No. 713,225. Patented Nov. 11, 1902.

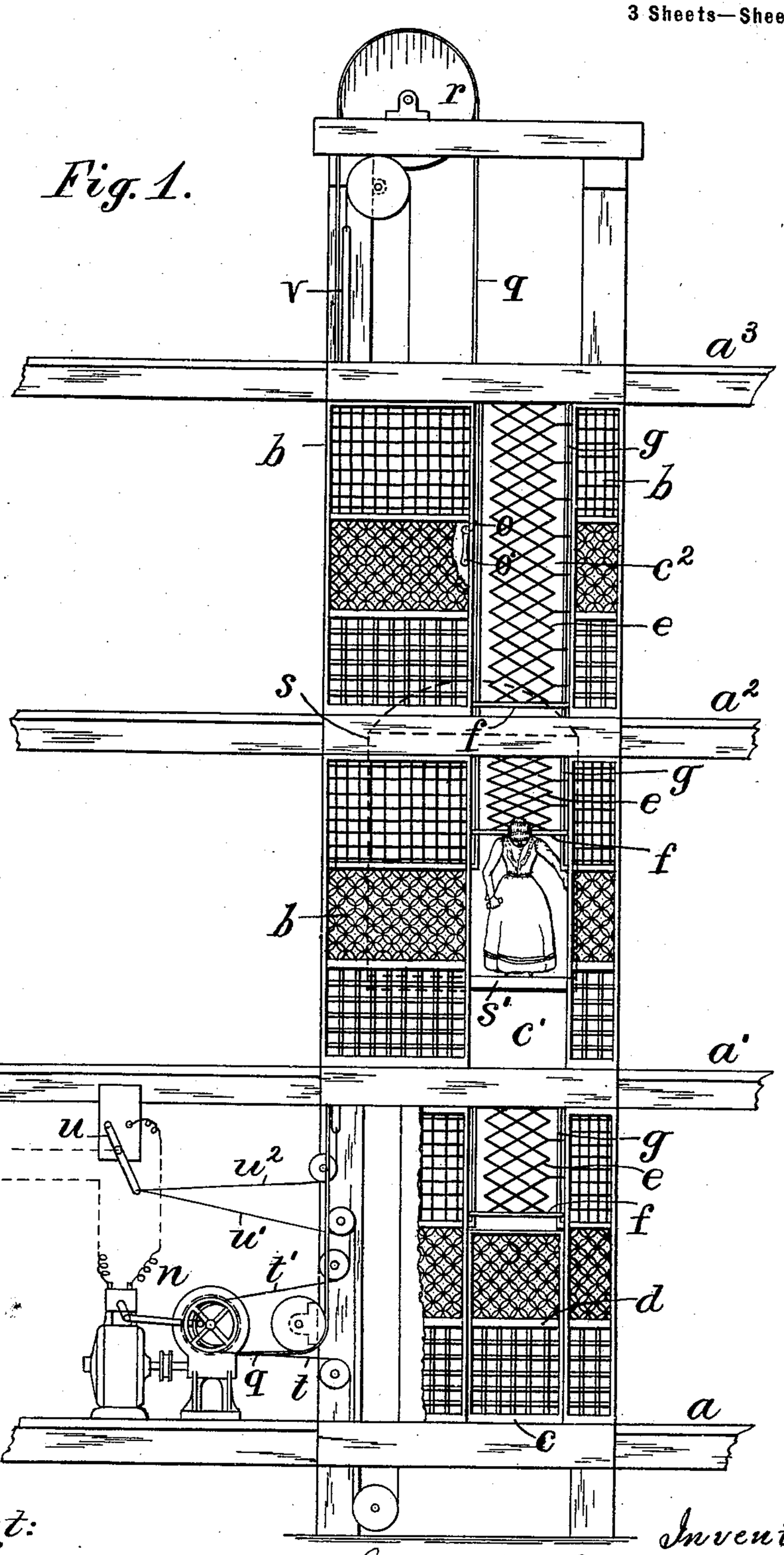
J. H. JOHNSON.

