No. 776,077. PATENTED NOV. 29, 1904.

J. F. MURPHY.

AUTOMATIC CONTROLLING MECHANISM FOR ELEVATORS.

APPLICATION FILED DEC. 31, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

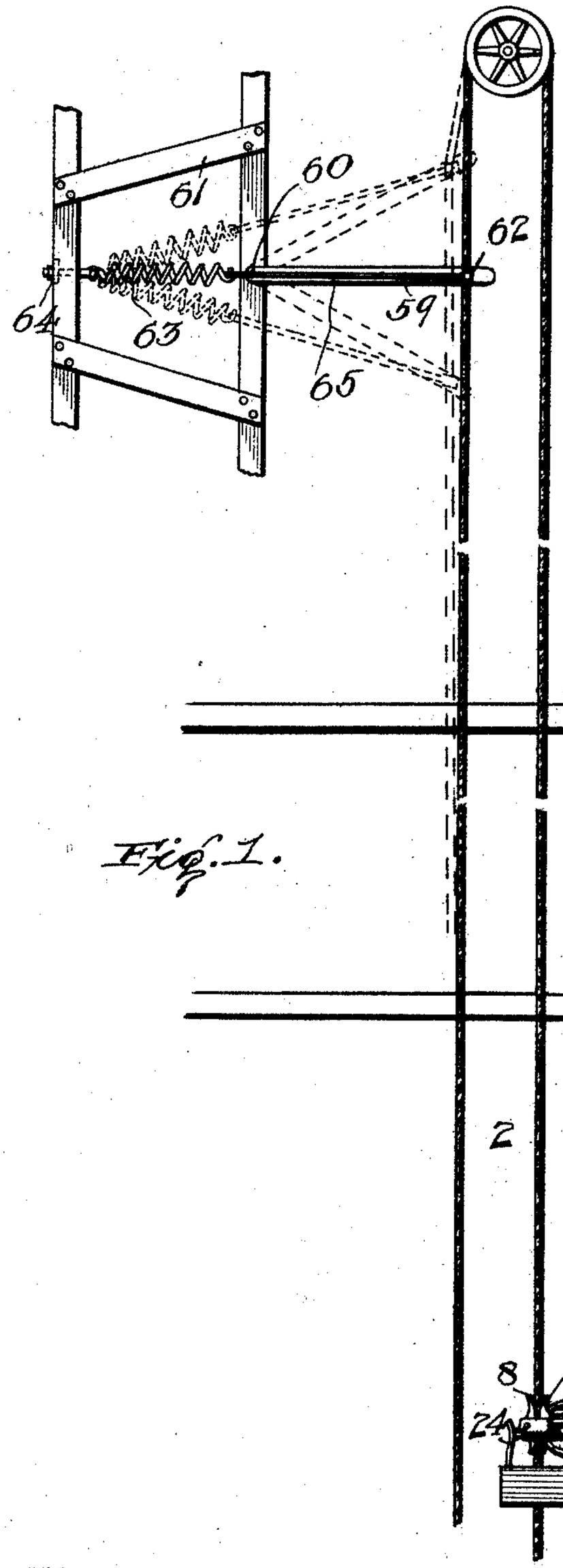


Fig. 1.

