No. 672,954. Patented Apr. 30, 1901.

H. B. MURDOCK.

AUTOMATIC DEVICE FOR OPERATING HATCH COVERS FOR ELEVATORS.

(Application filed Apr. 26, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

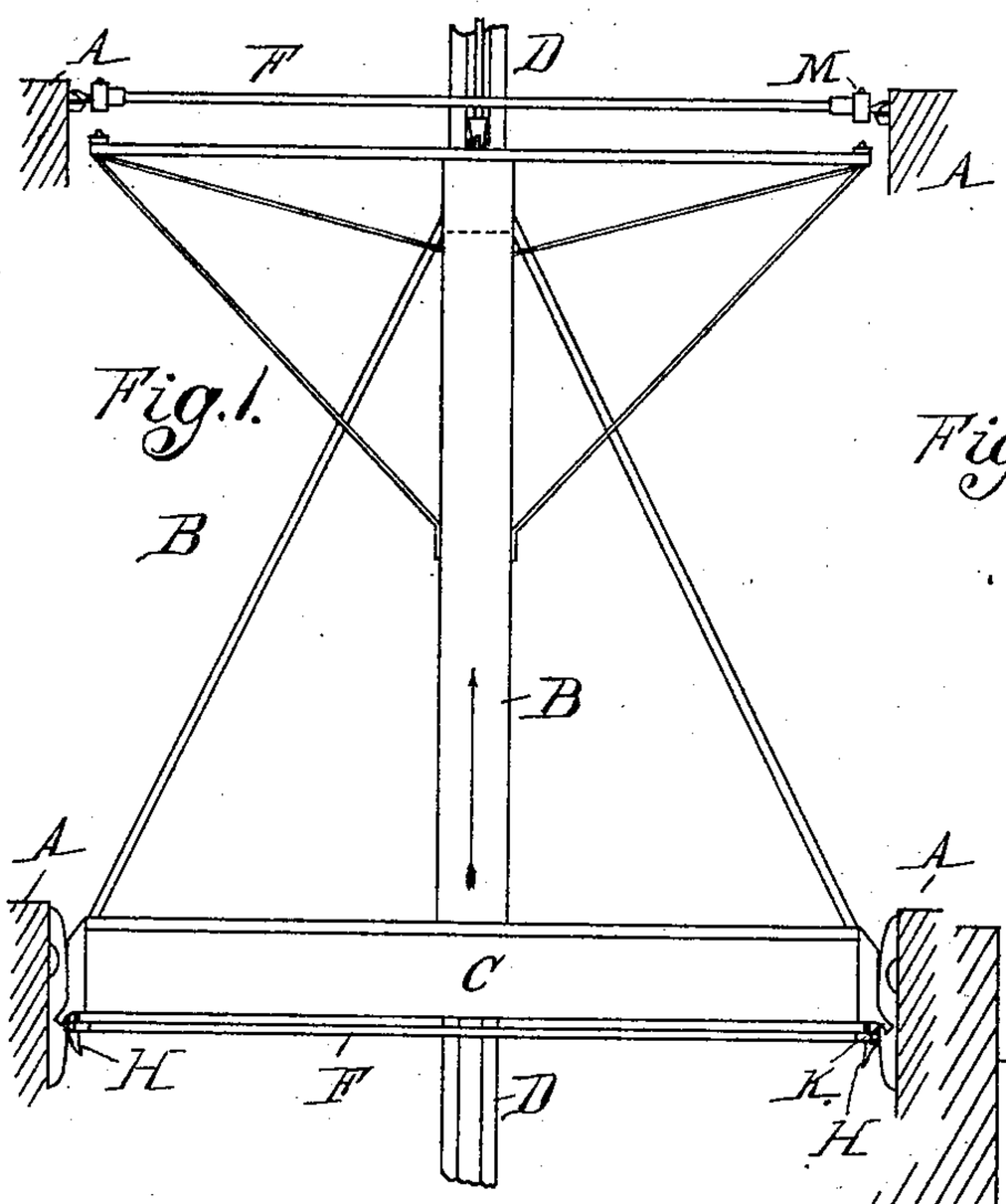

Fig. 6.

