(No Model.) 2 Sheets—Sheet 1.

T. H. MELROSE.

DEVICE FOR OPERATING DOORS AND GATES OF ELEVATOR HATCHWAYS.

No. 302,348. Patented July 22, 1884.

Fig. 1

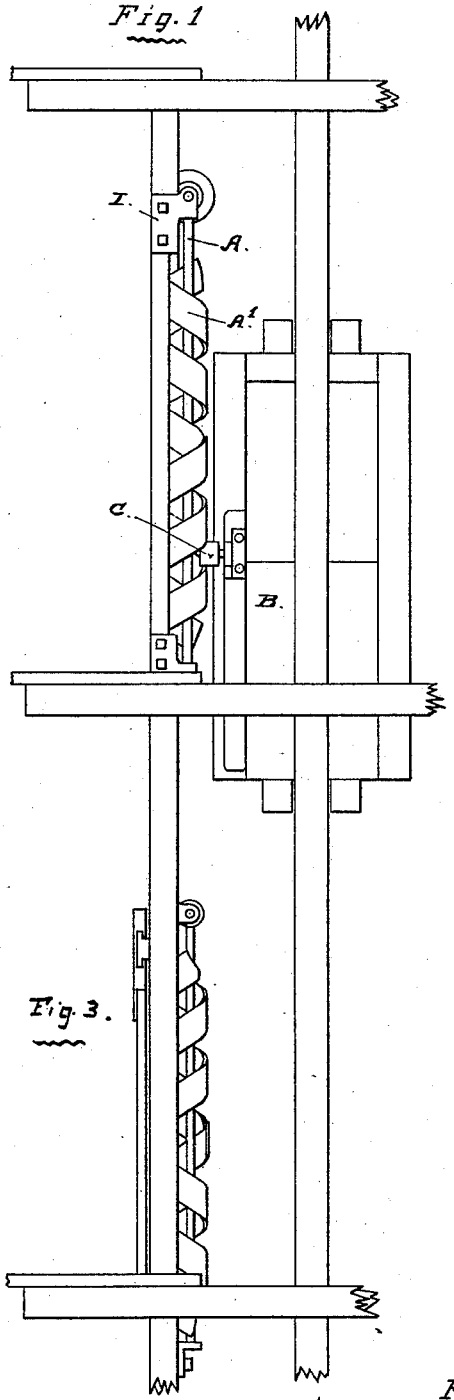


Fig. 2.

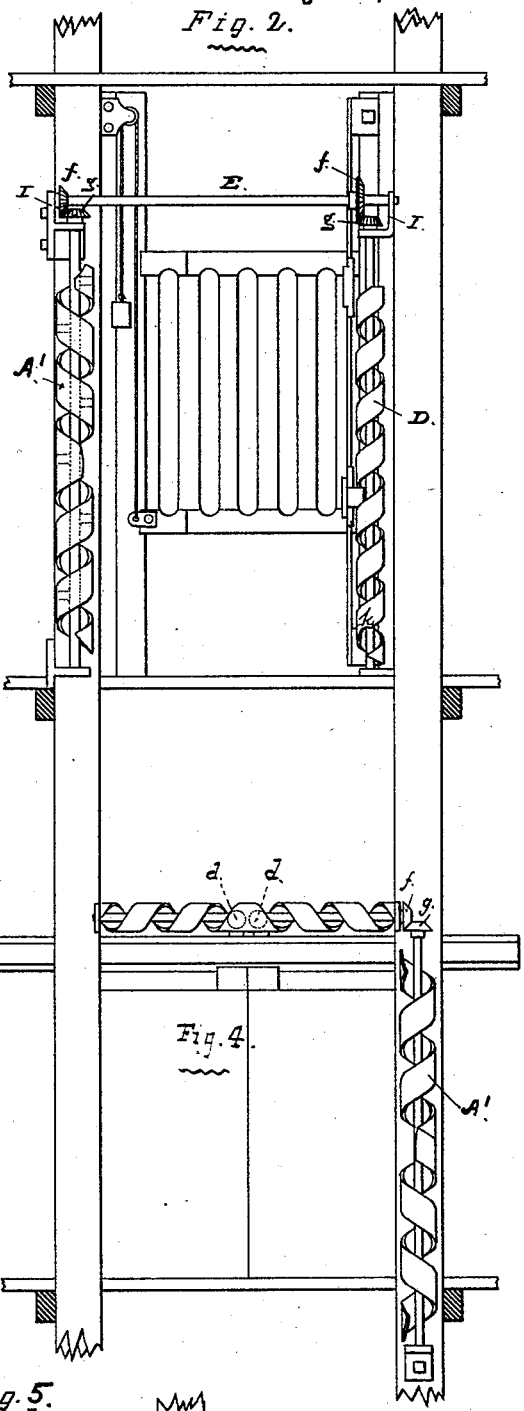
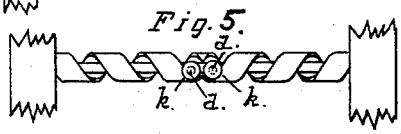