SAFETY DOORWAY FOR ELEVATOR HATCHWAYS.

(Application filed Nov. 23, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Attest:
L. Lee.
Walter H. Talmage.

Inventor,
James H. Johnson, per
Thomas S. Crane, atty.

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Fig. 2.

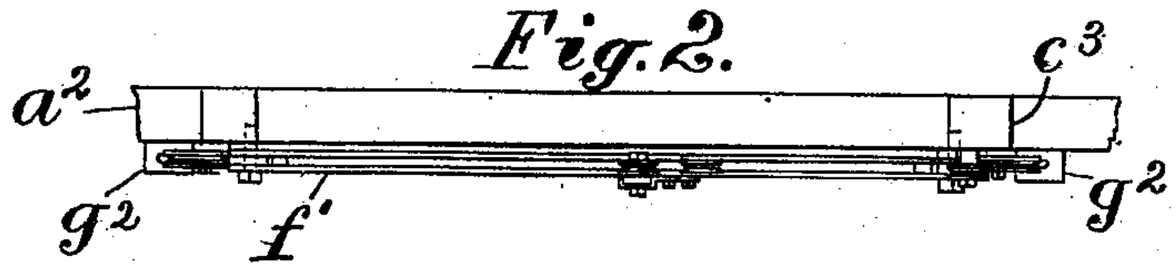

Fig. 4.

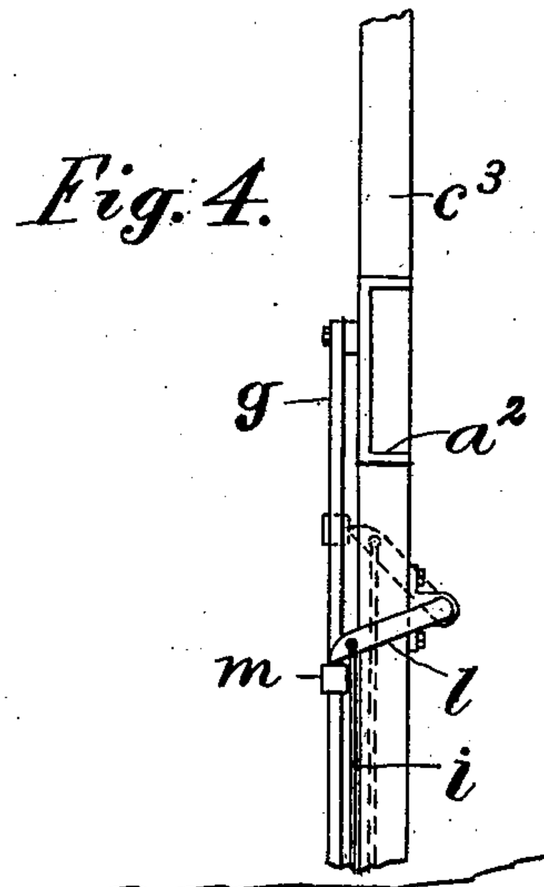

Fig. 3.

Attest:
L. Lee.
Walter H. Talmage.

Inventor.
James H. Johnson, by
Thomas L. Crane, Atty.

