(No Model.) 2 Sheets—Sheet 1.

C. E. FOSTER.

ELEVATOR CONTROL APPARATUS.

No. 553,672. Patented Jan. 28, 1896.

Fig. 1.

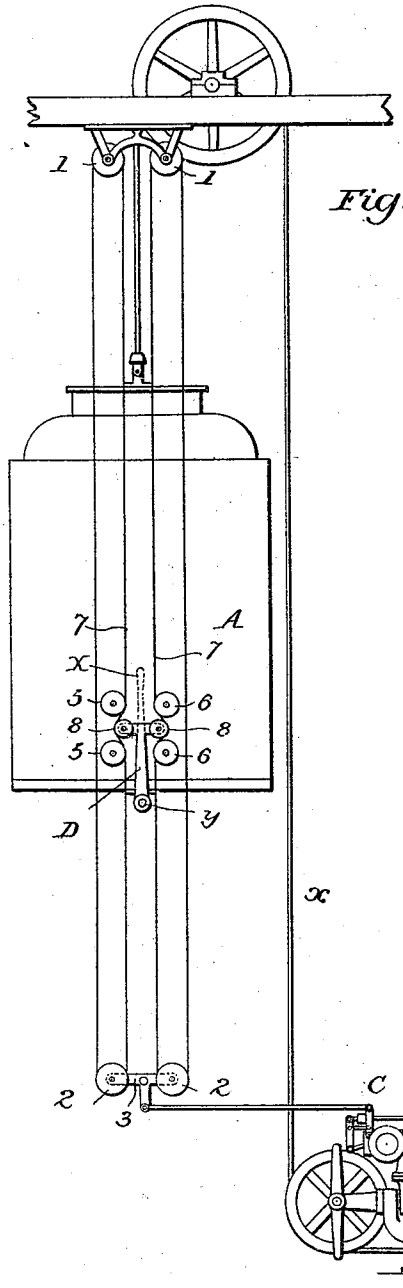
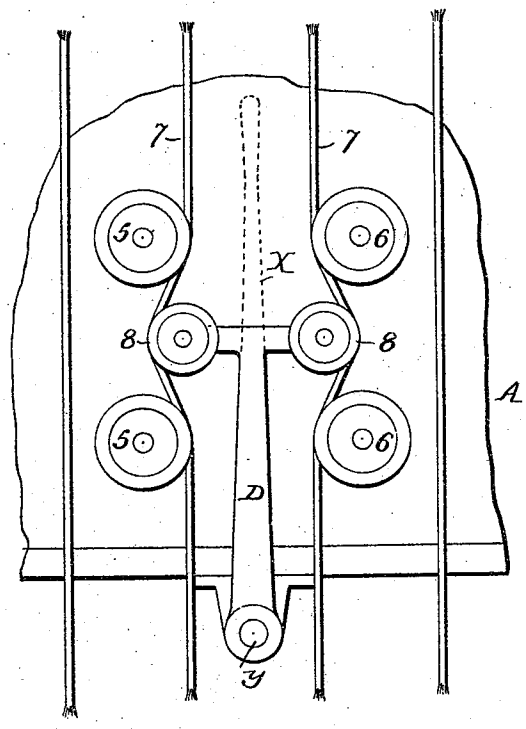


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

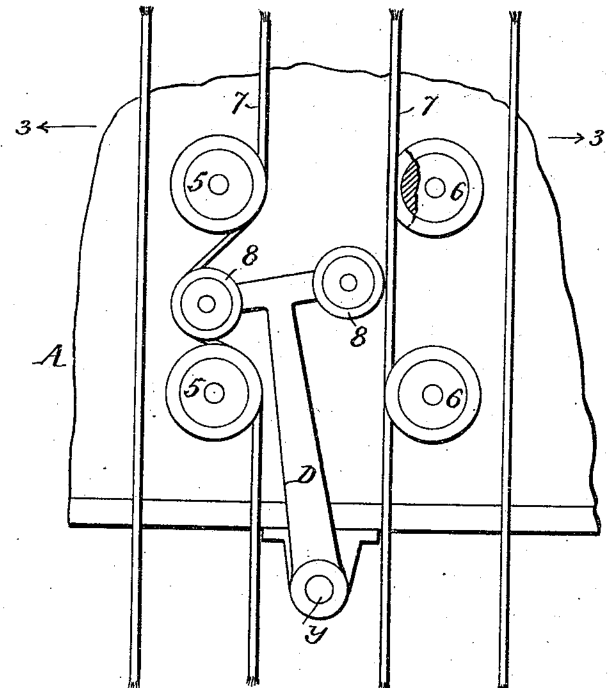


Fig. 4.