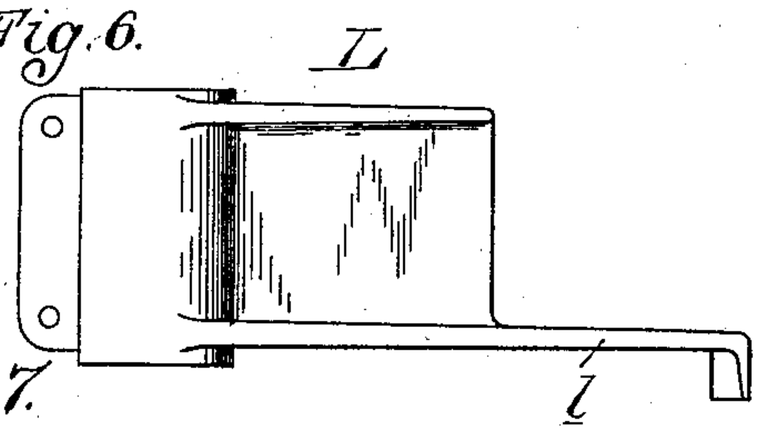

Fig. 7.

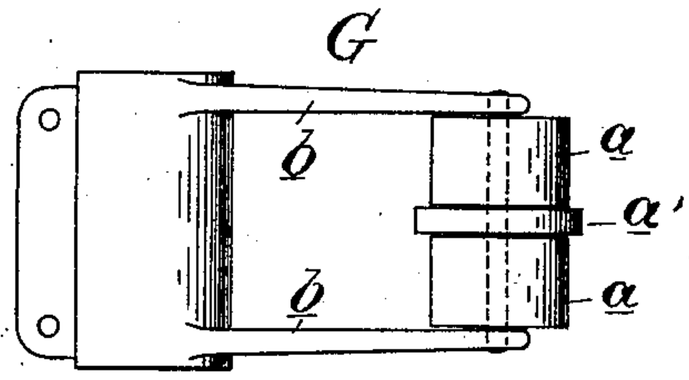

Fig. 3.

