

(No Model.)

C. F. HEMENWAY.
DEVICE FOR OPENING AND CLOSING DOORS.

No. 397,498.

Patented Feb. 12, 1889.

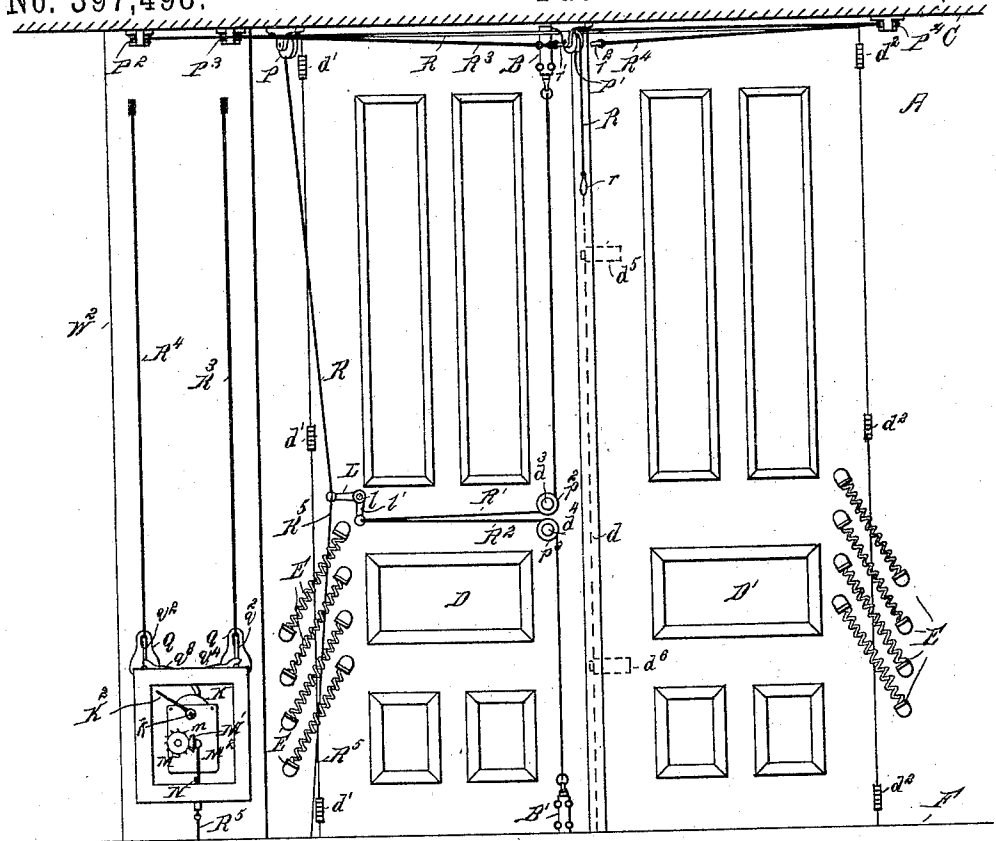


Fig. 1.

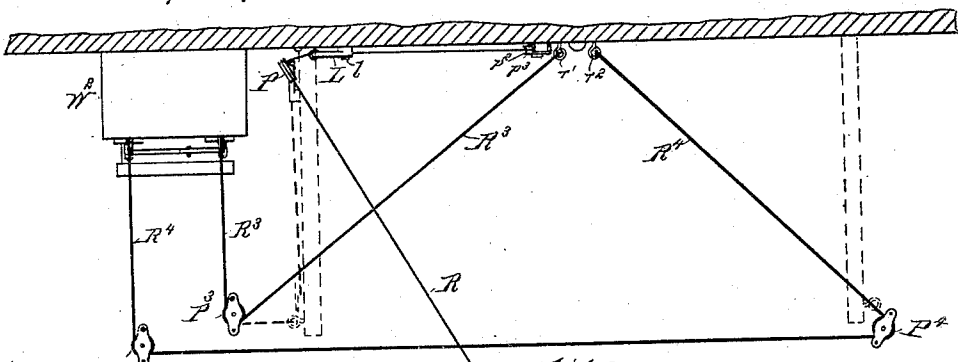


Fig. 2.

