(No Model.) 2 Sheets—Sheet 1.

M. H. CHRISTOPHERSON.

ELEVATOR OPERATING MECHANISM.

No. 526,771. Patented Oct. 2, 1894.

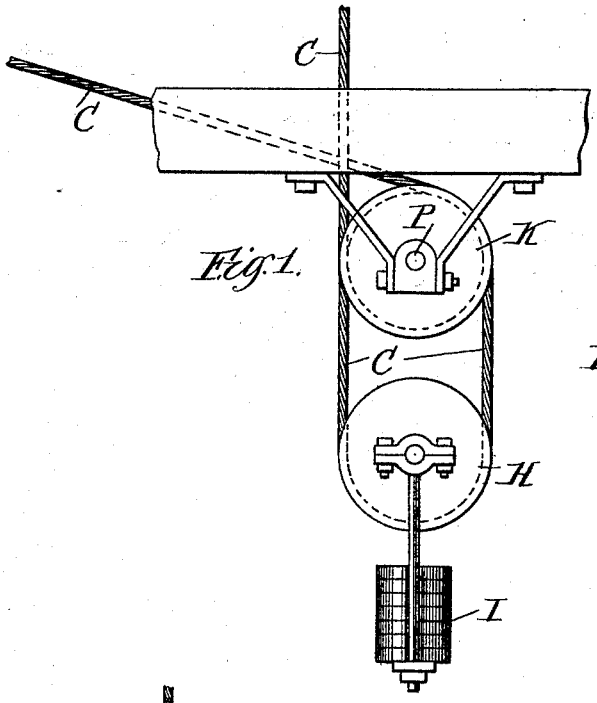

Fig. 1.

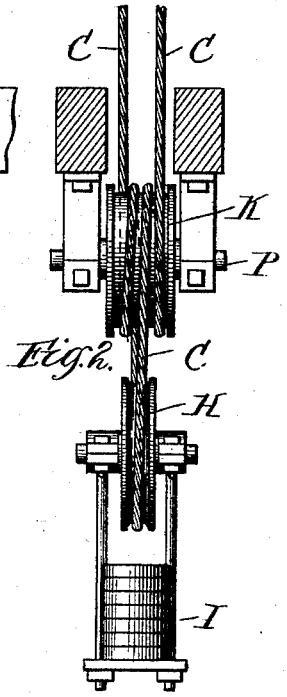

Fig. 2.

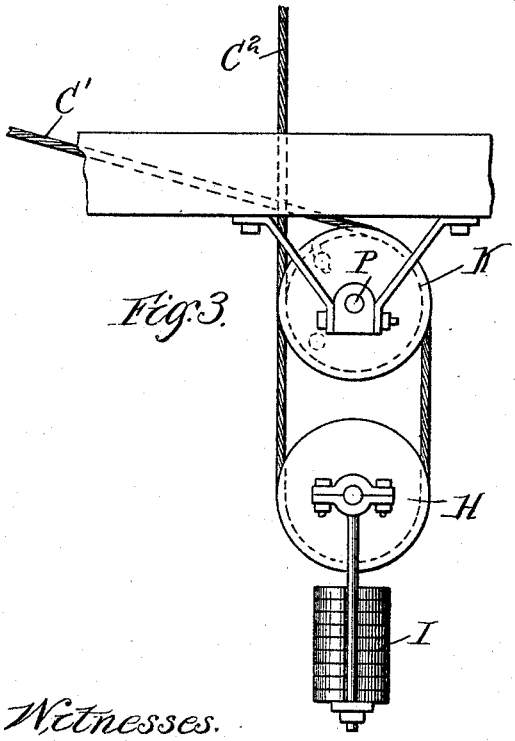

Fig. 3.