Fig. 3.

Fig. 4.

Fig. 5.



Witnesses:
Wm. Voit
D. Selleck

Inventor:
Thomas H. Melrose
By his Atty., Edwd. F. Osborn

(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

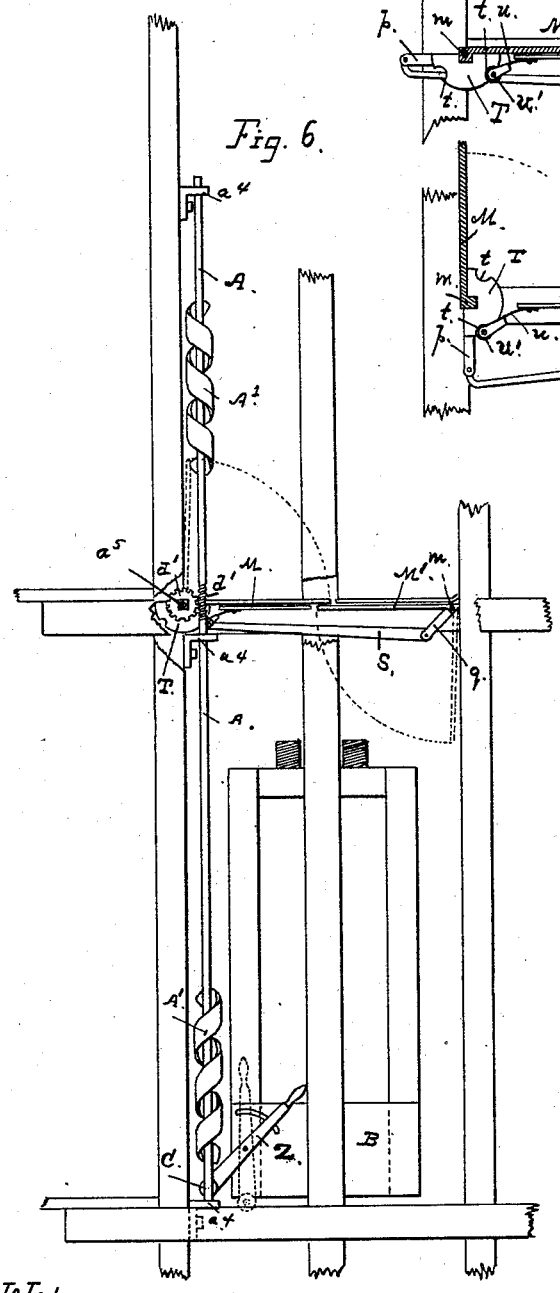


Fig. 7

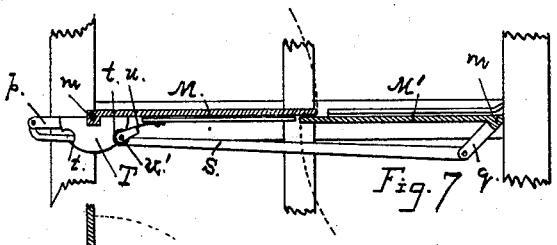
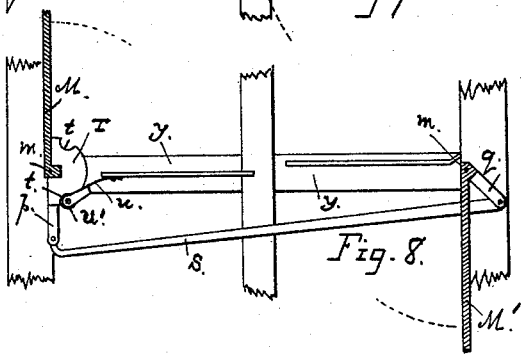


Fig. 8.



Witnesses:
H. E. Osborn
Jno. L. Taggard

Inventor:
Thomas H. Melrose
By his Atty., Edwin G. Osborn

UNITED STATES PATENT OFFICE.

THOMAS H. MELROSE, OF SAN FRANCISCO, CALIFORNIA.

DEVICE FOR OPERATING DOORS AND GATES OF ELEVATOR-HATCHWAYS.

SPECIFICATION forming part of Letters Patent No. 302,348, dated July 22, 1884.

Application filed October 4, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MELROSE, residing in the city and county of San Franciso, State of California, have made and invented a new and useful Improvement in Devices for Operating Doors and Gates at Elevator Hatchway-Landings; and I do hereby declare that the following is a full, clear, and exact description of the same and the manner in which it is to be applied and used, reference being had to the accompanying drawings.

My invention relates to an improved means for operating gates and doors at elevator-hatchway landings in an automatic manner by the ascending and descending movements of the elevator.

The following description fully explains the construction and application of my invention both to a double door of the sliding kind, to a gate or vertically-moving door or guard of an elevator-opening, and to a trap door or guard between stories.