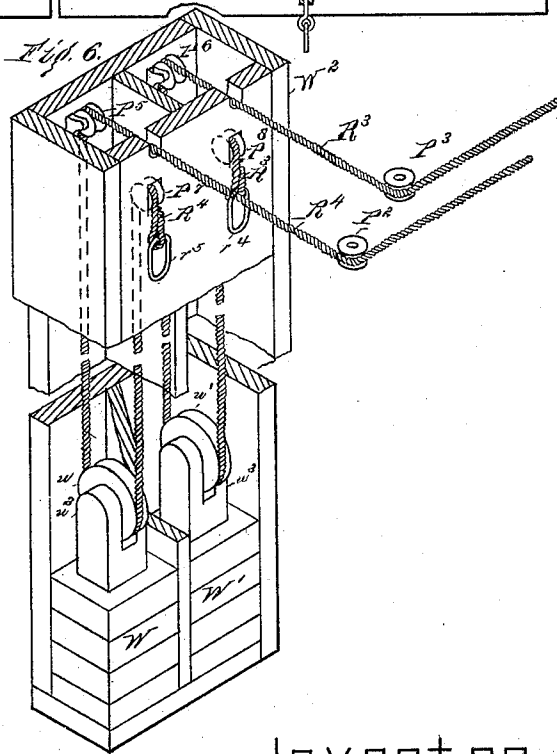
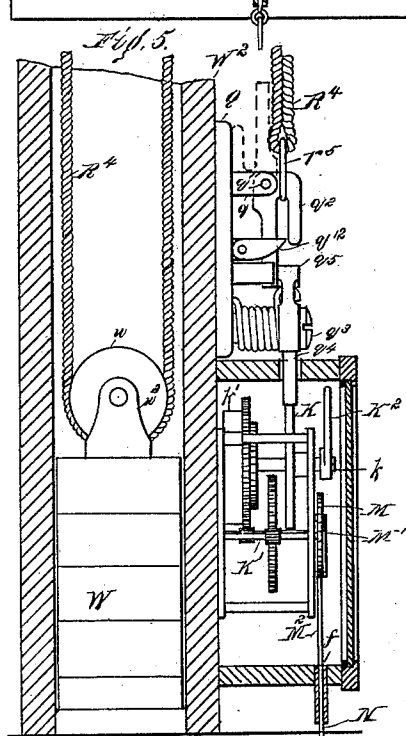
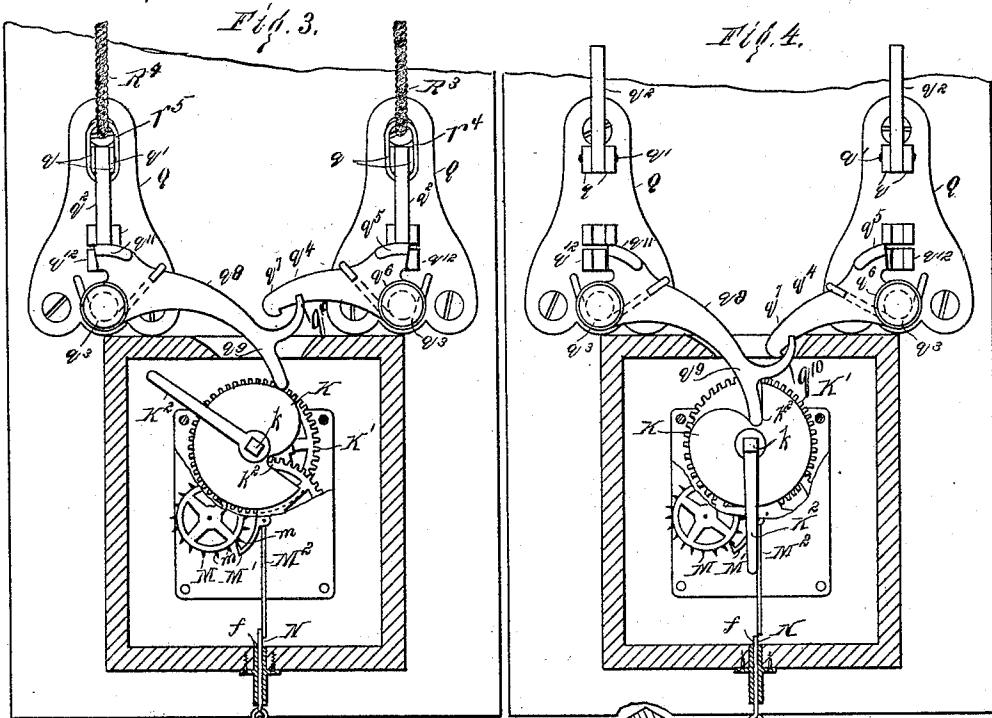
Witnesses—
Kirkley Hyde,
Antoine M. Day