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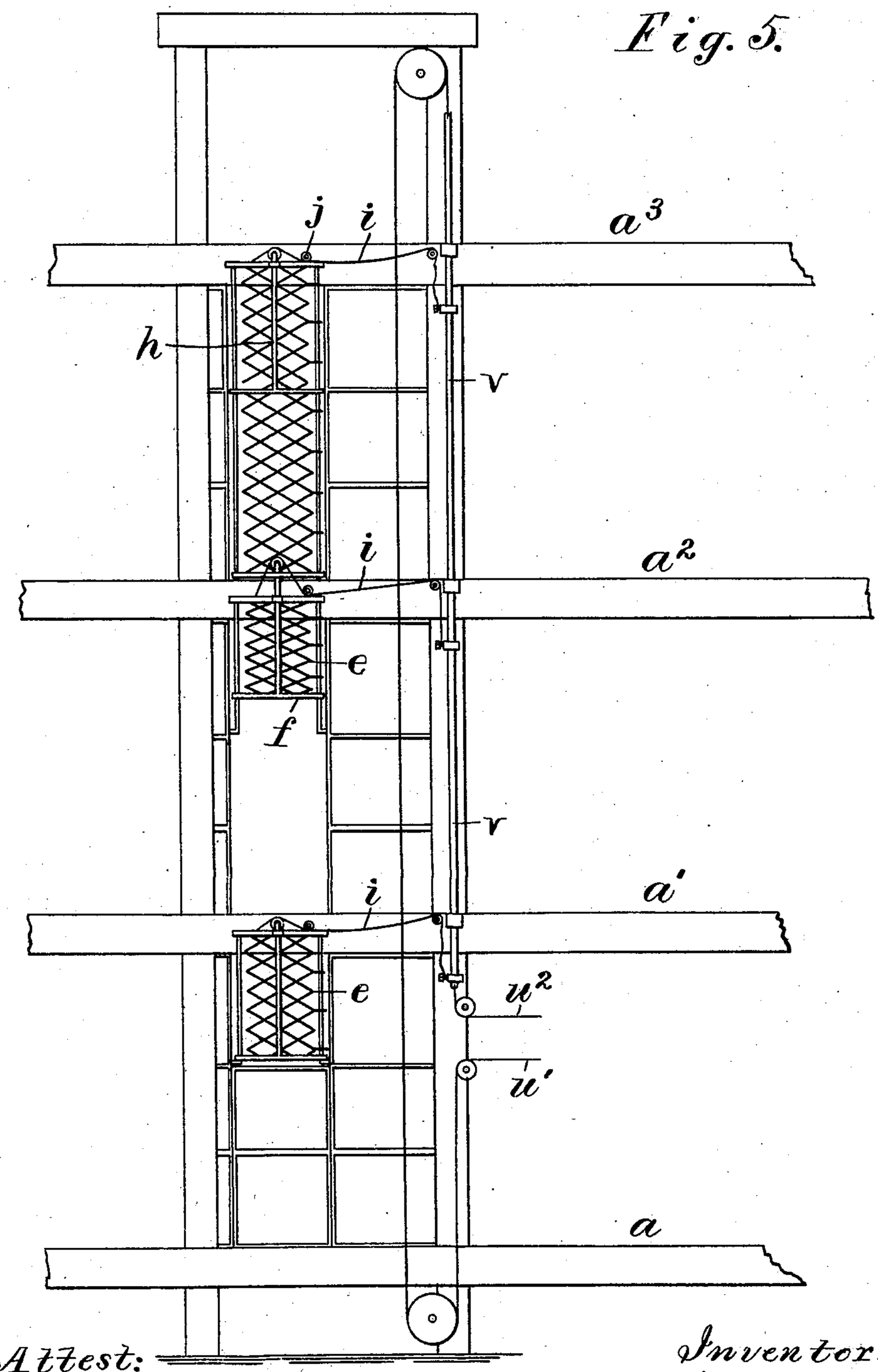
Fig. 5.



Attest:
L. Lee.
Walter H. Talmage.

Inventor.
James H. Johnson, per
Thos. L. Crane, Atty.

UNITED STATES PATENT OFFICE.

JAMES H. JOHNSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE JOHNSON ELEVATOR AND SAFETY COMPANY, A CORPORATION OF NEW JERSEY.

SAFETY-DOORWAY FOR ELEVATOR-HATCHWAYS.

SPECIFICATION forming part of Letters Patent No. 713,225, dated November 11, 1902.