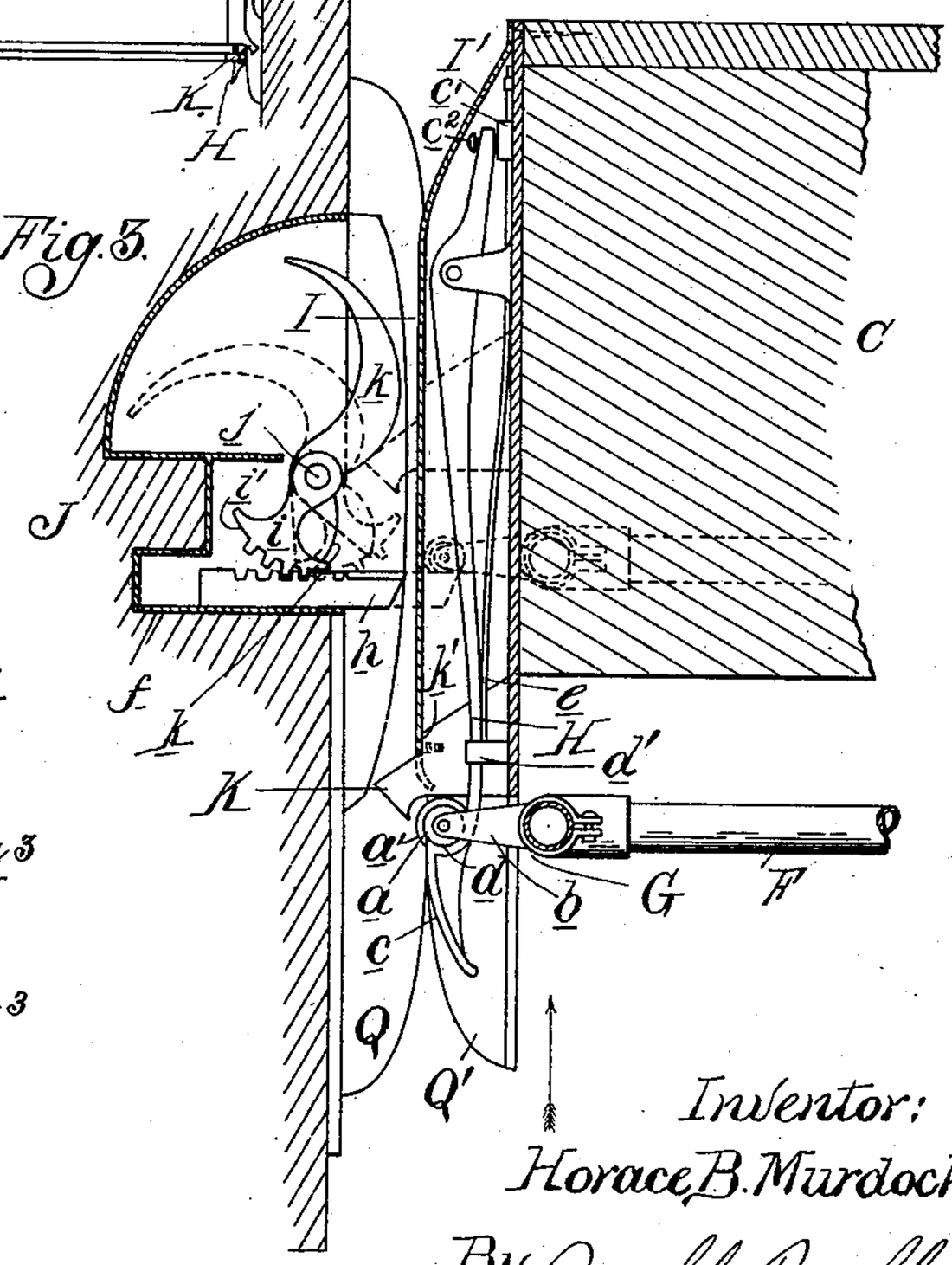

Fig. 5.

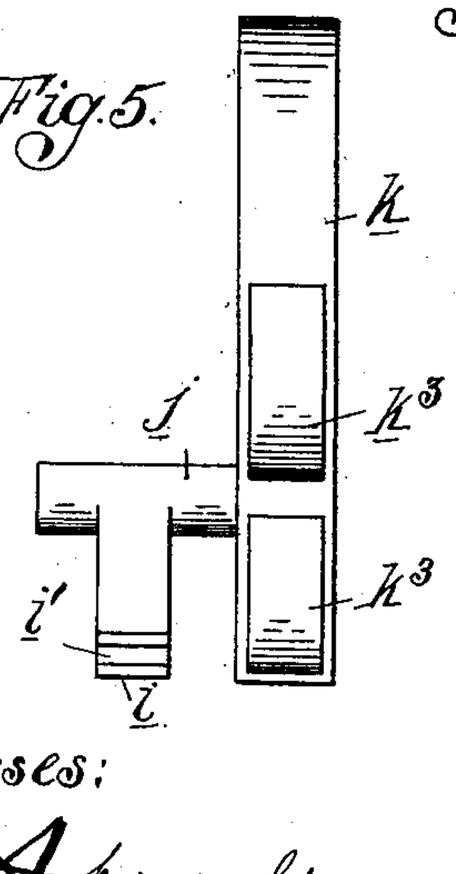

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Fig. 4.

