C. BARNUM.

ELEVATOR CONTROLLING DEVICE.

APPLICATION FILED JULY 11, 1910.

974,850.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

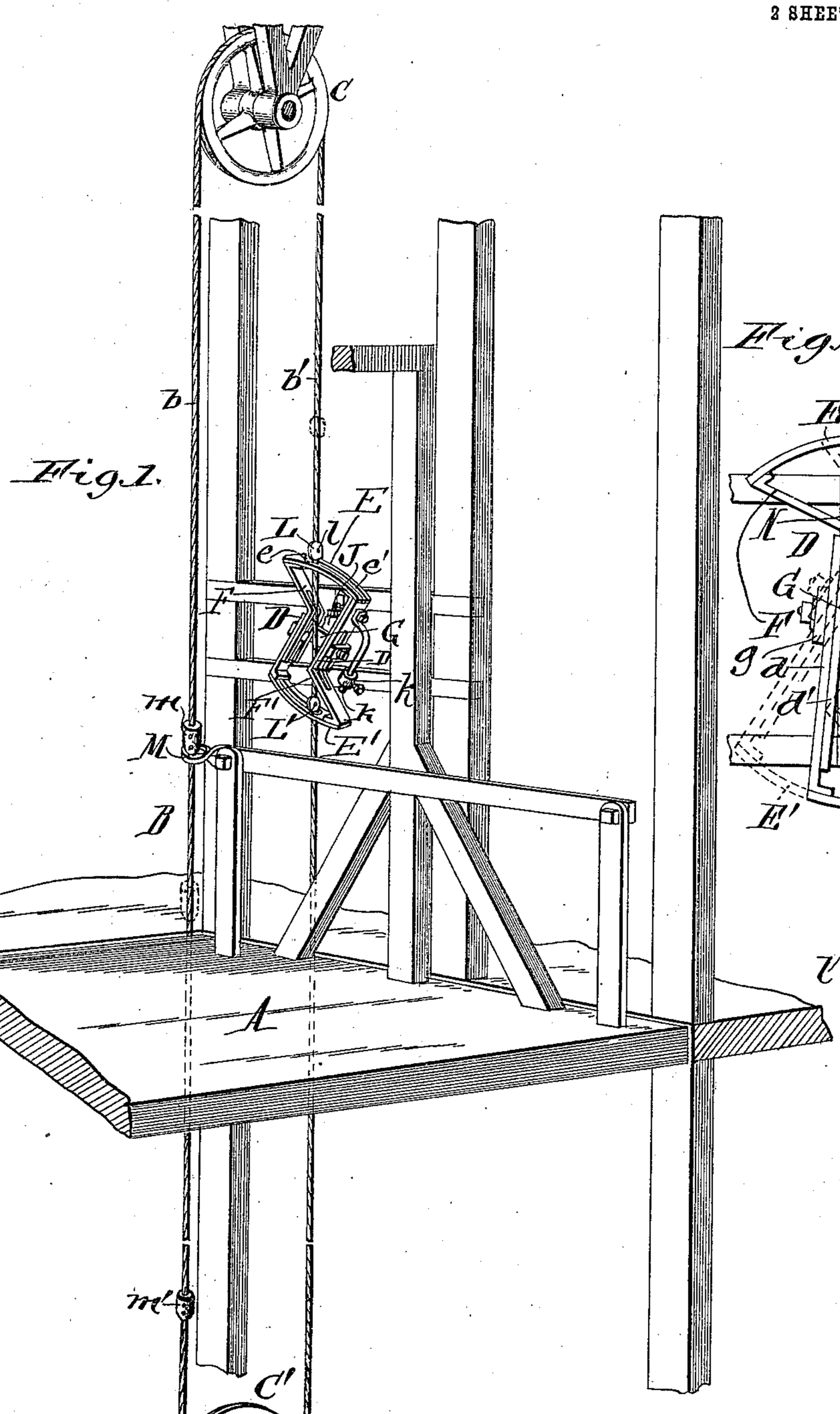
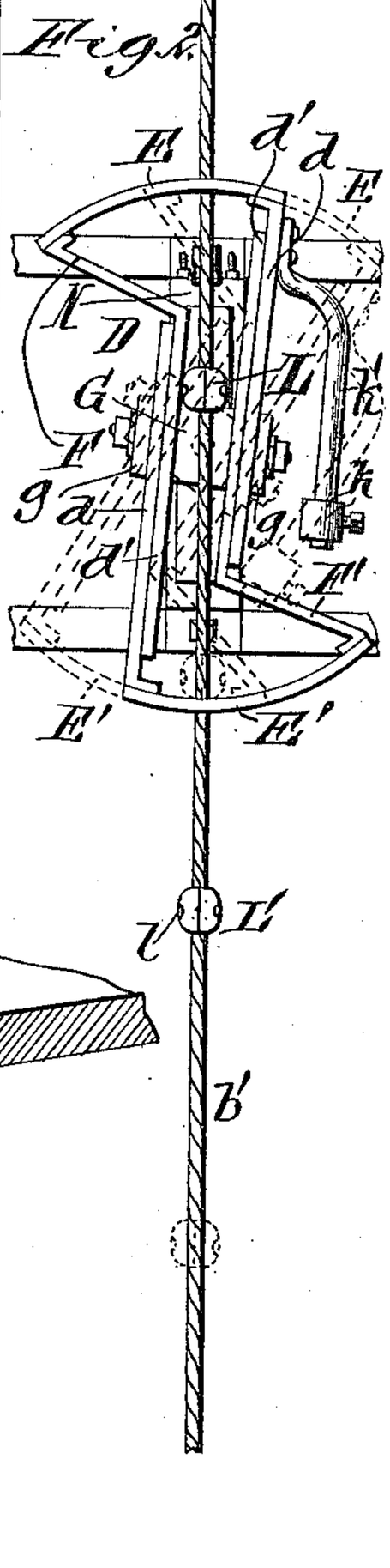


