No. 781,051. PATENTED JAN. 31, 1905.

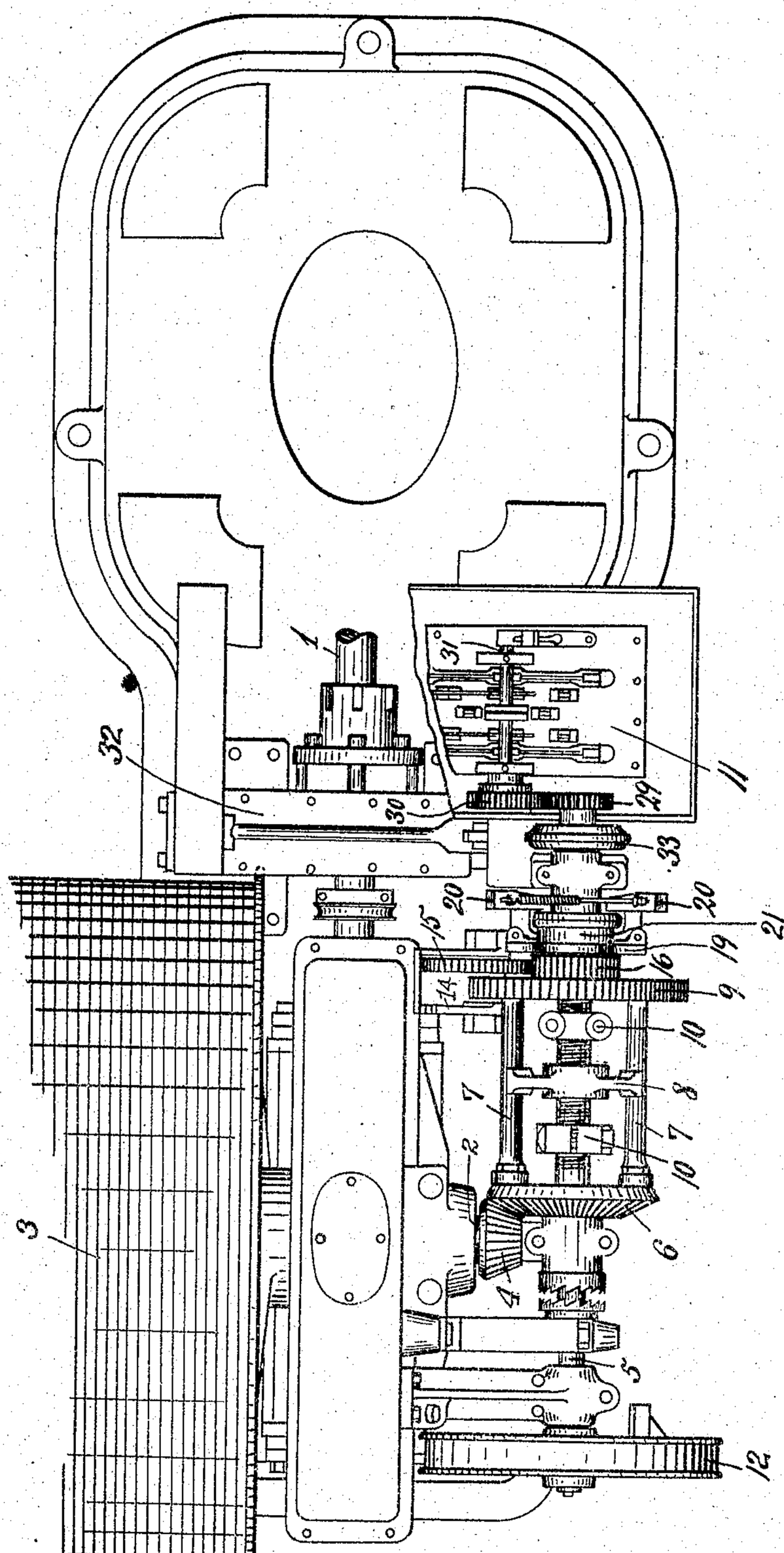
D. H. DARRIN.