Inventor—
Charles F. Hemenway
By *Albert M. Moore,*
His Attorney.

C. F. HEMENWAY.
DEVICE FOR OPENING AND CLOSING DOORS.

No. 397,498.

Patented Feb. 12, 1889.



Witnesses—

Hubley Hyer
Antoine M. Day

Inventor—
Charles F. Hemenway
By *Albert M. Moore*,
His Attorney.

UNITED STATES PATENT OFFICE.

CHARLES F. HEMENWAY, OF LOWELL, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF TWO-THIRDS TO JAMES F. MCKISSOCK, OF SAME PLACE.

DEVICE FOR OPENING AND CLOSING DOORS.

SPECIFICATION forming part of Letters Patent No. 397,498, dated February 12, 1889.

Application filed July 1, 1886. Serial No. 206,755. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. HEMENWAY, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Devices for Opening and Closing Doors, of which the following is a specification.

My invention relates to devices for opening and closing doors, particularly of fire-engine houses and hose-carriage houses, the object of these devices being to open the doors automatically upon the drawing of a bolt, to hold the doors open for a definite short time, long enough, however, to allow the engine or carriage to be drawn out of its house, and then automatically to close the doors.

In the accompanying drawings, Figure 1 is an inside elevation of a part of the wall and the doors of such a house, showing my improvement applied thereto; Fig. 2, a diagram or plan showing the front wall in horizontal section at the ceiling, and the weight-shaft, the clock, and the cords and pulleys which draw the bolts and which connect the doors to the weights, the position of the doors when open being shown by dotted lines; Fig. 3, an elevation of the clock and the locking mechanism held in position by the clock, the clock-case being in vertical section on the plane of the face of the locking-levers; Fig. 4, like Fig. 3, except that the locking-levers are released; Fig. 5, a side elevation of the clock-work, locking-levers, locking-hooks, the lower parts of the rope which connects the door and the weight, the falling of which weight pulls the door open by means of said rope, showing the weight-shaft and clock-case in vertical section; Fig. 6, an isometric view, showing the position when the ropes are let go to allow the doors to close, of the weights and the ropes which draw the bolts and which connect the doors to the weights, parts of the weight-shaft being in section and parts being broken away to show said weights and ropes.

A represents the wall of an engine-house; F, the floor; C, the ceiling; D D', the doors, one of which, D', is provided with a strip, *d*,

which overlaps the inner edge of the other door, D, to close the crack or space between the doors when the same are closed; *d'* *d*², the hinges of the doors; B B', bolts secured to the door D and sliding into mortises in or sockets secured to the floor and ceiling; *d*³ *d*⁴, spring-latches which are secured to the door D' and enter suitable sockets on or mortises in the edge of the door D, all these parts being of the usual construction and operation.

Secured to the ceiling near the door D is a pulley, P, over which and over another pulley, P', runs a cord or rope, R, one end of which hangs down over the position occupied by the driver's seat when the hose-carriage or fire-engine is in its usual place in the house, said end being provided with a suitable ball, *r*, adapted to be grasped by the hand of the driver, the other end of the rope R being attached to the horizontal arm of a bell-crank lever, L, pivoted at *l* on the door D.

