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PATENTED MAR. 13, 1906.

V. R. & E. H. BROWNING.
SAFETY LOWERING DEVICE.

APPLICATION FILED MAY 10, 1904.

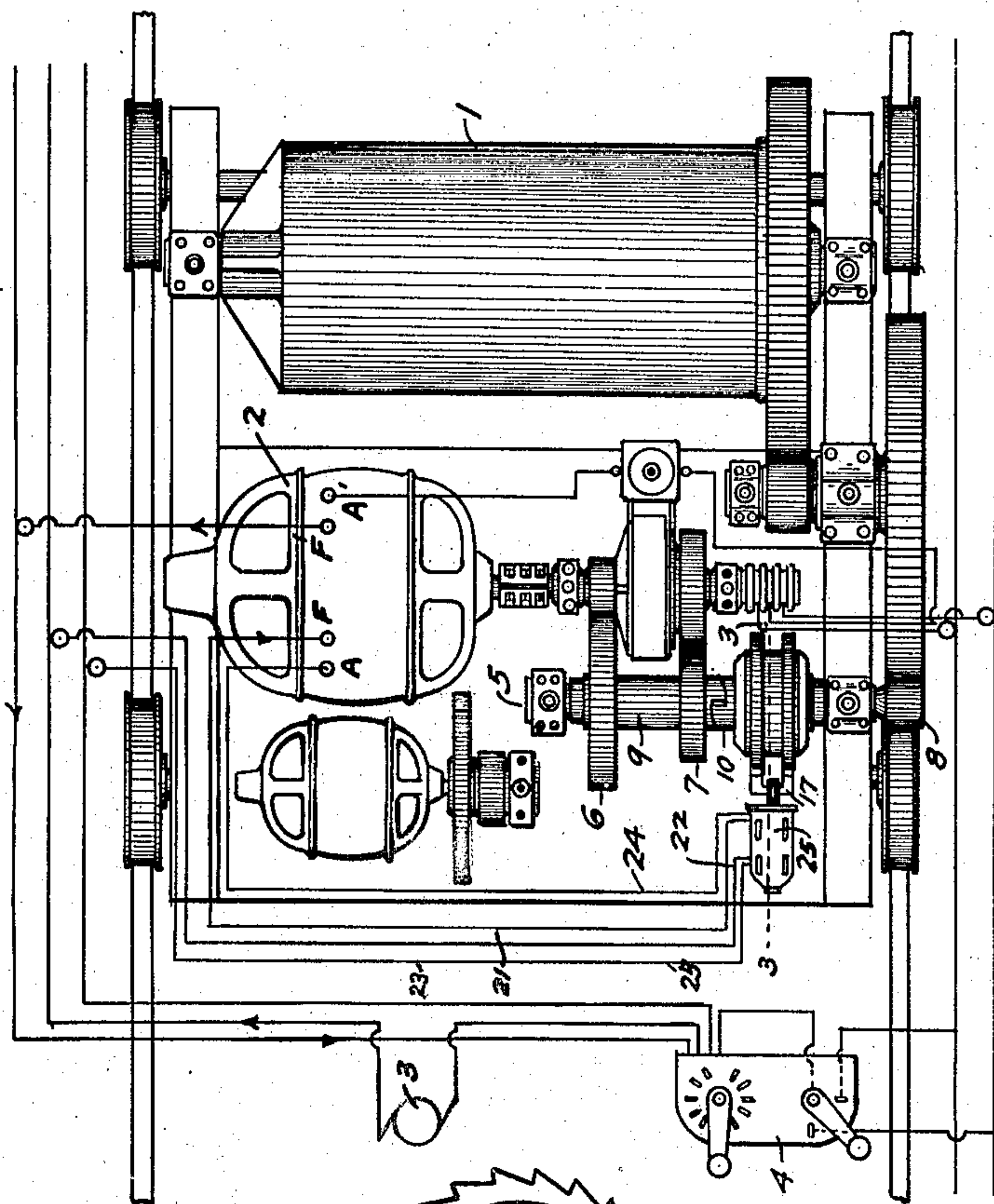


Fig. 1

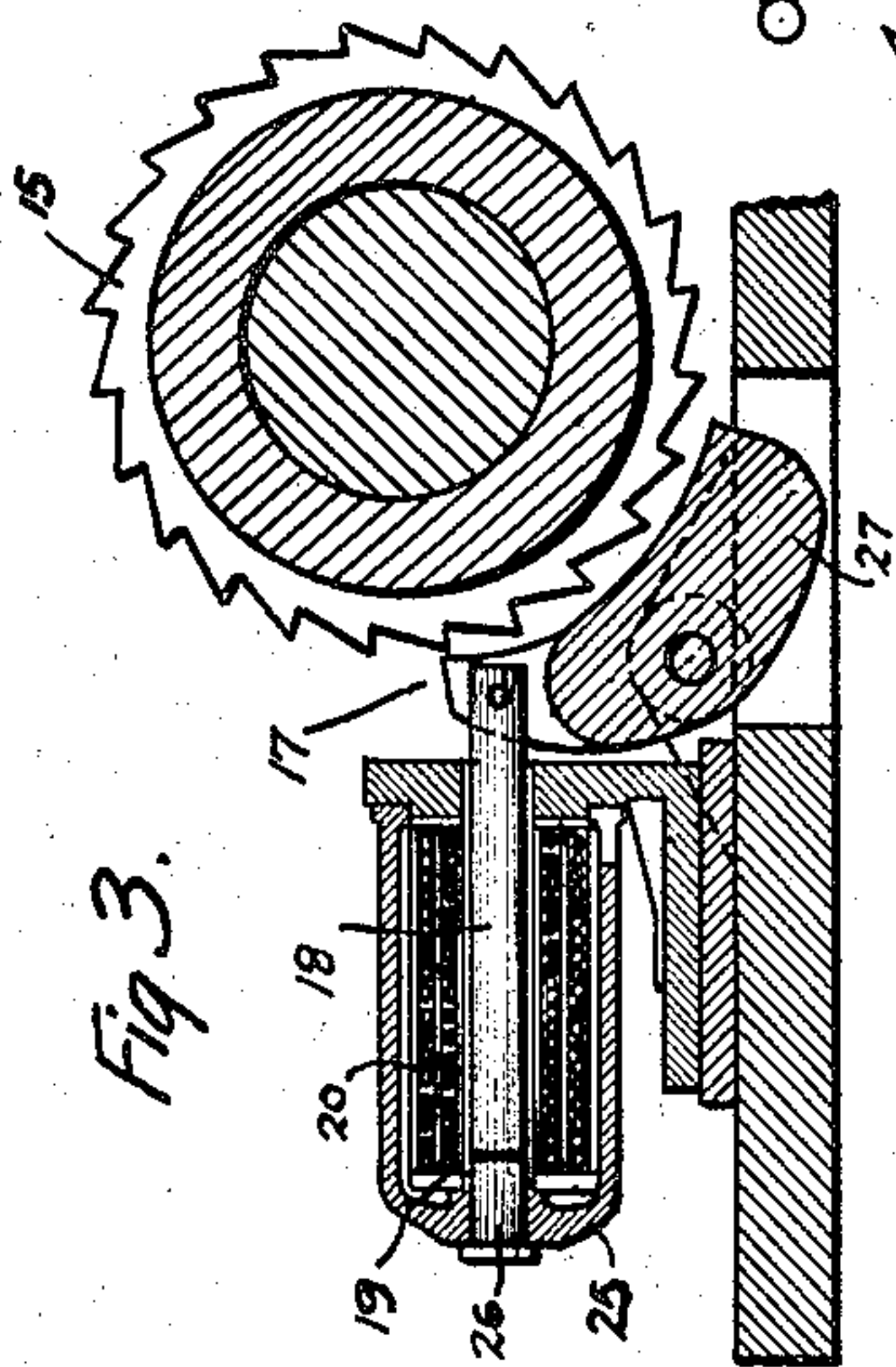


Fig. 3.

