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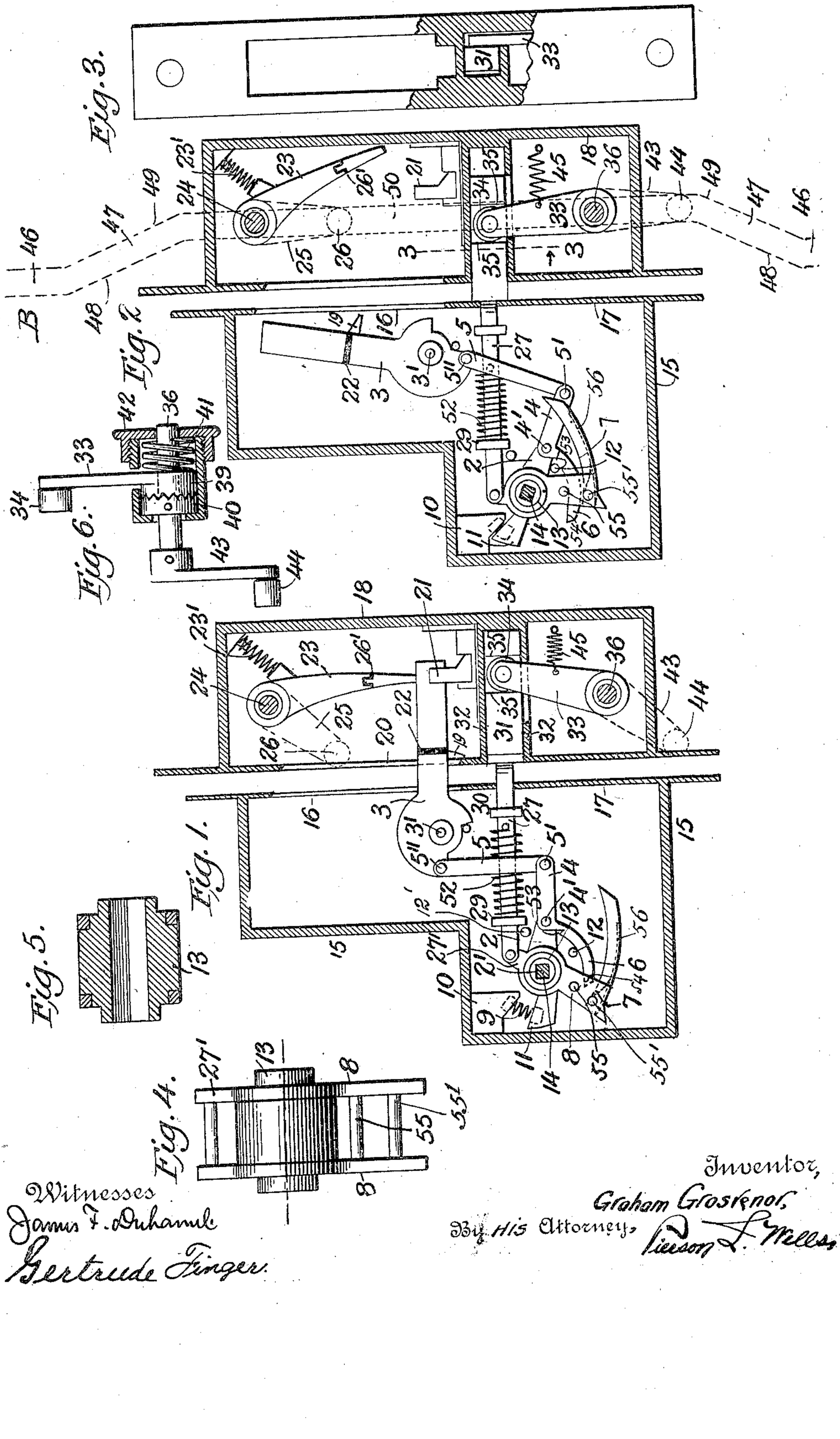
MECHANICAL MOVEMENT.

APPLICATION FILED MAY 15, 1905.

994,384.

Patented June 6, 1911.



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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

994,384. Specification of Letters Patent. Patented June 6, 1911.