Near the inner edge of the door D on horizontal studs *d*³ *d*⁴, projecting from said door, turn two grooved pulleys, *p*² *p*³, over which run from the downhanging arm *l'* of the lever L two cords or ropes, R' R², the end of one of these ropes last named being attached to one bolt, B, and the end of the other rope to the bolt B', so that the driver, when all things are ready, can, without leaving his seat, by grasping the ball *r* and pulling the rope R, draw both bolts of the door and allow the doors to open. This construction is also in common use. It is also common to connect the doors by cords to weights suspended at the ends of such cords, so that when the bolts are drawn, as above described, the doors will be opened by the running down of the weights.

I use the ropes R³ R⁴ in conjunction with weights to open the doors, these ropes being attached at one end to screw-eyes *r'* *r*² at the inner edges of the doors near the tops of the same, and running over pulleys P² P³, (one of the ropes running over another pulley, P⁴, rendered necessary by the doors opening in opposite directions to allow of the weights both being placed at the same side of the doors,) and over other pulleys, P⁵ P⁶, placed immediately above the weights W W'. As com-

monly used, the ends of the ropes $R^3 R^4$ would be fastened to the weights $W W'$, the descent of which would of course open the doors after the bolts were drawn, as above described, the weights being at all times suspended when the doors are closed and being raised by the closing of the doors.

Instead of fastening the ropes $R^3 R^4$ to the weights $W W'$, I pass said ropes down under grooved pulleys $w w'$, journaled in ears $u^2 u^3$, which project from the tops of said weights, respectively, and then carry these ropes upward over pulleys $P^7 P^8$ journaled in the front wall of the weight shaft or box W^2 , in which the weights move, and thence down on the outside or in front of said weight-shaft, the ends of the ropes last named terminating in loops or links $r^4 r^5$. It is obvious that if the links $r^4 r^5$ were rigidly held the falling of the weights $W W'$ would open the doors substantially in the ordinary manner, and that if, after the doors had been opened a sufficient length of time, the ends of the ropes provided with said links were let go the doors might be closed, the ropes $R^3 R^4$ slipping through the weights without lifting them.

I use to close the doors door-springs E , of any ordinary construction, but not too strong to prevent the falling of the weights; or the doors may be closed by suitably-arranged cords and weights, the weights being smaller, of course, than those used to open the doors.

The apparatus described below is adapted to hold the links and then to release said links after a sufficient interval has elapsed from the opening of the doors to allow the engine to pass out, one set of locking mechanism to hold and release the link being used for each door, this being rendered necessary by the fact that the door D is first closed and then locked by springing the bolts $B B'$ into their sockets.

The two sets of locking mechanism are precisely alike, except in the proportions and positions of the locking-levers, so that the following description applies to either set in all other respects. For convenience the locking mechanism which holds and releases the link r^5 of the rope R^4 will be first described; but the letters of reference will be used to designate corresponding parts of either locking mechanism, except the locking-lever. A vertical plate, Q , is secured to the front side of the weight-shaft, and is provided with vertical ears q , between which turns on a horizontal pivot, q^1 , a hook, q^2 , the form of which is clearly shown in Fig. 5, the hook being adapted to engage one, r^5 , of the links above named, the pivot of said hook being back of the line of draft of said link, so that the springs E and the weight W have a constant tendency to throw the open end of said hook outward and upward into the position shown by dotted lines in Fig. 5, and to release said link and allow the weight to fall when the door is closed, and to allow the door to be closed by said springs E after the weight W has fallen.