Application filed November 23, 1901. Serial No. 83,353. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. JOHNSON, a citizen of the United States, residing at 25½ South Twelfth street, Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Safety-Doorways for Elevator-Hatchways, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of elevators in which the hatchway is inclosed and doorways are made in the inclosing walls upon the different floors for access to the car or platform. In such elevators the doorway is made of suitable height for the passenger or operator to enter or leave the car, and such doorway is frequently closed at the top by a rigid lintel, and the space between such lintel and the floor above is closed by a screen or solid wall. In operating such elevators it is the rule that the doorway shall be closed before the car is set in motion; but notwithstanding such rule fatal accidents have happened in numerous cases through the inadvertent starting of the car upwardly when the passenger was entering or leaving the same, as the starting of the car throws such a person out of balance when partly in the same and the body is then readily caught between the rising platform and the rigid lintel of the doorway. To avoid such accidents, it has been proposed to place a yielding bar below the lintel of the doorway to actuate car-stopping mechanism upon the assumption that if the passenger's body actuated such bar it would stop the car in time to avoid injury. The present invention is based upon a different assumption—namely, that automatic car-stopping appliances are liable to be out of order when infrequently used, as would be the case with the device just referred to, and that the passenger could be more certainly preserved from danger if the danger-point could be postponed for a few seconds to permit the car conductor to stop the car by the ordinary means or the passenger to extricate himself from his false position. It is well known that accidents often prove fatal when the circumstances do not necessarily involve such result from the want of self-possession upon the part of the victim or of some one charged with his safety, and such a fatal result would be averted in the case of such elevator accidents if a little time were afforded for the conductor and passenger to recover their self-possession when the accident occurs. This additional time is secured in the present invention by extending the doorway which opens into the hatchway at each floor from the door-sill to the ceiling above, entirely removing the door-lintel or other obstruction, and furnishing the doorway above the door with a yielding screen adapted to push upwardly, and to thus afford time for a person who is inadvertently crowded against such screen to make his or her way into the car before the succeeding floor is reached and also affording time for the car conductor to stop the car before the person is crushed in the doorway. The yielding screen is readily made of the lazy-tongs design, with the meshes of the links adapted to contract vertically, and the bottom bar of such screen may be readily connected with counterbalances which enable any person who is forced against the screen to push it upward without any material resistance. The entire door may be of this construction and a latch provided upon the door-frame at the height of the ordinary lintel, by which construction the car conductor can push the screen upwardly and support it upon such latch while passengers are moving in and out of the car, but the latch not preventing the further upward movement of the screen if any person is carried upward against it by the accidental movement of the car.

The invention can be applied to existing elevators already provided with doors by removing the lintel of the door and the rigid screen, if there be any, above the same and replacing such lintel and screen with a collapsible or yielding screen that can be pushed upwardly, if required. Passenger-elevators are always provided with mechanism which can be operated from the car for stopping the hoisting mechanism and arresting the movement of the car, and in many elevators a

pull-rope is extended through the hoistway, where it can be manipulated by the car conductor.

In my invention means may be connected with the yielding screen for arresting the car by actuating such pull-rope or other device for stopping the hoister. I have heretofore in a previous patent, No. 632,415, granted September 5, 1899, for improvements in automatic safety-stops for elevators, shown a safety rod or rope extended through the hoistway in addition to the devices for normally operating the car-hoister, such safety rod or rope being connected with a cut-out switch if an electric hoister be used and with the reversing-valve if a hydraulic hoister be used. Such a safety-rope can be readily connected at each floor with the yielding screen and the car thus arrested automatically when an accident occurs to lift the screen.

The invention is illustrated in the annexed drawings in connection with an elevator-hoister.

Figure 1 is a diagrammatic representation of three floors in a building with a hoistway extended through the same and an electric hoister in the basement. Fig. 2 is a plan of the door-sill shown at the top of Fig. 3, which is an elevation of the doorway, and a part of the wall *b* of the hatchway viewed from the inner side, with the ordinary door partly open; and Fig. 4 is a section on line 4 4 in Fig. 3. Fig. 5 shows the inner side of the hatchway in which the doorways are formed, with the connections from the several collapsible screens to the pull-rod at one side of the hatchway.