AUTOMATIC STOP MECHANISM FOR ELEVATORS.

APPLICATION FILED APR. 1, 1903.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses
Julian D. Wootten
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3 SHEETS—SHEET 2.

Fig. 2

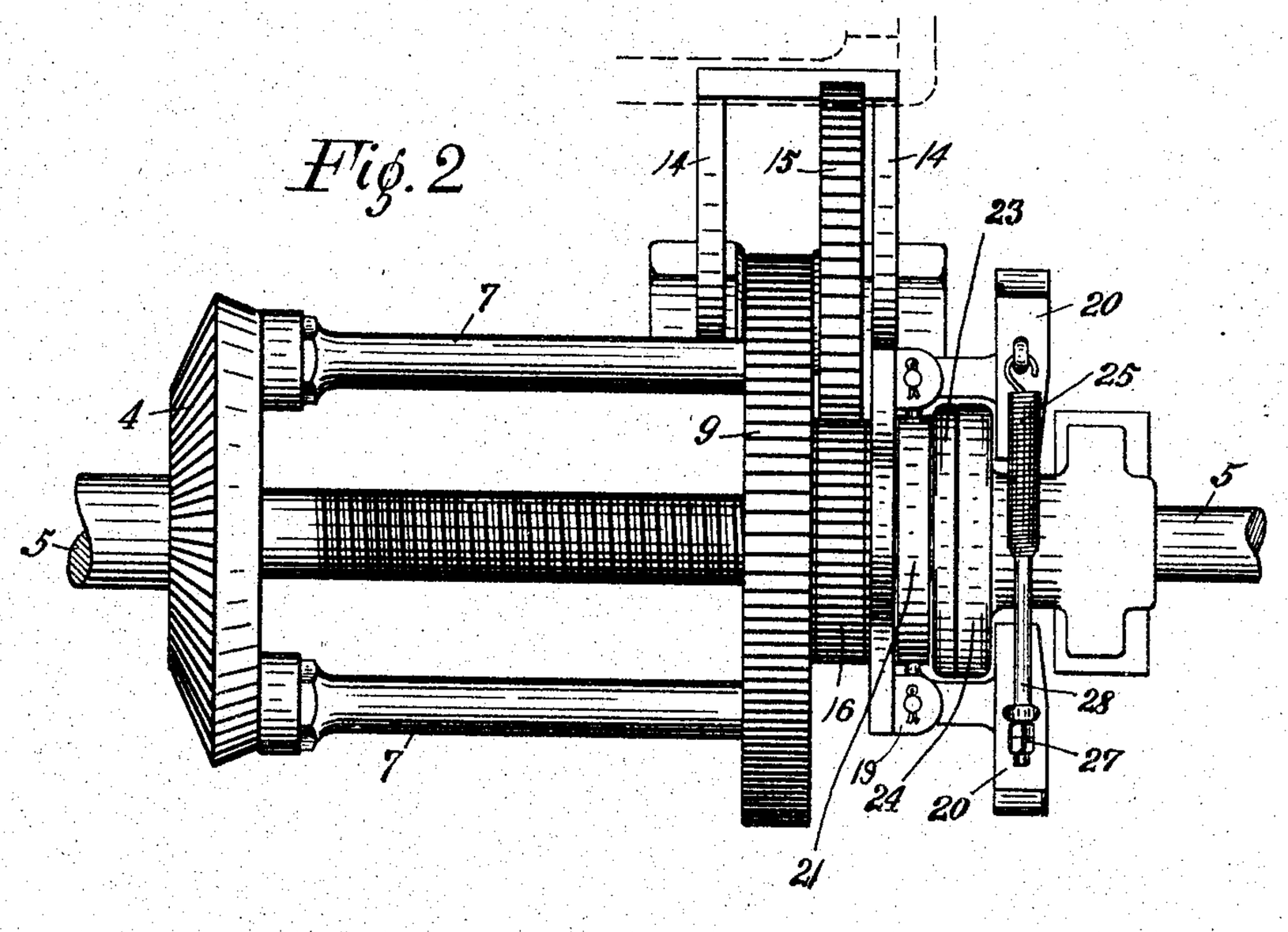


Fig. 3

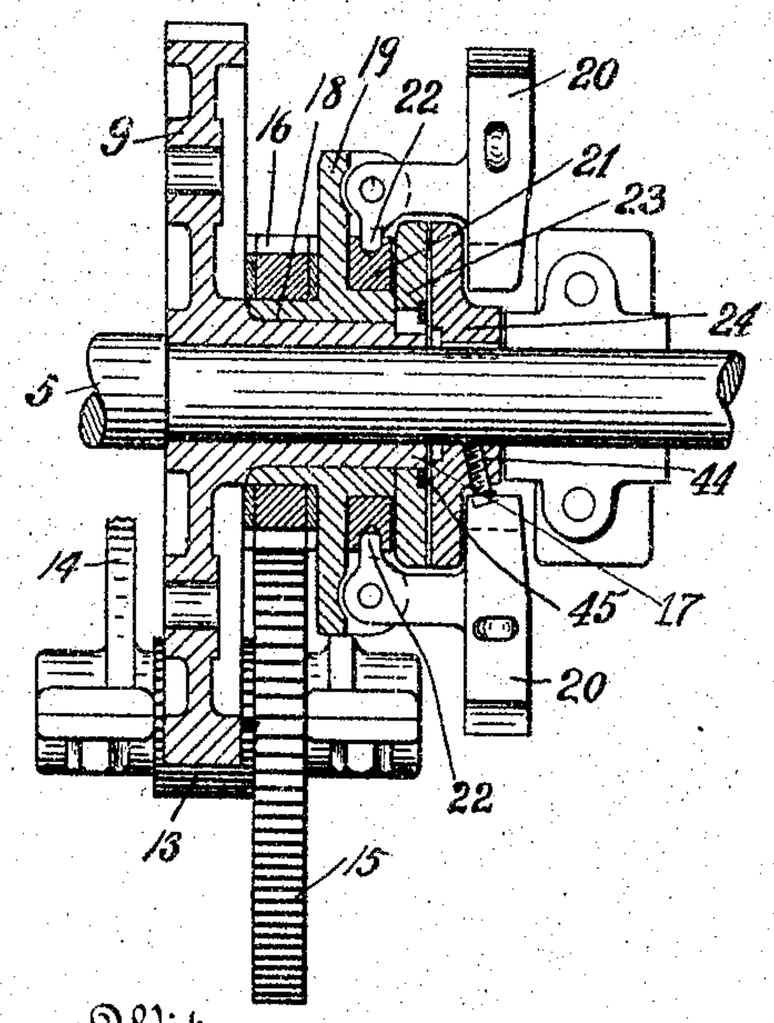
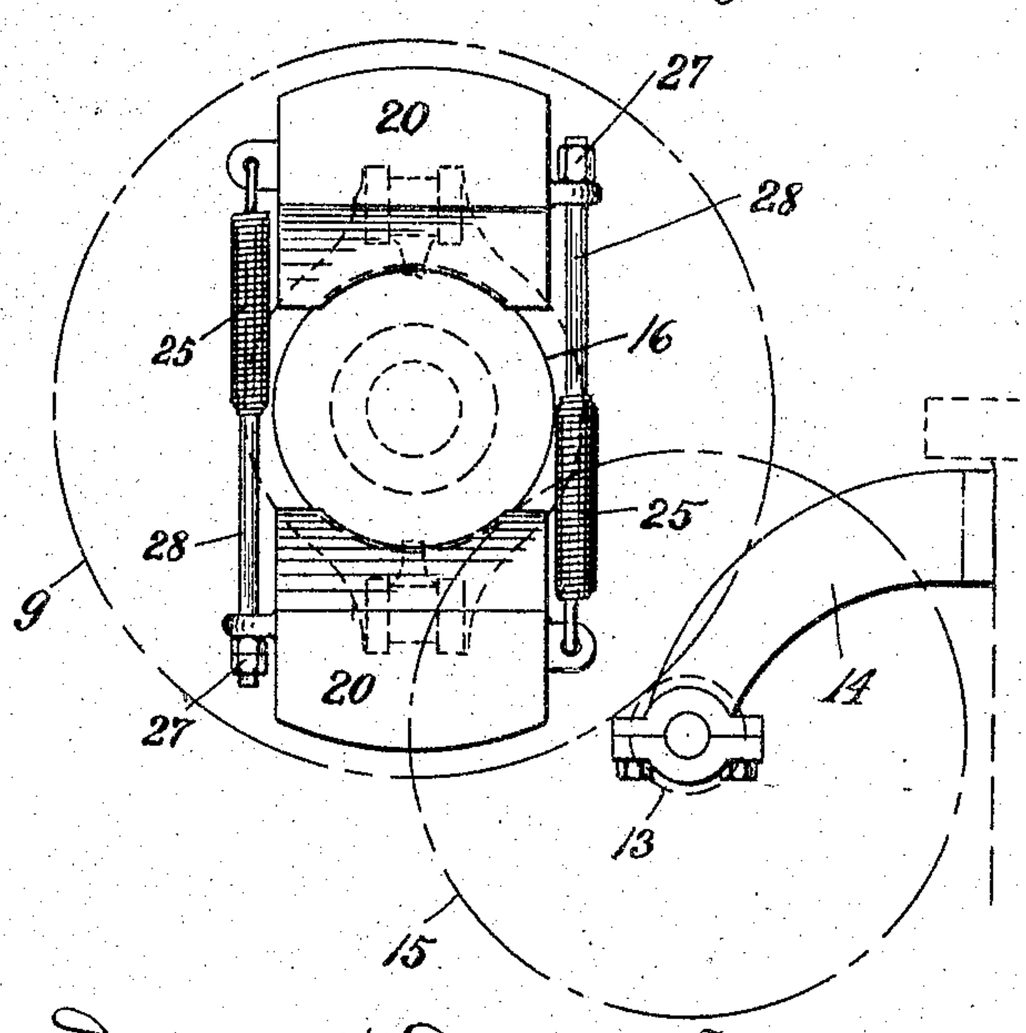