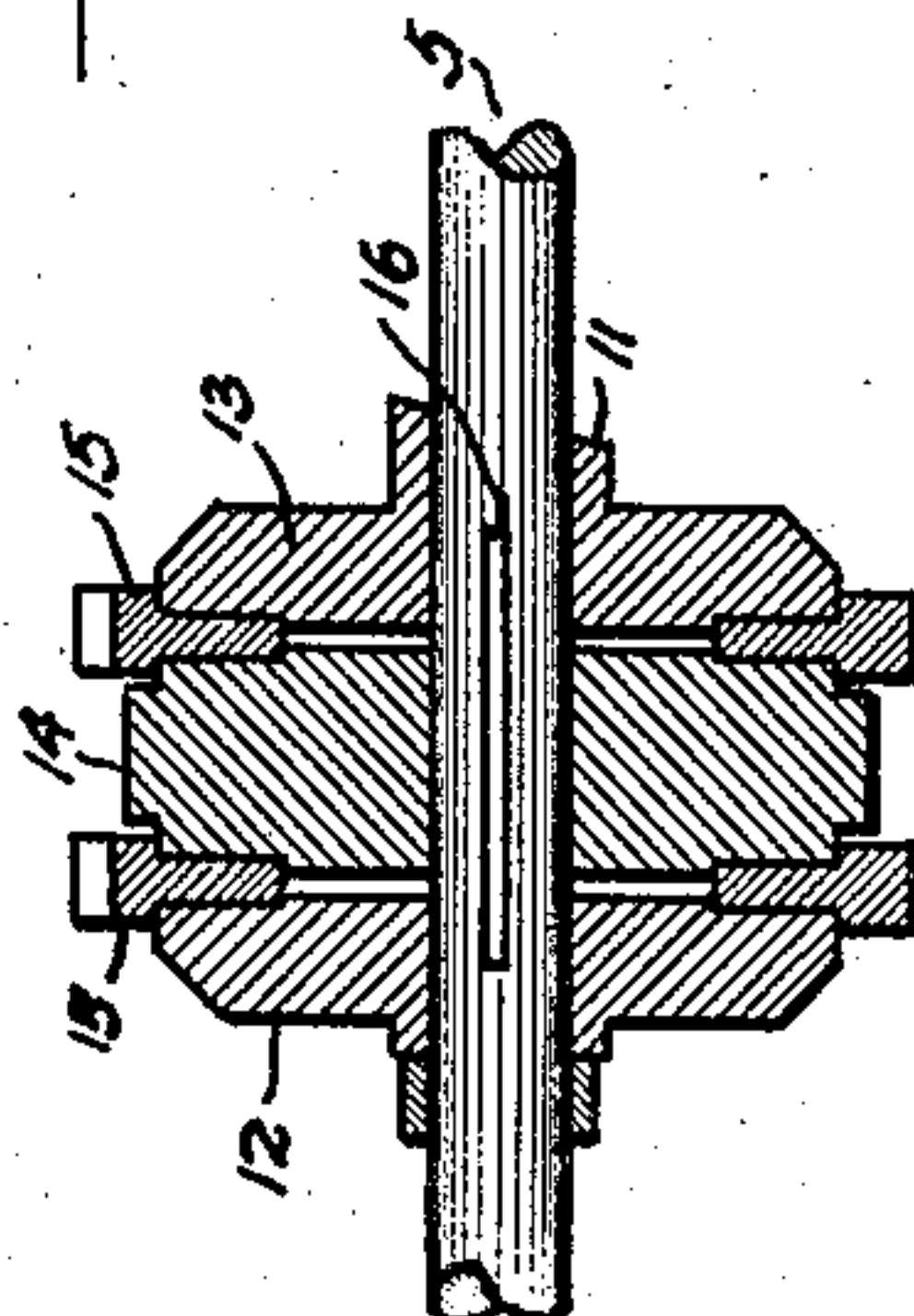


Fig. 2

WITNESSES:

Brennan West.
W. H. Browning.

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UNITED STATES PATENT OFFICE.

VICTOR R. BROWNING AND EARL H. BROWNING, OF NOTTINGHAM,
OHIO.

SAFETY LOWERING DEVICE.

No. 814,828.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed May 10, 1904. Serial No. 207,343.

To all whom it may concern:

Be it known that we, VICTOR R. BROWNING and EARL H. BROWNING, citizens of the United States, residing at Nottingham, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Safety Lowering Devices, of which the following is a specification.

This invention relates to hoisting machinery, and has particular reference to an automatically-controlled safety lowering device for the same, the object of the invention being the production of a device of this character which will throw itself out of operation while hoisting a load, but which will upon the reversal of the hoisting-motor automatically control the descent of the load, and thus prevent any possibility of accident.