In Fig. 1, a, a', a^2, a^3 designate the several floors of a building, b the inclosure of the hoistway, and c, c', c^2 the doorways leading into the hoistway upon the several floors. The doorway opening into the inclosure upon each floor is shown extended uninterruptedly without obstruction from the sill of the door to the ceiling of the floor above. d is the ordinary door fitted to the doorway c upon the first floor or basement, and e the collapsible screen over the same between the top of the door and the ceiling of the floor a' above. n designates an elevator-hoister, from which the cable q is extended over a pulley r to the car s, which is indicated only in dotted lines between the floors a' and a^2. Ropes t t' are shown extended from the ordinary controller upon the electric hoister and would in practice be connected with a pull-rope in the hoistway for the normal operation of the car.

An independent cut-out switch u is shown in the circuit of the electric motor, and ropes u' and u^2 are extended over suitable pulleys to a safety-rod v upon one of the posts in the hoistway, to which connection can be made from the several yielding screens, so that when either of such screens is moved the current is cut off from the motor and the car instantly stopped. The doorway opening from the floor a^2 is shown provided with a door formed wholly of the lazy-tongs design, the upper bar of the lazy-tongs being fixed to the floor a^3, while the lower bar f is guided by rods g, supported upon the door-posts. A latch or weighted pawl o is shown upon one of the door-posts at the level of the ordinary lintel, and the bar f can readily be raised to engage such latch, the handle o' of the latch serving to disengage the bar at any time and permitting it to be dropped to the floor below. Such latch prevents only the downward movement of the bar, and the collapsible door is thus adapted to push upward considerably above the level of the latch in case any person is accidentally caught underneath such bar. The doorway c' opening from the floor a' is represented with the door (assumed to be of ordinary construction) pushed entirely open and the collapsible screen e fitted to the space between the top line of the door and the sill upon the floor a^2 above.

Fig. 3 represents such screen viewed from the inner side of the doorway, the bar f having cords g' attached to its opposite ends and connected with counterbalance-weights g^2, proportioned to hold the screen in a state of equilibrium, so that it can be raised and lowered without material effort. The bars g are shown secured at the top to the fixed frame f' of the collapsible screen, such frame being attached rigidly at its opposite ends to the beam of the floor a^2. The frame f' is shown attached to the inner side of the floor-beam as near as possible to the sill of the doorway above. A portion of the collapsible screen thus lies upon the face of the floor-beam, and the space in front of such floor-beam is useful in accommodating the closed bars of the screen if the screen is pushed upward. A screen of greater length is thus afforded, and a greater amount of contraction is secured in such screen by the accommodation of the closed bars in some measure above the ceiling of the floor a'. This view shows connections from the bar f to the safety-rope for actuating a switch, valve, or other agency to arrest the motion of the car. A push-bar h is shown attached to the bar f and extended upwardly through a guide or clip upon the bar f' and engaged at the top with a cord i. The cord is extended (over stationary pulleys j upon the floor-beam) to any suitable point for actuating the stopping mechanism, and an antifriction-wheel k is shown upon the push-bar h, which operates, when the bar f is pushed upwardly, to pull the rope upward, as indicated by the dotted lines extending above the floor a^2 in Fig. 3. The nearer end of the rope i is fixed permanently to the stationary bar f' or other fixed point near the pulley k, and the cord and all its pulleys may be arranged at any suitable point below the level of the beam a^2, which forms the sill of the doorway c^2. In Fig. 3 they are shown arranged upon one of the beams of the floor a^2 to afford all the room possible over the doorway c', and such con-

struction is useful where the ceilings are low, but is not necessary where they are sufficiently high. The outer end of the rope *i* is shown in the drawings connected in three different ways. Fig. 3 shows the rope extended inward indefinitely, as would be required to connect with a stopping device at the bottom of the hatchway. Fig. 4 shows the rope connected with a lever *l*, and Fig. 5 shows the outer ends of the ropes *i* extended from the several screens to the safety-rod *v*, which is connected by the ropes *u'* and *u²* to the cut-out switch *u*. Fig. 5, like Fig. 1, shows the screen between the floors *a'* and *a²* pushed upwardly by an accident and the rope *i* from such screen tightened, so as to raise the rod *v* and actuate the cut-out switch to stop the hoisting-motor. The ropes *i* from the upper and lower door-screens are shown slackened by the lifting of the safety-rod *v*, which ropes exert no resistance to the movement of the safety-rod, although each of them by its separate connection therewith is able to operate the safety-rod independently whenever the emergency arises.