Application filed May 15, 1905. Serial No. 260,387.

To all whom it may concern:

Be it known that I, GRAHAM GROSVENOR, a citizen of the United States, residing in the borough of Manhattan, in the city of New York and State of New York, have invented a new and useful Improvement in Mechanical Movements, of which the following is a specification.

This invention relates to a mechanical movement embodying an actuator and an actuatable member, capable of being operatively connected with and disconnected from each other with the result that the actuator may be rendered effectual or ineffectual to actuate the other said member.

The present mechanical movement embraces a transmitter interposed between the actuator and the actuatable member, and adapted to pass over at least either one of two paths during the prescribed movement of the actuator; that is to say, the direction of movement of this transmitter during a period of rest of the actuatable member, is different from that which it takes when the latter member is designed to move. For convenience, the transmitter is permanently connected to both the actuator and the actuatable member, so that when the transmitter is caused or compelled to follow a predetermined or prescribed path, (other than that due solely to its connections,) motion is transmitted from the actuator to the actuatable member through said connections. Such transmitter is conveniently in the form (and in this form it is herein illustrated) of a link, having a pivotal connection with the actuator and pivotally related to the actuatable member. During the movement of the actuator while such link is restrained in its movement only by the connections aforesaid, it plays idly about its pivots without imparting motion to the actuatable member. When, however, the transmitting link is constrained to follow a different path than that which it has under these conditions, motion is transmitted from the moving actuator to the actuatable member. Such constrained motion of the link may be effected in various ways; for instance, by the positioning of one or more guide surfaces along which a part moving in unison with the said link is compelled to travel during the movement of the actuator.

One of the most useful of the applications which I have devised at the present time for my present invention, is that of a door-lock of the character adapted for use in connection with those elevator systems in which it is desirable that the locking bolt should be incapable of being thrown from its locking position at such times as the car is not at the given landing or floor entrance, but in which it is designed that the turning of the knob spindle when the car is at the floor shall serve to draw back the bolt.

In the drawings accompanying the present specification, Figure 1 is an elevational view of an assemblage of parts which embodies the present invention, the latter being shown in an application adapted to fulfil the conditions obtaining for a door-lock used in connection with some elevator systems; the cover plates of the respective casings holding the pivoted locking bolt and the electrical contact device being removed, and the bolt being indicated in its locking position with the associated parts in a corresponding position. Fig. 2 is a view similar to Fig. 1, but indicates the bolt as withdrawn from its locking position, while the position of the associated parts corresponds thereto. Fig. 3 is a view on the plane of the line 3, 3, in Fig. 2, looking in the direction of the arrow adjacent to that line. Fig. 4 is an elevation of the knob spindle with the parts mounted thereon. Fig. 5 is a sectional view of the parts in Fig. 4. Fig. 6 is a detail elevation, partly in section, of the cam-roller arm coöperative with the cam mounted on the elevator car, the arm for shifting the slide controlling the operative connection of the spindle with and its disconnection from the locking bolt, and the clutch mechanism interposed between the two arms.

Similar characters of reference designate corresponding parts in all figures.

The present mechanical movement comprises an actuator and an actuatable member, so constructed and related to each other and to an interposed transmitter that the actuator may be rendered either operative or inoperative to actuate the said actuatable

member; that is to say, the moving actuator may either be accompanied by the movement of the actuatable member or be ineffective to change the condition of the latter with respect to its state of rest or motion. Such results are accomplished through the medium of an interposed transmitter, related or connected to the actuator and the actuatable member in a manner such that when the resultant movement of the transmitter is determined only by the motion of the actuator and the nature of the transmitter connections, the actuatable member is not influenced by the actuator. When, however, such transmitter is constrained to follow a definite and predetermined path through the instrumentality of a guide surface or surfaces shiftable into and out of position, the actuator and the actuatable member move in unison.

In the illustrated embodiment of the invention, the actuator is in the nature of an angularly movable arm, the actuatable member in the nature of a pivoted part, and the transmitter in the nature of a link interposed between the two.