Fig. 4



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3 SHEETS—SHEET 3.

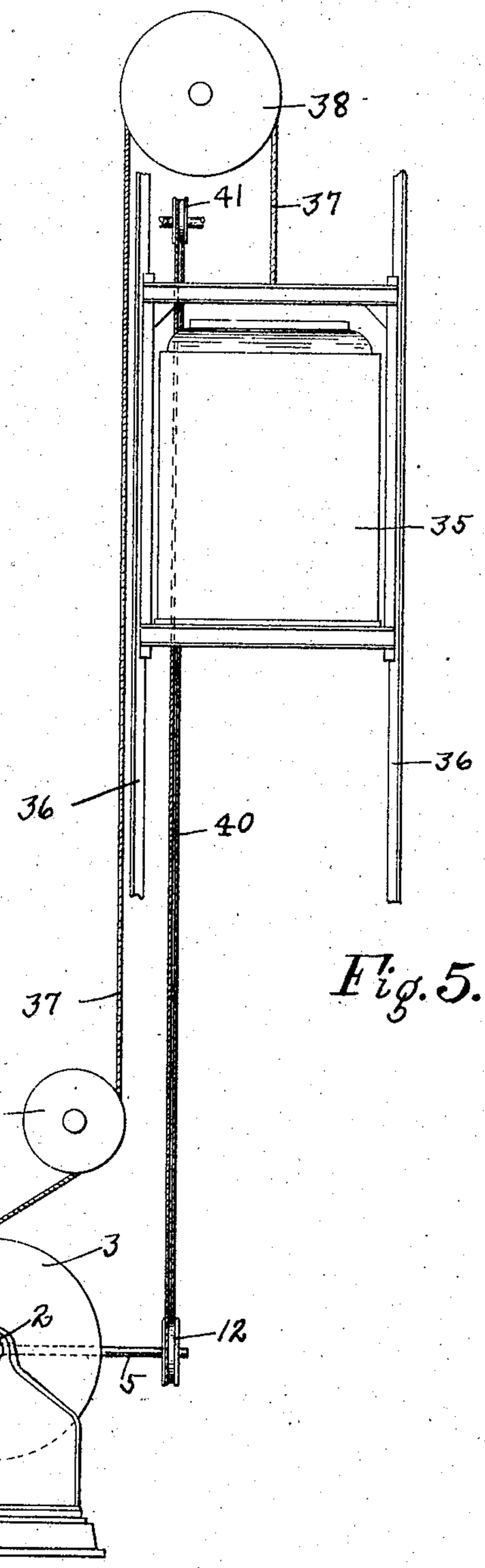

Fig. 5.

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No. 781,051. Patented January 31, 1905.

UNITED STATES PATENT OFFICE.

DAVID H. DARRIN, OF NEW YORK, N. Y.

AUTOMATIC STOP MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 781,051, dated January 31, 1905.

Application filed April 1, 1903. Serial No. 150,504.

To all whom it may concern:

Be it known that I, DAVID H. DARRIN, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Stop Mechanism, of which the following is a full, clear, and exact specification.

This invention relates to automatic stop mechanism for elevators, and more particularly to a safety mechanism which operates to throw off the power and set the brake when the speed of a driven shaft—as, for instance, a shaft connected with the power-controller—becomes too great.

The objects of the invention are to automatically throw off the power and to apply the brake in such a manner that it will have no tendency to produce too sudden a stop or to overshift and release before the car has stopped. In order to attain these objects, I propose to actuate the power-controller and the brake through clutch mechanism which shall be operated at such slow speed as to at all times operate gradually and surely and which shall be controlled by a governor operated from a driven shaft—as, for instance, the drum-shaft. It is preferable to use a governor having a high speed in order that its sensitiveness and efficiency may be thereby increased. A difficulty heretofore has been to devise connections between the governor, the controller, and the brake that would be reliable and certain when actuated suddenly while the parts are working at a high speed. I overcome this difficulty by actuating the brake and the power-controller through mechanism which moves at a relatively low speed, but controlled by the governor, moving at a different though preferably higher speed. I am thus enabled to use governors having any desired speed without doing more than vary the ratio between the speeds of the governor and the mechanism which actuates the power-controller. The advantages of having the speeds of the governor and the mechanism actuating the power-controller independent of each other, so that one is not limited by the other, may be readily seen.

Having thus stated the objects and nature of my invention, I will more particularly describe it with reference to the form thereof shown in the accompanying drawings, in which—

Figure 1 shows in plan the invention applied to an electric-elevator hoisting-machine. Fig. 2 shows a plan view of the invention detached. Fig. 3 shows a sectional view, and Fig. 4 shows an end view. Fig. 5 is an elevation showing a complete elevator system to which the invention is applied.

35 represents an elevator-car moving between guides 36 and supported by a cable 37, attached to the drum 3 and passing over sheaves 38 39.

40 is a hand-rope which passes through the car and over the sheaves 12 and 41, so as to enable the operator on the car to control the motor in the usual manner.

1 represents the motor-shaft, geared to the driving-shaft 2 of the winding-drum 3. The shaft 2 carries a gear-wheel 4, meshing with a gear 6, turning freely on the controller-operating shaft 5. The shaft 5 has a threaded portion on which a wing-nut 8 travels. Rigidly connected by the bars 7 with gear 6 is a gear 9, which is mounted on the shaft 5 so as to turn independently. The wing-nut 8 engages the bars 7 and is rotated by them, at the same time traveling longitudinally on the threaded portion between the adjustable stops 10, one of which engages the nut 8 when the elevator is at the top of its travel and the other when it is at the bottom. Whenever the nut engages either of the stops 10, the shaft 5 is turned and the controlling-switch 11 is automatically thrown out and the brake applied. The shaft 5 is ordinarily operated by the sheave 12, which is turned by means of a cable controlled by the operator for starting and stopping.