Fig. 2.



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2 SHEETS—SHEET 2.

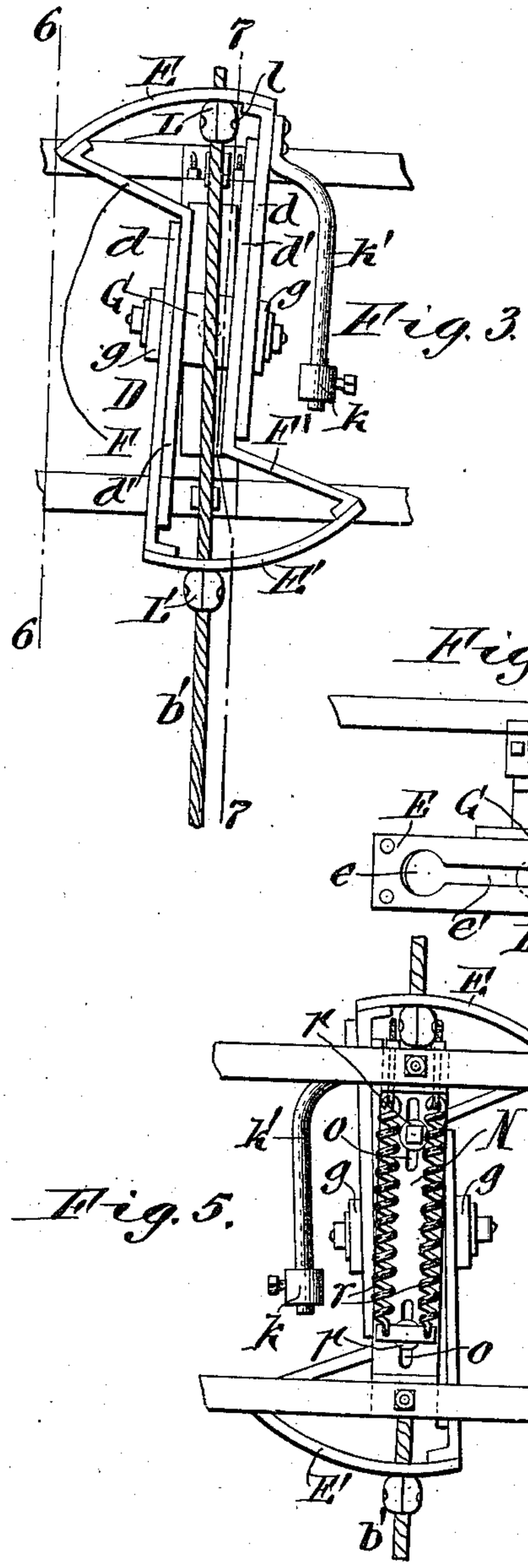

Fig. 3.