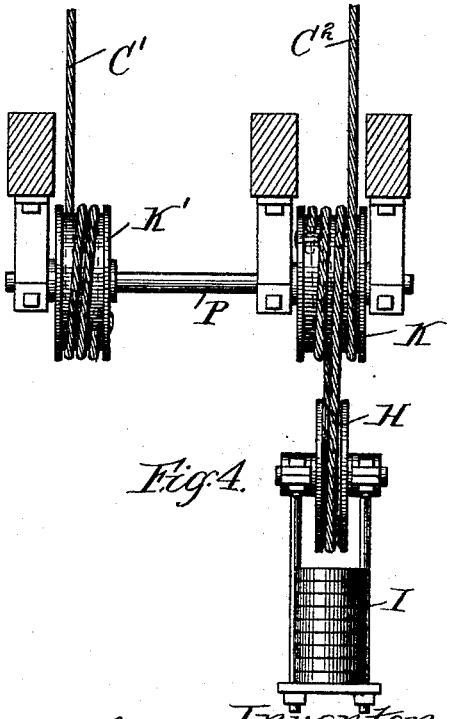

Fig. 4.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

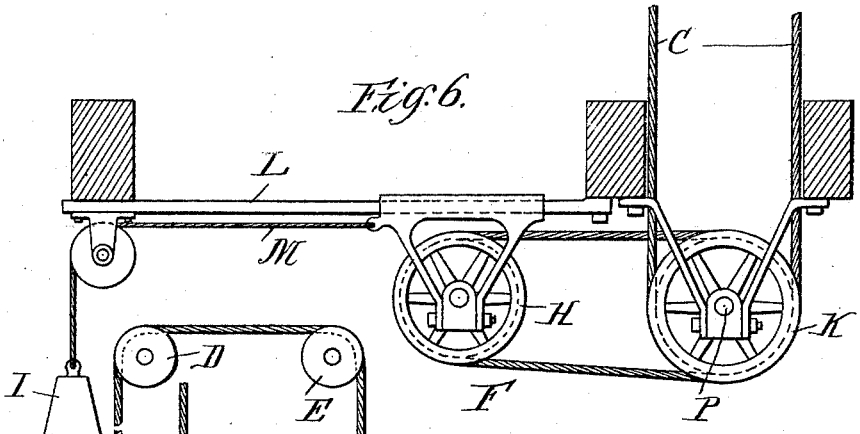


Fig. 8.

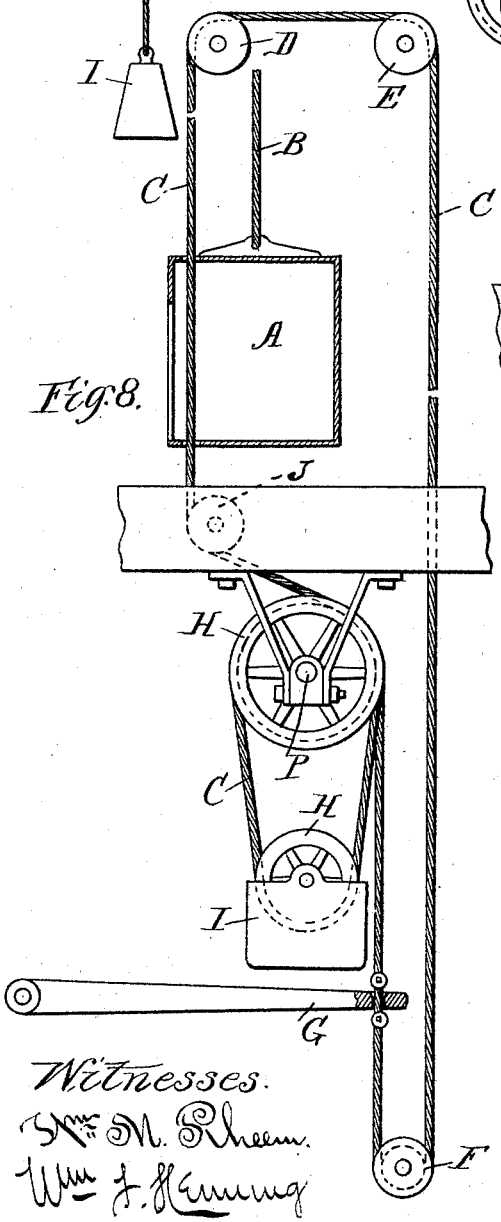


Fig. 5.