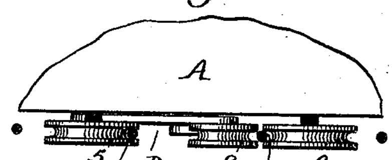


Fig. 5

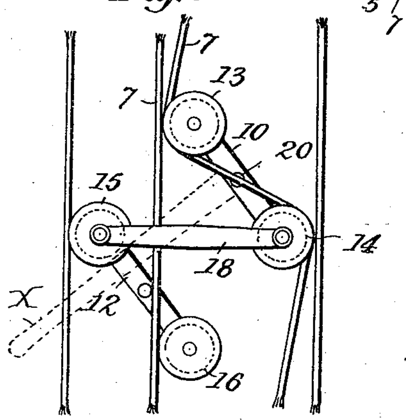
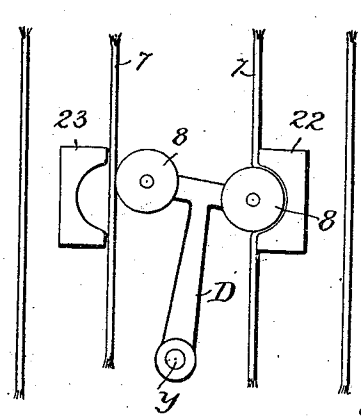


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES E. FOSTER, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELEVATOR-CONTROL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 553,672, dated January 28, 1896.

Application filed May 21, 1895. Serial No. 550,095. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. FOSTER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Elevator-Control Apparatus, of which the following is a specification.

Two classes of double-cable positive-control devices have proved to be more serviceable than any others for modern elevator apparatus in high buildings, where speed is required. In fact these two constitute the only thoroughly practical and efficient control devices and comprise, first, standing cables—that is, cables which are suspended from eyebolts at the top of the well and pass around pulleys upon or connected with the car and attached at their lower ends to the operating valve or devices for operating the same; and, secondly, running cables or "traveling cables," as they are called, passing around pulleys at the top and bottom of the well, and each connected directly or indirectly with the cage, so as to travel therewith at all times, and my invention has for its object to obviate certain objections to such devices heretofore used.

With this object in view my invention consists of the novel arrangement and construction of the parts for carrying the invention into effect, hereinafter more fully described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, and in which like letters and figures indicate corresponding parts, Figure 1 is an elevation of sufficient of an elevator apparatus to illustrate my improved control device. Fig. 2 is an enlarged view illustrating the position of the parts upon the cage when the valve is in its mid-position or stop position; Fig. 3, a view illustrating the positions of the parts when the valve is shifted to one side; and Fig. 4 is a sectional plan on the line 3 3, Fig. 1, Figs. 2, 3, and 4 being enlarged. Figs. 5 and 6 are views illustrating modifications of the deflecting device.

The cage A, the engine B, and the control device C may be of any suitable construction, the engine being shown as a hydraulic engine, but it may be an electrical or a steam engine, and the control or stopping, starting and arresting device may be either a main valve or a pilot-valve, or it may be a switch, or belt-shifter, or other device of like character. The engine is connected with the cage through the medium of the usual flexible suspensory-ropes *x*, passing over and around suitable guide-pulleys, and the cage may travel between guides and be provided with the usual safety appliances, brakes and other devices, common in this class of apparatus, but not necessary here to illustrate. At the top of the well are two pulleys 1 1, and at the bottom of the well are two pulleys 2 2, and the bearings of either set of pulleys may be movable and connected with the control-valve or its equivalent.

As illustrated, I have shown an ordinary arrangement where two cables are used, the upper pulleys 1 1 being fixed or being connected with any of the suitable counterbalance devices, while the lower pulleys are upon a lever 3, which is connected with the valve device C. In this case, however, the cables are each an endless cable, hanging free within the well and having no direct connection with any device except the upper supporting-pulleys.

Upon the cage are two sets of bearings, preferably in the form of pulleys 5 5, 6 6, in such position that the edges of each pair of pulleys shall be opposite one of the cables, (preferably the inner sections of the cables, as shown,) so that either cable may be contracted or have its bight or loop tightened by deflecting the same outward between either pair of pulleys; and in connection with these pulleys I make use of a deflector, which, as shown, consists of a lever D, pivoted at *y*, and carrying a cross-bar having the pivots or bearings of two flanged pulleys 8 8. These parts are so arranged that when the deflector is in its mid-position each of the cables 7 7 will be deflected to a certain extent between each pair of pulleys 5 5, 6 6, as illustrated in Fig. 2, the lever 3 then being horizontal and the parts in a stop position. By now swinging the deflector to one side or the other the bend in one of the cables is relaxed, and the other is still further increased—as, for instance, as shown in Fig. 3—and thereby the loop or bight of one cable is tightened, while the other is correspondingly relaxed and a positive movement is imparted to the lever 3, and this movement may be imparted in either direction by swinging the deflector to one side or the other.