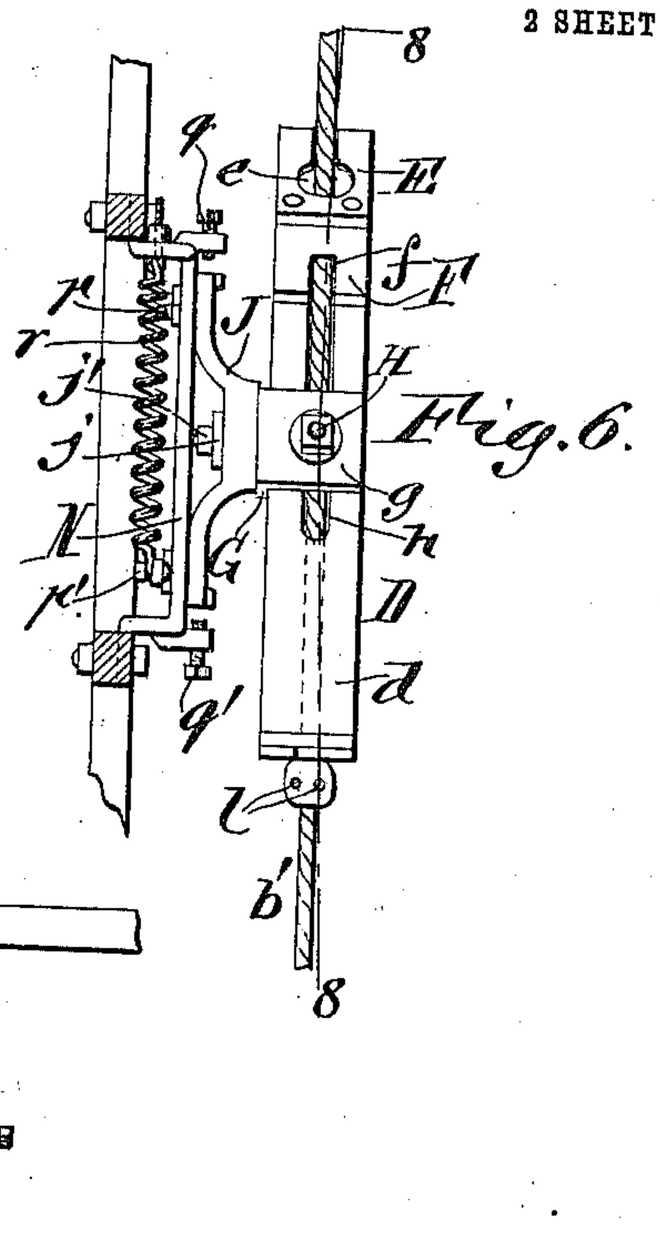

Fig. 6.

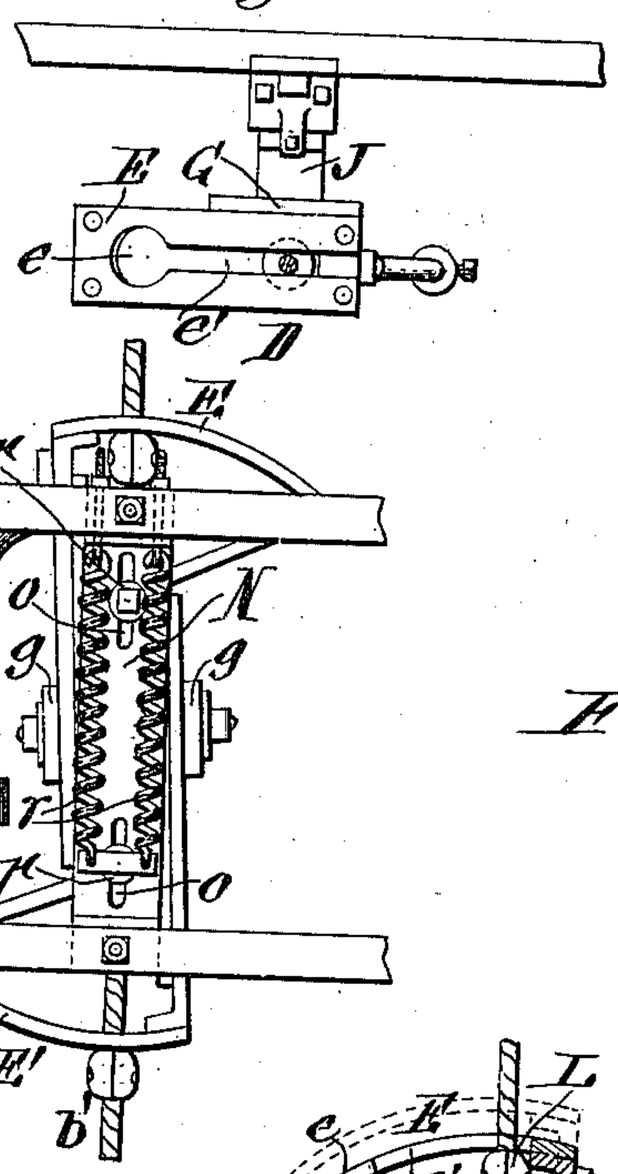

Fig. 4.

