

No. 837,960.

PATENTED DEC. 11, 1906.

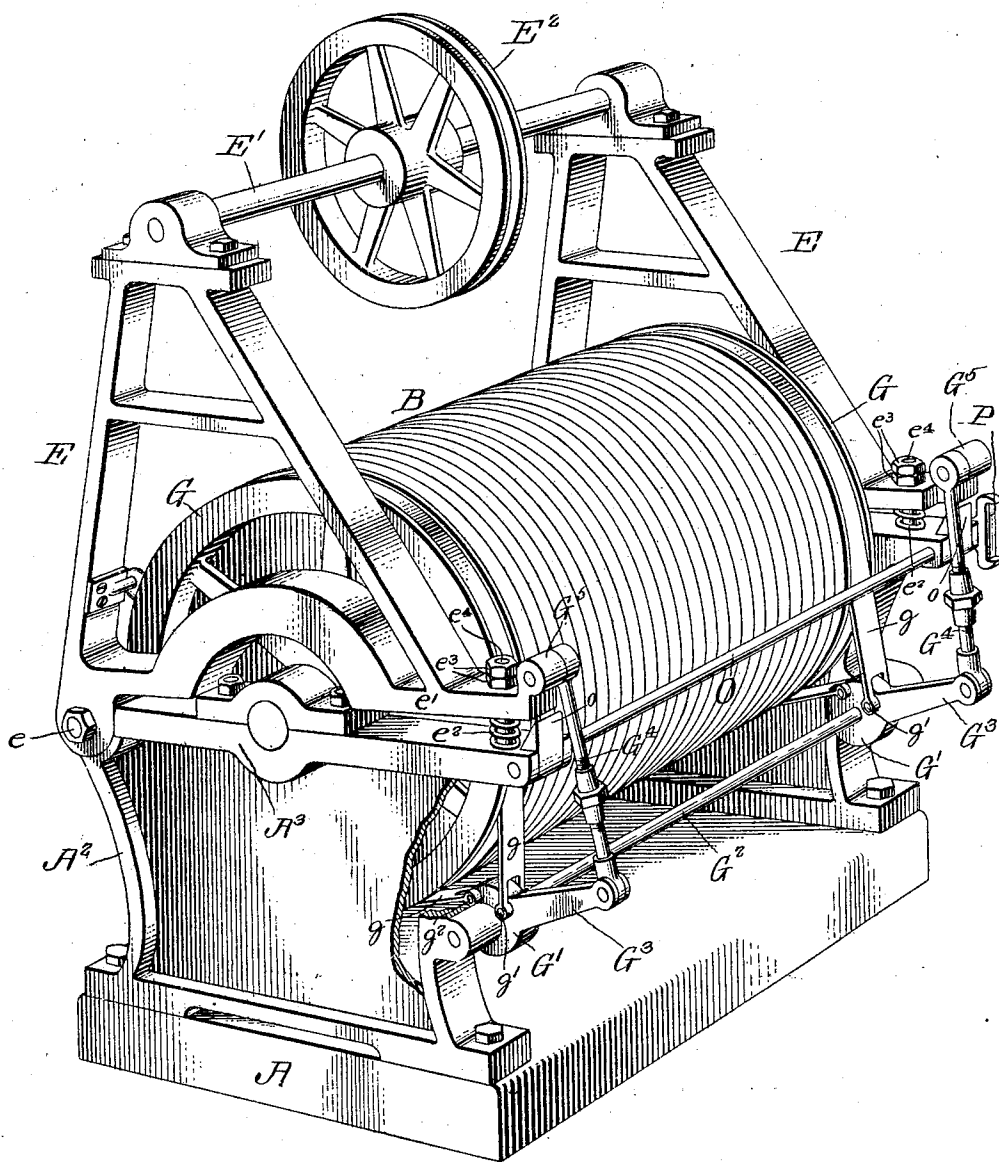
T. W. POWER & A. BOYINGTON.

ELEVATOR.