In the drawings referred to by letters of reference, Figure 1 shows in side elevation a portion of elevator-hatchway between two floors or stories and the application of my improvement to a vertically-moving gate. Fig. 2 is a front elevation of Fig. 1 from the right-hand side, showing the mechanism as it appears from the inside of the hatchway. Figs. 3 and 4 are similar views showing the application of the same means for operating laterally-sliding doors. Fig. 5 is a view taken from the left-hand side of Fig. 3, to show the horizontal shaft, which is employed at the top of doors and gates when their movement in a horizontal direction is to be produced. Figs. 6, 7, and 8 show the mode of operating a trap-door.

My improved device produces from the vertical movements of an elevator up and down its shaft or hatchway an alternate opening and closing of the door or guard at each landing as the elevator approaches and passes it, and it effects the desired result in an automatic manner without employing cords and weights, springs, or locking devices.

It consists of a stud carrying a friction-roller, and fixed to the elevator-cage at one side, so as to be in line with and take into a vertical helix, A′, held in bearings at one side of the opening at the landing. The helix being free to rotate, it receives motion by the engagement of the stud in the movements of the elevator up and down. The rectilinear movement of the elevator is thus caused to impart a rotary movement to the helix.

At one side of the opening at the landing, and just against the side timbers inside of the hatchway, is placed an upright shaft, A, having a spiral groove running one half the length of the shaft in one direction, and the other half in the other. Such a shaft is readily made by winding a band or ribbon of metal spirally and at fixed distance around a central rod or shaft in such manner that a helical groove is produced for the required distance along the length of the shaft and running regularly around it. The ends of this shaft are held in suitable bearings at top and bottom.