Referring to the drawings, such actuator arm is designated by 2, the same being mounted to turn about an axis 2′. The actuatable member or lever 3 is pivoted to turn about an axis 3′, while the transmitter link 4 is pivoted to the actuator arm at 4′, a connecting link 5 being, in this instance, interposed between and pivoted at 5′ and 5″, respectively, to, the transmitter link and lever 3. The links 4 and 5 constitute means for transmitting motion from the actuating arm 2 to the actuatable member 3. It is evident from this relation that the angular movement of arm 2 through an arc insufficient to bring the center lines of the transmitter and connecting link in alinement, merely changes their angular relation to each other and is ineffective to operate lever 3 said links merely turning upon their pivots during such motion. If, however, link 4 is compelled to follow a path different from that which it traverses under the above conditions, motion may, under such circumstances, be transmitted from arm 2 to arm 3. In this instance, the transmitter link is, through the agency of a shiftable guide, compelled to move through substantially the same angle as the arm 2 sweeps over during its movement, or in other words, is, in effect, made substantially rigid with such arm. Under these latter conditions it is evident, therefore, that a motion of arm 3 results.

Specifically, link 4 is provided with an arc-shaped extension 6 the curve of which is concentric with axis 2′. As long as link 4, and its extension 6 are free to turn on the pivot 4′, the extension will swing with reference to axis 2′, that is downward in Fig. 1, when arm 2 is turned. If, however, a guide or stop is interposed in the path of such downward movement of the extension, the latter will, during the turning of arm 2, travel along the surface of such guide or stop, and link 4 remaining in more or less fixed angular relation to arm 2 will compel the movement of arm 3. In this instance the guide or stop, shown at 7, consists of a shoulder formed by the edge of a shiftable part or arm 8, pivoted to turn about axis 2′.

The initial position of the parts (Fig. 1,) is assured by the action of a spring 9 interposed between an abutment 10 and an ear or wing 11 rigid with the actuator arm 2, the tension of this spring tending to force the parts into a position in which the arc-shaped inner edge of the link extension 6 contacts with a fixed or limit stop 12, a safety stop 12′ being also provided with which arm 2 is adapted to contact. It is to be noted in this instance that since the inner and outer edges of the curved extension 6 are each adapted to travel at times in contact with a corresponding stop, such edges are concentric with axis 2′. This being the relation of the parts, it is evident that by shifting the stop 7 from its inoperative to its operative position, or vice versa, the actuator may be rendered at will either operative or inoperative to actuate the actuatable member.

One of the most useful adaptations of this movement which I contemplate at the present time, is that of embodiment in a door-lock controlling the ingress to and egress from an elevator shaft. The mechanical movement is shown in a mechanical environment calculated to fulfil conditions obtaining in those systems of electrically operated elevators in which when a car is not at a given landing, the lock of the door leading therefrom to the elevator well cannot be unlocked even though the knob spindle be grasped and turned by the individual. The door remains locked and the continuity of the electric circuit is preserved until the car stops at the landing at which time the turning of the spindle readily releases the locking bolt, and at the same instant breaks the power circuit. That is to say, in the present embodiment, the actuator 2 extends from a block 13 through which extends the usual squared shaft 14 constituting the knob spindle rotatably mounted in casing 15, while rigid with the said block is the aforesaid ear 11. The actuatable member 3 is here in the nature of a swinging locking bolt, also journaled within casing 15 and playing through an opening 16 in the end plate 17 of the casing. Opposed to the casing 15 is a casing 18 (mounted in or on the door framing or jamb). The present locking bolt is adapted not only for a swinging but also for a sliding door; when used for the latter purpose, the