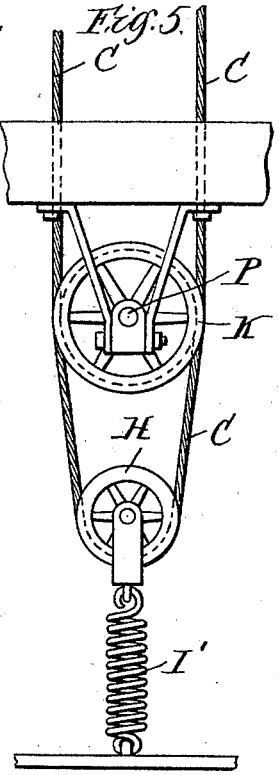
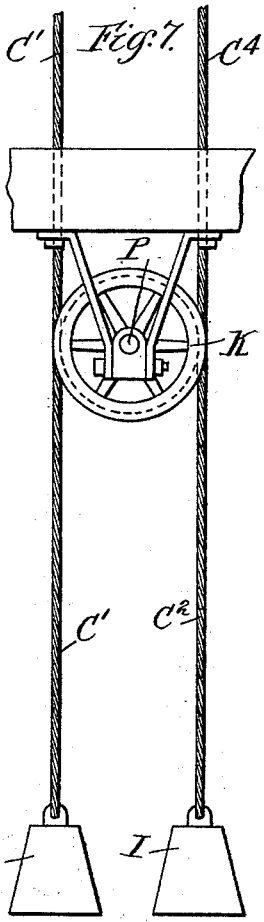


Fig. 7.



Witnesses.
Wm. N. Rheem.
Wm. F. Fleming

Inventor
Martin H. Christopherson
By Brown and Darby
Attys

UNITED STATES PATENT OFFICE.

MARTIN H. CHRISTOPHERSON, OF CHICAGO, ILLINOIS.

ELEVATOR-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 526,771, dated October 2, 1894.

Application filed March 23, 1894. Serial No. 504,816. (No model.)

To all whom it may concern:

Be it known that I, MARTIN H. CHRISTOPHERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Elevator-Operating Mechanism, of which the following is a specification.

This invention relates to apparatus for controlling the valve mechanism of machinery for operating elevators, and particularly to that class of elevators where the valve controlling cable is stationary and the car travels thereon.

It is the object of this invention to provide compensating means for variations in the length of the cable due to variations in temperature and moisture of the atmosphere.

With this object in view the invention consists in the various constructions, combinations and relative locations and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings and finally pointed out in the appended claims.

In the drawings Figure 1 is a side view and Fig. 2 is a front view, partly in section, showing the application of one form of my invention. Fig. 3 is a side view and Fig. 4 a front view showing another form of my invention. Fig. 5 is a view similar to Fig. 1 showing another form in which my invention can be applied. Fig. 6 is a similar view showing a horizontal arrangement of apparatus for carrying out the principles of my invention. Fig. 7 is a side view of a modified construction for carrying out the principles of my invention. Fig. 8 is a side view of a construction embodying my invention, showing its application to steam elevators.

Similar reference signs are employed throughout the several views of the drawings to designate similar parts.

A represents an elevator car of any suitable form or construction and B is the hoist-rope therefor, which may be operated from any suitable source of power.

C. designates the hand operated cable for controlling the valve operating mechanism. This cable is adapted to pass through suitable holes in the roof and floor of the car as clearly shown in Fig. 8, over suitable guide pulleys, D, E, at the top of the elevator shaft, thence to a winding drum, K, suitably located, preferably in the motor or engine room, and suitably supported as shown. After making one or more turns around said drum the cable forms a loop or bight, in which is carried a movable pulley H, having a weight I attached thereto, thence the cable returns to the drum K, makes one or more than one complete turn therearound and then returns either directly, or over suitable guide pulley J, if necessary, see Fig. 8, to the car. It will be observed that this valve operating cable is stationary until the elevator conductor operates the same by hand to shift the valve controlling connections to start or stop the car. Instead of the weight I, a spring I′ may be employed for accomplishing the same purpose, see Fig. 5, which may be secured at one end to pulley H and at the other end to any suitable fixed support.

In some cases, on account of the want of sufficient space, it may be necessary to give the loop in which the weighted movable pulley H is carried a horizontal or inclined lead. In such cases I provide a suitable guide L therefor. An example of this construction is shown in Fig. 6, and the weight I is secured to the guiding frame of pulley H by means of a rope M passing over a suitable guide pulley as shown.