Fig. 5.

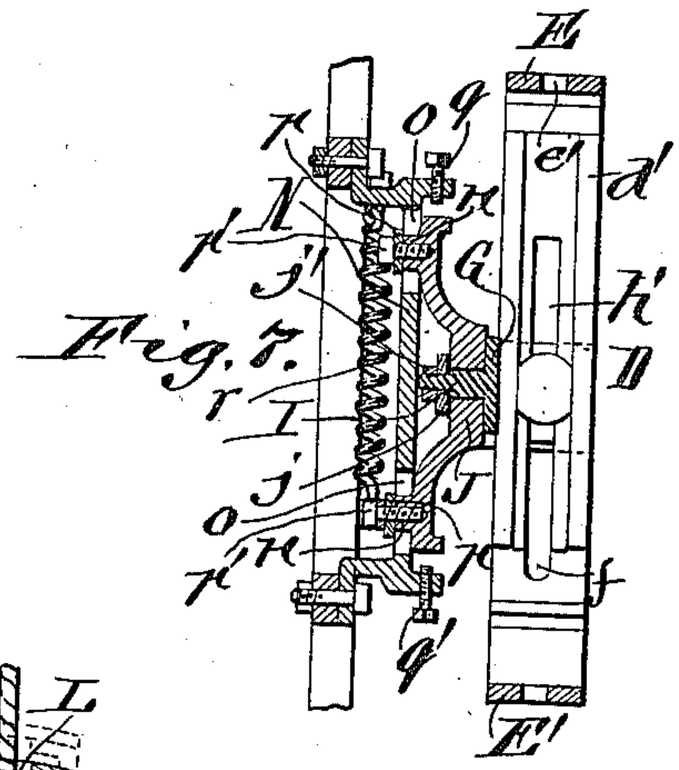

Fig. 7.

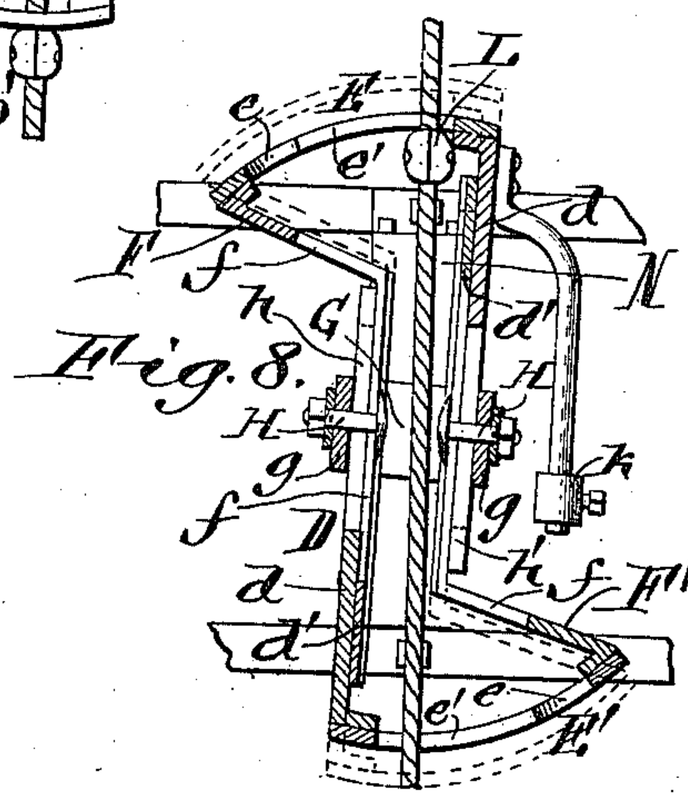

Fig. 8.

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UNITED STATES PATENT OFFICE.

CORDIE BARNUM, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO FRED H. BURR, OF BUFFALO, NEW YORK.

ELEVATOR-CONTROLLING DEVICE.

974,850. Specification of Letters Patent. **Patented Nov. 8, 1910.**

Application filed July 11, 1910. Serial No. 571,310.

To all whom it may concern:

Be it known that I, CORDIE BARNUM, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Elevator-Controlling Devices, of which the following is a specification.

This invention relates more particularly to electrically operated elevators although the same is also applicable to elevators driven by steam, water or other power.