bolt is provided with a laterally extending lug 19 adapted to engage with the lower edge of the bolt opening 20 in the casing 18. The locking bolt 3 here serves the additional purpose of establishing, when in its locking position, the electric circuit through the lock, and when withdrawn from such position the breaking of such circuit is occasioned. These results are brought about by interposing in the path of the bolt adjacent to the terminus thereof (when the bolt is moving to its locking position) a pair of contacts 21 mounted in casing 18 and spring-pressed toward each other, these contacts being connected to leads in any desired manner. Preferably, also, that a portion of the bolt which impinges against and forces the contacts apart is insulated from the other portion thereof, see insulation 22. Means are shown for positively holding the bolt in its locking position and assuring its proper functioning with the contacts during such time as the car is not at the landing or approaching the same. Such means comprises an arm 23 adapted when in the position indicated in Fig. 1 to prevent the rise of the bolt away from the contacts and shiftable to a position (when the mechanism should be so related as to permit the bolt to be withdrawn) such as that indicated in Fig. 2. Arm 23 is secured to a shaft 24 mounted in casing 18 and extending into the elevator shaft where it is provided with an arm 25 carrying a cam roller 26 adapted to coöperate with a cam on the car, in a manner to be described later. A returning spring 23′ for arm 23, etc., is shown. This arm may, as indicated, have its end or bolt-contacting portion insulated from the body thereof, see insulation 26′.

It is through the instrumentality of the cam on the car that the before-mentioned guide or stop 7 is shifted from its inoperative to its coöperative position, the means here provided for enabling the cam to act in this manner comprising a slide bar 27 pivoted at one end to a finger 27′, rigid with stop or guide bar 7 and guided to follow a to and fro movement by guides 29 in line with an opening 30 in the casing 15. Disposed in coöperative relation with the slide bar 27 (when the door is in its closed position) is a slide or plunger 31 mounted in guides 32 in the casing 18, and adapted when moved forward to push the slide bar 27 to the left in Fig. 1. A reciprocatory movement is imparted to slide 31 as the result of the vibration of an arm 33, whose free end is operatively connected to the slide. In this instance a roller 34 mounted on the arm is located between ribs 35, 35 on the slide. Arm 33 is mounted upon a shaft 36 journaled in the casing 18 and extending toward the elevator well. The turning of this shaft counter clockwise in Fig. 1 (through the operation of the car-carried cam) serves to shift arm 33, and hence slide 31, forward. To compensate for such a shrinkage, etc., of the door, or its casing, or both, as results in increasing the width of the space between the edge of the closed door and the casing, and maintain, nevertheless, a proper operative condition of the lock mechanism, I prefer that the total range of designed movement of the slide 31 when first set up, shall be an amount in excess of that required to thrust back the slide bar 27 to its proper stop-positioning condition. Under such circumstances the movement of the slide will be sufficient to accomplish its designed purpose even though, in course of time, the respective casings separate from each other to a considerable extent. Such an over-movement of the slide is here rendered possible by the employment of a clutch between shaft 36 and arm 33. A convenient clutch construction is illustrated in Fig. 6 in which it will be seen that the hub portion 39 of arm 33 is pressed firmly against a collar 40 (rigid with shaft 36) by a spring 41 interposed between the end of a barrel 42 and the hub portion of the arm 33, the thrust being here taken by the opposite end of the barrel and the said hub portion and collar preferably having ratchet or corrugated friction surfaces. It is evident from this construction that the arm 43 carrying cam roller 44 may move independently of arm 33. A returning spring 45 for arm 33 and slide 31 is indicated.

The cam on the car for effecting through the vertical travel of the latter, the turning of shafts 24 and 36, is in the nature of a suitable fixture provided with oppositely facing walls with which the cam rollers are adapted to be brought in contact. Referring to the indicated cam which is illustrated in a conventional way only, the same, designated by B is provided at both its upper and lower ends with entrance portions 46, 46, the opposite walls of which are spaced apart a distance that will allow of the ingress of the cam rollers when in their initial position (that is the relative position thereof indicated in Fig. 1.) as the car approaches the landing from above or from below. Contiguous to each entrance portion is an oblique or inclined portion 47, one of whose walls 48 is the operative wall for throwing the rollers to the right in Fig. 1, while the opposite wall 49 of the inclined portion at one or the other end of the cam serves to assure the return of the rollers from the position indicated in Fig. 2 to their initial position indicated in Fig. 1. Connecting the portions 47, 47 is a portion 50 whose walls extend in line with the di-

rection of car travel, and serve to hold the rollers in their shifted position while the car is at rest at the landing.