APPLICATION FILED JUNE 15, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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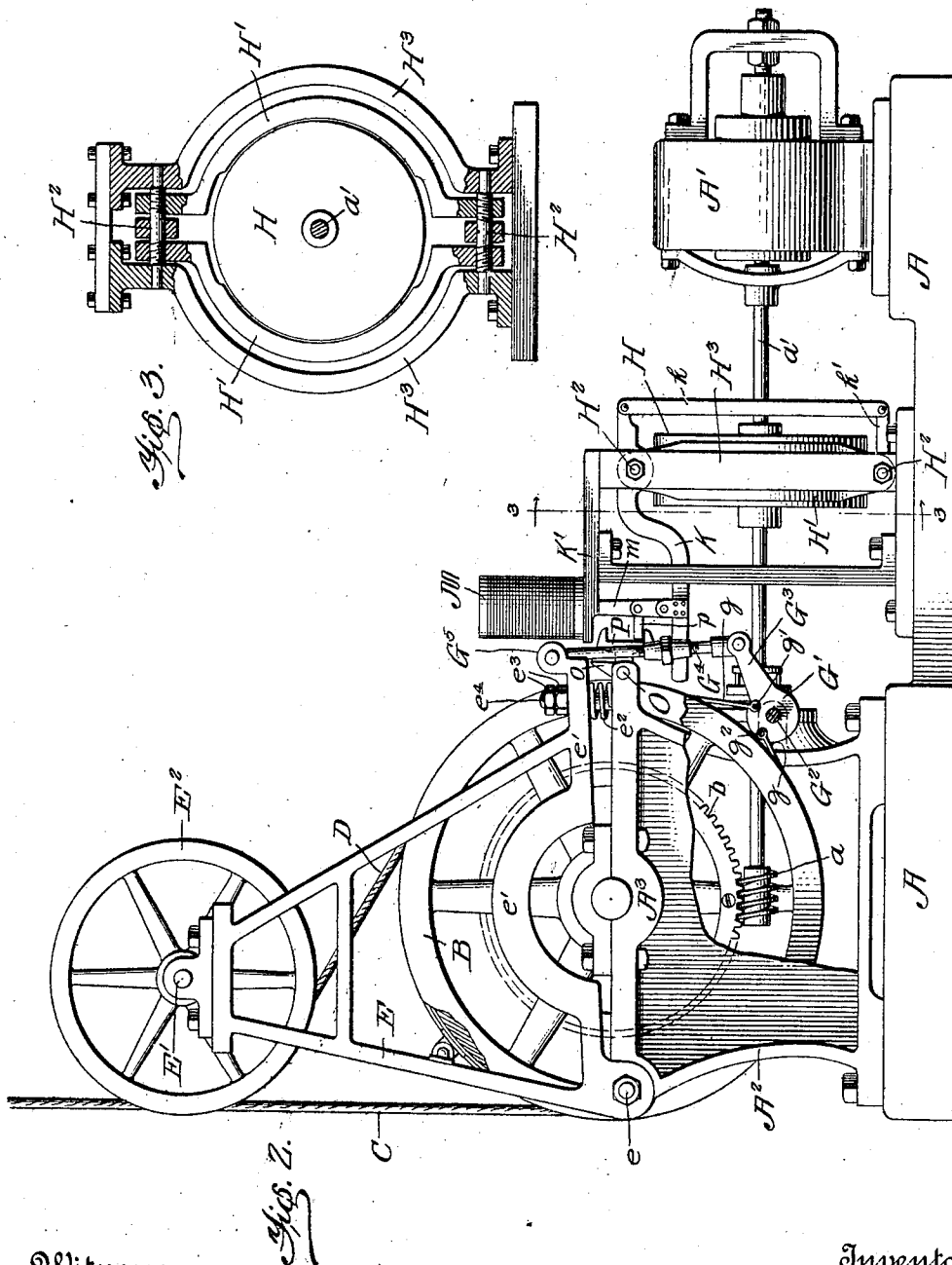
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UNITED STATES PATENT OFFICE.

THOMAS W. POWER AND ARTHUR BOYINGTON, OF WASHINGTON,
DISTRICT OF COLUMBIA; SAID BOYINGTON ASSIGNOR TO SAID
POWER.

ELEVATOR.

No. 837,960.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed June 15, 1906. Serial No. 321,816.

To all whom it may concern:

Be it known that we, THOMAS W. POWER and ARTHUR BOYINGTON, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

The invention to be hereinafter described relates to elevators, and more particularly to that type wherein the cage or car and its counterbalancing-weights are operated by cables from suitable actuating means.

In this general type of elevator system the actuating means for the cables is driven from a suitable motor through a system of gearing, and upon stopping the cage or car for any purpose the backlash, always present to a more or less extent, permits undesirable shocks and up-and-down vibrations to the car or cage before it finally comes to rest.

The present elevator service requires that the car or cage shall travel at high speed between stations and that it be stopped and started quickly; but under these conditions of service in the type of elevator referred to the shocks and vibrations become augmented to an annoying and dangerous extent.

