

(No Model.)

2 Sheets—Sheet 1.

E. L. & G. HAIL.
ELEVATOR.

No. 582,987.

Patented May 18, 1897.

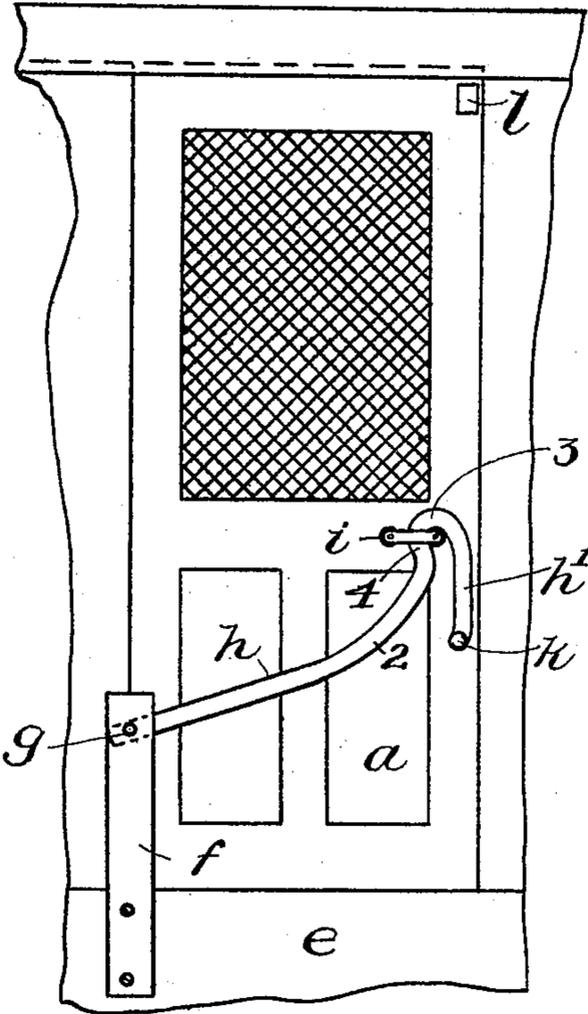


Fig. 1.

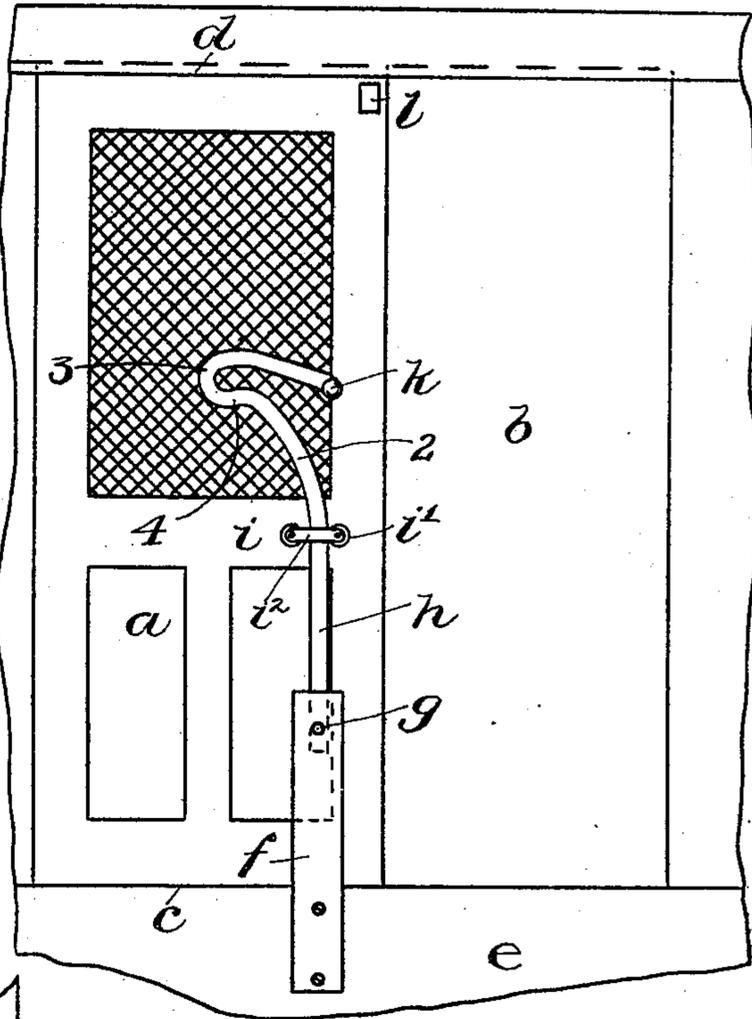


Fig. 2.