It will be seen that when the deflector is swung so as to deflect one cable the other is released, and consequently one of the cables at least is absolutely stationary while the parts are in this position, even though the cage may be rapidly moving up or down, while the other cable may travel with the cage or remain in a stationary position, accordingly as there is more friction upon the pulleys 1 2 or the pulleys with which it is in contact carried by the cage, the cable being free to run over either set of pulleys, so that in practical effect it will travel to a certain extent upon the pulleys 1 2, and also to a certain extent upon the pulleys carried by the cage, thereby reducing the actual speed of running of the cable and the pulleys. Thus as compared with the ordinary traveling cables only one cable will travel at a time instead of both traveling, and the speed of the traveling cable and pulleys will be much less than that of either cable in the ordinary double-running-cable device. It will be noted, moreover, that in the present construction only one of the cables is deflected and runs over the pulleys when the cage is in motion, and while the amount of bend or deflection of either cable is much less than required for such double standing cable devices. While both cables are deflected when the parts are in the position shown in Fig. 2, this is not material because at that time the cage is in a stationary position.

Instead of having stationary guide-pulleys upon the cage with deflecting-pulleys swinging between one pair or other of the said stationary guide-pulleys, the deflecting-pulleys and guide-pulleys may be combined and carried by levers, as illustrated in the construction shown in Fig. 5, where there are two centrally-pivoted levers 10 12, each carrying a pair of pulleys, the pulleys 13 14 upon the lever 10 engaging one cable 7, while the pulleys 15 16 upon the other lever engage the other cable, the parts being so arranged and the levers so connected by a connecting-rod 18 that when one lever is swung so as to cause its pulleys to form a double bend in the cable the other will be swung so as to carry the pulleys away from contact with the cable, as shown in Fig. 5, with the same effect as in the other construction, so far as taking up the bight of one cable and letting out that of the other simultaneously is concerned, while one cable is left stationary and the other will travel or stand stationary without any direct connection with the cage, while permitting the latter to move at its regular rate of speed and in either direction.

Other devices for taking up and letting out the loops of the two suspended freely-running cables may be employed.

By this construction and arrangement the deflecting devices carried by the cage may be made very light and the deflector easily operated, as they do not have to sustain any portion of the weight of either cable, and the latter may be made light and flexible and do not deteriorate rapidly from the constant bending which results when standing cables are employed.

It will be evident that any suitable operating device within the cage may be connected to the deflector to operate the latter, as required. For instance, as shown in Figs. 1 to 4, the deflector is connected to the shaft *y*, from which an operating-handle X extends into the cage. In the construction shown in Fig. 5 the operating-handle X is connected to the shaft 20, which is the pivot of the lever 10.

While I have referred to the deflecting device as provided with pulleys for the purpose of permitting the cable to travel around the same and thereby reducing the travel which would be incident to a positive and direct continuous connection of the same with the cage, it will be evident that the deflecting device may deflect a section of either cable without permitting the same to travel upon the said device—as, for instance, in the construction shown in Fig. 6, where there are two recessed bearing-blocks 22 23 arranged in such position that when the deflecting device is swung to one side or the other one of the cables will be forced frictionally against the edge of the recess in one of the blocks and will be so held that it cannot move by the time the deflecting device has reached the limit of its movement in either direction, the cable running freely over the pulley of the deflecting device, however, and in contact with the edge of the bearing-block until this final position is attained.

It will be evident that the above construction has all the advantages incident to the use of two traveling cables—that is, that there is a positive movement in both directions or in each direction; that it is not necessary to make use of a weight for effecting the movement in either direction, and that therefore any danger of the shifting of the position of the stopping and starting device from the lengthening or contracting of the cable, which is incident to the use of single cables, is avoided.

Without limiting myself to the precise construction and arrangement shown, or to the use of any special deflecting devices upon the cage, I claim as my invention—

1. The combination with the car, and stopping and starting device of an elevator, of two independent endless cables, each suspended to travel freely upon its supports within the well and connected to operate the stopping and starting device, and a deflecting device upon the cage constructed to deflect a part of one cable and simultaneously relax the other, and means for operating the deflector from within the car, substantially as described.

2. In a control device for elevators, the combination of a car, two endless cables suspended in the well and independent of the car, and a deflecting device upon the car ar-

ranged to deflect both cables in a mid position, and to relax one as the other is bent to a greater extent, substantially as described.

3. In a control device for elevators, a car, stopping and starting devices, pairs of upper and lower guide pulleys, one pair connected with the stopping and starting device, two endless cables supported to travel freely on said pulleys, and a deflecting device upon the car provided with pulleys arranged to make contact with and deflect both cables when the deflector is in a mid position, and to relax one cable as the other is further deflected, substantially as described.

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

CHARLES E. FOSTER.

Witnesses:
I. A. FAIRGRIEVE,
W. CLARENCE DUVALL.