E. BOENING.

FRICTION ROPE DRIVE ELEVATOR.

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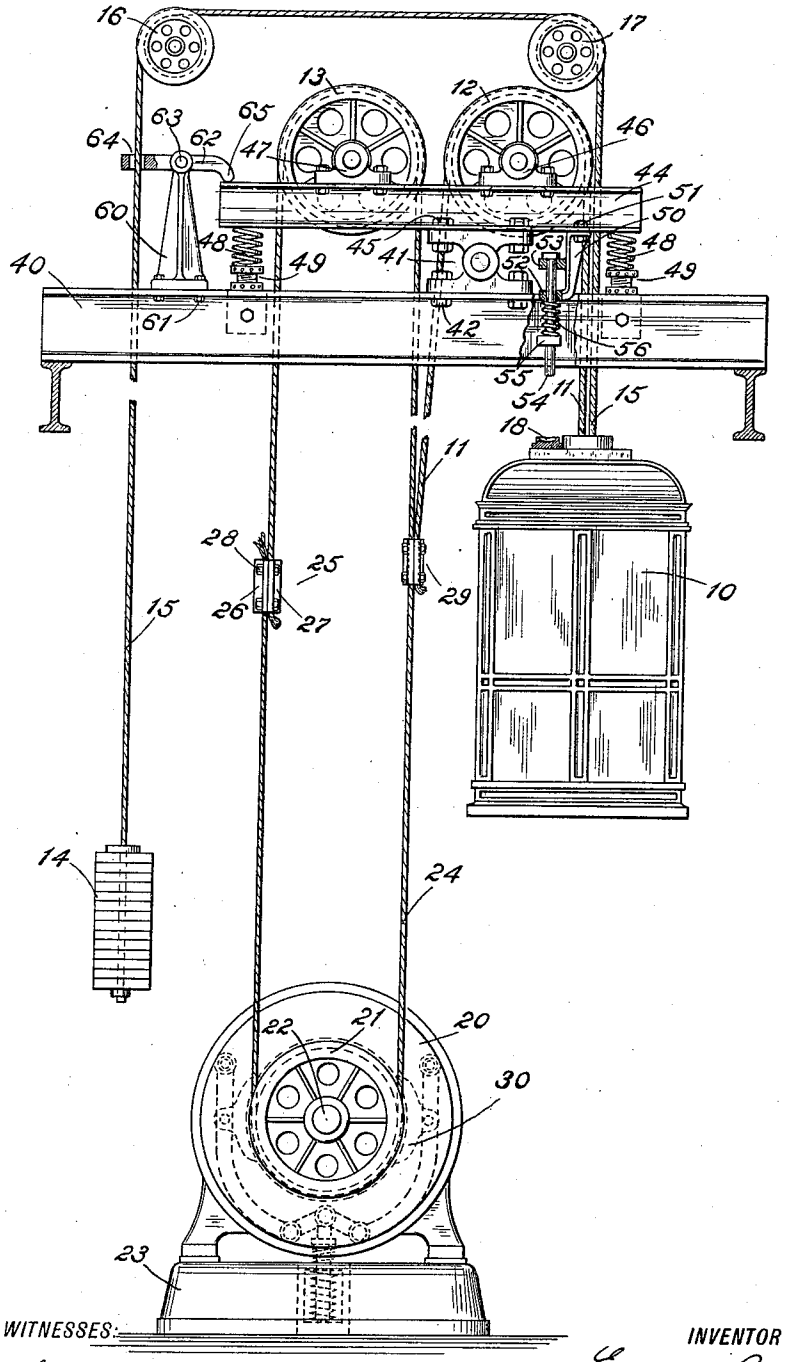
1,031,683. **Patented July 9, 1912.**



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FRICTION ROPE-DRIVE ELEVATOR.

1,031,683. Specification of Letters Patent. Patented July 9, 1912.

Application filed November 2, 1906. Serial No. 341,703.

To all whom it may concern:

Be it known that I, ERNEST BOENING, a citizen of the United States, and a resident of the city of Yonkers, in the county of Westchester and State of New York, United States of America, have invented certain new and useful Improvements in Friction Rope-Drive Elevators, of which the following is a specification.

My invention relates to friction rope drive elevators and its object is to provide a simple and efficient safety device for preventing accidents in this type of elevator.