It is apparent from the foregoing relation of the cam parts that while the shafts 24 and 36 are turned to release the locking bolt in the manner described and to retain the shafts in stationary condition while the car is at the landing, the movement of the car in either direction from the landing assures the return movements of the said shafts, and thereby the arm 23, and slide 31 to their initial positions. Slide bar 27 is provided with a returning spring 52. The protruding end of slide 31 is preferably of a width that will allow the slide to properly cooperate with slide bar 27 even though the parts are considerably displaced from their original positions, through settling, etc.

So long as the car remains at a landing and the door is still closed, as shown in Fig. 2, the bar 27 occupies its left-hand position and the extension 6 is confined between the pins 55, 55′ carried by the arm 8. Now when the knob spindle 14 is turned against the resistance of the spring 9, the extension 6 must travel over a path determined by the pins 55, 55′, and, therefore, the locking bolt or actuatable member 3 will be withdrawn from the keeper casing 18 so that the door may be opened. It should be noted that by reason of the lug 19, a sliding door may be locked as well as a swinging door. The holding device comprising the arm 23 and spring 23′ is an additional means to insure the locking bolt being held in proper position and the circuit-closer in circuit-closing position. Upon opening the door the spring 52 forces the slide bar 27 to the right to the position shown in Fig. 1, and if the spindle 14 is then released the spring 9 would move the arm 2 upwardly. During this movement the extension 6 would bear against the fixed stop 12, and, therefore, as the pivotal point 4′ moved upwardly, the pivotal point 5′ also moves upwardly throwing the bolt to locking position. To lock the bolt against movement in this manner to locking position when the door is opened and the spindle released, latch mechanism is depended upon. It will be noticed that the pins 55 and 12 are about the same distance from the center of the spindle 14 and the arc of movement of the extension 6 is on the spindle as a center. To lock the bolt against movement from its unlocking position so long as the door remains open, the extension 6 is recessed at 53. This recess is intended to fit over the pin 12 to hold the parts from movement, but to permit this the end of the extension 6 is cut away at 54 so that when the door is opened and the arm 8 moves to the left, the pin 55 then opposite the portion 54 will not interfere with sufficient upward movement of the extension 6 when the spindle is released to permit the recess 53 to seat itself on the pin 12 and thus act as a latch device. In other words, when the locking bolt is in its unlocked position, recess 53 is opposite stop pin 12, but the walls of the recess are prevented from impinging against the pin by the fact that a laterally extending pin 55 rigid with the guide or stop 7, bears against the full portion of the inner edge of the extension 6. When, however, the door is opened and the slide bar 27 moves to the right under the action of its spring, the flattened or cut away portion 54 of the extension 6 comes opposite the pin 55, and if the spindle is released, the extension 6 is moved upwardly and the walls of the recess 53 are brought against the stop pin 12; the locking bolt is thus effectually held against movement away from its unlocked position while the door remains open. Upon closing the door, the slide bar 27 is thrust back by reason of its being beveled at its outer end, and the pin 55 acting upon the inner edge of the extension 6 as a cam, withdraws the extension from the stop 12 and leaves the bolt free to be locked automatically by the spring 9.

The extension 7 is provided with a laterally extending web 56 in the path of movement of the extension 6 to prevent the latter from moving too far in the downward direction and to act as a cam on such extension to insure its passage between the pins 55, 55′. This web does not extend to the outermost end of the extension 7, as shown in Fig. 2, but is of sufficient length to effect its purpose. If the arm 2 is held in the position shown in Fig. 2, and an elevator car carrying the cam B approaches, the slide bar 27 will be moved to the left automatically, the web 56 will engage the extension 6 and move the same between the pins 55, 55′. This will cause the transmitter link 4 to be moved downwardly about 4′ as a fulcrum, which results in the downward movement of the transmitter link 5 and the upward movement of the actuatable member 3, the latter having already been released by the cam B moving the arm 23 to the left therefrom.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of my invention, and I desire, therefore, not to be limited to the precise construction herein disclosed.

Having described my invention, I claim;

1. In a device of the character described, the combination of an actuator arm, an actuatable lever, a transmitting link pivoted at one end to said actuator arm, a suspension link interposed between the opposite end of the transmitting link and said actuatable member, and a guide shiftable into and out

of position to control the movement of the transmitting link.