It is well known that when electric motors are reversed suddenly that the same are liable to be burned out. Such quick reversal frequently occurs in the case of elevators which are operated by electric motors and when the latter is burned out it involves not only considerable expense for repairing the motor but also causes prolonged interruption in the use of the elevator.

It is the object of this invention to provide a controlling device for use in elevators operated electrically or otherwise which prevents sudden reversal of the motor which moves the car, thereby preventing burning out of the motor in the case of an electric motor or injuring the motor or driving mechanism of other forms of motors and avoiding interruption in the use of the elevator.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a fragmentary perspective view of an elevator equipped with my improved means for controlling the operation of the electric motor which shifts the car. Fig. 2 is a front elevation of the controlling device, on an enlarged scale, showing the position which the stop device assumes when the controlling cable has been shifted for lifting the car. Fig. 3 is a similar view showing the parts in a position in which the upward movement of the controlling cable is arrested in its neutral position. Fig. 4 is a top plan view thereof. Fig. 5 is a rear elevation thereof. Figs. 6 and 7 are vertical transverse sections in the correspondingly numbered lines in Fig. 3. Fig. 8 is a vertical longitudinal section taken in line 8—8, Fig. 6.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the vertically movable car or cage of the elevator which is guided in ways of any suitable construction which are arranged at the side of the hatch, well or shaft through which the car moves.

B represents the endless controlling cable or line whereby the operation of the electric motor which raises and lowers the car is controlled. This controlling cable has upright front and rear runs b, b^1 arranged at the side of the car and passes at its upper turn around an upper supporting pulley or sheave C and at its lower turn around a lower supporting pulley or sheave C^1. The shaft of the lower pulley C^1 is connected in any suitable manner with the electric motor which raises and lowers the car, this motor and its switch mechanism being well known in the art and therefore not shown in the drawings. The switch mechanism of this motor is so constructed and connected with the controlling cable that upon pulling the front run of this cable upwardly from its central position the car will be moved downwardly by the motor while upon moving the front run of this cable downwardly from its central position the car will be raised by the motor. During such upward or downward movement of the front run of the controlling cable the rear run always moves in the opposite direction.

My improved controlling device which prevents sudden shifting of the controlling cable from one extreme position to the other and thus prevents quick reversal of the electric motor, is preferably associated with the rear run of the controlling cable and is constructed as follows:—D represents an oscillating stop member or frame which comprises two upright longitudinal parallel connecting bars each of which is composed of two overlying sections d, d^1 for adjusting purposes to be hereinafter described, upper and lower stop bars E, E^1 which are preferably curved concentrically or substantially so and each of which is connected at one end with one of the sections of one of the longitudinal bars, and upper and lower inclined shifting bars F, F^1 each of which connects the other end of one of the stop bars with one of the sections of the other longitudinal bar. Each of the stop bars is of a length greater than the distance between the longitudinal bars of the stop frame and has that end which is connected with an inclined bar overhanging the respective longitudinal bar with which said inclined bar connects, whereby

each longitudinal bar and the companion inclined bar together form an inwardly deflected elbow, as shown at Figs. 1, 2, 3, 5 and 8.

The stop frame as a whole is mounted so as to be capable of turning in a vertical plane. The preferred means for this purpose which are shown in the drawings comprise a U-shaped yoke having its cross bar G arranged on the rear side of the longitudinal bars of the stop frame while its arms or legs g, g are arranged adjacent to the lateral sides of the sectional longitudinal bars and secured thereto about midway of the length of the stop frame. Each leg of the yoke is preferably connected with the sections of the adjacent longitudinal bar by means of a bolt H passing through this leg and corresponding longitudinal slots h, h^1 formed in the respective bar sections, the head of said clamping bolt bearing against the inner side of the respective bar section while the nut of the same bears against the outer side of the respective yoke leg. The central part or cross bar of the yoke is pivotally supported so that the same and the stop frame carried thereby are capable of turning in a vertical plane. For this purpose the cross bar of the yoke is provided on its rear side with a horizontal laterally projecting pivot pin I which is journaled in a support consisting preferably of a carriage J which is capable of a limited yielding vertical movement for purposes which will presently appear, said pivot pin being held in position on said carriage by engagement of the rear side of the yoke cross bar with the front side of the carriage and a washer j held in place on the rear end of the pivot pin by means of a screw nut j^1 and bearing against the rear side of the carriage, as shown in Figs. 6 and 7.

Each of the stop bars is provided with a circumferentially extending slot, the end e of the slot which is arranged over an inclined shifting bar being comparatively wide or enlarged while the opposite end e^1 thereof is narrow, so that the slot as a whole presents the appearance of a key hole, as shown in Fig. 4. Each of the inclined shifting bars is also provided with a longitudinal slot f which preferably forms a continuation of the longitudinal slot h in that section d^1 of the respective longitudinal bar with which the inclined shifting bar connects.