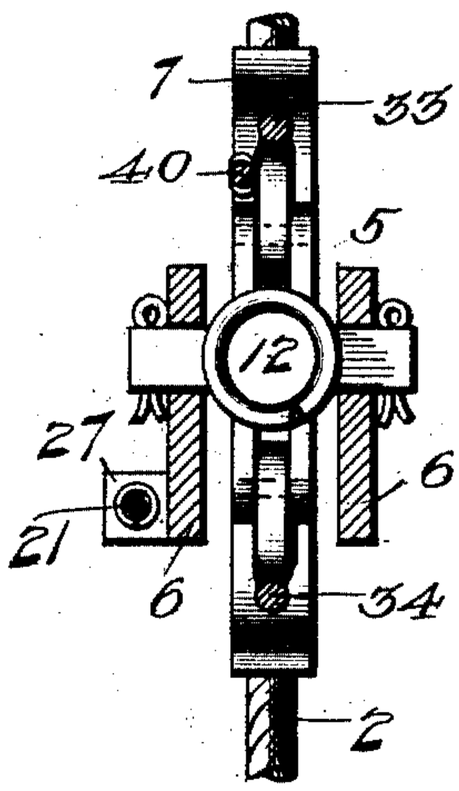
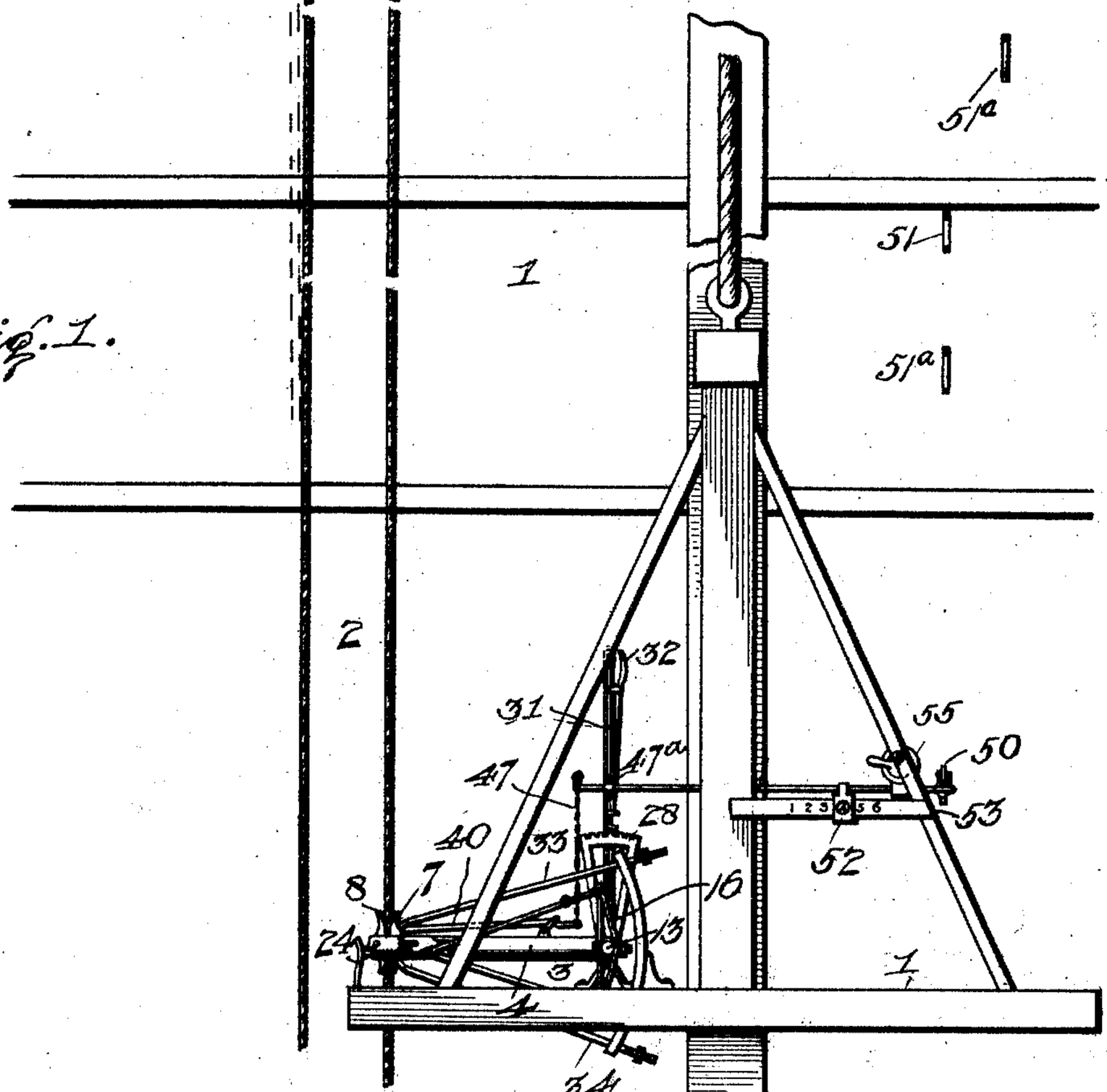


Fig. 4.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

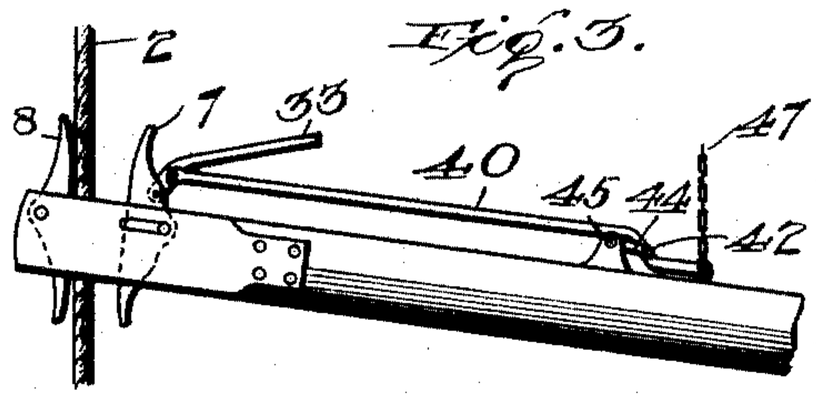


Fig. 2.