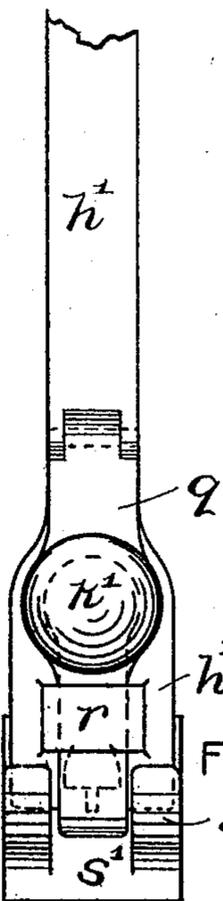


Fig. 7.

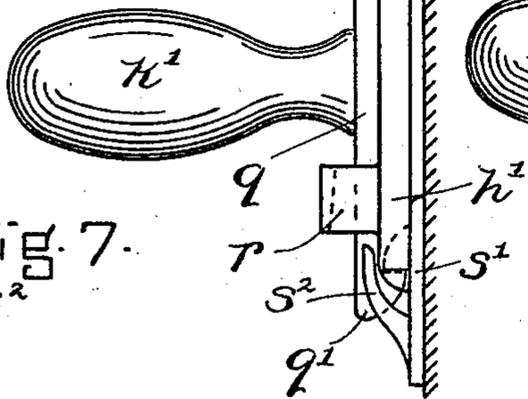


Fig. 8.

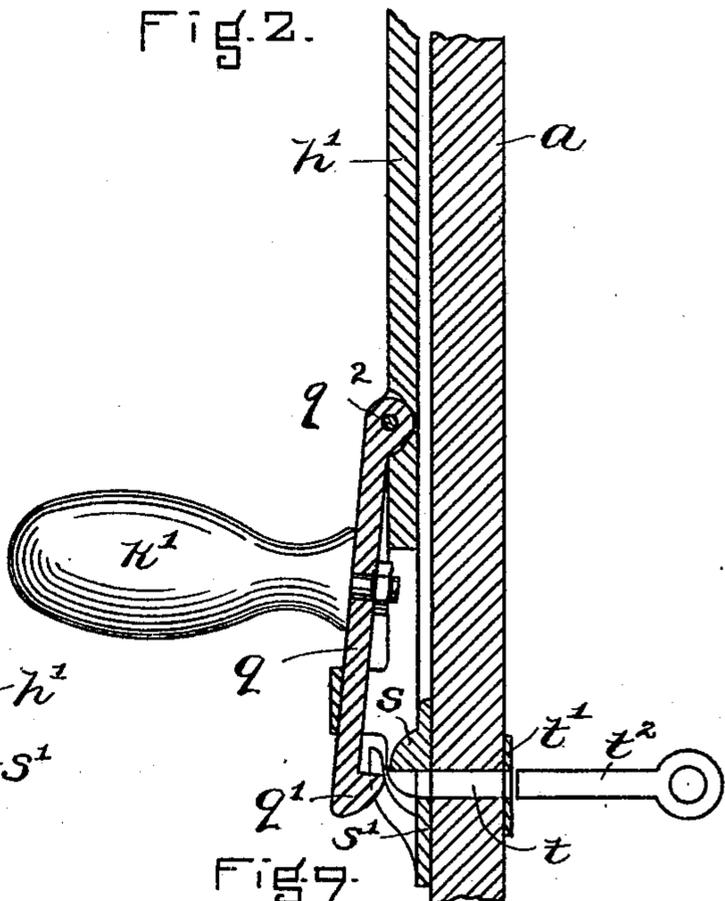


Fig. 9.