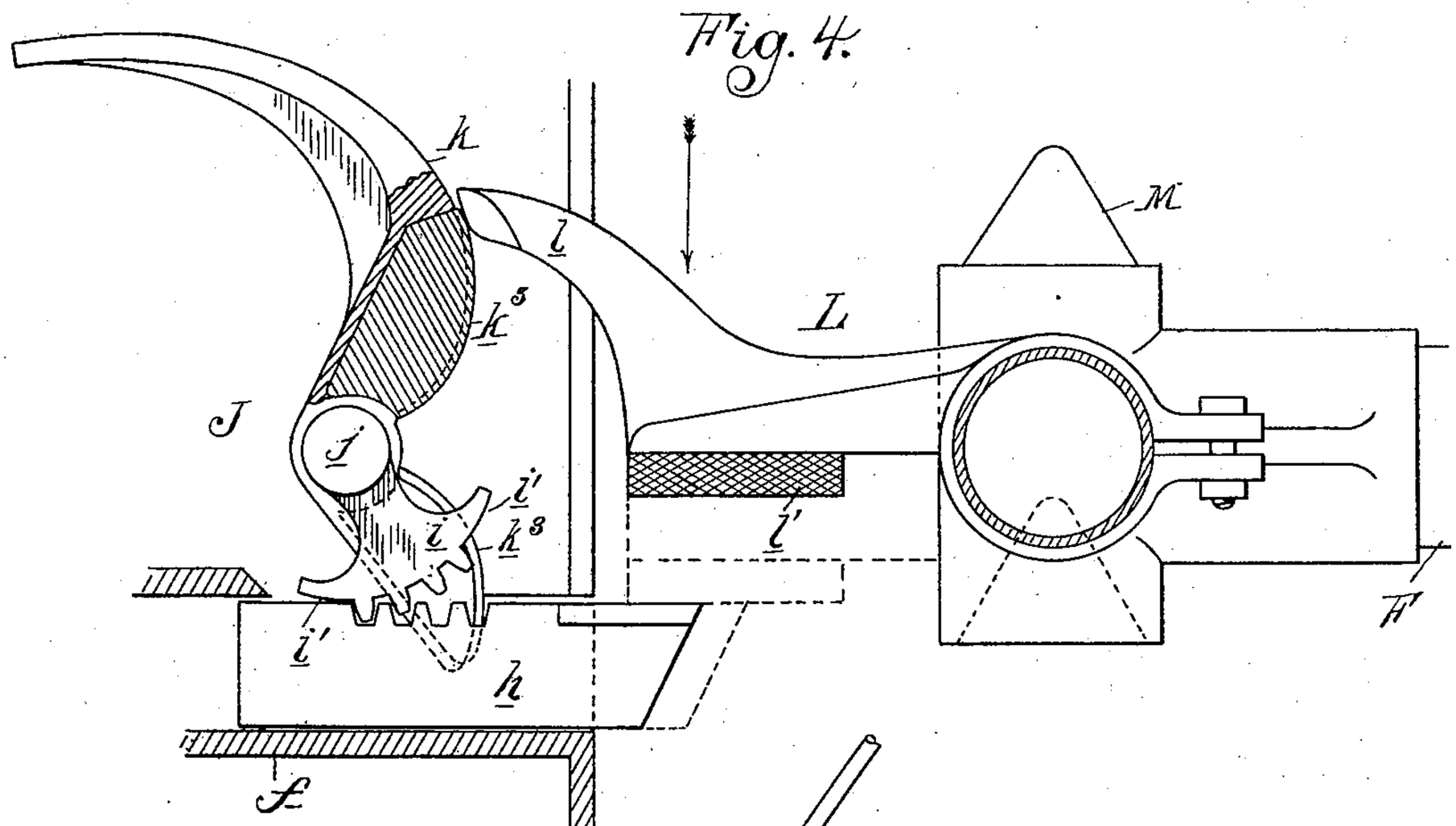

Fig. 2.