2. In a mechanical movement, the combination with an actuator, of an actuatable member, a transmitter connected to the actuator and to the actuatable member, said transmitter having a curved extension, means for limiting the play of said extension about its connection with said actuator, and a movable guide for limiting the path of travel of said extension in the opposite direction.

3. In a device of the character described, the combination of an actuator, an actuatable member, a transmitter link, a part rigid therewith, a stop for limiting the play of said part in one direction, and a shiftable guide for limiting when positioned the play of the part in the opposite direction.

4. In a device of the character described, the combination of an actuator, an actuatable member, a transmitter link pivotally mounted on the actuator and having a curved extension, a stop for limiting the play of said extension in one direction about its pivotal connection, and a shiftable guide for limiting when positioned the pivotal turning of said extension in the opposite direction.

5. The combination of a pivoted actuator arm, a pivoted actuatable member, a transmitter link pivotally mounted on the actuator arm, a suspension link interposed between the transmitter link and the actuatable member, said transmitter link having an extension, means coöperative with said extension for limiting the pivotal turning of said transmitter link in one direction, and a shiftable guide for limiting the pivotal turning of the transmitter link in the opposite direction.

6. The combination of a pivoted actuator arm, a pivoted actuatable member, a transmitter link pivotally mounted on the actuator arm, a suspension link interposed between the transmitter link and the actuatable member, said transmitter link having an extension, provided with bearing faces concentric with the pivotal axis of the actuator arm, means coöperative with said extension for limiting the pivotal turning of said transmitter link in one direction, and a shiftable guide for limiting the pivotal turning of the transmitter link in the opposite direction.

7. The combination of a pivoted actuator arm, a pivoted actuatable member, a transmitter link pivotally mounted on the actuator arm, a suspension link interposed between the transmitter link and the actuatable member, said transmitter link having an extension, means coöperative with said extension for limiting the pivotal turning of said transmitter link in one direction, a shiftable guide for limiting the pivotal turning of the transmitter link in the opposite direction, and a cam-controlled slide for shifting said guide.

8. The combination with a door of a pivoted actuator arm, a bolt connected thereto, a transmitter link pivotally mounted on the actuator arm, a suspension link interposed between the transmitter link and the bolt, said transmitter link having an extension, means coöperative with said extension for limiting the pivotal turning of said transmitter link in one direction, a shiftable guide for limiting the pivotal turning of the transmitter link in the opposite direction, and means for holding the bolt in its unlocking position while the door is open.

9. The combination with an actuator, of an actuatable member, a transmitter, a guide for directing movement of said transmitter, and means co-acting with said transmitter for holding the actuatable member stationary.

10. The combination with an actuator, of an actuatable member, a transmitter, a guide for directing movement of said transmitter, and means for withholding the aforesaid parts from movement.

11. The combination with an actuator, of an actuatable member, an interposed transmitter, a guide for said transmitter, means for shifting the position of said guide, and mechanism for shifting said guide to operative position.

12. The combination with an actuator, of an actuatable member, a transmitter, a guide for said transmitter, means co-acting with said transmitter to hold said actuatable member stationary, and means for shifting said guide automatically.

13. The combination with an actuator, of an actuatable member, a transmitter interposed between said actuator and actuatable member, a guide for said transmitter, means for shifting said guide, and means for withholding said actuatable member from movement.

14. The combination with an actuator, of an actuatable member, a transmitter connected between said actuator and actuatable member, a movable guide for said transmitter, apparatus for moving said guide into operative position to permit said actuatable member to be moved, means for restoring said guide to normal position, and latch mechanism co-acting with said transmitter for holding said actuatable member in one of its positions.

15. The combination with an actuator, of an actuatable member, a transmitter, a guide for such transmitter, a latch for holding said member in one position, and means for moving said guide to permit said member to be moved to another position.

16. The combination with an actuator, of

an actuatable member, means for transmitting motion from said actuator to said actuatable member, means for locking said actuatable member in a predetermined position, releasing means, and means for rendering operative said transmitting means upon the locking means being released.

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

GRAHAM GROSVENOR.

Witnesses:

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