My invention particularly resides in a device which will automatically operate the shaft 5 to throw off the power and set the brake when the speed becomes too great.

Turning freely on the shaft 5 is the gear 9, which meshes with a pinion 13, carried in a hanger 14. Rigidly connected with the pinion 13 is a gear 15, which meshes with a pinion 16. The pinion 16 is secured to a carrier

18, which is driven from the driving-gear 9 through 13 and 15. In order to make the construction compact, the carrier is in the form of a sleeve and is mounted on the clutch-sleeve 17, shown as the hub of the gear 9; but it may be connected with the driving mechanism in other ways. The carrier or sleeve 18 has two lugs 19, in which are pivoted two levers having governor-balls or weights 20. The governor-balls are carried on bell-cranks or angle-levers, one arm 22 engaging a ring 21, which is mounted to slide and rotate freely on the sleeve 18. This ring 21 preferably has holes into which the arms 22 of the levers engage. The ring 21 abuts against a sliding clutch-disk 23, which is splined to the clutch-sleeve 17 or hub of the gear 9. 24 is a corresponding clutch-disk keyed to the shaft 5 and also fastened by a set of screws 44.

45 is a spring for disengaging the clutch-disks.

25 represents springs attached to lugs on the governor-balls 20. The tension of the springs is adjusted by means of nuts 27 on threaded rods 28, with which the springs 25 are connected. Consequently the greater the tension of the springs the greater the speed necessary to throw the balls out to engage the clutch. The balls are interconnected and act in unison on the clutch-disk 23 through the ring 21. I have shown two governor-balls; but it is obvious that more than two could be used.

The end of the shaft 5 carries a gear 29, which meshes with a gear 30 on the shaft 31 of the switch 11. The switch shown is a well-known type of mechanically-operated reversing-switch and need not be further described.

32 is a brake-shoe operating on a brake-wheel, (not shown,) and operating to apply the brake from the shaft 5 by an eccentric 33 whenever the shaft is operated.

Assuming the shaft 2 in motion, the gears 4, 6, and 9 will also be in motion. The nut 8 will be traveling on the threaded portion of the shaft 5, which latter will be at rest. The gear 9, through the intermediate gears 13 and 15, will rotate the gear 16, which drives the carrier 18, and thereby rotates the governor-balls 20 and the ring 21. The governor-balls rotate about twenty times as rapidly as the gear 9 and the clutch-disk 23. This ratio may of course be varied as desired. Should the speed become too great, the balls will move outward slightly, their centrifugal force overcoming the tension of the springs 25, and thereby throw the clutch-disk 23 into engagement with the disk 24. The shaft 5 is rotated, and thereby opens the switch 11 through the gears 29 and 30 and shaft 31 and applies the brake. The gears 29 and 30 may be varied to change the ratio between the shafts 5 and 31. A valve or other power-controlling device can be actuated in the same manner. The speed with which the shaft 5 is moved will be comparatively low, not usually over fifteen revolutions per minute, and consequently there will be only a fraction of the jar and shock there would be if the clutch was rotating as fast as the governor. As has been stated, a high-speed governor is preferable, and I consider the combination of a high-speed governor with a low-speed clutch a very valuable feature of my invention.

It will be seen that I have combined with the ordinary manual controlling mechanism an automatic end stopping mechanism and an automatic speed-governor each adapted to operate on a single shaft independently of the other.

It will be understood that I do not confine myself to the specific details described, as the invention is capable of modification according to the conditions to be met. I do not limit myself to the application of this invention to elevators, as in addition to types of elevators other than that shown the invention is applicable to many other uses where the speed of a shaft is to be controlled.

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

1. The combination of a power-controller, a governor, and a releasable connection between said power-controller and said governor, said connection being responsive to but operated at a lower speed than the governor, and adapted to operate said power-controller, substantially as described.