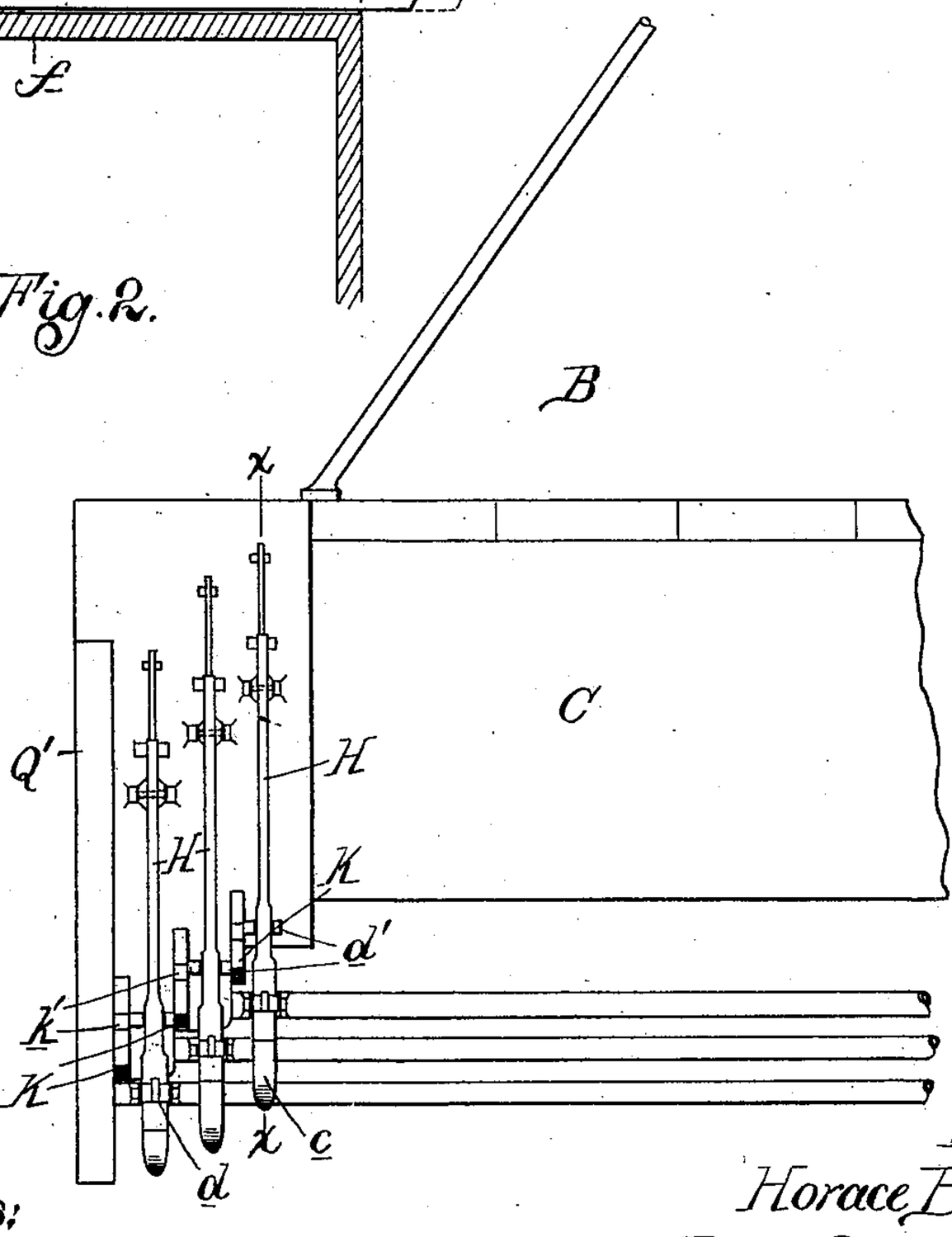

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Fig. 9.

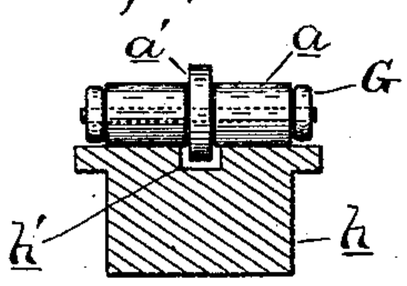


Fig. 8.

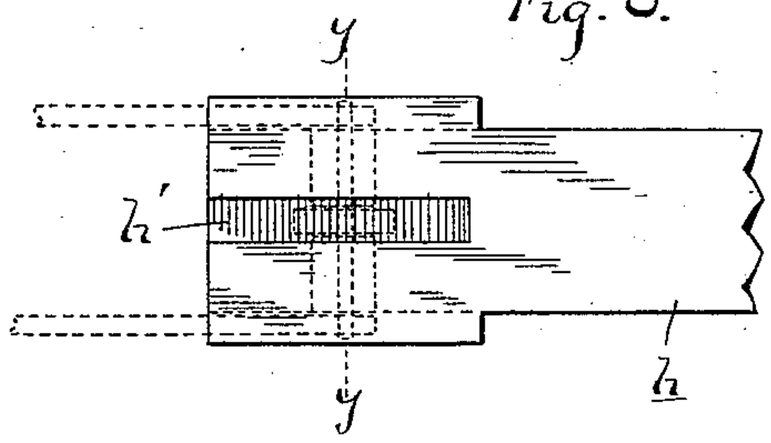
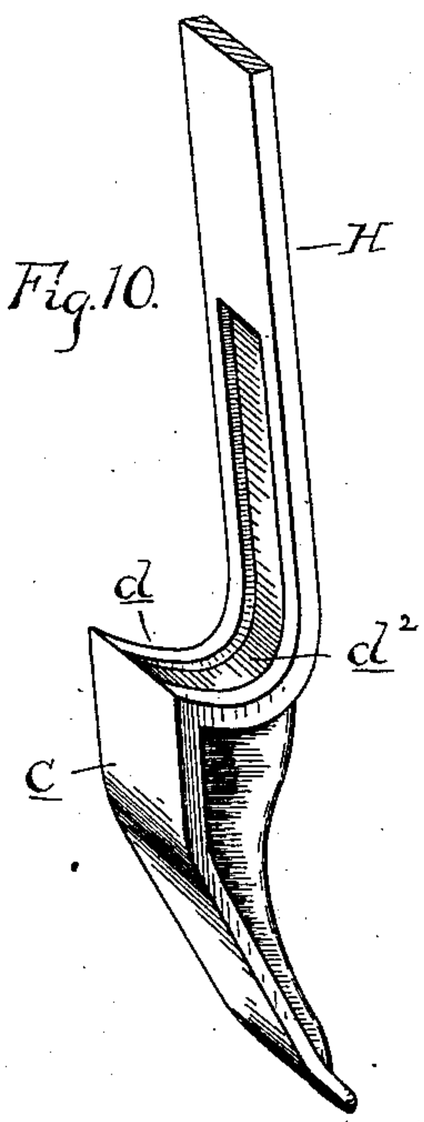


Fig. 10.



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UNITED STATES PATENT OFFICE.

HORACE B. MURDOCK, OF DETROIT, MICHIGAN, ASSIGNOR TO THE ANDERSON SAFETY ELEVATOR COMPANY, LIMITED, OF SAME PLACE.

AUTOMATIC DEVICE FOR OPERATING HATCH-COVERS FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 672,954, dated April 30, 1901.

Application filed April 26, 1900. Serial No. 14,375. (No model.)