In Fig. 8 I have shown my invention applied to steam elevating apparatus, in which case the cable is connected directly to the valve operating lever G.

In the forms above described, of apparatus for carrying out the principle of my invention I have shown and described an endless cable, but it will be readily understood that my invention is equally applicable to a construction and arrangement wherein it may not be convenient to lead both parts or strands of the cable to the same winding drum. In such case I do not employ an endless cable, but I mount an additional drum K′ on the counter shaft P, and secure thereto one end C′ of the cable after making one or more turns around said drum, as clearly shown in Figs. 3 and 4. The other end C^2, of the cable after passing up through the car, and over the guide pulleys or sheaves in the top of the shaft leads to winding drum K and after one or more turns therearound,

forms a loop in which is hung the movable pulley H and weight I as above described, and then winds one or more times around the drum again and the end is secured to the drum. In this construction, as will be readily understood, compensation for the varying length of the cable is made only at one end of said cable. I have shown a construction in Fig. 7 wherein a compensation for the varying length of the cable is made in each strand or leg, and at each end thereof. In this construction as well as in the construction shown in Figs. 3 and 4, that part of the cable leading from the engine or motor room to the top of the shaft and back again forms a bight. The end C′ of the cable leading downwardly from the car is given one or more turns around drum K and then hangs vertically down and to the end thereof is attached a weight I. The other end, C^2, of the cable after leading from the top of the shaft from the car, over the guide sheaves, thence leads downwardly through the shaft to drum K around which it is given one or more turns in a direction opposed to the direction of wind of end of C′, and then hangs vertical, a weight I being secured to the end thereof. It will thus be seen that compensation is provided for in each leg of the operating bight of the cable.

It will be understood that the surface of the winding drums K, may be plane or grooved to receive the turns of the cable. In some cases I prefer to use a plane surfaced drum and in others a grooved drum. The advantage derived from a grooved drum is that the cable is thereby provided with a greater bearing surface and hence the friction of contact between the drum and the cable is increased. In some cases this may be a disadvantage instead of an advantage as in other cases, and then I employ a plane drum.

It will be readily understood that the valve mechanism of the elevator motor is operated from shaft P by any suitable connections and as such connections, and the valves of the motors themselves form no part of my invention I have not deemed it necessary to show any construction thereof.

Owing to the construction of the core of wire or other cables employed as valve operating cables in elevator constructions, variations in temperature and humidity of the atmosphere affects to a considerable degree the length of the cable, thus causing the cable to bind so tight against the guide sheaves and winding drum as to make it difficult to operate the same, or else, on the other hand, causing the cable to become so slack as to render it liable to jump its guiding sheaves, thus causing the elevator conductor to lose control of the hoisting motor. These inconveniences only add to the annoyance of the delays required to take up or let off slack cable by means of turn buckles in the heretofore ordinary way. The difficulties and objections above noted are especially present in tall buildings where a very long valve controlling cable is necessary. These objections and inconveniences are entirely obviated in my invention in a simple but exceedingly effective way, as actual practice has demonstrated.

In the operation of my device the elevator conductor pulls down or up, as the case may be, on that portion of the cable extending through the car. By reason of the wrapping of the cable around the drum K said drum is rotated and hence the valve mechanism is operated while at the same time the weight or spring attached to the movable sheave as in Figs. 1, 2, 3, 4, 5, 6 and 8 carried in the bight of the cable, or the weights attached to the ends of the cable, as in Fig. 7, takes up the slack of the cable in case of elongation therein or pays it out if there is a contraction in the length of the cable. Each pull on the cable by the conductor in the car thus serves to equalize the tension throughout every portion thereof. In other words, suppose the cable to be at rest over night and during that time there is an elongation of the cable due to a dry, warm condition of the atmosphere. Frequently this elongation in the cable during one night of rest is sufficient to cause the cable to jump its guiding sheaves. By reason of the friction of contact of the turns of the cable around the valve operating or winding drum this slack cannot be taken up in the bight by the movable sheave and weight carried thereby, nor by the weights attached to the ends as in Fig. 7 and consequently there is a tension on the part acted upon by the weight greater than the tension on the slack portion of the cable extending from bottom to top and from top to bottom of the shaft. The effect of the weights or spring is to equalize this tension throughout the length of the cable and this effect is accomplished by the first pull on the cable in the morning and each succeeding pull during the day maintains this equalized tension thus avoiding the necessity of turn buckles to let off or take up slack in the cable.