Into the groove of the helix A′ a roller, C, carried on a stud, *c*, secured to the frame of the elevator cage or platform B, is caused to engage by being fixed in line and position to enter the end of the groove as the elevator moves up or down. This spiral groove or helix does not continue in the same direction for its entire length, but it is reversed at a point midway of the shaft, so that one portion is a right-hand helix, while the remainder is a left-hand helix. While traversing the shaft A, the stud *c* produces at the beginning of its engagement and for the one-half of its action a rotary motion in one direction, and then for the remainder of its contact a rotation in the opposite direction. In moving along the length of this shaft, therefore, the stud produces alternate rotation in opposite directions in the ascending as well as in the descending movements of the elevator, and this double motion being applied to the door or guard at the landing through the medium of the connecting mechanism, the alternate opening and closing of the guard is effected by the travel of the stud *c* once along the length of the helix A′ at each traversing movement of the elevator in either direction. To apply the movements of this helix to a gate or guard having a vertical lift in guides in the hatchway-opening, a second helix, D, is placed on the opposite side of the opening, and the principal shaft is geared with it by employing a counter-shaft, E, and bevel-gears *f f g g* to connect

the two. The groove of this second helix, D, acts upon a stud fixed on the side of the gate at the lower end, so as to produce a vertical motion of the gate up or down from the rotary movement of the helix, and according as it turns to the right or the left. The helical groove on this second shaft, D, being a simple helix, running regularly round in one direction, it is used only in situations where the door or guard is a single one; but when applied to operate a double door a double or reversed helix is used for transmitting the movements from the principal shaft, so as to act simultaneously upon the two sides or halves of the door and alternately open and close them at each revolution or time of action of the principal helix.

To operate horizontally-sliding doors or guards no counter-shaft is required, as the secondary helix is geared immediately into the primary helix A′, and is supported in horizontal position immediately above and across the top of the doors and in suitable brackets, I I. The point of junction between the two spirals in the shaft thus placed horizontally is brought at the line of meeting between the two halves or sections of the door, and a roller, *d*, on each section plays into the half of the helix upon its own side. Rotation of the shaft D in either direction, therefore, produces simultaneous movement of the two door-sections in opposite directions—either toward or away from each other. Such construction affords a simple and effective means of operating hatchway-guards in an automatic manner as the elevator approaches and passes by each opening in succession. It is positive in its action, and not liable to be thrown out of order. When the elevator comes to rest at a landing, the guard is held open, and cannot fall of itself or be closed until the elevator begins to move away from the opening. It also serves to hold the guard closed against any attempt to open it from the outside, and it does this without employing any additional locking device. To produce such action, a notch or depression, *k*, is simply made in the edge of the helix at that point in the groove where the roller is in contact and rests when the gate or guard is closed. During the operation of the helix the door-roller is brought into place at the end of the groove, and the door is closed, the depression or break *k* in the helix receives the door-roller, and prevents any retrograde movement until the shaft receives its motion again from the regular action of the stud on the elevator cage or platform. No application of force to the door from the outside can open it while the rollers are thus locked in the groove.

In case of accidental derangement of the mechanism arising from the relative position of the helices and rollers becoming changed and the two parts thrown out of time, I may provide against breakage by placing a clutch between the bevel-gear and the principal helix. Therefore, if from any cause the helices do not rotate in proper time with relation to the movement of the stud carried on the elevator, any resistance thrown upon the primary helix will overcome the clutch connecting the gear and shaft together, and the gear will slip without operating the second helix. Rotation of the primary helix will then take place without injury to the door or guard.