To all whom it may concern:

Be it known that I, HORACE B. MURDOCK, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Devices for Operating Hatch-Covers for Elevators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to elevator attachments in which the hatch-openings in the floors are closed by the hatch-covers carried by the elevator-car and deposited in hatch-openings in its ascent and descent, and the invention is particularly designed to form an improvement on the device described in United States Letters Patent No. 592,933. In the aforesaid Letters Patent devices are described for operating a set of hatch-covers carried beneath the platform of the elevator-car in such manner that in passing through each hatch-opening it releases one of the hatch-covers and leaves it in the hatch-opening, and when the elevator-car goes down the hatch-covers are again automatically removed and carried down with the car beneath its platform. It is also old to carry a set of hatch-covers on top of the elevator-car and operate them by suitable devices to be automatically deposited one by one in the hatch-opening on the descending of the elevator-car, and it is customary to equip an elevator with both devices, so that as the car goes up it removes one set of hatch-covers from the openings and carries them up on top of the car and deposits the other set suspended beneath the platform in the hatch-openings after passing through, and vice versa, in descending.

My invention primarily consists in certain improvements in the device described in the above Letters Patent, whereby the same device is applicable for operating either set of hatch-covers singly or in combination together.

To this end the invention comprises the novel construction, arrangement, and operation of two sets of supporting devices for each hatch-cover, one set for supporting it in the hatch-opening and the other set for supporting it on the elevator-car, (either beneath or above it, according to whether it belongs to the upper or lower set,) all so constructed and arranged as to coöperate with each other in the movement of the car, all as more fully hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a vertical section through two hatch-openings with the elevator-car in position for removing the hatch-cover from the upper hatch-opening and placing one in the lower one as in the act of going up. Fig. 2 is an enlarged elevation of one of the four like corners of the elevator-platform, showing a set of three devices for supporting a set of three lower hatch-covers beneath the platform, the housing which incloses the devices being omitted. Fig. 3 is a vertical section through the corner of the platform on line $x\,x$ in Fig. 2 in connection with a sectional elevation of one of the four like devices in each hatch-opening for supporting a hatch-cover in said opening, the drawings illustrating the operation of the parts as in releasing one of the lower set of hatch-covers from the platform and depositing it in the hatch-opening as in the ascent of the elevator-car, the full lines showing the parts in position while the cover is still carried beneath the elevator-platform and the dotted lines after it has been released. Fig. 4 is a sectional elevation of the device for supporting the hatch-covers in a hatch-opening, showing its operation in connection with a hatch-cover carried on top of the elevator-car when the elevator-car descends. Fig. 5 is a front elevation of the actuating-cam and gear-segment. Fig. 6 is a detached plan view of one of the four arms with which the upper set of hatch-covers are provided for supporting them in the hatch-openings. Fig. 7 is a detached plan view of one of the four arms with which each hatch-cover of the lower set is provided to support it in the hatch-openings. Fig. 8 is a plan view of a portion of one of the sliding bolts, showing the cut-out portion. Fig. 9 is a section on line $y\,y$, Fig. 8. Fig. 10 is a perspective view of the lower end of one of the hangers, showing the cut-out portion.

In the drawings, A represents the floors in a building, provided with the usual hatch-openings, through which the elevator-car B

in its ascent and descent is to pass. C is the platform of the elevator-car, and D is one of the two vertical guide-posts, all constructed and arranged to operate in the usual manner.

F represents the hatch-covers for closing the hatch-openings. They may be of any known construction, preferably as described in the aforesaid Letters Patent, in which a tubular outer frame is used filled in with wire-netting and asbestos. The covers of the upper and lower set are alike, and each is provided at or near the four corners with outwardly-projecting brackets to support the covers in the hatch-openings in the usual manner at four points on opposite sides. The brackets G of the lower set of hatch-covers have arms *b*, between which are mounted the rubber roller-buffers *a*, separated by a metallic antifriction-wheel *a'*, all arranged as shown in Fig. 7.

H represents pivoted hangers or carrying-latches for supporting the hatch-covers from the platform of the elevator-car. These hangers or carrying-latches are arranged in groups at the sides of the platform, near the corners, and each consists of a bar pivoted at its upper end upon a common bed-plate and formed at its lower end with an outwardly-projecting shoulder *d*, adapted to form a support or seat for the rubber buffers *a* of the hatch-covers, said shoulder having a cut-out portion d^2 for the reception of the wheel *a'*. The hanger engages between guide-lugs *d'* and is backed by a spring *e*, which presses it outwardly as far as a stop *c'* beneath the extreme upper end will allow, a set-screw c^2 in the end of the hanger adjusting the hanger in its normal position. The hangers of each group are suitably stepped off, and the brackets G of the hatch-covers are correspondingly placed in line with the hangers, so that each cover is independently supported by four hangers, one below the other. Each hanger is rounded off below the supporting-shoulder to form a cam *c*, and each group is partially inclosed within a housing I, detachably secured, and the upper end of this housing is beveled off and forms a cam I'.