The rear run of the controlling cable passes through the slots of the upper and lower stop bars and in the normal position of the stop frame this run of the controlling cable also passes through the slots of the shifting bars and longitudinal bars, as shown by full lines in Fig. 1 and by dotted lines in Fig. 2, but in the abnormal position of the stop frame, as shown by full lines in Fig. 2 the rear run of the controlling cable only passes through the slots of the stop bars and is withdrawn from the slots of the shifting bars and longitudinal connecting bars. The stop frame is yieldingly held in its normal position preferably by means of a weight k which is adjustably secured to an arm k^1 depending from the outer side of that section of one of the connecting bars with which the upper stop bar connects at the narrow end of its slot, whereby the stop frame is so balanced that it normally tends to assume a position in which the enlarged parts of the slots in its stop bars are arranged in line with the rear run of the controlling cable. This run of the cable is provided with upper and lower tappets L, L^1 which are of such dimensions that they are capable of passing through the enlarged parts of the slots in the stop bars but are incapable of passing through the narrow parts of these slots. Each of these tappets is preferably constructed in the form of a divided sphere the sections of which are connected and clamped against opposite sides of the controlling cable by screws l in a manner common in elevator construction.

When the elevator and the electric motor are at rest the stop frame is turned by the weight k into the normal position shown by full lines in Fig. 1 and by dotted lines in Fig. 2, so that the controlling cable is arranged within the enlargements of the slots in the stop bars and in the slots of the connecting bars and shifting bars and the upper and lower tappets are arranged adjacent to the upper and lower stop bars. If it is now desired to move the car downwardly the front run of the controlling cable or cord is pulled upwardly thereby causing the rear run to descend, whereby the lower tappet L^1 moves downwardly away from the lower stop bar and the upper tappet L engages with the inclined upper shifting face of the upper shifting bar and causes the stop frame to be turned into the abnormal position shown by full lines in Fig. 2. During its continued downward movement the upper tappet passes between the two connecting bars of the stop frame and strikes the upper side of the lower stop bar at the contracted end of the slot therein, before the weight k has returned the stop frame to its normal position in which the enlarged part of the slot in the lower stop bar is in line with the controlling cord or cable, thereby arresting the downward movement of the rear run of the controlling cable.

As soon as the upper tappet L strikes the upper side of the lower stop bar and the movement of the controlling cable in this direction is arrested the weight k turns the stop frame from the position shown in full lines in Fig. 2 to the position shown by dotted lines in the same figure, thereby bringing the enlargements of the slots in the

stop bars in line with the controlling cable and the inclined underside of the lower shifting bar over the upper tappet. If it is now desired to reverse the movement of the motor and cause the car to move upwardly the operator pulls downwardly on the front run of the controlling cable which causes the rear run to move upwardly, whereby the upper tappet L is engaged with the incline face of the lower shifting bar and turns the stop frame into the abnormal position shown in full lines in Fig. 2, thereby bringing the narrow part of the slot in the upper stop bar in line with the upper tappet L so that when the controlling cable reaches its central or neutral position the upper tappet will engage with the underside of the upper stop bar, as indicated in Fig. 3. When the controlling cable reaches this position the switch of the motor has been turned to its central or neutral position in which the current is cut off from the motor and the movement of the latter is either slowed down or stopped altogether. Immediately after the upper tappet strikes the narrow part of the slot of the upper stop bar the weight *k* again shifts the stop frame from the position shown by full lines in Fig. 3 to the position shown by dotted lines in Fig. 2, so that the controlling cable and its tappets are again in line with the enlarged parts of the slots in the stop bars. When this occurs the operator is free to continue the upward pull of the rear run and the downward pull of the front run of the controlling cable during which movement the upper and lower tappets pass through the enlargements of the slots in the upper and lower stop bars, whereby the switch of the motor is turned in the opposite direction and the motor is reversed so as to cause the car to be moved upwardly. During the first part of this upward movement of the rear run of the controlling cable from its central position the upper tappet L passes upwardly through the enlarged part of the slot in the upper stop bar but immediately thereafter the lower tappet L^1 engages with the face of the lower inclined shifting bar and temporarily turns the stop frame into the position shown by full lines in Fig. 2 so that the lower tappet engages with the upper stop bar adjacent to the narrow part of its slot and is arrested against further movement in this direction. After the lower tappet engages with the upper stop bar the weight *k* again returns the stop frame from the position shown by full lines in Fig. 2 to the position shown by dotted lines in the same figure.