Below the hook q^2 and secured to the plate Q is a horizontal stud, q^3 , at right angles to the pivot of said hook, on which stud turns a locking-lever, q^4 , having an upward projection or short arm, q^5 , long enough to reach above the lower end of the hook and to prevent said hook from being turned upward on its pivot to release said link. A spring, q^6 , consisting of a spiral of wire one end of which is attached to the plate Q and the other of which bears upon the long arm q^7 of the lever q^4 , and tends to press said long arm downward and to carry the short arm q^5 of said lever from in front of the lower end of said hook q^2 . The free end of the long arm of said lever q^4 rests upon and is prevented from falling by the long arm q^9 of the corresponding lever, q^8 , or a projection, q^{10} , from said long arm q^9 of the other set of locking mechanism, until said arm q^9 is allowed to fall by the rotation of the cam K , as described below. The levers $q^4 q^8$ are respectively right-handed and left-handed, and the lever q^8 turns upon a separate pivot or stud, q^3 , and is actuated by a separate spring, q^6 , just as the lever q^4 turns and is actuated. The shape and proportions of the locking-lever q^8 are such that its short arm q^{11} extends by the link-holding hook of its set of locking mechanism (when the doors are closed) in one direction farther than the short arm q^5 of the other locking-lever, q^4 , extends beyond the link-holding hook of the other set in the opposite direction, as shown in Figs. 3 and 4. It results from this construction that the cord R^3 will be released sooner than the cord R^4 when the free end of the long arm of the lever q^8 is allowed to fall. The free end of the long arm of said last-named lever rests upon the periphery of a cam, K , the latter turning upon a horizontal shaft, k , and caused to rotate by clock-work or a train of gears, K' , of any ordinary construction, actuated by a mainspring, k^1 , or weight, and provided with an escapement-wheel, M , escapement M' , and pendulum M^2 , also of ordinary construction, except that no bob is used on the pendulum. The cam K is generally circular, but is provided with a cam-notch, k^2 , or depression to allow the long arm of the lever q^8 to fall when the cam revolves. The clock-work is normally at rest, and the long arm of the lever q^8 rests upon the circular part of the periphery of said cam when the doors $D D'$ are closed, the clock-work at such times being prevented from working by the pendulum being held from vibration by a rod, N , which projects upward through a hole, f , in the bottom of the clock-case in the path of said pendulum, and is held from dropping out of said path by friction on the sides of said hole f or the sides of a tube or bushing placed in said holes, the rod N preventing the pallets m of the escapement from letting go the teeth of the escapement-wheel. The lower end of the rod N is connected to one end of a cord, R^5 , which passes under two grooved pulleys, $p^4 p^5$, the hangers of which,

p^6 p^7 , are secured to the under side of the floor F, and the other end of said cord R⁵ is connected to the outer end of the horizontal arm of the lever L, so that the cord R⁵ is practically a continuation of the cord R. When the driver pulls the rope or cord R by grasping the ball r , he not only unbolts the doors, which then open automatically, as above described, but he also sets in motion the clock-work, which will allow the links r^4 r^5 to escape from the hooks q^2 , as above described, and allow the doors to be closed by the springs E, the time during which the doors will remain open after drawing the bolts depending upon the time it takes for the outer end of the long arm of the lever q^8 to reach the bottom of the cam-notch k^2 . It will be seen that the door D is first closed by its springs and locked by the springing of the bolts B B', and that the door D' is immediately after closed and locked to the door D by the spring-latches d^3 d^6 , above named.

It is necessary that the door first closed should be securely fastened before it can rebound or be blown open by the wind, in order that the other door may be latched to it at the instant of its closing.

The clock is rewound by turning back the wrench K² from the position shown in Fig. 4 to the position shown in Fig. 3, and is held from motion by raising the rod N into the position it occupies in Fig. 3 in the path of the pendulum.

To prevent the links r^4 r^5 from falling out of the locking-hooks by accident, a latch, q^{12} , is used, pivoted to the plate Q and normally held in a horizontal position, but capable of being pushed upward by said links to admit said links into said hooks.

The pulleys secured to the weights are, of course, only anti-friction pulleys, allowing the ropes to slip through the weights with as little wear as possible on the ropes.