J represents the sliding supports for the covers in the hatch-openings. Each support comprises a casing *f*, a sliding bolt *h*, having a cut-out portion *h'*, said bolt being guided in the casing and provided with rack-teeth, a toothed segment *i*, secured upon a shaft *j*, or preferably made integral with the shaft, and a double cam *k*, secured upon the end of the shaft *j*, all so arranged that by turning the cam *k* from the position shown in full lines in Fig. 3 into the position shown in dotted lines the bolt is projected, while the reverse movement retracts it into the casing.

To limit the movement in either direction, the gear-segment has at both ends the plain portions *i'*, which act as stops in connection with the bolt. I also construct the cam *k* with rubbing faces k^3 by securing pieces of rawhide in recesses made in the faces of the cam. They also deaden the noise. There are four of these supporting devices in each hatch-opening, the sliding bolts thereof being in line with the rubber buffers *a* of one of the hatch-covers and adapted to support the same when projected outwardly, while the cams *k* are in vertical line with a set of four wipers secured to the sides of the platform, one set of wipers for each hatch-opening. These wipers are preferably made integral with the base-plate of the hangers and project beyond the housing, as shown in Fig. 3, having a suitable shoulder *k'* for securing the housing I thereto.

L represents the brackets which are secured to opposite sides of the frame-bars of those hatch-covers which form the upper set carried on top of the elevator-car and by means of which they are supported in the hatch-openings. As shown in detail in Figs. 4 and 6, the brackets are made with a finger *l*, adapted to strike the cam *k* in the descent of the elevator-car, and thereby project the bolt *h*, so that the cover may rest thereon while the car descends. *l'* represents suitable buffers on the under sides of said brackets to deaden the noise incidental to the operation. The brackets on the upper covers, the same as those of the lower covers, are in alinement with and coöperate only with the supporting devices of that particular hatch-opening which the cover is designed to close, and all of these brackets on both the upper and lower covers are adjustably secured on the covers, except for those of the uppermost and lowermost hatch-opening, for which the bracket may be formed integral with the corner-pieces.

M represents suitable buffers in the four corners of the upper hatch-covers, so that in picking up these covers they will be noiselessly piled up on the top of the car, the lowermost of these upper covers being preferably fixedly secured on top of the car, as shown in Fig. 1, so that it may close the hatch-opening in the first floor while the elevator-car is in the basement. To prevent the platform from swaying while passing through the hatch-openings, suitable guides Q Q' are secured in the openings and on the platform, respectively.

The parts being constructed and arranged as shown and described, they are intended to operate as follows: Supposing in Fig. 1 the elevator-car to be ascending and carrying a cover freely suspended below it by four hangers, as H, (two on a side,) while the hatch-opening on the floor above is closed by a cover F, supported upon the bolts of four supporting devices, it will be seen that as the top of the elevator-car passes through a hatch-opening it lifts off the cover and carries it up with it, and thus the covers of all the hatch-openings through which the elevator-car passes will be lifted off one after another and piled up on top of the elevator-car. In the upward passage of the platform through a hatch-opening the cam I', formed by the upper end of

the housing I, first pushes back the sliding bolts *h*, (which were left projecting after the cover had been lifted off,) and then in the further upward movement one set of four wipers, as K, will strike the upper horns of the cams *k* of the four supports and actuate them from the position shown in full lines in Fig. 3 into the position shown in dotted lines, thereby forcing the hangers to release the cover by pushing against the face of the hangers directly below their shoulders, and the cover thus remains behind, supported in the hatch-opening by the rubber buffers resting upon the bolts *h*, as shown in dotted lines in Fig. 3. The hangers after being pushed out of engagement with the buffers *a* are withdrawn on the further upward movement of the platform with little friction by reason of the metal disk *a'* making a rolling contact with the hanger. Supposing the elevator-car to be on its downward trip, the platform in approaching a hatch-opening will cause one set of four wipers to strike the lower horns of the cams *k* of the four supporting devices of the cover in the hatch-opening and retract the bolts, while at the same time four hangers are pushed in behind the rubber buffers *a* of the supporting-brackets of the cover and reëngage with the same, so that in the further downward movement it is carried down with the platform. As the top of the elevator-car passes down through a hatch-opening the fingers *l* of the uppermost cover carried on top of the elevator-car will strike the upper horn of the cams *k*, and thereby again project the bolts *h*, as plainly shown in Fig. 4, thus leaving one of the upper set of covers suspended in the hatch-opening. It will thus be seen that with but a single set of supports in each opening I am enabled to support both sets of covers thereon in either the ascent or descent of the elevator-car, which is a decided advantage.