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(No Model.)

2 Sheets—Sheet 2.

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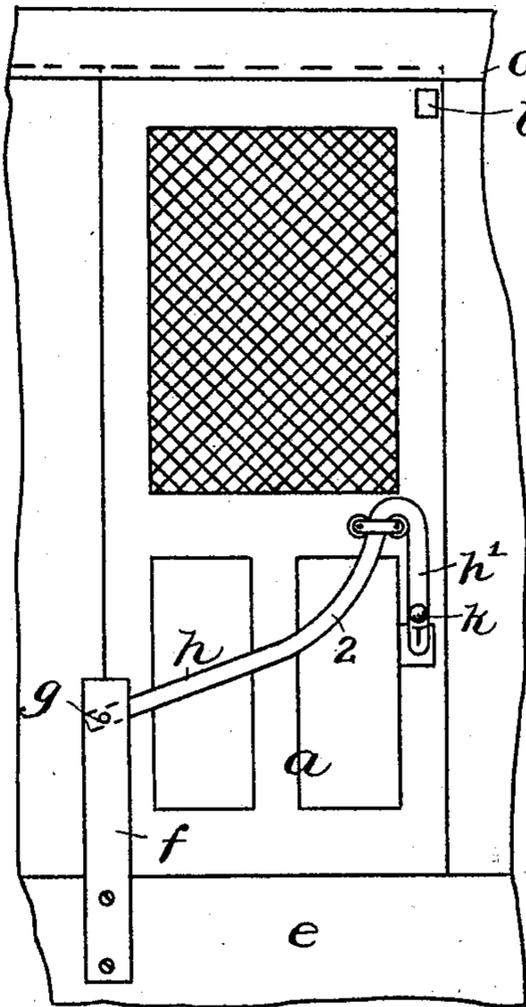


FIG. 3.

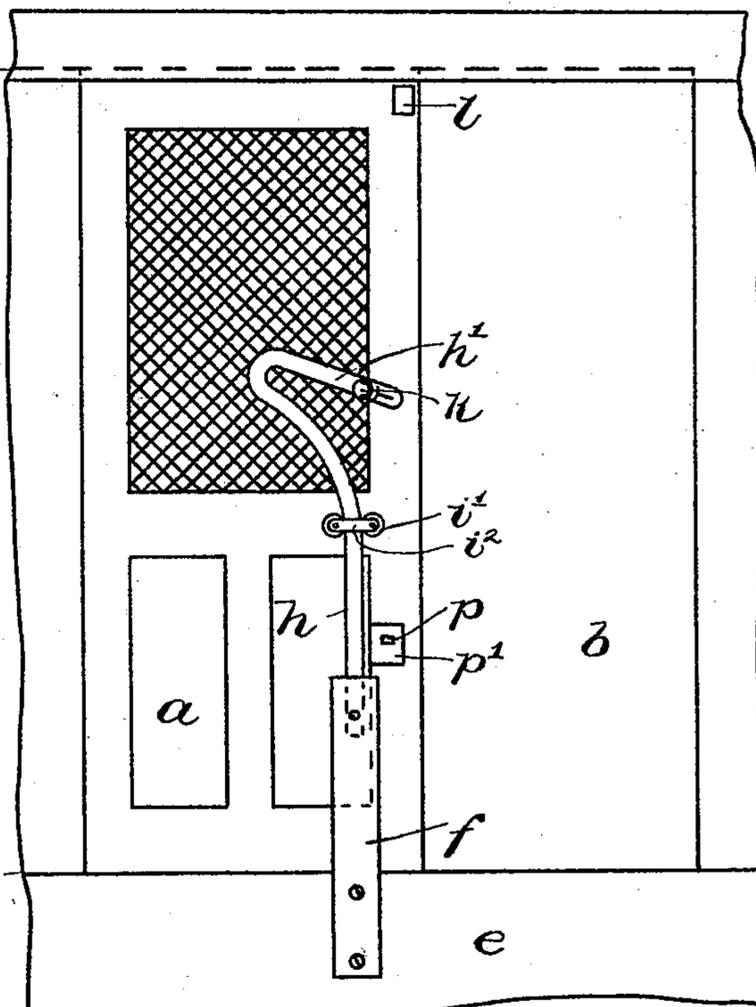


FIG. 4.