Obviously my improvement is applicable to any self-closing door, and it is immaterial which end of the door-opening rope is released to allow the closing of the door, because whenever the rope ceases to be connected at one point to the door and at another to a stationary object and between these points to be held taut by the weight the door will be closed automatically by the spring E, so that the clock-work and other parts of the holding and releasing mechanism might be attached to the door to hold one end of said rope, the other end of said rope being rigidly attached to any fixed object.

I claim as my invention—

1. The combination of a self-closing door, a rope connected at one end to said door, one or more guide-pulleys over which said rope is carried, a weight sliding freely on said rope, a link or loop attached to the other end of said rope, a pivoted hook adapted to engage said link and to be turned upon its pivot by the draft of said rope to release said link or loop therefrom, a locking-lever arranged in

front of the open end of said hook to prevent said hook from turning on its pivot, a spring to turn said lever on its fulcrum, and clock-work arranged to prevent said lever from turning on its fulcrum for a definite time and thereafter to release said lever, whereby said door may be opened by the falling of said weight and allowed to close thereafter, as and for the purpose specified.

2. The combination of a self-closing door, suitable guide-pulleys, a rope connected at one end to said door, a weight provided with a pulley, said rope passing under said last-named pulley and over said guide-pulley, a link or loop attached to the other end of said rope, a pivoted hook adapted to engage said link and to be turned upon its pivot by the draft of said rope to release said link or loop therefrom, a locking-lever having a short arm adapted when placed in front of the open end of said hook to prevent said hook from turning on its pivot, a spring to turn said lever upon its fulcrum, and a cam provided with a cam-notch and rotated by clock-work, the longer arm of said lever resting upon said cam and holding said short arm in front of said open end of said hook until the free end of said long arm enters said cam-notch, as and for the purpose specified.

3. The combination of two self-closing doors, the inner edge of one of said doors being adapted to overlap the inner edge of the other of said doors when the same are closed, suitable guide-pulleys, two ropes, each connected at one end to one of said doors, two weights, each sliding freely on one of said ropes, two links, one attached to the other end of each rope, two pivoted hooks, each adapted to engage one of said links and to be turned upon its pivot by the drawing of the rope to which said link is attached to release said link therefrom, a locking-lever having a short arm, adapted, when placed in front of the open end of one of said hooks, to prevent said hook from turning on its pivot, a spring to turn said lever upon its fulcrum, a cam provided with a cam-notch and rotated by suitable clock-work, the longer arm of said lever resting upon the periphery of said cam and holding said short arm in front of said open end of said hook until the free end of said long arm enters said cam-notch, and another locking-lever having a short arm adapted to prevent the other of said hooks from turning on its pivot when placed in front of the open end of said last-named hook, the free end of the long arm of said last-named locking-lever resting upon the long arm of said first-named locking-lever or upon a projection which said last-named long arm is provided with and pressed upon the same by a spring, and adapted to release its hook before the other hook is released by said first-named locking-lever to allow one of said doors to close before the other of them, and said last-named spring, as and for the purpose specified.

4. The combination of two self-closing doors,

the inner edge of one of said doors being provided with one or more latches to engage with the other of said doors, two ropes, each connected at one end to one of said doors, one or more guide-pulleys over which said ropes are carried, two weights, one of which slides freely on each of said ropes, links or loops attached to the other ends of said ropes, respectively, pivoted hooks adapted to engage said links and to be turned upon their pivots by the draft of said ropes to release said links or loops therefrom, and locking-levers, each arranged in front of the open end of one of said hooks to prevent the same from turning, springs to turn said levers upon their fulcrums, and clock mechanism arranged to pre-

vent said levers from turning on their fulcrums for a definite time and thereafter to release said levers one after the other to allow said ropes to slip through said weights, whereby said doors may be opened by the falling of said weights and allowed to close one after the other, as and for the purpose specified.

In witness whereof I, the said CHARLES F. HEMENWAY, have hereunto set my hand this 21st day of June, A. D. 1886.

CHARLES F. HEMENWAY.

Witnesses:

ALBERT M. MOORE,
JOSEPH W. PIPER.