With these general considerations in view the object of the present invention is to provide means whereby not only shall the car or cage be brought to rest at desired points, but all shock and vibration of the car or cage be prevented.

The invention consists of the parts and combinations to be hereinafter more fully described and then definitely pointed out in the claims.

In the drawings, Figure 1 is a perspective view of one embodiment of the present invention, a drum being shown as the actuating means for the cage and counterbalance-cables and some of the parts being omitted for clearness. Fig. 2 is an end elevation of the parts shown in Fig. 1 associated with the motor and other parts to be described, portions being broken away to show structures beyond; and Fig. 3 is a detached detail view of the main brake, parts being in section to show the quick-acting screw devices, the sections being on line 3 3, Fig. 2.

In the drawings, A A represent any form of base or support on which is erected the motor A' and other parts to be described. The motor A' is herein illustrated as being of the

electric type; but obviously any desired or preferred form of motor may be employed.

Upon the base A is the frame A², provided with the usual bearings A³ for the shaft of the usual winding-drum B, said drum B being driven from the suitable motor A' by means of the worm *a* on shaft *a'*, which engages the worm-wheel *b*, operatively connected to the drum B. The described worm and worm-wheel connection between the motor A' and drum B is found to be desirable, but other forms of gearing connection might of course be employed. The usual continuous or separate cables C and D, the former connected to the car or cage and the latter connected to the usual counterweight, wind about the drum B in opposite directions, as indicated in Fig. 2.

The parts thus far described are and may be of usual construction, and it will be noted that as the elevator-car is moved up or down in its usual guides by the actuating means the counterweight will move down or up, respectively, and the two be substantially counterbalanced. Owing to the backlash or play that is always present between the teeth of the gearing connecting the motor-shaft *a'* and drum B, especially when the parts become worn by use, the drum B will have a small oscillating movement on its axis under unusual strains placed upon the cables C and D. These varieties of strains are most marked when the car or cage is brought to a stop, and the more sudden the stoppage the more emphatic and objectionable will be the variations in such strains, thus imparting to the car or cage violent shocks up and down until it finally comes to rest. To meet these conditions and overcome these objections, we have devised the following construction, the details of which may of course be varied without departing from the spirit of the present invention.

Pivottally mounted at *e* to the frames A² at each end of the winding-drum are the frames E E, connected at the upper portion by a shaft or rod E', upon which loosely rotates and slides a guide-sheave E². The pivoted frames E E may for identification be termed the "momentum-frame." The base portion *e'* of each of the frames E E is extended transversely of the drum, and interposed between said base portions and the top of the main frame A² are the springs *e*² *e*², the ten-

sion of which may be adjusted by appropriate means, such as the nuts e^3 e^3 and screw-bolts e^4 .

The cable C, connected to the cage or car, may pass directly upward from drum B, as shown in Fig. 2, while the cable D, connected to the counterweight, passes about the guide-sheave, as shown; but obviously this arrangement may be changed.

From the above construction it will be seen that if sudden variations in strain be imparted to the cables C and D, as in the stopping of the elevator car or cage, the variations will be transmitted by the cable D to the momentum-frame E and cause said momentum-frame to move around its pivotal connections e with the main frame A^2 , compressing the springs e^2 , as will be obvious.

Operatively connected to the momentum-frame E is a momentum-brake applicable to the drum B under the conditions just above described. This momentum-brake may be variously formed and in the drawings is illustrated as a friction-band g , passing around a proper friction-pulley G, secured to the drum B, one end of said band g being secured at g^1 and the other end at g^2 to a hub G^1 , said hub being mounted on the shaft G^2 , carried in suitable bearings, substantially parallel to the axis of the drum B. This momentum-brake in the form just described or otherwise may be duplicated on each end of the drum, if desired. Projecting from the shaft G^2 is a brake-arm G^3 , connected by an adjustable link G^4 to the end G^5 of the momentum-frame, as shown in Figs. 1 and 2.

It will thus be seen that upon rotative movement of the momentum-frame about its pivotal connections e , due to the sudden variations in strain placed upon the cables C and D, not only will the momentum-frame compress the springs e^2 , but the momentum-brake will also be applied, the action of the momentum-brake being thus dependent upon the variations in strain upon the cables C and D, due to the momentum of the car and counterweight, as the car is brought to a stop.

