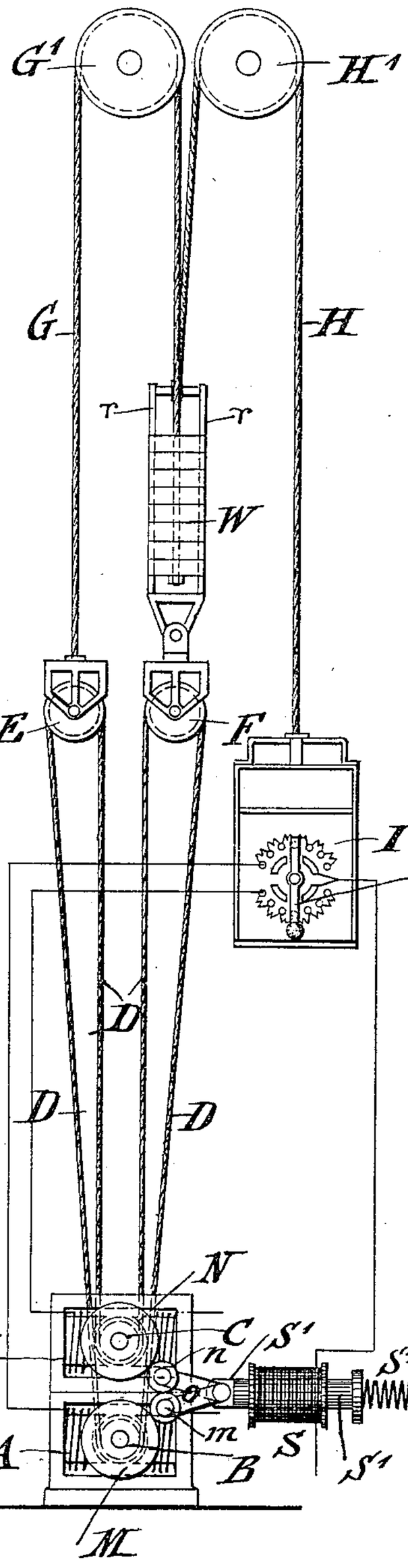
No. 658,587. Patented Sept. 25, 1900.

G. H. REYNOLDS.

ELEVATOR.

(Application filed July 17, 1900.)

(No Model.)



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ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 658,587, dated September 25, 1900.

Application filed July 17, 1900. Serial No. 23,875. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, a citizen of the United States, residing at New York, borough of Manhattan, State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to certain improvements in rope-driven elevators of that type for which Letters Patent were granted to Ethelbert M. Fraser respectively on September 6, 1898, and December 20, 1898, Nos. 610,481 and 616,096, and which is based on the combination of the driving-rope, suspension-ropes, car, and its counterweight, with two motors, which are adapted to run in opposite directions at the same or different relative speed, my improvement being designed with a view of producing the synchronous running of the motors whenever the car is stopped by means of a friction device, which is applied to disks on the motor-shafts simultaneously with the stopping of the car and automatically removed therefrom as soon as the car moves in one or the opposite direction by the differential speed imparted to the motors.

For this purpose my invention consists of an elevator which comprises two motors which are adapted to run in opposite directions at the same or at different relative speeds, pulleys on the shafts of said motors, an endless driving-rope connecting said pulleys with intermediate traveling pulleys, suspension-ropes connecting said traveling pulleys with the car and its counterweight, and a friction device which is applied to the motor-shafts whenever the motors are run at the same speed and released whenever the motors are run at differential speed.

The invention consists, further, of an elevator comprising two motors the shafts of which are adapted to run in opposite directions at the same or at different relative speeds, pulleys on the motor-shafts, intermediate traveling pulleys, an endless driving-rope passing over the motor-pulleys and the traveling pulleys, and an electrically-operated friction device which is applied to the motor-shafts whenever the motors are to be run at equal speed, but released from the motor-shafts when the motors are to be run at differential speed for moving the car in one or the other direction.

The invention consists, further, of certain details of construction and combination of parts, which will be fully described hereinafter and finally pointed out in the claims.

The accompanying drawing represents a diagrammatic side elevation of my improved rope-driven elevator with my improved friction device shown as applied to the motor-shafts.

Referring to the drawing, A A′ are two motors, which are adapted to be run in opposite directions to each other at the same or at different speeds.

B and C are driving-pulleys on the shafts of the motors, which are rotated independently of each other.

D is an endless driving-rope which passes around both driving-pulleys B and C and around traveling pulleys E and F. The traveling pulley E is connected by a rope G, which passes over an overhead sheave G′, with the counterweight W of the car I, while the traveling pulley F is suspended from the weight-supporting straps *r* and the latter connected by a rope H, passing over an overhead sheave H′, with the car I. The counterweight W acts not only as a counterweight for the car and its load, but secures also the frictional contact of the endless driving-rope with the peripheries of the driving-pulleys B and C, the weight of the car and its load being in certain fixed proportion to the counterweight.