In the accompanying drawings, forming a part of this application, Figure 1 is a plan view of a trolley for use in hoisting machinery, said view also showing diagrammatically electrical connections for controlling the same. Fig. 2 is a fragmentary sectional view taken substantially through the center of the disks and ratchet-rings of the safety lowering device, and Fig. 3 is a view taken at right angles thereto on the line 3 3 of Fig. 1.

In the raising and lowering of heavy loads there is always danger of some breakage in the machinery or of too sudden descent of the load, either of which will result in a loss of control of the latter, which is liable to cause serious accident. It is therefore desirable to interpose in the train of the hoisting mechanism a safety device which is always ready to arrest the machinery in case either of the above contingencies arise.

In the patent issued to E. H. Browning and Victor R. Browning January 27, 1903, No. 719,182, there is shown a hoisting mechanism similar to the one that is represented in Fig. 1 of this application, said patent also showing a conventional form of safety lowering device. Inasmuch as substantially the same mechanism for hoisting and the same electrical connections are shown in said patent, I will refer to the same for a description of these parts and will make the present description as brief as will suffice to disclose the subject-matter of the present invention.

Referring to the accompanying drawings, in which similar reference characters designate corresponding parts throughout the sev-

eral views, 1 represents the hoisting-drum of the trolley, and 2 the motor for driving the same, said motor being geared with the drum by suitable mechanism.

3 is the commutator of an electric generator which furnishes the current for driving the motor, and 4 is a controller by means of which the direction of the current through the field-magnet coils may be reversed.

The conductors leading to the field-magnet coils are connected with the motor at the points F F', and the conductors leading to the armature are represented at A A'. As is well known, the direction of rotation of the motor-armature can be reversed by simply reversing the direction of the current through the fields or through the armature. The connections shown are intended to reverse the current through the fields.

The disks and ratchets of the safety lowering device are shown in Fig. 1 as mounted upon a shaft 5, said shaft also carrying gears 6, 7, and 8, through which power may be transmitted to the hoisting-drum. The gears 6 and 7 are mounted upon a sleeve 9, which is loose upon the shaft 5, and the gear 8 is secured to the shaft. The end of the sleeve 9 next to the safety lowering device is provided with helical surfaces 10, which contact with corresponding surfaces on the adjacent disk of the lowering device, one of said latter surfaces being indicated at 11 in Fig. 2. The sleeve 9 and the various disks and ratchet-rings of the safety lowering device are so proportioned that they almost cover the shaft 5 between its end bearings.

By referring to Fig. 2 it will be seen that the safety lowering device has outer disks 12 and 13 and an inner disk 14, between which are mounted the ratchet-rings 15. The disks are so mounted on the shaft that there may be a slight lateral movement thereon; but they are forced by the key 16 to turn therewith.

As will be understood, when the motor 2 is started the shaft 5 will be held from turning because of the resistance due to the gearing and to the load until the sleeve 9 cams the disks 13 and 14 laterally into close frictional engagement with the ratchet-rings 15, after which the sleeve and the disks move together as one shaft. The pitch of the helical surfaces is so slight that when the current is thrown off of the motor the sleeve and disks

will not move apart, but will remain in the position to which they were forced when the motor was turning. This being true, it will be obvious that if the disks are held from rotation the entire mechanism will be held
5 against movement.

To lock the disks against rotation, the ratchet-rings 15 are placed between the disks so that they are very firmly pinched
10 thereby, and a pawl 17 is provided for engaging the ratchets to hold the rings. When so held, there can be no descent of the load unless the rings slip between the disks, and the friction between these parts is so great that
15 there can be no movement unless the motor is actually driven in a reverse direction.