If it is now desired to cause the elevator car to again move downwardly the controlling cable is moved one step so that its rear run moves downwardly during which movement the lower tappet L^1 will first engage the upper inclined shifting bar and turn the stop frame so that the lower tappet will engage the upper side of the lower stop bar at the narrow end of its slot and be arrested thereby in the central or neutral position of the motor switch, whereby the motor will either slow down or stop. Then the weight *k* will return the stop frame to its normal position in which the enlargement of the slot in the lower stop bar is brought in line with the lower tappet and permit the latter together with the controlling cable to be pulled through the lower stop bar for effecting the second step of its downward movement, thereby causing the switch of the motor to be shifted from its central position to the opposite side of this position, so that the movement of the motor and the car operated thereby are reversed.

It will now be apparent that by means of this device the operator is unable to move the controlling cable with one pull from one extreme position to the other extreme position. Instead of this the controlling cable when moved away from one extreme position is always positively arrested temporarily upon reaching its central or neutral position before this cable can be again moved from this central position to the opposite extremity of its movement, thereby insuring a period of rest for the controlling cable centrally between its extremes of movement during which the motor can either slow down or stop its rotation in one direction before it is possible to turn the switch for causing the motor to turn in the opposite direction, thereby preventing burning out of the motor.

Inasmuch as the throw of the controlling cable varies in different elevators it is necessary to adjust the distance between the stop bars of the stop frame and the distance between the tappets of the controlling cable accordingly. This may be readily done by adjusting the tappets L, L^1 on the controlling cable in accordance with the throw of the controlling cable and moving the stop bars of the stop frame toward or from each other to suit the distance between the tappets, as shown by dotted lines in Fig. 8. This adjustment of the stop bars is effected by loosening the clamping bolts H and then sliding the connecting bars lengthwise relatively to each other and the arms or legs of the yoke as far as necessary and then again tightening the clamping bolts. This movement of the connecting bar sections relatively to each other is possible owing to the longitudinal slots *h*, h^1 in these bar sections through which the clamping bolts H pass as heretofore described.

It has been found in practice that the brake mechanism usually employed in connection with the electric motor for stopping or retarding the same when the switch is in

its central position sometimes slips and the motor is therefore not stopped when the controlling cable is exactly in its central position but is liable to over run somewhat. When this occurs an undue strain would be placed upon the stop device particularly when the controlling cable is positively and automatically shifted by motion derived from the car. These automatic shifting devices for the controlling cable are well known and in common use and the instance shown in the drawings consists of a main stop M mounted on the car and adapted to engage either with the underside of an upper tappet *m* on the front run of the controlling cable during the last portion of the upward movement of the car for shifting the controlling cable and causing the motor to stop automatically at the end of the upward movement of the car, or to engage with the upper side of a lower tappet m^1 on the front run of the controlling cable during the last portion of the downward movement of the car so as to automatically shift the controlling cable in the opposite direction and cause the motor to stop at the end of the downward movement of the car.

If no means were provided to permit the stop frame to yield when one or the other of its stop bars is engaged by one of the tappets L, L^1 during the slippage of the motor brake and slight over run in the movement of the elevator car a considerable strain would be placed upon the stop frame which would be liable to injure the same. Means are therefore provided for avoiding injury to the stop device under these circumstances which means are preferably constructed as follows:

N represents a bracket secured to a stationary support adjacent to the hatch way, well or shaft of the elevator. Upon this bracket the carriage J which pivotally supports the yoke is guided so as to be capable of vertical movement. These guiding means preferably consist in engaging the carriage with the front side of the bracket and providing the same with lugs *n* at its upper and lower ends which project rearwardly through vertical slots *o* in the bracket and with washers *p* secured by means of screws p^1 to the rear ends of these lugs and bearing against the rear side of the carriage.

The upward and downward movement of the carriage and the parts supported thereby is limited preferably by means of adjustable stops consisting preferably of screws *q*, q^1 arranged at the upper and lower ends of the bracket in position to be engaged by the upper and lower ends of the carriage.

The carriage is yieldingly held in its central position between the upper and lower stops *q*, q^1 by means of the weight of this carriage and the parts mounted thereon which tend to depress the same, and one or more springs *r* which connect the carriage with the bracket and operate to lift the same. The weight of the carriage and connecting parts and the tension of the springs is so proportioned that they practically neutralize each other and hold the carriage in its central position. When the stop frame is engaged by one of the tappets of the controlling cable so as to depress the same this movement is cushioned by the resistance offered by the springs *r* and when the stop frame is engaged by said tappets so as to lift this frame this movement is cushioned by the weight of the stop frame and associated parts. By this means the stop frame is relieved from any sharp blows or undue strains when the same is engaged by the tappets of the controlling cable, thereby preventing injury or straining and possible breakage of the stop mechanism.