With the construction shown in Figs. 3 and 5 the lifting of the screen above the top of any particular doorway forces the push-bar *h* above the sill of the next doorway; but such construction is only necessary where the ceilings are too low to admit a collapsible screen (and the mechanism for tightening the rope *i*) wholly below the ceiling. The push-bar *h* and the cord *i* extend above such door-sill, as shown in the drawings, only in case of accident and do not, therefore, interfere with the normal use of the doorway. It is assumed in the use of such cord connection that the stopping mechanism would operate as the bar *f* was pushed upwardly and bring the car to rest, so that any further movement of the collapsible screen would be unnecessary; but I have shown in Fig. 4 a construction for operating the safety-rope from the collapsible screen without interfering with its continued movement if the car is not promptly stopped by cutting off the power. Such means consists of a lever *l*, pivoted upon the door-post, the fulcrum *l'* for the lever being shown upon the outer side of such post and the point of the lever projected into the hatchway in line with a dog *m* upon one edge of the collapsible screen. Such dog is shown in Fig. 3 fitted to move vertically upon one of the guide-rods *g*, and the lever *l* is also shown in Fig. 3 in contact with the upper side of such dog. The safety-rope *i* is shown attached to the lever and is pulled as the dog pushes the lever upwardly until the dog slips past the point of the lever, which permits the screen to continue its contraction after the required movement has been imparted to the cord.

The figure of a woman is shown standing upon the platform *s'*, which appears in the doorway *c'*, and the yielding screen partly collapsed by the pressure of her head against the bar *f*. It is obvious that the contact of the woman with such a screen produces an entirely-different effect upon her actions than a violent concussion with a rigid object like a fixed door-lintel, and thus renders her escape from injury far more possible, as it not only reduces the force of the concussion, but gives her additional time in which to move to a safe position.

By counterbalancing the yielding screen the shock is reduced in the greatest possible degree, and the person in contact therewith can throw it off and move from beneath it with almost entire freedom. The use of the yielding or collapsible screen thus furnishes a great security from the accidents which arise in connection with a rigid lintel, and this result is attained whether or not the movement of the screen is made to actuate the stopping devices of the car. The connection of the yielding screen with such stopping devices adds, however, a still further protection to the persons who may be brought into contact with the screen, as such connection operates irrespective of their own actions to terminate the danger to which they are exposed.

Where a fixed lintel is employed, the door is often suspended from such lintel upon antifriction-rollers; but with a movable lintel, such as is furnished by the bottom of the yielding screen, other means of supporting the door are required. The lazy-tongs design for doors is extensively used, and this requires no support at the top, but is fixed to one of the door-posts, and the end of the movable bar rests upon the door-sill.

Where a sliding door is preferred, it is supported upon the door-sill, and such a door *d* is for illustration shown in Fig. 3. The door is provided at the bottom with antifriction-wheels *d'*, running upon a rail extended along the door-sill and inside the wall *b*, which is partially shown in Fig. 3.

From the above description my invention will be readily distinguished from any yielding bar attached to the lintel of a doorway for the purpose of actuating some agency to stop the car, as the utility of such device depends entirely upon the prompt and invariable operation of the automatic agencies.

My invention does not require any automatic agencies, nor does the safety of the passenger in my invention depend upon the prompt and invariable operation of any mechanism, but affords an opportunity for the conductor to stop the car by the use of the ordinary means, which are kept in perfect condition by constant use.