I do not claim anything new as to construction of the devices for supporting the covers in the hatch-openings or from the platform, as these and the manner of their operation are substantially the same as in the aforesaid Letters Patent, except as to the brackets G of the lower hatch-cover, which I have secured adjustably upon the frame-bars of the cover and provided with a metal wheel *a'* between the rubber buffers *a*. This is a distinct improvement, as it prevents the hangers from dragging the covers by holding the cam-face *c* of the hangers out of contact with the rubber buffers in the act of releasing or reengaging said hangers with the covers, while the shoulders of the hangers and the sliding bolts *h* are suitably grooved to keep them out of contact with the metal wheel. Aside from this specific improvement my invention relates mainly to the construction of the hatch-covers forming the upper set, whereby the same supports in the hatch-openings provided for the lower set are adapted to coöperate with them. To this end said covers have been provided with the brackets L and fingers *l* and the platform with the cam I', which for the sake of simplicity have been formed as part of the housing, but obviously may be made independent projections.

What I claim as my invention is—

1. In an automatic device for operating hatch-covers for elevators, the combination of a hatch-opening having a single set of sliding supports fixed in said hatch-opening and adapted to be automatically projected and retracted by the movement of the car in either direction, a cover for said hatch-opening suspended beneath the platform of the car from the car itself, means operated by the movement of the car to disconnect said cover from the car and support it in the hatch-opening on the ascent of the car, and a second cover supported on top of the car adapted to close said hatchway and separate means coöperating with the same supports in the hatch-opening in the movement of the car to automatically project and retract said supports to support said second cover in the hatch-opening in the descent of the car.

2. In a device for operating hatch-covers for elevators, the combination of two sets of hatch-covers, one detachably suspended beneath the platform of the car and the other supported on top thereof, and adapted to close the hatch-openings alternately in the ascent and descent of the car, a single set of sliding supports in each hatchway adapted to support one of either set of covers, said sliding supports being adapted to automatically engage with and support said hatch-covers in the ascending and descending movement of the car.

3. In a device for operating hatch-covers for elevators, the combination with the elevator-car, of carrying-latches dependent from the platform of the car, a lower set of hatch-covers with which said carrying-latches are adapted to automatically engage, to support said covers below the car, means for tripping said carrying-latches in the hatch-openings, in the ascent of the car, an upper independent set of hatch-covers supported on top of the car, sliding supports in each hatch-opening adapted to engage with and support said hatch-covers in the hatchways and means for automatically projecting and retracting said supports in both the ascending and descending movement of the car.

4. In a device for operating hatch-covers for elevators, the combination with an elevator-car, a hatch-cover supported on top of said car and provided with brackets as L, sliding bolts mounted in the hatch-openings and adapted to support said hatch-cover in the hatch-opening, cams as *k* for projecting and retracting said sliding bolts, fingers as *l* on the cover for actuating said cams in one direction and a cam as I' on the platform for operating said cam in the other direction by the movement of the car.

5. In a device for operating hatch-covers for elevators, the combination with the ele-

vator-car, of carrying-latches dependent from the platform of the car, a lower set of hatch-covers with which said carrying-latches are adapted to engage to support said covers below the car, means for automatically operating said latches in the movement of the car, an upper set of covers supported on top of the car and means common to both sets of covers for supporting the same in the hatch-opening, said means comprising a series of sliding bolts secured in each hatch-opening and means carried by the car and upper covers for projecting and retracting said bolts in either the upward or downward movement of the car.

6. In a device for operating hatch-covers for elevators, the combination with the elevator-car, of a hatch-cover normally resting on top of the elevator-car and adapted to close the hatch-opening of the elevator-shaft, sliding bolts secured in the hatch-opening and adapted to support the said cover in said opening, fingers carried by the hatch-cover adapted to actuate said bolts to project them in the descent of the car and a lug or cam carried by the car adapted to return the same in the ascent of the car.

7. In a device for operating hatch-covers for elevators, the combination with the car and carrying-latches for suspending the hatch-covers from the platform of the car, the supporting-brackets G of the hatch-covers provided with the rubber buffers a and the metal wheel a' interposed between the rubber buffers and of larger diameter than the buffers.

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

HORACE B. MURDOCK.

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JOS. A. NOELKE.