I claim as my invention:

1. An elevator controlling device comprising a movable controlling member and a tappet thereon, and a stop member movable transversely relatively to the controlling member and provided with a stop face and with a shifting face, said stop member when in its normal position having its stop face arranged out of the path of said tappet and its shifting face in the path of said tappet and said stop member being shiftable into an abnormal position by moving said tappet against said shifting face and thereby bringing said stop face into the path of said tappet.

2. An elevator controlling device comprising a controlling cable and a tappet thereon, an oscillating frame having a stop face and a shifting face adapted to be engaged by said tappet, and means for holding said frame yieldingly in a position in which its stop face clears said tappet, said shifting face being adapted to be engaged by said tappet when the frame is in its normal position and thereby shifted into an abnormal position in which said stop face is arranged in the path of said tappet.

3. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower stop bars and upper and lower inclined shifting bars arranged adjacent to the inner sides of the stop bars, and means for holding said frame yieldingly in a position in which the tappets clear said stop bars and engage the shifting bars for turning said frame so that said stop bars are in the path of said tappets.

4. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower stop bars and upper and lower inclined shifting bars arranged adjacent to the inner sides of the stop bars,

each of said stop bars having a slot which is wide in line with the adjacent inclined shifting bar and narrow on one side of said shifting bar, and means for holding said frame yieldingly in a position in which said tappets and cable are in line with the wide parts of said slots and said inclined shifting bars.

5. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower stop bars, upper and lower inclined shifting bars each connected at one end with one end of one stop bar and two connecting bars each connecting the opposite end of each stop bar with the shifting bar of the other stop bar, and means for holding said frame yieldingly in a position in which said tappets and cable are in operative relation to said inclined shifting bars and out of operative relation to said stop bars.

6. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower curved stop bars and upper and lower inclined shifting bars arranged adjacent to the inner sides of the stop bars, and means for holding said frame yieldingly in a position in which the tappets clear said stop bars and engage the shifting bars for turning said frame so that said stop bars are in the path of said tappets.

7. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower stop bars and upper and lower inclined shifting bars arranged adjacent to the inner sides of the stop bars, and means for holding said frame yieldingly in a position in which the tappets clear said stop bars and engage the shifting bars comprising a weight mounted on said frame on one side of its center.

8. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame provided with upper and lower stop bars and upper and lower inclined shifting bars adapted to be engaged alternately by said tappets, means for yieldingly holding said frame in position for engaging said tappets with said inclined shifting bars and permitting said tappets to clear the stop bars, and means for adjusting said stop bars toward and from each other.

9. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame provided with upper and lower stop bars and upper and lower inclined shifting bars adapted to be engaged alternately by said tappets, means for yieldingly holding said frame in position for engaging said tappets with said inclined shifting bars and permitting said tappets to clear the stop bars, and means for adjusting the stop bars and shifting bars toward and from each other.

10. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame provided with upper and lower stop bars and upper and lower inclined shifting bars adapted to be engaged alternately by said tappets, means for yieldingly holding said frame in position for engaging said tappets with said inclined shifting bars and permitting said tappets to clear the stop bars, and means for adjusting the stop bars and shifting bars toward and from each other comprising connecting bars each composed of two sections slidable lengthwise on each other and clamping bolts passing through said sections.

11. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame provided with upper and lower stop bars and upper and lower inclined shifting bars adapted to be engaged alternately by said tappets, and connecting bars connecting said stop bars and shifting bars, means for yieldingly holding said frame in position for engaging said tappets with said inclined shifting bars and permitting said tappets to clear the stop bars, a yoke connected with the connecting bars and a support on which said yoke is pivoted.

12. An elevator controlling device comprising a controlling cable and upper and lower tappets thereon, an oscillating stop frame having upper and lower stop bars, upper and lower inclined shifting bars, longitudinal bars connecting said shifting and stop bars and a yoke connected with said longitudinal bars, a vertically movable carriage on which said yoke is pivoted, a bracket on which said carriage is guided, a spring connecting said bracket and carriage and operating to raise the latter, and stops which limit the vertical movement of the carriage.

Witness my hand this 8th day of July, 1910.

CORDIE BARNUM.

Witnesses:
FRED. H. BURR,
THEO. L. POPP.