It is desirable to have the pawl 17 entirely disconnected from the ratchet-rings while the load is being hoisted, and for this reason we
20 provide electrical means for drawing the pawl backwardly out of engagement at this time, said means being shown most clearly in Figs. 1 and 3. 18 represents an armature-plunger which is adapted to be acted upon by
25 the coils of the two solenoids 19 and 20. One of these solenoids is connected, through the wires 21 and 22, with the field-magnet coils of the motor, and the other solenoid is connected, through the wires 23 and 24, with the arma-
30 ture-circuit. These two solenoids are arranged concentrically about the armature-plunger, and for the purpose of increasing their magnetic effect they are surrounded by an iron shell 25. Also in order to prevent
35 the entrance of dust within the shell the opening into the latter opposite the plunger is closed by a suitable plug 26. From this description it will be understood that when the armature-plunger is drawn into the solenoids
40 the pawl 17 will be released from engagement with the ratchet-rings and the latter will be free to turn while the motor is hoisting the load. In order to attract the armature in this manner, however, it is necessary for the
45 currents in the solenoids to flow in the same direction, so that they will add their strengths together. When, however, the current is reversed in the field-coils of the motor, it is also reversed in the solenoid—that is, in series
50 therewith—so that the current in one solenoid substantially neutralizes the magnetic effect of the current in the other solenoid, with the result that there is not sufficient attraction of the armature-plunger to prevent the en-
55 gagement of the pawl with the ratchet-rings, as the pawl is weighted at its lower end, as shown at 27, so that it is tipped forward into engagement with the rings. This same ac-
60 tion takes place when the current is cut off entirely, so that when the motor is stopped altogether or when it is driven backwardly while the load is being lowered the pawl will be in engagement with the rings and will hold the load under complete control.

65 Having thus described our invention, what

we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In hoisting apparatus, a driven member, a motor for turning said member, and gearing connecting said motor and member, a safety
70 lowering device in said gearing, said device having a solenoid that is in series with the motor, and means for reversing the direction of current through said solenoid and motor.

2. In hoisting apparatus, a driven member, 75 a motor for driving said member, and gearing connecting said motor and member, a safety lowering device in said gearing, said device having clamping-disks and ratchet-wheels, and a pawl adapted to engage said ratchet-
80 wheels, a solenoid adapted to control said pawl, connections placing said solenoid in series with the said motor, and means for reversing the current through the said solenoid and motor, for the purpose specified. 85

3. In hoisting apparatus, a motor, a driven member, and gearing connecting said motor and member, a safety lowering device interposed in said gearing, said device having
90 clamping-disks and ratchet-rings, and a pawl for engaging said rings, a plunger connected with said pawl, and a pair of solenoids surrounding said plunger, one of said solenoids being in series with the motor-armature, and the other solenoid being in series with the
95 motor-fields, and means for reversing the direction of the current through one of the solenoids.

4. In hoisting apparatus, a motor, a driven member, gearing connecting the motor and
100 member, and a safety lowering device interposed in said gearing, said device having clamping-disks and ratchet-rings and a pawl for engaging with said rings, said pawl being adapted to normally engage the rings, a plun-
105 ger connected with said pawl, and a pair of solenoids surrounding said plunger, one of said solenoids being in series with the motor-armature, and the other solenoid in series with the field-coils of the motor, and means
110 for reversing the current through the fields, whereby when the motor is turned in a reverse direction, the currents in the solenoids will flow in opposite directions and will thus neutralize their effect upon the plunger so that
115 the pawl can engage with the ratchet-rings.

5. In hoisting apparatus, a motor, a driven member, gearing connecting said motor and member, a safety lowering device interposed
120 in said gearing, said device having clamping-disks and ratchet-rings and a pawl for engaging said rings, a plunger connected with said pawl, and a pair of solenoids surrounding the plunger, one of said solenoids being in series with the motor-armature and the other so-
125 lenoid in series with the motor-fields, a metallic shell surrounding the said solenoids, and means for reversing the current through the armature-fields and one of the solenoids, for the purpose specified. 130

6. In hoisting apparatus, a motor, a driven member, gearing connecting said motor and said member, a safety lowering device interposed in said gearing, said device having
5 clamping-disks and ratchet-rings and a pawl engaging said rings, and means for holding said pawl out of engagement with said rings while the motor is turned in one direction, and for permitting the pawl to engage the
10 rings while the motor is turned in the reverse direction.

7. In hoisting apparatus, a motor, a driven member, gearing connecting said motor and said member, a safety lowering device interposed in said gearing, said device having
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clamping-disks and ratchet-rings and a pawl for engaging said rings, said pawl being adapted to engage the rings when the motor is stopped or is turning in one direction, and means for holding said pawl out of engagement while the motor is turned in the opposite direction. 20

In testimony whereof we affix our signatures in the presence of two witnesses.

VICTOR R. BROWNING.
EARL H. BROWNING.

Witnesses:

W. H. WHEELER,
H. B. STRONG.