pair of diametrically opposite projections 20 that extend toward the pinion. Likewise, the pinion 13 is provided with a pair of diametrically opposite projections 21 that extend between the projections 20 on the hub. While I have elected

to show a pair of each of said projections, it will be understood that any other number of such projections on the hub and the pinion may be employed if preferred. As shown in Fig. 6, the spaces between the projections 20 on the hub are considerably wider than the projections 21 on the pinion, whereby lost motion is provided between these parts. By this construction it will be understood that when the motor is driven the projections 20 turn upon the rod 12 without rotating the pinion 13 until the projections on the hub and the pinion engage, after which the pinion will turn with the hub. When the motor is driven in a reverse direction, the projections that were formerly in engagement will separate and the projections 20 will move toward the opposite sides of the projections 21, the pinion remaining stationary during such movement.

Projecting from the pinion 13 is a lug 22, having a hole therethrough for a bolt 23 by means of which the said lug and pinion are secured to one end of the brake band 24, the said band having an inwardly projecting part 25 through which the bolt extends so that the lug 22 and part 25 are rigidly secured together. The brake band is in the form of a helix, the outer surface of which conforms to the inner surface of the member 6, in which member the brake band is adapted to turn or against which it is adapted to be expanded so as to hold the pinion 13 against rotation. Secured to that end of the brake band that is opposite to the part 25 is an abutment 26, and a similar abutment 27 is secured to the next adjacent convolution of the band 24, said abutments facing each other, as shown in Fig. 4. Between these abutments and engaging with the same is a helical spring 28, the same being placed under tension so as to force apart the said abutments. The abutments 26 and 27 respectively have inwardly extending lugs 29 and 30 that project into a position for engagement with lugs 31 and 32 on the hub 19. The lugs are spaced apart such a distance as to afford considerable lost motion between them and their respective abutments, as shown in Fig. 4.

To the drum 18 I secure one end of a hoisting rope or cable 33 to which may be attached a hook or any other suitable device that is to be moved by the hoisting mechanism, which rope or cable may be led over suitable sheaves or pulleys to any point to where the power from the hoisting mechanism is to be applied.

The above being a full description of the construction of the parts comprising my invention, I will now describe the operation thereof. Assuming that a load is being hoisted, the motor is running in a direction to turn the motor gear 11 and the projections 20 on the hub thereof as indicated by

the arrow in Fig. 6. The first slight rotation of the motor shaft has had no effect upon the drum owing to the lost motion provided between the lugs 20 and 21; but, after a slight movement of the motor gear, the pinion 13 is positively rotated by the engagement of the said lugs 20 with the lugs 21 on the pinion. The rotation of the pinion 13 in the direction indicated by the said arrow causes the lug 22 and part 25 on the pinion and brake band respectively to move the latter in such a way as to loosen the same from its engagement with the member 6. Immediately following the engagement of the lugs 20 and 21 the lug 32 on the hub 19 engages with the projection 30 on the abutment 27, and forces the abutment forwardly against the tension of the spring 28. This movement of the abutment also draws the brake band away from the member 6 and still further loosens the brake. During the hoisting operation, therefore, the brake band will simply trail along behind the pinion 13 and will offer no appreciable resistance to the movement of the mechanism. If, after the load is hoisted, the motor be stopped, the pull upon the cable 33 tends to rotate the pinion 13 in the direction opposite that indicated by the arrow in Fig. 6, and the lug 32 ceases to press against the projection 30 of the abutment 27 so that the spring 28 expands and forces the brake band into engagement with the member 6. The pressure of the lug 22 against the opposite end of the band causes the latter to grip the member 6 tightly, and the load is thus held in its elevated position while the motor is at rest. To lower the load, therefore, it is necessary to positively drive the motor gear 11 in its reverse direction. In so doing, the lugs 20 and 21, which had been in engagement during the hoisting operation, separate, but, before they come into engagement on their opposite sides due to the reverse movement, the lug 31 on the hub 19 engages with the abutment 26 and again loosens the brake band, compressing the spring 28. It will thus be seen that the brake band is loosened not only during the hoisting operation, but also to a less extent during the lowering operation, while it exerts its full braking effect while the load is in suspension and the motor at rest. By this construction and operation power is not unnecessarily consumed at any stage of operation of the device.

Various changes in the details shown and described may be made without departing from the principles of my invention, and I desire it to be understood that the following claims are not intended to be limited to such details any further than is made necessary by the specific terms therein employed.

I claim:

1. In a hoisting device, a hoisting drum

having a cable attached thereto, a train of gearing for driving said drum, said train including a pinion having a lug thereon, a gear mounted co-axially with said pinion and having a lug thereon adapted to engage with the lug on the pinion for driving the same as the gear is driven in either direction, a coiled brake band secured at one of its ends to said pinion, a stationary member surrounding the brake band so as to be engaged thereby, lugs on the said gear, and abutments secured to the brake band in position to be engaged by the latter lugs whereby the rotation of the gear in either direction will cause a lug thereon to engage with one of the said abutments and disengage the brake band from the said member.

2. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion and a gear mounted co-axially therewith, engaging means on the pinion and on the gear for driving the pinion from the gear, a coiled brake band secured to the pinion, a stationary member with which the brake band is adapted to frictionally engage, an abutment secured to that end of the brake band that is opposite the pinion, a second abutment secured to the next adjacent convolution of the brake band, and lugs on the said gear extending into position to engage the said abutments whereby, as the gear is turned in either direction, one of said lugs will engage with an abutment and thereby loosen the engagement of the band with the said member.

3. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion and a gear mounted co-axially therewith, engaging means on the pinion and on the gear for driving the pinion from the gear, a coiled brake band secured to the pinion, a member surrounding the said brake band with which the latter is adapted to frictionally engage, an abutment secured to that end of the brake band that is opposite the pinion, a second abutment secured to the next adjacent convolution of the brake band, and lugs on the said gear extending into position to engage the said abutments whereby, as the gear is turned in either direction, one of said lugs will engage with an abutment and thereby loosen the engagement of the band with the said member.

4. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion, a lug at one end of said pinion, a gear mounted co-axially with the said pinion, a lug on said gear projecting into the path of movement of the lug on the pinion, the sizes of the lug on the gear and pinion being such that lost motion is pro-

vided between the gear and pinion, a coiled brake band secured at one of its ends to the pinion, an abutment secured to the opposite end of the brake band, a similar abutment secured to the next adjacent convolution of the brake band and facing the former abutment, a spring between the said abutments, said spring being under tension and tending to separate the abutments, a stationary friction member against which the band is adapted to be forced by the said spring, and means on the gear for engaging with the said abutments and thereby loosening the engagement of the band with the said member when the gear is driven in either direction.

5. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion, a pair of lugs at one end of said pinion, a gear mounted co-axially with the said pinion, a pair of lugs on said gear projecting between the lugs on the pinion, the sizes of the lugs on the gear and pinion being such that lost motion is provided between the gear and pinion, a coiled brake band secured at one of its ends to the pinion, an abutment secured to the opposite end of the brake band, a similar abutment secured to the next adjacent convolution of the brake band and facing the former abutment, a coiled spring between the said abutments, said spring being under tension and tending to separate the abutments, a stationary friction member surrounding the brake band against which the band is adapted to be forced by the said spring, and means on the gear for engaging with the said abutments and thereby loosening the engagement of the band with the said member when the gear is driven in either direction.

6. In a hoisting device, a frame or casing, a rod mounted in said casing, a drum journaled on said rod, said drum having a hoisting cable attached thereto, a pinion journaled on said rod, gearing connecting said pinion with the said drum for turning the latter as the pinion is rotated, a friction member stationarily mounted in said casing, a brake band secured at one of its ends to said pinion and adapted to frictionally engage the said member, a gear loosely mounted on the said rod, means on said gear and said pinion that are adapted to engage with each other and drive the pinion as the gear is driven, and means on said gear for disengaging the brake band from the said member when the gear is turned in either direction.

7. In a hoisting device, a frame or casing, a rod mounted in said casing, a drum loosely journaled on said rod, said drum having a hoisting cable attached thereto, a pinion loosely journaled on said rod, gearing con-

necting said pinion with the said drum for turning the latter as the pinion is rotated, an annular friction member stationarily mounted in said casing, a coiled brake band secured at one of its ends to said pinion and adapted to frictionally engage the said member, a gear loosely mounted on the said rod, means on said gear and said pinion that are adapted to engage with each other and drive the pinion as the gear is driven, and means on said gear for disengaging the brake band from the said annular member when the gear is turned in either direction.

8. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion and a gear, said pinion and gear being mounted upon the same axis, means for driving the pinion from the said gear, a coiled brake band secured at one of its ends to the said pinion, a stationary friction member with which the said band is adapted to engage for holding the drum from rotation, an abutment secured to the free end of the brake band, a similar abutment secured to the next adjacent convolution of the brake band, said abutments facing each other, a coiled spring between the said abutments, said spring being under tension to force the band into engagement with the friction member, a pair of lugs on the said gear in position to engage with the said abutments, and means for driving the said gear, the construction being such that when the gear is not being driven the spring will hold the brake band into frictional engagement with the said member, but when the gear is driven in either direction the band will be disengaged from the friction member so as to per-

mit the drum to be driven without material resistance from the brake.

9. In a hoisting device, a hoisting drum having a cable attached thereto, a train of gearing for driving said drum, said gearing including a pinion and a gear, said pinion and gear being mounted upon the same axis, lugs on the pinion and gear that are adapted to engage with each other for driving the pinion from the said gear, a coiled brake band secured at one of its ends to the said pinion, a stationary friction member surrounding the brake band with which the latter is adapted to engage for holding the drum from rotation, an abutment secured to the free end of the brake band, a similar abutment secured to the next adjacent convolution of the brake band, said abutments facing each other, a coiled spring between the said abutments, said spring being under tension to force outwardly the band into engagement with the friction member, a pair of lugs on the said gear in position to engage with the said abutments, and means for driving the said gear, the construction being such that when the gear is not being driven the spring will hold the brake band into frictional engagement with the said member, but when the gear is driven in either direction the band will be disengaged from the friction member so as to permit the drum to be driven without material resistance from the brake.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

GEORGE A. ARMINGTON.

Witnesses:

S. E. FOUTS,
MAE E. TAIF.