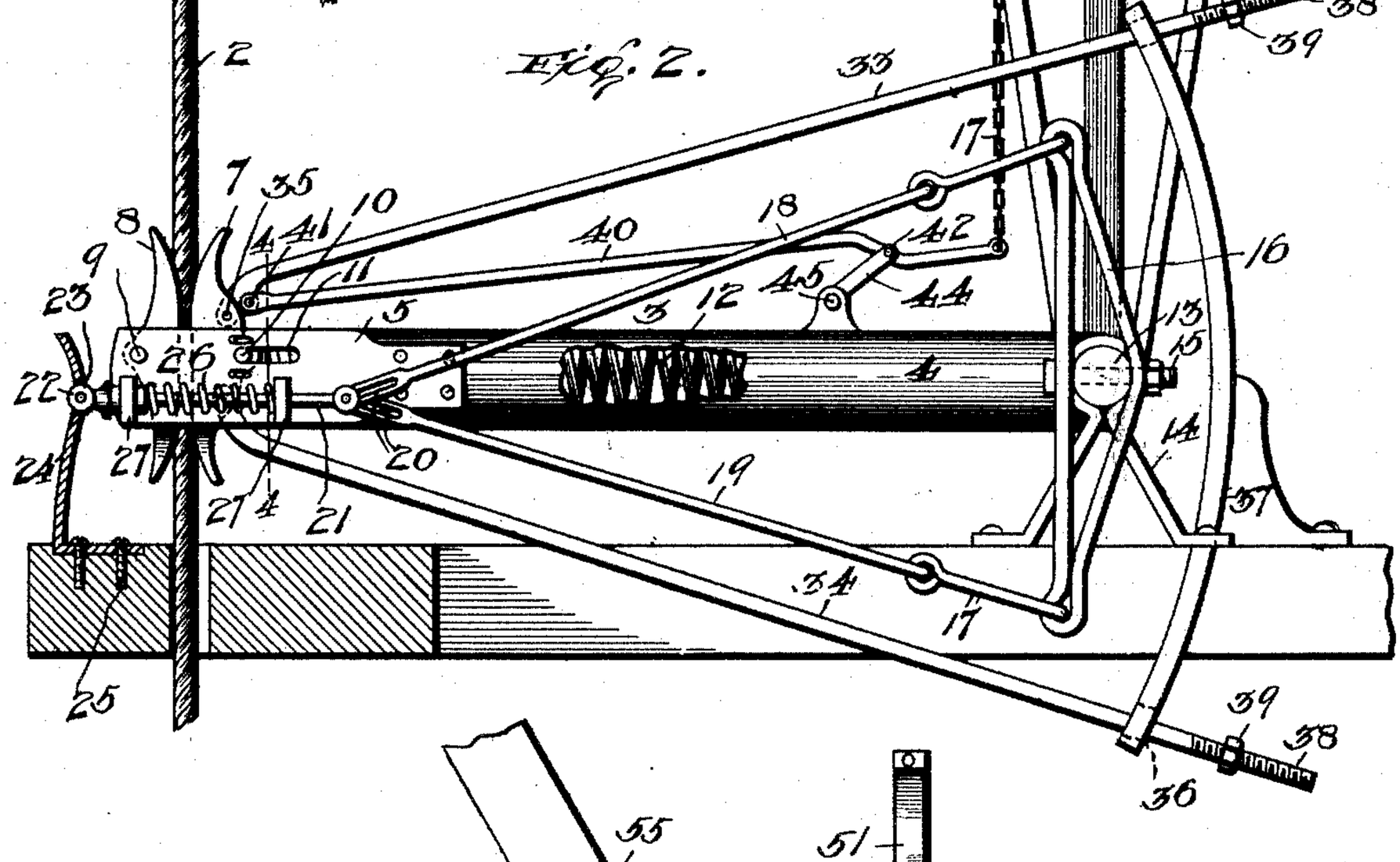