In working a horizontal guard or trap-door by means of my helical shaft and a projection on the elevator-cage, I hinge at opposite sides of the well or hatchway at the level of a floor, and at each story or landing, if desired, two trap-doors, M M, each of which is in length somewhat exceeding half the measurement across the opening, so that when turned down horizontally one slightly overlaps and is supported by the edge of the other. The two doors are then hinged at *m m*, Figs. 6, 7, 8,) and are operated through the medium of the vertical shaft A, having reversed helices A′ A′ and supported in bearings a^4 a^4 at points above and below the strap in proper relation to a projecting stud, *c*, on the side of the elevator-cage, so as to permit its engagement with the grooves of the helices. The half door or trap nearest this shaft A is fixed on a rock-shaft, a^5, held in suitable bearings and geared into the shaft A by a worm-gear and pinion, *d′ d′*, Fig. 6. Rotation of the shaft A in one direction raises the trap M, and in the opposite direction brings it down into horizontal position across the hatchway. The other half, M′, of the trap-door is moved in the opposite direction—that is, it is caused to turn down as the upper one, M, is raised, and is then raised to the horizontal simultaneously with the downward movement of the upper one. These movements are produced through the medium of a novel arrangement and application of levers and arms or connections, as seen in Figs. 7 and 8. A short arm, *p*, is fixed to the back of the upper trap, M, and projects a short distance horizontally to the rear. A similar lever-arm, *q*, on the back of the opposite half, M′, projects downward at an angle of about forty-five degrees. These two arms *p q* are then connected together by a connecting-rod, *s*, that extends across beneath the doors and at one side of the opening, so as to clear the run of the cage.

A locking device consisting of a segment-plate, T, fixed on the side of the trap-section M, and a spring-dog, *u*, placed on the side of the cross-timber *y*, is employed to insure positive closing of the door when not being operated, and also to serve as a means of keeping them open or in the extreme perpendicular position when thrown open by the run of the cage up and down. The segment-plate T has two notches, *t t*, with which the spring-dog *u* is caused to engage alternately as the trap-door M is turned upon its hinge. The end of this dog carries a friction-roller, *u′*, to run upon the edge of the segment-plate. Now, from this construction there is obtained a sure and positive support of the lowermost section, M′, by the levers *p q* and the connection *s*,

and the horizontality of the door is maintained as long as the arm *p* is kept out in line with the door M. This position can only be disturbed and the trap released by the upward movement of the half-section M; but this part M, being geared into the vertical shaft A, the position of parts is preserved until the shaft is rotated.

Figs. 7 and 8 show positions of the several parts during the opening and closing of the trap-door. The helices A′ A′ are right and left hand, respectively, the lower one being set to throw the door M upward by the engagement of the stud *c* with its groove in the ascent of the cage, and the upper one being opposed to the lower helix, so that the continued ascent of the cage, after passing clear of the doors M M′, brings the stud *c* into engagement with this upper spiral and reverses the motion of the shaft A. These movements are of course reversed in the descending movement of the cage.

For situations where it may be desired to keep the doors open while the cage is in constant use, as in cases of freight-elevators, and situations where it is only necessary to shut off the stories from communication with one another during the night as a safeguard against fire, the stud or actuating stop on the cage can be fixed on the end of a swinging lever, *z*, Fig 6, by which it can be thrown into and out of play with the helical shaft A and the operation of the doors shut off for the time. This application of my improvement in operating doors of elevator-hatchways from the run of the elevator affords a simple, safe, and effective means of cutting off all connection between stories of a building in the intervals when the cage is not in position at the story-landing.

I hereby reserve the right to make future application for patent for the devices shown in Figs. 6, 7, and 8 which are distinct from those herein claimed.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with an elevator, a device for opening and closing doors or guards at the floor-landings from the movements of the car or platform, consisting of a projection on the elevator-car, the primary helix A′, and the secondary helix connected with the primary helix by suitable mechanism, and a projection attached to the door or guard and adapted to engage with the spiral of the secondary helix, substantially as described.

2. An elevator-shaft provided with a helix for guiding and rotating a shaft on the car, said helix consisting of a spirally-wound metal strip secured to said shaft flatwise, substantially as set forth.

3. The notch or depression *k* in the edge of the groove in the helical grooved shaft adapted to receive the roller, substantially as described, for the purpose set forth.

4. The combination, with the upright shaft A, having helical grooves, as described, of the stud *c* on the end of the shifting-lever *z*, having a fulcrum on the side of an elevator cage or platform, substantially as herein described, for the purpose set forth.

Witness my hand and seal.

THOMAS H. MELROSE. [L. S.]

Witnesses:
EDWARD E. OSBORN,
H. E. OSBORN.