The elevator so far described is practically the elevator shown and described in the Fraser patents referred to. A certain difficulty was experienced in operating this type of elevators, which consists in the lack of synchronism of the motors when it is desired to bring the car to a state of rest at the different landings. This lack of synchronism induces the car either to come to a stop before it arrives at its position of rest or to move slightly beyond this position before it comes to a stop. This forms a serious objection to this class of

elevators, and it is therefore necessary for remedying this defect to introduce an additional element—namely, a friction device which is put in action and applied at the proper time to the motor-shafts, so as to compel them to run synchronously when the car is to be stopped and to continue this synchronous speed during the time the car is stopped, while as soon as the friction device is disconnected or released from the motors they are run at different speeds, so as to move the car in one or the other direction.

The friction device consists of two disks M and N, which are keyed to the motor-shafts, and of two movable friction-disks *m* and *n*, which are placed in contact with each other and in intermittent contact with the peripheries of the disks M and N whenever it is desired to stop the car. The friction-disks *m* and *n* are supported by pivot-links *o o* at the end of the core S′ of a solenoid S, which core is acted upon by a helical spring S^2, interposed between the outer end of the core and a suitable stop-plate S^3, as shown at the lower part of the drawing. The solenoid S is placed in electric circuit with a controlling-switch T in the car in such a manner that the current is supplied to the solenoid when the car is in motion, or, in other words, when the motors are running at differential speed, while at the moment when the switch-lever is placed into a central position for stopping the car the circuit of the solenoid is interrupted and the latter deënergized, so that the spring S^2 will immediately act on the core S′ and force the friction-disks *m* and *n*, carried by the same, into contact with the friction-disks M and N on the motor-shafts, so that the accelerating action exerted by that friction-disk of the motor running at a greater speed on the intermediate friction-disks *m* and *n* will immediately exert an accelerating action on the friction-disk of the motor running at slower speed, so that the speed of the motors is quickly synchronized, and consequently the almost instant stoppage of the car obtained.

Supposing that the car is moving in downward direction and the motor A rotated at a greater speed than the motor A′, when the car is to be stopped the switch-lever is placed in its central position, in which position the current flowing through the solenoid is interrupted and the core moved by the action of its spring in lateral direction, so as to bring its friction-disks *m* and *n* in contact with the friction-disks M and N on the motor-shafts. The friction-disk M, rotating at greater speed, imparts an accelerating action to the intermediate disks *m* and *n*, which are in contact with each other and with the circumferences of the friction-disks M and N, and exerts thereby an accelerating motion on the friction-disk N, while the motion of the friction-disk M is retarded. This action produces quickly the synchronism of the motors, so that they rotate at the same speed and bring thereby the car to a direct or positive stop, the motors continuing at synchronous speed as long as the car is at rest. As soon as the car is to be moved again in either direction the position of the switch-lever is changed, the differential speed which is necessary to produce the motion of the car in one or the other direction is reëstablished, and simultaneously therewith current supplied to the solenoid, so that the core is drawn back against the tension of its spring, the frictional contact between the friction-disks *m n* and the friction-disks M N interrupted, and the normal running of the elevator under the differential speed of the motors produced.

The motors employed may be electrical or any other motors, while the construction of the elevator may be according to any arrangement, as I do not desire to confine myself specially to the construction shown. At the same time any other arrangement of synchronizing friction-gear may be used, as will be apparent to anyone conversant with elevator construction. Neither do I desire to confine myself to the electrical actuation of the friction-gear, as this may be accomplished either by hand, pneumatically, or otherwise.

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

1. The combination, with an elevator-car and its counterweight, of two motors adapted to be run in opposite directions to each other at the same or at different speeds, connections between said motors, car and counterweight, and a friction device applied to the motor-shafts for synchronizing the speed of the motors when the car is to be stopped and released therefrom when the car is to be put in motion, substantially as set forth.

2. The combination, with an elevator-car and its counterweight, of two motors adapted to be run in opposite directions to each other at the same or at different speeds, connections between said motors, car and counterweight, a synchronizing friction device acting on said motors, and means for operating said friction device so as to synchronize the speed of the motors whenever the car is to be stopped and reëstablish the differential speed of the motors when the car is to be put in motion, substantially as set forth.

3. The combination, with an elevator-car and its counterweight, of two motors adapted to run in opposite directions to each other at the same or at different speeds, connections between said motors, car and counterweight, a synchronizing friction-gear for said motors consisting of friction-disks on the motor-shafts, intermediate friction-disks placed in contact with each other, and mechanism to place the intermediate friction-disks in contact with the motor-disks when the motors

are to be synchronized and the car stopped, or to release the intermediate friction-disks from the motor-disks when the motors are to be run at differential speed for moving the car in one or the other direction, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

GEO. H. REYNOLDS.

Witnesses:
PAUL GOEPEL,
GEO. L. WHEELOCK.