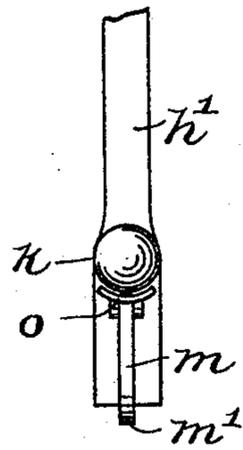


FIG. 5.

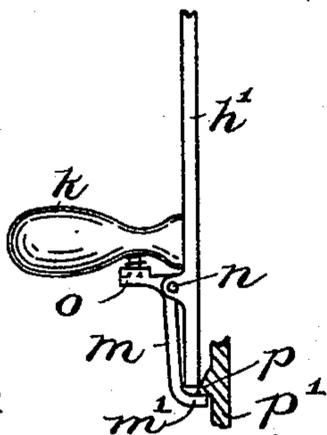


FIG. 6.

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UNITED STATES PATENT OFFICE.

EDWARD L. HAIL AND GEORGE HAIL, OF PROVIDENCE, RHODE ISLAND.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 582,987, dated May 18, 1897.

Application filed June 19, 1896. Serial No. 596,105. (No model.)

To all whom it may concern:

Be it known that we, EDWARD L. HAIL and GEORGE HAIL, citizens of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Door-Operating Devices, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention has for its object to obviate the necessity of employing projecting latches or fastening devices on the doors leading from elevator-landings into the elevator well or shaft. It is commonly the practice to provide doors employed for this purpose with latches, which must be grasped by an attendant on the elevator-car and lifted out of engagement with a catch on the door-frame before opening the door, it being generally impossible to operate the latches from the outside, thereby preventing the liability of any one opening the door by mistake and falling into the hatchway. The catches are usually so arranged as to project out beyond the edge of the door and are liable to tear the clothing and injure the passengers as they pass through the doorways. Hence the object of this invention, as before stated, is to provide a locking device for doors of the character specified which will be so arranged as not to be liable to injure the clothing or persons of the passengers.

Another object of the invention is to provide means which may be operated by the attendant upon the elevator-car for opening and closing the doors leading from the corridor into the elevator well or hatchway with a minimum of exertion; and a further object of the invention is to provide a device which will not only lock the door when closed, but which may be employed by the attendant for opening or closing the doors.

To these ends the invention consists of the devices illustrated in the drawings and which we will now proceed to describe in detail, and then point out in the claims hereto annexed.

Reference is to be had to the accompanying drawings and to the letters and figures marked thereon, forming a part of this specification, the same letters and figures designating the same parts or features, as the case may be, wherever they occur.

In the drawings, Figure 1 illustrates one form of our invention, the door opening and closing lever being so formed as to constitute a lock for the door and the lever being illustrated in its normal locking position. Fig. 2 illustrates the lever as having opened the door and extending vertically, so as not to obstruct the doorway. Figs. 3 and 4 illustrate another embodiment of our invention, in which the lock for the door consists of a latch mounted upon the end of the lever. Figs. 5 and 6 illustrate in detail the latch employed upon the lever in Figs. 3 and 4. Figs. 7, 8, and 9 illustrate in detail another form of latch which we prefer at times to employ.

Referring to the drawings, *a* indicates the door, which is operated to open or close a doorway *b*, leading from a corridor or landing into an elevator well or shaft. The door slides in guides *c d* and may be supported upon antifriction-rollers, if desired, although we have not illustrated them. Secured to the wall *e* of the elevator shaft or well is an upwardly-projecting support or standard *f*, which is near the rear edge of the door when closed and which has near its upper end a pivot-pin *g*, on which is fulcrumed a lever *h*, which is peculiarly formed, as we shall now describe.

When the door is moved to closed position, the lever extends from the pivot-pin *g* across the doorway and between two antifriction-rollers *i i'*, the bearings of which are connected by the bridge *i²*, and is then bent downward to form a depending arm or end *h'*, provided with a handle *k*. By grasping the handle *k* and throwing the lever upward and backward its rear edge engages the roller *i* and forces the door toward open position.