In my invention no lintel whatever is placed in the doorway; but the space above the door is extended toward the ceiling above for a sufficient distance to secure the time that is needed during the upward movement of the car and the collapsing of the screen.

Where a ceiling is only a few feet above the passenger's head or the top of the door, the whole of such space would necessarily be util-

ized for the collapsible screen, while in cases where a story of a building is omitted at the elevator-shaft and a head-room of fifteen or twenty feet exists it would not be necessary to extend the collapsible screen through the whole of such space above the doorway. It will be understood, therefore, that my invention is not limited literally to the extension of the doorway and the screen to the ceiling if the ceiling is at such a distance as to render it unnecessary. As such cases occur but seldom, the extension of the doorway and screen to the ceiling would commonly be necessary.

As elevator-cars are commonly run without doors, a screen is almost invariably required to close the hatchway above each hatchway-door to prevent passengers from falling from the car, and my invention furnishes such screen, while avoiding the dangers that are caused by the introduction of a lintel in the doorway.

The wall is shown provided with a grooved guide d^2 to support the top of the door, and the post c^3 at the opposite side of the door is shown provided with a forked jaw d^3, into which the edge of the door fits, so as to hold it firmly when closed.

Having thus set forth the nature of the invention, what is claimed herein is—

1. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor extending from floor to ceiling, a door in such doorway permitting the movement of the passenger to the car and a collapsible screen extended from such door to the ceiling above, whereby the yielding of the screen in contact with a passenger avoids injury to the passenger during a considerable movement of the car.

2. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor extending from floor to ceiling, a door in such doorway permitting the movement of the passenger to the car, vertical guides extended upon the sides of the door-frame from such door to the ceiling above, and a lazy-tongs screen fitted to such guides, whereby the yielding of the screen in contact with a passenger avoids injury to the passenger during a considerable movement of the car.

3. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor extending from the floor to the ceiling, the lower part of such doorway having a door for the movement of the passenger to the car, and the upper part of the doorway having a collapsible screen extended to the ceiling and adapted to yield through an extended space if pressed by a passenger, to avoid injury to the passenger until the car can be stopped.

4. An elevator having a hatchway extended through several floors and a car or platform movable therein, with a hoister to elevate the car, and pull rope or rod extended vertically through the hatchway to stop the hoister, an inclosure around the hatchway with a doorway-opening at each floor extending from the floor to the ceiling, the lower part of such doorway having a door for the movement of the passenger to the car, and the upper part of such doorway to the ceiling having a collapsible screen adapted to yield through an extended space if pressed by a passenger, and the movable part of the screen over each of the doorways being connected separately with the pull-rope and arranged and operated to stop the hoister when any of the screens is pushed upwardly.

5. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor from the floor to the ceiling, a door in such doorway permitting the movement of the passenger to the car, guides at the sides of the doorway extended upwardly from the top of the door, a lazy-tongs screen having the bar f' fixed at the top of the doorway and the movable bar f fitted to the guides, whereby the space, between the door and the ceiling above, is filled with a screen adapted to yield when pressed by a passenger, and thus avoid injury to the passenger during a considerable movement of the car.

6. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor extending from floor to ceiling, a door in such doorway permitting access to the car, and a collapsible lazy-tongs screen having its stationary bar f' fixed above the level of the ceiling and below the level of the next door-sill, and the door-frame having guides with the lower bar f of the screen fitted movably thereto, as and for the purpose set forth.

7. An elevator having a hatchway extended through several floors and a car or platform movable therein, an inclosure around the hatchway with a doorway-opening at each floor extending from floor to ceiling, a door in such doorway permitting access to the car, a collapsible screen extended from such door to the ceiling above, and means for counterbalancing the moving parts of such screen, whereby the screen yields freely if accidentally pressed by the passenger, and injury to the passenger is avoided during a considerable movement of the car.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES H. JOHNSON.

Witnesses:
L. LEE,
THOMAS S. CRANE.