Connected to the motor-shaft a' is the friction-wheel H, Fig. 3, about which extend the friction-straps H^1 H^1 , the ends of said straps being connected by quick-acting screws H^2 H^2 , said screws having appropriate bearings in the supporting-frames H^3 H^3 . Secured to one of the quick-acting screws H^2 is an actuating-lever K, one end of which is operatively connected to the other quick-acting screw H^2 by means of a link k and auxiliary lever k' , as best seen in Fig. 2. From this construction it will be apparent that if the lever K is turned about the axis of the quick-acting screws the friction-bands H^1 H^1 will be clamped on the friction-wheel H, such parts constituting the main brake for the elevator system.

Suitably disposed with respect to the brake arm or lever K and preferably supported upon the framework K' is a solenoid M, the core m of which extends toward and is jointed to the brake arm or lever K, as seen in Fig. 2. The solenoid M is appropriately disposed in a circuit of the starting and stopping mechanism controlled from the elevator car or cage.

From the construction described it will be noted that when the solenoid M is energized and the motor therefor in action the elevator is being moved and the friction-bands H^1 H^1 are out of substantial frictional contact with the friction-wheel H, the left-hand end of the brake lever or arm K being at such time raised, as will be obvious. When it is desired to stop the car, the circuit is manipulated to stop the motor and at the same time deenergize the solenoid M, whereupon its core m is allowed to fall under the weight of the brake-arm K or other appropriate means, and thereupon turn the quick-acting screws H^2 and apply the brake-bands H^1 H^1 to the brake-wheel, thus bringing the elevator cage or car to rest, the brake devices just described acting as the main elevator-brake. Should there be lost motion between the drum and its actuating means, the variations of strain on the cables C and D will cause the momentum-frame, under the impulse of the cable D, to be moved about its pivotal connection e and apply momentarily the momentum-brake, thereby preventing any back-and-forth movement of the drum and consequent shock to the car due to the lost motion or backlash between the drum and its actuating means. It will thus be seen that the momentum-frame and momentum-brake act only under the impulse and variations in strain upon the cables at the time of stopping the car, and at such time they cooperate to prevent the shocks referred to.

In order to guard against any application of the momentum-brake during the normal running movement of the elevator, we have provided a safety device to prevent action of the momentum-frame and momentum-brake at such time. This safety device comprises the toes o , secured to a rod O, extending transversely between the frames A^2 , said toes being adapted to swing with said rod to carry the ends of said toes beneath the base portions e' e' of the momentum-frame, thereby preventing the momentum-frame from turning downward against the springs e^2 while the toes are in such position. Connected to the transverse rod O, near one end thereof and adjacent the solenoid and its core, is a toe-actuator P, the upper and lower projecting end portions of which are adapted to be engaged by a projection p , extending from the core m of the solenoid when such core is raised or lowered. The construction is such that when the current is directed to

start the elevator, and consequently energize the solenoid, the projection *p* is raised and turns the toe-actuator *P*, thereby throwing the toes *o* beneath the base portions *e'* of the momentum-frame, so that said frame cannot, while the elevator is in motion, move about its pivotal connections *e* with the main frame. When, however, the current is directed to stop the elevator, the solenoid is energized and the core *m* falls, so that the projection *p* engages the lower portion of the toe-actuator, thereby moving the toes *o* out from under the base portions *e'* of the momentum-frame, so that said frame is free to be actuated, as hereinbefore already described.

While we have shown and described the above as one of the forms and embodiments of the present invention, it is to be understood that variations may be made in the construction and different forms and characters of parts may be employed to carry the invention into practical effect, the essentials being that suitable means be employed to prevent shock to the elevator cage or car as it is being brought to a stop and that means be provided for preventing the action of the first-named devices while the car is being moved by the actuator or motor.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an elevator, a winding-drum, a cage or car cable, and a counterbalance-cable connected to said winding-drum, a motor, gearing connections between the motor and drum, and a momentum-brake operative as the car or cage is brought to rest to prevent shock to the car due to backlash in said gearing connections.

2. In an elevator, a winding-drum, a car or cage cable and a counterbalance-cable connected respectively to said winding-drum, a motor, gearing connections between the motor and drum, a main brake, and a momentum-brake operative as the car or cage is brought to rest to prevent shock to the car or cage.

3. In an elevator, a winding-drum, a car or cage cable and a counterbalance-cable, said cables connecting the car or cage and counterbalance to the winding-drum, a momentum-frame movable under variations of tension on said cables due to stopping the car or cage, and a momentum-brake connected to said frame.