I will describe my invention in the following specification and point out its novel features in claims.

The drawing is a diagrammatic representation of one type of friction rope drive elevators with my invention applied thereto.

In the drawing 10 designates an elevator-car of any desired form or construction; 11 its hoisting-cable which is attached to the car and runs up and over a sheave 12 which is mounted near the top of the shaft. The cable 11 may be run over the sheave 12 down to the driving rope 24 to which it is attached as shown at 29.

20 designates a reversible motor of any suitable type such, for example, as an electric motor. 21 is a driving sheave or pulley which is rigidly mounted upon the shaft 22 of the motor. The motor is preferably securely fastened to a base 23. The driving rope 24 is in the form of a loop which passes under the driving sheave 21 and over a supporting sheave 13 which is situated near the top of the shaft. The driving rope may have its ends spliced together or its ends may be connected together by a fastening such as is shown at 25. This fastening comprises two parts 26 and 27 which are rigidly held together by means of bolts 28 but which may be loosened so that the fastening may be shifted to change the position of the rope connection or to take up any slack in the rope caused by stretching.

14 designates a counterweight which may be connected to the car by means of a cable 15 which is supported by sheaves 16 and 17 situated near the top of the shaft.

While I have described the hoisting cable for the car, the counterweight cable and the driving rope as single ropes it is to be understood that these ropes may be duplicated according to the usual custom so that two or more of these cables or ropes may be used together.

A brake mechanism 30 is shown in dotted lines, which mechanism may be used in conjunction with the driving sheave 21.

40 designates a channel-iron which may form a part of the overhead work or framework of the structure in which the elevator is placed. Upon this channel-iron is mounted a hinge-block 41 which may be rigidly attached to the channel-iron by means of bolts 42. The upper part of the hinge-block 41 may be attached to the secondary channel-iron 44 by means of bolts 45. The overhead sheaves 12 and 13, over which the hoisting cable 11 and the driving rope 24 pass, are attached to the channel-iron 44 by means of stationary bearings 46 and 47. Springs 48, 48 are provided near the ends of the secondary channel-iron 44 and these springs may be provided with adjusting screws 49, 49 by means of which the pressure of these springs may be regulated.

The sheave 12 which supports the car is mounted at one side of the hinge-block 41 while the sheave 13 which supports the driving rope is mounted on the other side of the hinge-block 41. The weight of the car, therefore, will cause the secondary beam 44 to be tilted in such a way as to raise the sheave 13 which supports the driving rope and to thereby maintain the driving rope under tension and to keep the driving rope in the proper frictional contact with the driving sheave 21. The frictional contact or tension thus produced will be proportional to the weight of the car and its load and will also be distributed equally over the driving rope 24.

So much of the apparatus as I have above described and its operation are more fully pointed out in another application Serial No. 302,866, filed by me February 26, 1906.

50 designates a bracket which is rigidly attached to the secondary channel-iron or tilting lever 44 as shown at 51. Extending from this bracket are two bosses 52 and 53 through which a vertical rod 54 passes. A collar 55 is attached to this rod, and between the collar 55 and the lower projecting boss 52 a spring 56 is placed.

60 designates a stationary bracket which is rigidly attached to the channel-iron 40 as

is shown at 61. A lever 62 is pivoted at 63 in this bracket 60. One end of this lever 62 is placed in proximity to the counterweight-cable 15 and directly in the path of the travel of the counterweight as is shown at 64. The other end 65 of this lever is arranged to coact with the tilting lever 44.

The usual operation of this device is obvious. The tension on the driving ropes is automatically maintained in a manner previously pointed out. Whenever the motor is run in one direction the car will be moved in one direction; an opposite rotation of the motor will cause the car to be moved in the opposite direction.

When the motor is rotated to cause the car to be moved this operation will continue until the motor has stopped in any of the usual manners, either by an operator in the car or by an automatic arrangement for cutting off the motive power from the motor and applying the brake to the driving sheave.

The present invention is for the purpose of insuring the stopping of the car at the top and bottom of its run in case all of the usual devices for stopping the car should fail to act.