2. The combination with a driven shaft, of a power-controller, a governor driven from said shaft, and a releasable connection between said power-controller and said governor, said connection being responsive to but operated at a lower speed than said governor, for operating the power-controller, substantially as described.

3. The combination with a driven shaft, of a power-controller normally at rest, a governor driven from said shaft, and a releasable connection between said power-controller and said governor, controlled by said governor and rotating at a speed different from, but having a fixed ratio to the governor, for operating said power-controller automatically, substantially as described.

4. The combination with a driven shaft, of a switch, a rotatable shaft controlling said switch, a clutch member on said shaft, a rotating clutch member adapted to engage said member on the shaft, a governor controlling the engagement of said clutch members and rotating at a higher speed than the rotating clutch member, and means controlled by the governor for engaging the clutch members, substantially as described.

5. The combination of a switch, a shaft controlling said switch, a rotating governor and actuating connections between said shaft and

said governor, said connections rotating at an intermediate speed and being actuated by the governor, substantially as described.

6. The combination of a rotating shaft carrying a movable clutch member, a governor driven from said shaft at a higher speed than the shaft, and connections between said governor and said clutch member to actuate the latter, substantially as described.

7. The combination of a rotating shaft carrying a movable clutch member, a governor driven at a higher speed than the shaft, and connections between said governor and said clutch member to actuate the latter, substantially as described.

8. The combination of a rotating shaft carrying a movable clutch member, a governor rotatably mounted on said shaft, gearing between said shaft and said governor and means controlled by the governor for actuating the clutch member, substantially as described.

9. The combination of a rotating shaft carrying a movable clutch member, a governor rotating at a speed different from that of the shaft, a ring engaged by the governor and adapted to be moved to operate the movable clutch member, substantially as described.

10. The combination of a rotating shaft, a switch actuated thereby, a releasable connection between said shaft and said switch, a governor rotating at a higher speed than the shaft, and a ring actuated by said governor and adapted to complete the connection, substantially as described.

11. The combination of a rotating shaft carrying a movable clutch member, a governor and a slidable ring rotating at a higher speed than the shaft, said ring being moved automatically by the governor to actuate the clutch member, substantially as described.

12. The combination of a power-controller, a shaft normally rotating at a low speed for operating said power-controller, means for connecting the shaft and power-controller, and devices for actuating said connections, said devices rotating at a higher speed and acting automatically, substantially as described.

13. In an elevator safety-stop mechanism, the combination with a hoisting and power-controlling mechanism, of a safety speed-governor driven therefrom for shutting off the power when the speed becomes too great, a releasable device between the governor and the power-controller, and so connected with the governor as to be actuated without shock at a speed lower than that of the governor, substantially as described.

14. The combination with a normally rotating clutch member and a normally stationary clutch member, one of said members being movable to engage the other, of a governor rotating at a speed higher than that of the rotating member, and connections between the governor and said movable member to engage said members at the speed of the rotating member, substantially as described.

15. The combination with a driven shaft, of a movable clutch member rotating at a low speed, a rotatable governor, and a connection between said governor and clutch member for actuating the latter, said governor being mounted coaxially with the clutch member and rotating at a speed different from, but having a definite ratio to that of the clutch member, substantially as described.

16. The combination with a power-controller and a brake, of means for shutting off the power and applying the brake, comprising a shaft normally at rest, a second shaft normally rotating at a low speed, means for engaging the two shafts, and a governor rotating at a high speed and controlling the engagement of said two shafts, whereby the brake is applied at a low speed without shock or recoil, substantially as described.

17. The combination with a brake, of means for applying the brake, comprising a shaft normally at rest, a second shaft normally rotating at a low speed, means for engaging the two shafts, and a governor rotating at a high speed and controlling the engagement of said two shafts, whereby the brake is applied at a low speed without shock or recoil, substantially as described.