I consider the winding of the cable around the winding drum in the manner shown and described and the application of the weight to a bight or to the end of the cable after being wound, a most important feature of my invention whereby I secure results and accomplish purposes impossible to secure by merely a weighted pivoted-lever or merely a weight hung in the bight of the cable formed without said winding, because in the former case it is not practical in elevator constructions, especially in tall buildings to employ a lever with swing enough to successfully take up two or three or four feet of slack, and in either case, should there be a sticking of the valve mechanism, for any reason, as is frequently the case on account of lack of lubrication, or rust, or the presence of particles of waste or packing, requiring considerable power to be applied to the hand cable, the ca-

ble would "render" that is slip around on the drum on the valve operating countershaft and all the power applied to the cable would be taken up in moving the weight or the pivoted lever, and if a heavier weight be employed it would be impossible to easily manipulate the cable.

Having now fully described the construction of my invention, its purpose, function, and mode of operation, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an elevator control mechanism a cable, guide pulleys therefor, means for applying tension to said cable, and a winding drum arranged between said means and the operating part of said cable and means operated by said drum for operating the elevator control valve; as and for the purpose set forth.

2. In an elevator apparatus of the class described, a cable, means for imparting tension thereto, and a winding drum for said cable, said drum arranged intermediate said tension means and the operating part of said cable and connections between said drum and the control valve for operating the latter from the former; as and for the purpose set forth.

3. In an apparatus of the class described, a hand cable for operating a control valve, an operating drum around which said cable is adapted to be wound and devices for applying tension to an intermediate wrapping of said cable around said drum, said drum arranged between said tension devices and the operating part of said cable; as and for the purpose set forth.

4. In an apparatus of the class described, a cable having a run thereof arranged in position to operate the elevator control valve from the car, a drum for operating said control valve around which said cable is adapted to be wound, and means for applying a tension to said cable, said means being supported upon an intermediate wrapping of the cable around said drum, said intermediate wrapping being in a run of the cable different from said operating run; as and for the purpose set forth.

5. In an apparatus of the class described, a cable, a drum for operating the control valve around which said cable is adapted to be wound, one of the intermediate turns of said cable forming a bight, said bight being formed in a run of said cable different from the operating run thereof, and a movable sheave carried in said bight and a tension device attached to said sheave; as and for the purpose set forth.

6. In an apparatus of the class described, a hand cable, suitable guide sheaves therefor, an operating drum for operating the control valve around which the cable is adapted to be wound, a bight being formed in said cable intermediate its windings on said drum, a tension device carried by said bight and a guide for said tension device; as and for the purpose set forth.

7. In an elevator control mechanism, a car, a stationary hand operated valve controlling cable, a valve operating drum around which said cable is adapted to be wound, and means for applying tension to that portion of said cable on the opposite side of said drum from the car; as and for the purpose set forth.

8. In an elevator control mechanism, a car, a stationary hand operated cable passing therethrough, a counter shaft from which the control valve is operated, a drum mounted thereon around which said cable is adapted to be wound, a bight being formed in said cable intermediate its windings on said drum on the opposite side of the drum from that portion of the cable passing through the car, and a tension device carried in said bight; as and for the purpose set forth.

9. In an elevator control mechanism, a car, a stationary cable passing therethrough, a counter shaft from which the control valve is operated, a drum mounted thereon adapted to receive windings of said cable, a bight being formed in said cable intermediate its windings on said drum and on the opposite side of said drum from that portion of said cable passing through the car, and means for applying tension to said bight; as and for the purpose set forth.

10. In an elevator control mechanism a drum, a cable leading to said drum on one side thereof and wound therearound and means for applying tension to said cable on the opposite side of said drum and means for operating the control valve from said drum; as and for the purpose set forth.

In testimony whereof I have hereunto set my hand, this the 19th of March, 1894, in the presence of two subscribing witnesses.

MARTIN H. CHRISTOPHERSON.

Witnesses:

S. E. DARBY,

M. I. CAVANAGH.