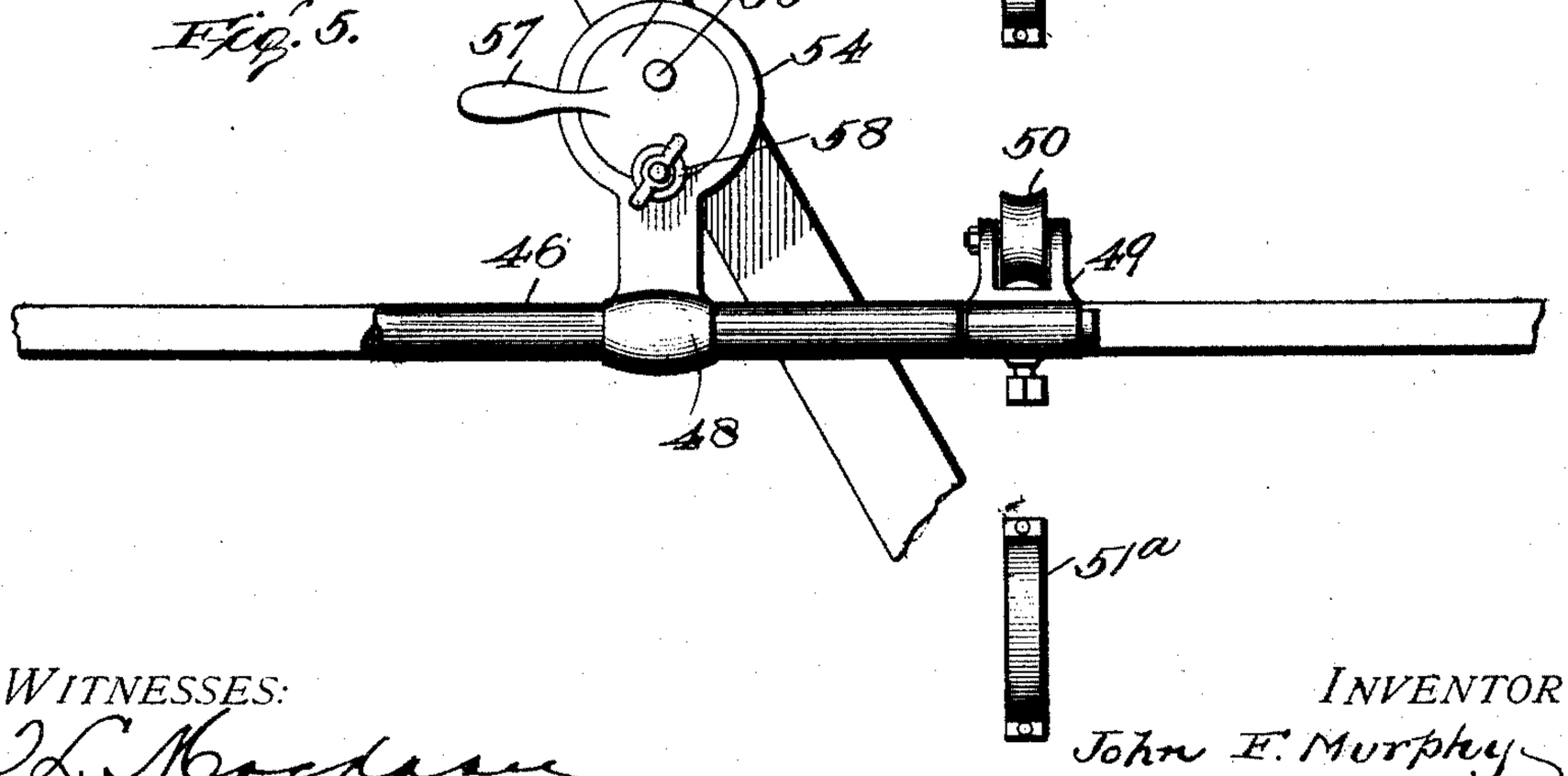