18. The combination with a driving-shaft and a controller-shaft, of manual means for operating said controller-shaft, means for operating it automatically at determined times, and means for operating it automatically when the speed of the driving-shaft exceeds a certain limit, comprising a governor rotating at a high speed, a clutching mechanism adapted to operate the controller-shaft, rotating at a lower speed, and connections between the governor and the clutching mechanism for actuating the controller-shaft automatically at the speed of the clutching mechanism, substantially as described.

19. The combination with a driving-shaft and a controller-shaft, of manual means for operating said controller-shaft, means for operating it automatically at determined times, and means for operating it automatically when the speed of the driving-shaft exceeds a certain limit, comprising a governor rotating at a high speed, a clutching mechanism adapted to operate the controller-shaft, rotating at a lower speed, and connections between the governor and the clutching mechanism for actuating the controller-shaft automatically at the speed of the clutching mechanism, said automatic mechanism being mounted on said controller-shaft, substantially as described.

20. The combination with a driving-shaft and a controller-shaft, of manual means for operating said controller-shaft, means for operating it automatically at determined times, and a governor and clutching mechanism for

operating it automatically when the speed of the driving-shaft exceeds a certain limit, said automatic devices being mounted upon said controller-shaft, substantially as described.

21. In an elevator safety stop mechanism, the combination with a car, hoisting and power-controlling mechanism, of a safety speed-governor for shutting off the power when the speed becomes too great, the devices controlling the power being so connected with the governor as to be actuated without shock, at a speed lower than that of the governor, and manually-controlled means for throwing the power on from the car, substantially as described.

22. In an elevator safety stop mechanism, the combination with a car, hoisting and power-controlling mechanism, of a safety speed-governor for shutting off the power when the speed becomes too great, the devices controlling the power being so connected with the governor as to be actuated without shock, at a speed lower than that of the governor, and manually-controlled means for actuating said power-controller from the car to throw the power on, substantially as described.

23. The combination of a power-controller, a governor, means responsive to, but operating at a speed lower than said governor, adapted to operate said power-controller to throw off the power, and manually-controlled means for actuating said power-controller to throw on the power, substantially as described.

24. The combination with a driving-shaft and a controller-shaft, of manual means for operating said shaft to throw the power on or off, means for operating it automatically at determined times to throw the power off, and a governor and actuating connections to operate it automatically to throw the power off when the speed of the driving-shaft exceeds a certain limit, substantially as described.

25. The combination with a brake, of a governor, and means adapted to operate said brake, between said governor and said brake, said means being responsive to, but operating at a lower speed than said governor, substantially as described.

26. The combination of a rotating shaft, a carrier rotatably mounted thereon, governor-balls pivoted on said carrier, means for driving said carrier at a higher speed than said shaft, and a clutch member carried on said rotating shaft and adapted to be actuated by said governor-balls to engage another clutch member, substantially as described.

27. The combination of a rotating shaft, a carrier rotatably mounted thereon, governor-balls pivoted on said carrier, means for driving said carrier at a higher speed than said shaft, means for regulating said governor-balls, and a clutch member carried on said rotating shaft and adapted to be actuated by said governor-balls to engage another clutch member, substantially as described.

28. In an elevator safety stop mechanism, the combination with a car, hoisting and power controlling mechanism, of a safety speed-governor for shutting off the power when the speed becomes too great, and manually-controlled means for throwing the power on from the car, substantially as described.

29. The combination with a driving-shaft and a controller-shaft, of manual means for operating said controller-shaft, means for operating it automatically at determined times, and means for operating it automatically when the speed of the driving-shaft exceeds a certain limit, comprising a governor rotating at a high speed, a clutch mechanism adapted to operate the controller-shaft, rotating at a lower speed, and connections between the governor and the clutching mechanism for actuating the controller-shaft automatically at the speed of the clutching mechanism, substantially as described.

30. The combination with a driving-shaft and a controller-shaft, of manual means for operating said controller-shaft, means for operating it automatically at determined times, and means for operating it automatically when the speed of the driving-shaft exceeds a certain limit, substantially as described.

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

DAVID H. DARRIN.

Witnesses:
F. G. TOWNSEND,
JULIAN S. WOOSTER.