It is essential in order that the door may slide evenly and without binding that the pressure of the lever be applied to it constantly in a horizontal direction, and for this reason the lever is formed with a curved portion 2, the edges of which engage the rollers *i i'*, the curve being of such nature that the lever presents a point of contact with the rollers which maintains the same direction of force and gives a nearly horizontal thrust to the door in either direction. If the lever were straight, the thrust would be upward in such way as to bind the door and prevent it

from sliding, whereas by curving the lever as illustrated on the drawings the door is made to slide easily.

By forming the lever with a depending arm 5 h' the handle k is in position to be easily grasped by an attendant upon the elevator-car when the door has been moved to closed position, and when the lever has been swung upon its pivot so as to extend vertically, as 10 illustrated in Fig. 2, the arm h' projects forward to such an extent that the handle k is near the front edge of the door, where it may be easily grasped to move the door to closed 15 position. This is one of the important features of our invention for the reason that if the lever were so constructed that its handle when the door was fully open would be between the walls of the elevator-car and the well it would be impossible to fully open the 20 door by said handle or reach it in order to close the door.

In addition to the lever being curved to slide the door backward and forward for opening or closing the doorway it is also shaped 25 to constitute a lock to prevent the door being opened from the outside when it has been once moved to closed position. For this purpose it is provided with an offset bend 4, concentric with the pivot g , and against which 30 the roller i' bears when the door is closed, the hook or loop 3 supporting the lever.

The door is provided with a stop l , which may engage the upper sill of the door-frame to prevent the tilting of the door if an attempt 35 is made to open it from the outside while the said door is locked.

When the door is closed, the lever projects across the doorway, and when the door is open it extends vertically, so as not to be in 40 the way of passengers entering or leaving the car.

In practice, when the elevator has come to the landing the attendant grasps the handle k and throws the lever around its pivot sufficiently to disengage the hook or loop 3 from 45 the roller i' , and then, the movement of the lever being continued, the rear edge of the portion 2 engages the roller i and slides the door to open position, and in closing the 50 door the front edge of the curved portion 2 bears against the roller i' , forcing the door to a closed position when the bend 4 and the loop 3 engage the said roller and lock the door.

In Figs. 3 and 4 the door opening and closing lever is shown as being provided with a 55 movable latch mounted upon the lower end of the arm h' , the lever being formed without the offset or concentric hook illustrated in Figs. 1 and 2.

Referring more particularly to Figs. 5 and 6, the locking device consists of a latch m , pivoted at n on the end h' of the lever, and having a finger-piece o , extending into position below the handle k , whereby it may be 65 easily grasped in taking hold of the handle. The bent end m' of the lever automatically slips under a catch p on the plate p' , secured

to the door a when the door is closed, and locks the door from being opened until the 70 finger-piece o is raised so as to withdraw the latch m from the catch.

In Figs. 7, 8, and 9 we have illustrated enlarged details of a slightly different form of 75 automatic locking device for the door opening and closing lever. In these figures the said lever is provided with a pivoted latch q , the movement of which is limited by a bridge r , the lower end of the latch being formed 80 into a hook q' , which automatically engages a catch or projection s on a plate s' , secured to the door, thereby forming a lock, the said plate s' being provided with fingers s^2 , fitting over the end h' of the lever h when the latter is in its lowermost position for the purpose of 85 holding said lever against lateral or sidewise movement. In this case the handle or knob k' is secured to the latch and tends by its weight to hold the hooked end q' in engagement with the catch or projection s on the 90 door.

When the attendant wishes to open the door, he grasps the handle k' and in lifting it to swing the door-operating lever moves it on its pivot q^2 and releases the latch from 95 engagement with the projection, after which he throws the lever upward and backward.

We may provide the door with a keyhole t , surrounded by an escutcheon t' , and through which a key t^2 may be thrust to throw the latch 100 out of engagement with the catch to permit the door to be opened from the outside.

While we have chosen to describe our invention as more especially applicable for use on doors on elevator-cars or on the doors leading from the landings into the elevator-shaft, 105 yet we do not wish to be understood as limiting ourselves to such use of the invention, as it may be applied to doors of any character, as car-doors or the like.