Fig. 5.



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No. 776,077. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

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AUTOMATIC CONTROLLING MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 776,077, dated November 29, 1904.

Application filed December 31, 1903. Serial No. 187,357. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. MURPHY, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Automatic Controlling Mechanism for Elevators, of which the following is a specification.

This invention relates to elevators, and has special reference to the controlling means therefor.

To this end the invention primarily contemplates a practical and effective automatic controlling mechanism comprising means whereby the elevator-car may be automatically stopped at the landings or other desired points unless otherwise desired by the operator.

A general object of the invention is to provide an automatic controlling mechanism equally applicable to freight and passenger elevators and embodying means whereby the operator can readily set the mechanism to provide for an automatic stoppage of the car at the predetermined landing or point, utilizing the motion of the car to actuate the operating-cable for bringing the car to a state of rest in the exact position desired.

A further object of the invention is to associate with the mechanism improved tripping means which can be so regulated as to provide for stopping the car either above or below the floor-level, which is a point of special utility in connection with freight-elevators. In such use this adjustment of the tripping device would take care of the sag and slower action of the lifting machinery where freight-elevators are overloaded.

The invention also has in view associating with the mechanism an auxiliary cable pulling device which coöperates with such mechanism to provide means for moving the operating-cable to its limit of movement in either direction after having been started through the medium of the controlling mechanism.

With these and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts, which will be hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in the relation of elements providing for the automatic action of the controlling mechanism and the movement of the operating-cable to its limit in either direction are necessarily susceptible to structural modification, according to the character of elevator or other conditions to be met; but a preferred embodiment of the invention, exemplifying the essential features thereof, is shown in the accompanying drawings, in which—

Figure 1 is a general elevation of an automatic controlling mechanism shown applied to an ordinary type of freight-elevator and also illustrating the operating-cable and the auxiliary pull device which continues or supplements the action of the mechanism. Fig. 2 is an enlarged elevation of the controlling mechanism shown in its at-rest position. Fig. 3 is a smaller detail elevation showing the gripper-lever swung to its limit of movement in one direction and illustrating the position assumed by the locking-toggle for the clutch-restrainer or clutch-restraining rod. Fig. 4 is a detail cross-sectional view through the clutch-head on the line 4 4 of Fig. 2. Fig. 5 is an enlarged detail view illustrating a practical expedient for adjusting the trip to operate for stopping the car at, above, or below the floor-level, according to the conditions required.

Like reference-numerals designate corresponding parts in the several figures of the drawings.

As indicated, this invention is applicable to elevators of any type wherein the elevator machinery is controlled through the medium of the ordinary shiftable operating cable or rope, and hence the improvements are equally serviceable when applied to either a freight or passenger elevator, inasmuch as in either case the invention provides improvements whereby the elevator-car may be automatically stopped or arrested at any landing or predetermined point. In the application of

the invention to either of these types of elevators some slight modifications may be necessary; but in all embodiments the essential features of the invention are preserved. These features may be well exemplified in the application of the mechanism to an ordinary freight-elevator, so for illustrative purposes such form of elevator is shown in the drawings.

Referring particularly to the drawings, the numeral 1 designates the elevator-car guided for movement in the ordinary elevator shaft or well and connected with the lifting or elevator machinery in the ordinary way. Also there is associated with the machinery and the car the usual shiftable operating-cable 2, which is ordinarily pulled by the operator for controlling the valve of the machinery, whereby the elevator-car may be directed either up or down, as desired. In the ordinary action of the shiftable pulling-cable 2 the side or leg thereof available to the operator is pulled down for starting the car upward and pulled up for starting the car downward in the well-known manner.

The automatic controlling mechanism contemplated by the present invention is carried by the car 1 at a convenient point and is directly associated with the side or leg running through or past the car-platform.

Primarily the invention involves a vertically-swinging member 3, designed for pulling the operating-cable up or down. This vertically-swinging member 3 may be properly termed a "gripper-lever," inasmuch as the same is constructed to carry an automatic cable-clutch for gripping the cable 2 with sufficient tightness for pulling upon the same in either direction, according to the direction of swing of the gripper-lever. This gripper-lever may be variously constructed without departing from the scope of the invention; but a practical construction is shown in the drawings, wherein the said lever essentially consists of a tubular casing member 4 and an open clutch-head 5. The open clutch-head 5 is carried by the free swinging end of the casing-section 4 of the lever and embodies the opposite parallel cheek-plates 6, rigidly united in any suitable manner at their inner ends to the casing-section 4 of the lever, and within the open clutch-head 5 (through which the cable 2 passes) there is arranged the automatic cable-clutch, consisting of a pair of inner and outer clutch-shoes 7 and 8, arranged, respectively, at opposite sides of the cable 2.

The clutch-shoes 7 and 8 are preferably of a segmental form and are provided with suitable gripping surfaces or faces for engaging the cable therebetween. The said segmental clutch-shoes are reversely arranged with reference to each other, and the outer one of said shoes (designated by the reference 8) has a fixed mounting within the outer end portion of the clutch-head 5. This mounting may conveniently be in the form of a pivotal connection 9 at a point intermediate the upper and lower ends of the shoe 8 and permitting of a certain freedom of play thereof, while holding it in a fixed position within the head. The other inner clutch-shoe 7 is movable toward and from the plane of the cable 2 for respectively opening and closing the clutch. Any movable support may be provided for this shoe 7, but, as shown in the drawings, said shoe is provided at opposite sides with the laterally-projecting supporting-pins 10, slidably mounted in the guiding-slots 11, provided in the cheek-plates 6 of the head 5, and the said shoe 7 has arranged to bear against the inner side thereof one end of the main clutch-spring 12, conveniently housed within the casing-section 4 of the gripper-lever and serving to press the shoe 7 with sufficient force to hold it in firm gripping contact with the cable 2 for pulling purposes.