4. In an elevator, a winding-drum, a car or cage cable and a counterbalance-cable, said cables connecting the car or cage and counterbalance to said drum, a pivotally-mounted momentum-frame movable about its pivot under variations of tension on said cables due to stopping the car or cage, and a momentum-brake connected to said frame.

5. In an elevator, a winding-drum, a car or cage cable and a counterbalance-cable, said

cables connecting the car or cage and counterbalance to the winding-drum, a momentum-frame movable under variations of tension on said cables due to stopping the car or cage, means for preventing movement of the momentum-frame as the car or cage is being raised or lowered by the drum, and a momentum-brake connected to said frame.

6. In an elevator, a car or cage cable and a counterbalance-cable, means for raising and lowering the car or cage, said cables connecting the car or cage and counterbalance to the said means, a motor, connections between the motor and said means, a momentum-frame, and a momentum-brake connected to said frame, said frame being operative to apply the momentum-brake under varying tensions on the said cables as the car or cage is being brought to a stop.

7. In an elevator, the combination of a main frame, a drum rotatable thereon, a car or cage cable and a counterbalance-cable, each connected to said drum, a tilting momentum-frame, means for normally holding said momentum-frame in tilted position, and a momentum-brake connected to said momentum-frame, variations in tension of said two cables causing the momentum-frame to move and apply the momentum-brake.

8. In an elevator, the combination of a main frame, a drum mounted thereon, a car or cage cable, and a counterbalance-cable connected to said drum, a momentum-frame pivotally mounted on the main frame, a guide-sheave carried by the momentum-frame and about which one of said cables extend, means for rotating said drum, devices for preventing tilting movement of the momentum-frame during normal running of the elevator, and a momentum-brake connected to said momentum-frame, said frame being rendered operative by tension on the cable passing about said sheave as the car is being brought to a stop.

9. In an elevator, the combination of a drum, cables connected to said drum, a motor, gearing connection between the motor and drum, a main brake, a momentum-brake, means for applying the main brake to stop the elevator, and means operable by variations in cable tensions as the elevator is brought to a stop to apply the momentum-brake.

10. In an elevator, the combination of a drum, cables connected to said drum, a motor, gearing connection between the motor and drum, a main brake, a momentum-brake, means for applying the main brake to stop the elevator and means operable by variations in cable tensions as the elevator is brought to a stop to apply the momentum-brake, and safety devices for preventing the application of the momentum-brake during normal running of the elevator.

11. The combination of an elevator-drum,

its frame and cables, a motor, gearing connections between the motor and drum, a tilting momentum-frame, a sheave carried by said frame and about which a cable passes, a momentum-brake for said drum connected to said frame, toes mounted on the drum-frame, an actuator for moving said toes beneath one end of the tilting momentum-frame to prevent operative movement of the momentum-frame during normal running of the elevator and removing the toes of such position as the elevator is being stopped to enable the said frame to tilt and apply the momentum-brake.

12. The combination of an elevator-drum, its frame, and cables, a motor, gearing connections between the motor and drum, a main brake, a tilting momentum-frame pivoted to the drum-frame, a momentum-brake connected to the said momentum-frame, toes movable beneath the tilting momentum-frame, a solenoid, and connection between it, said main brake and said toes, for the purpose described.

13. In an elevator, a car or cage cable and a counterbalance-cable, means for raising and lowering the car or cage, a motor, connections between the motor and said means, and a brake operative under varying tension of said cables to prevent shock as the car or cage is brought to rest.

14. In an elevator, a car or cage cable and a counterbalance-cable, means for raising and lowering the car or cage, a motor, con-

nections between the motor and said means, a brake operative under varying tension of said cables to prevent shock as the car or cage is brought to rest, and a safety device for preventing the application of said brake during normal running of the elevator.

15. In an elevator, a car or cage cable and a counterbalance-cable, means for raising and lowering the car or cage, a motor, connections between the motor and said means, a brake operative under varying tension of said cables to prevent shock as the car or cage is brought to rest, safety devices for preventing the application of said brake during normal running of the elevator, and a solenoid for moving the safety devices into and out of operative position.

16. In an elevator, the combination of a motor, means connected with said motor for raising and lowering the car, a brake-wheel connected to said motor, a friction-strap adapted to frictionally engage said brake-wheel, a quick-acting screw for operating said strap, a solenoid and intermediate connections between the solenoid and quick-acting screw for operating the latter.

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

THOMAS W. POWER.
ARTHUR BOYINGTON.

Witnesses:

JOHN T. POWER,
M. SCHILLING.