Having thus explained the nature of the 110 invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, we declare that what we claim is— 115

1. As a means for operating a door, a hand-operative lever fulcrumed on a stationary support and having a bent end provided with a handle, said lever extending across the doorway and engaging the door whereby when the 120 lever is rocked, the door is opened and the lever is moved to vertical position with the bent end extending forward to be grasped and the doorway is unobstructed.

2. As a means for operating a door, a stationary support, a projection on the door, and a lever fulcrumed on said stationary support and engaging the projection on the door, said lever being formed with a curved edge sliding and bearing with a substantially horizontal 130 pressure against said projection.

3. As a means for operating a door, a stationary support on one side of the doorway near the rear of the door, and a lever ful-

crumed on said support, and engaging the door near the front edge thereof, said lever having a sliding engagement with the door and being curved to bear against the door with a substantially horizontal pressure.

4. As a means for operating a door, a stationary support near the rear of the door when closed, and a lever fulcrumed on said support and extending across said doorway to be easily grasped, said lever being curved to exert a substantially horizontal pressure against the door, and having a curved portion to rest upon a projection on the door.

5. As a means for operating a door, a stationary support near the rear of the door when closed, and a lever fulcrumed on said support and extending across said doorway, said lever being curved to exert a substantially horizontal pressure against the door and having a depending arm with a handle on the end thereof, which projects near the front of the door when the latter is open.

6. As a means for operating a door, a stationary support near the rear of the door when closed, and a hand-lever fulcrumed on said support and extending across the doorway to be grasped by the hand, said lever having a curved edge in sliding engagement with said door and being constructed and arranged to open and close said door, and lock it when closed.

7. As a means for operating a door, a stationary support near the rear of the door, and a hand-lever extending in normal position across the doorway and engaging the door, said lever having a curved edge in sliding engagement with said door and being constructed and arranged whereby when it is operated to open the door, it is thrown into vertical position and when it is operated to close the door it drops into substantially horizontal position across the doorway and locks the door.

8. As a means for operating a door which is provided with a projection, a stationary support near the rear of the door, a hand-lever extending in normal position across the doorway, and having a curved edge in sliding engagement with the projection on the door, and means on the lever for engaging said door or a part thereof to lock the door when closed, said lever extending vertically when the door is open.

9. As a means for operating a door, a stationary support near the rear edge of the door, a projection on the door, and a door-operating hand-lever fulcrumed on said sup-

port and curved to bear against said projection with a substantially horizontal pressure, said lever being provided with means for locking the door when closed.

10. As a means for operating a door, the combination with a door having a projection, of a lever fulcrumed on a stationary support, and engaging said projection, said lever having a depending arm with a handle, said arm being at an acute angle to the said lever, and said lever being constructed and arranged to lock the door against movement when closed.

11. As a means for operating a door, the combination with a door having a projection, of a lever fulcrumed on a stationary support located below the projection and having a depending arm with a hand-operative latch to automatically engage the projection on the door and lock said door against movement.

12. As a means for operating a door, a lever fulcrumed on a stationary support and in sliding engagement with the door, a movable latch on said lever to automatically engage the door, said latch having a handle by which it is disengaged from the door.

13. As a means for operating a door, a lever fulcrumed on a stationary support for opening and closing the door, and a movable latch on the lever for locking the door, in combination with a door constructed to allow the latch to be disengaged from the outside thereof.

14. As a means for operating a door, a lever fulcrumed on a stationary support, a movable latch on the lever for automatically locking the door when the door is closed, and a handle on said latch constructed and arranged to disengage said latch and swing the lever around its pivot.

15. As a means for operating a door, a lever fulcrumed on a stationary support and constructed and arranged to open or close the door, and a movable latch for locking the lever to the door and provided with a handle, and also having a limited movement relatively to the lever, whereby said handle may be used to actuate the lever.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 13th day of June, A. D. 1896.

EDWARD L. HAIL.
GEORGE HAIL.

Witnesses:

CHARLES A. HARKNESS,
HERBERT ALMY,