Normally the gripping-lever 3, carrying the cable-clutch 7 and 8, occupies a substantially horizontal position with relation to the floor of the car and at the end opposite the clutch is loosely or pivotally mounted in any convenient manner upon a pivot-axle 13, supported in suitable bearing-brackets 14, bolted to a stationary part of the elevator-car. This pivot-axle 13 also has bolted or otherwise rigidly fastened thereto, as at 15, a cross-arm 16, extending above and below the plane of the axle 13 and having loosely connected respectively at its upper and lower ends, through the medium of the links 17, the upper and lower latch-release rods 18 and 19, respectively. These upper and lower latch-release rods 18 and 19 extend convergently from their connection with the cross-arm 16 and have slotted or equivalent connections 20 with one end of a spring-projected latching-bolt 21, the other end of which bolt carries an engaging roller 22, designed to engage in the opening or notch 23 of an upstanding keeper-spring 24, secured at its lower end, as at 25, to a fixed part of the elevator-car. The latching-bolt 21 and its connections constitute a keeper-latch. The same is normally held projected in engagement with the keeper 24 through the medium of a holding-spring 26, placed about the bolt and arranged between the latch-supports 27, carried by and projected from the clutch-carrying head 5.

The pivot-axle 13, upon which are mounted both the gripper-lever and the cross-arm 16, having lifting connections with the lever through the medium of the latch described, also has mounted fast thereon an upstanding adjusting-segment 28, provided in the arc thereof with a plurality of adjustment-notches 29, corresponding in number to the stopping-points for the car. These notches are designed to be engaged by a setting-latch 30, carried by a controlling-lever 31 and operated by the latch-handle 32, also carried upon the

controlling-lever. This controlling-lever is loosely mounted at one end upon the axle 13 and is locked to the fast segment 28 through the medium of the latch 30. As thus latched to the segment a movement of the controlling-lever in either direction first imparts movement to the cross-arm 16 to disengage the latch and then to the gripper-lever immediately upon the disengagement of the latch from its keeper 24.

The swinging movement of the gripper-lever in either direction provides an automatic opening of the clutch when the cable has been pulled to its limit in either direction. This may be conveniently effected through the medium of upper and lower clutch-opening rods 33 and 34, disposed, respectively, above and below the plane of the gripper-lever and pivotally or otherwise suitably connected at one end, as at 35, to the inner movable clutch-shoe 7. The upper and lower clutch-opening rods 33 and 34 diverge from their connection with the movable shoe 7 and at their opposite ends loosely pass through the rod-openings 36, provided in the upper and lower end portions of the stationary abutment-bracket 37, suitably supported upon the elevator-car. The terminals of the rods 33 and 34, projecting through the openings 36, are threaded, as at 38, to receive thereon the adjustable stop-nuts 39, which are designed to be arrested against the abutment-bracket 37 when the gripper-lever reaches the position where the clutch should be released from the cable.

When the clutch is opened through the action of either rod 33 or 34, the same is automatically locked in such position through the medium of the clutch-restraining rod 40. This clutch-restraining rod 40 is pivotally connected at one end, as at 41, to one of the clutch-opening rods adjacent to the movable shoe, and may therefore be said to be connected with the movable shoe. At an intermediate point the said rod 40 has pivoted thereto, as at 42, one end of a toggle-link 44, the other end of which is pivoted, as at 45, to a fixed projection from the gripper-lever 3. The toggle-link 44 normally stands obliquely, and hence upon the drawing back of the movable clutch-shoe 7 the pivot-point 42 passes below the pivotal support 45 for the link, and hence provides what is commonly known as a "past-center lock." This lock may be released by simply raising the link 44 to the position shown in Fig. 2 and is accomplished through the medium of a trip device, including a tripping rock-shaft 46 and a release connection 47 between one end of such rock-shaft and one end of the clutch-restraining rod 40.

The tripping rock-shaft 46 has a bearing-mounting 47^a upon the controlling-lever 31 and also turns and slides in a bearing 48, carried by a fixed part of the car-framework. The said shaft turns in the bearing 47^a, but is suitably held against endwise movement therein, so that the movement of the lever 31 will provide for sliding the shaft in the bearing 48, which latter bearing receives the shaft with sufficient looseness to accommodate the swing of the lever. At its end opposite the release connection 47 the rock-shaft 46 carries a rocker trip-arm 49, fitted with a contact-roller 50, adapted to be engaged with the stop projections 51 51^a, arranged in the elevator-shaft. A pair of these stop projections 51 51^a are associated with each landing point or floor and are disposed an equal distance respectively above and below the position of trip 50 when the car is on level of the landing point or floor to provide for releasing the trip device sufficiently in advance for stopping the car at the landing point or floor.