Let us, for example, consider that the car is running up and that for some reason the motor 20 continues to run. In this case a cup-shaped receptacle 18 which is attached to the top of the elevator-car 10 will be brought up against the vertical rod 54 and will cause the latter to be raised, and through the action of the spring 56 will cause the right-hand end of the tilting lever 44 to be pushed upward. This will at the same time move the sheave 13 downward and will immediately cause the driving rope 24 to become slack so that it will no longer be driven by the motor and driving sheave 21. It will be noted that when the car is brought up against the rod 54, there will be an increased tension on the rope 11. The downward pull of the rope, lifting the car against the stop and the latter against the beam, will overcome the reacting downward pressure on the sheave and tilt the beam 44 so as to relieve the tension on the driving rope. When the car is running down its connected counterweight 14 will be moved up. The pivoted lever 62 which is in the path of movement of the counterweight 14 is so placed that the counterweight will strike one end of this pivoted lever just before the car reaches the lower limit of its travel. By striking one end of this pivoted lever 62 the counterweight will cause its other end 65 to be pressed downward against the left-hand end of the tilting lever 44 and will thereby depress the sheave 13 and slacken the driving rope 24 so that it will no longer be driven by the motor 20 and the sheave 21. By this simple mechanism all danger of accident by the car being driven up into the overhead work or down beyond the lower limit of its travel is absolutely obviated.

It is, of course, possible to work out the details of construction of the parts in many other ways than those herein shown and described. If the car is not counterbalanced in the usual manner a small weight may be used in place of the counterweight 14 for the purpose of actuating the pivoted lever 62.

This invention is in the nature of an emergency safety stop. It is therefore preferably arranged to act only when the car runs beyond the usual limits of its travel, but it can, of course, be arranged to bring the car to rest at its usual stopping places, and the claims are to be construed accordingly.

What I claim is:—

1. The combination with a driving sheave, of a driven sheave, a driving rope engaging said sheaves, a car, a lever connected to the driven sheave, said car being arranged for yieldingly holding the lever in position to maintain tension on the driving rope, and means for automatically operating said lever to reduce the tension on the driving rope.

2. The combination with a driving sheave, of a lever, a driven sheave carried by the lever, a driving rope connecting said sheaves, a car connected to the driving rope, arranged for maintaining tension on the driving rope, and means for operating the lever to reduce the tension when the car reaches a predetermined position.

3. The combination with a driving sheave, of a car, a hoisting rope or cable, mechanism for normally maintaining a tension on the hoisting rope varying with the load on the car, and means for automatically reducing the tension when the car reaches a predetermined position.

4. The combination with a driving sheave, of a hoisting rope, a car connected thereto, mechanism for placing a tension on the hoisting rope varying with the load on the car, and means for automatically operating said mechanism to reduce the tension.

5. A driving sheave, a rope passing around and by two sides of said sheave, a car connected to the rope, a tilting lever arranged to support the car and to increase the tension on said rope on both sides of the driving sheave, and means actuated by the movement of the car for moving the tilting lever and thereby decreasing the tension on the rope when the car reaches the limits of its travel.

6. A driving sheave, a rope-loop in frictional contact with the driving sheave, a car, a lever, sheaves on said lever, one of which sheaves supports the endless loop and another of which supports the car, and a fulcrum for said lever between the sheaves,

said car being arranged to engage with and shift the position of the lever when the car reaches the limit of its travel.

7. A driving sheave, a fixed support therefor, a driven sheave, a lever upon which said sheave is mounted, a rope-loop connecting said sheaves, an elevator-car connected to the loop and arranged to be driven thereby, said car being supported by the lever and arranged to produce an equalized tension on both sides of the loop proportional in strength to the effective weight of the car, said car being arranged to shift the position of said lever and to thereby decrease the tension on the rope-loop when the car reaches the limits of its travel.

8. A driving sheave, a fixed support therefor, a driven sheave, a lever upon which said driven sheave is mounted, a rope-loop connecting said sheaves, an elevator-car connected to the loop and arranged to be driven thereby, a counterweight connected to the car, said car being supported by the lever and arranged to produce an equalized tension on both sides of the loop proportional in strength to the effective weight of the car, and means actuated by the movement of the car for shifting the position of the lever when the car reaches the upper limit of its travel, and other means actuated by the movement of the counterweight for shifting the position of the lever and decreasing the tension on the rope-loop when the counterweight reaches the upper limit of its travel.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ERNEST BOENING.

Witnesses:
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