The pairs of stop projections 51 and 51^a for the separate landing points or floors are disposed in different vertical planes, and the rocker trip-arm 49 is designed to be set or adjusted into the plane of any pair of such stops through the medium of the controlling-lever 31, according to the landing point or floor where the car is designed to be automatically arrested. However, it will of course be understood that the stop projections for each floor are disposed in the same vertical plane.

The adjustment-notches 29 may be numbered to indicate the adjusted position for the trip rocker-arm 49; but in addition thereto there may be utilized a separate indicator, consisting of an open indicating-slide 52, fitted to the slidable tripping rock-shaft 46 and working over a numbered strip or bar 53, as plainly shown in Fig. 1 of the drawings.

Another feature to note in connection with the tripping rock-shaft 46 is that provision may be made for the vertical adjustment thereof in addition to the sliding adjustment for setting the trip-arm 49. This may be accomplished by having the bearing 48 pendent from an eccentric-strap 54, encircling an adjusting-eccentric 55, pivotally mounted, as at 56, upon a stationary part of the elevator-car and provided with a handle 57. A binding nut or device 58 may be fitted to the eccentric and engaged with the strap thereof to provide for securing it against movement after being once adjusted. This adjustment provides a trip-setting device whereby the shaft may be raised or lowered in order to stop the car either below or above the floor-level, which becomes of importance in such conditions as an overloaded freight-elevator. This adjustment would take care of the sag and slower action of the lifting machinery.

An important auxiliary of the invention resides in the employment of an auxiliary cable-pull device which is mounted at the top of the elevator-shaft out of the line of travel of the car and arranged at the slack side of the cable. This auxiliary pull device essentially consists of a swinging lever-arm 50, having a fixed pivotal support at one end, as at 60, upon a

suitable frame or support 61 and at its other end having a fast connection, as at 62, to the slack side of the cable. Associated with this lever-arm is a pull-spring 63, secured fast at one end, as at 64, to the frame or support 61 and having a link or rod connection 65 at its other end with the cable-attached end 62 of the lever-arm.

Normally when the gripper-lever 3 is horizontal the auxiliary pull device is at dead-center—*i. e.*, the pull-spring connection is in direct line with the lever-arm 59—but when the cable is started in either direction so as to deflect the lever-arm 59 from the horizontal the pull-spring 63 comes into active play and draws upon the cable-attached end 62 of such arm, with the result of continuing the movement of the cable to its limit in either direction.

Normally with the clutch-shoes 7 and 8 gripping the cable the operator first sets the latch 30 for the landing point or floor and then pulls upon the lever 31. This rocks the axle 13 with the result of first releasing the latch 21 and then swinging the gripper-lever in the desired direction, which exerts a pull upon the cable and a consequent starting of the machinery in the usual manner. When the gripper-lever reaches a proper limit, one of the clutch-opening rods 33 or 34 becomes arrested by the stop 39, with the result of drawing back the movable clutch-shoe 7 and causing it to be automatically locked in an open position by the toggle-lock 44. The gripper-lever is then returned to its normal horizontal position, where it becomes relatched, and when the stopping-point is reached the trip is actuated by one of the stop projections, thereby opening up the toggle-lock 44 and permitting the movable shoe 7 to grip upon the cable, whereupon the motion of the car will cause a drawing upon the cable in a direction for stopping the car by the time it reaches the desired landing.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described mechanism will be readily apparent without further description, and it will be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a gripper carrying a cable-clutch, and means for moving the gripper and automatically opening the clutch thereof.

2. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a swinging gripper carrying a cable-clutch, and means for moving said gripper and effecting an automatic opening of the clutch.

3. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a movable gripper carrying a cable-clutch, means for moving the gripper and opening the clutch, and means for automatically closing the clutch.

4. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a swinging gripper carrying a cable-clutch, means for moving the gripper and opening the clutch, and means for automatically closing the clutch.

5. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a movable gripper carrying a cable-clutch, means for moving the gripper and opening the clutch, and a device comprising means for automatically closing the clutch at variable points.

6. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a movable gripper carrying a cable-clutch, means for moving the gripper and effecting an opening of the clutch through such movement, and means for automatically closing the clutch.

7. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a movable gripper carrying a cable-clutch, means for moving the gripper and effecting an opening of the clutch, means for holding the clutch restrained in its open position, and means for automatically closing the clutch.

8. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a movable gripper carrying a cable-clutch, means for moving the gripper and effecting an opening of the clutch by such movement, means for restraining the clutch in its open condition, and a device comprising means for closing the clutch at variable points in the travel of the car.

9. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a swinging gripper-lever carrying a cable-clutch, means for moving said lever and opening the clutch by such movement, means for restraining the clutch in an open condition, and a trip device comprising means for effecting an automatic closing of the clutch at variable points in the travel of the car.

10. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a swinging gripper-lever carrying a cable-clutch consisting of a pair of relatively fixed and movable shoes, means for swinging the lever and retracting the movable shoe through such movement, means for restraining the movable shoe in its open position, and means for automatically tripping the movable shoe to a closed position.

11. In a controlling mechanism for eleva-

tors, the combination with the car and the operating-cable, of a swinging gripper-lever carrying a cable-clutch consisting of a pair of relatively fixed and movable shoes, means for swinging said lever and effecting a retraction of the movable shoe by such movement, means for restraining the movable shoe in its open position, and an adjustable trip device comprising setting means and also means for tripping the movable shoe to its closed position.

12. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a swinging gripper-lever carrying a pair of relatively fixed and movable clutch-shoes, a latch for holding the lever in an at-rest position, operating means for successively releasing the latch, lifting the lever, and effecting a retraction of the movable shoe, and a trip device for automatically tripping the movable shoe to its closed position.

13. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a vertically-swinging gripper-lever carrying at its swinging end a pair of relatively fixed and movable clutch-shoes, a latch for holding the gripper-lever in its at-rest position, operating means for successively releasing the gripper-latch, swinging the gripper-lever and effecting a retraction of the movable shoe, and an adjustable trip device having means for being brought into play at predetermined points and also comprising means for tripping the movable shoe to its closed position.

14. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a suitably-supported pivot-axle, a vertically-swinging gripper-lever loosely connected with the axle and carrying a pair of relatively fixed and movable clutch-shoes, a spring-projected latching-bolt carried by the lever, a keeper for said latch-bolt, a cross-arm carried by the pivot-axle and having release-rod connections with said latch-bolt, clutch-opening rods connected with the movable shoe and coöperating with a fixed abutment, a clutch-restraining rod having suitable connection with the movable shoe and provided with a self-acting lock, an adjusting-segment fast to the pivot-axle, a controlling-lever having a latched connection with said segment, and a trip device having a release connection with said clutch-restraining rod.

15. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a suitably-supported pivot-axle, a swinging gripper-lever carrying a fixed clutch-shoe and a movable spring-pressed clutch-shoe, a spring-projected latching-bolt carried by the lever, a cross-arm carried by the axle and having release-rod connections with said bolt, a stationary abutment-bracket, clutch-opening rods connected with the movable shoe and carrying stops movable against said abutment-bracket, a clutch-restraining rod having connection with the movable shoe, a locking toggle-link pivotally connected respectively with the gripper-lever and the clutch-restraining rod, a notched adjusting-segment fitted to the axle, a controlling-lever having a latched connection with said segment, and a trip device including stationary stops, and an adjustable rock-shaft coöperating with said stops and having a release connection with said clutch-restraining rod.

16. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of a plurality of stops for the different landing-points arranged out of alinement, a pair of such stops being associated with each landing-point and arranged respectively above and below the same, a gripper carrying a cable-clutch, means for moving the gripper and opening the clutch, and a trip device having means for tripping the clutch to its closed position and including an adjustable tripping rock-shaft carrying a rocker trip-arm coöperating with said stops.

17. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of stationary stops, gripper devices coöperating with the cable, and a trip device coacting with the gripper devices, said trip device including a rock-shaft carrying a rocker trip-arm coöperating with the stops, and an adjusting device connected with the shaft and comprising means for raising and lowering the same.

18. In a controlling mechanism for elevators, the combination with car and the operating-cable, of a gripper device carried by the car and exerting a pull action on one side of the cable, and an auxiliary cable-pull device comprising means for exerting an auxiliary pull on the slack side of the cable.

19. In a controlling mechanism for elevators, the combination with the car and the operating-cable, of the gripper devices carried by the car and exerting a pull action on one side of the cable, and an auxiliary cable-pull device associated with the slack side of the cable and comprising a swinging lever-arm having a fixed pivotal support at one end and a fast connection at its other end with the cable, and a pull-spring having a fixed support at one end, and a connection at its other end with the cable-attached end of the lever-arm.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN F. MURPHY.

Witnesses:
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