(No Model.) 2 Sheets—Sheet 1.

J. CASE & J. A. WHITAKER.

DEVICE FOR AUTOMATICALLY OPENING AND SHUTTING DOORS IN COAL MINES.

No. 363,985. Patented May 31, 1887.

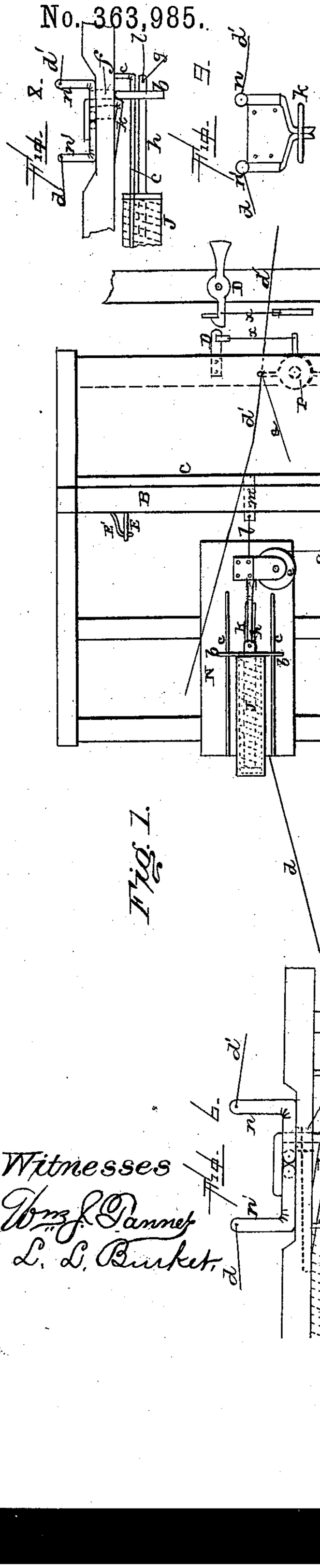

Fig. 1.

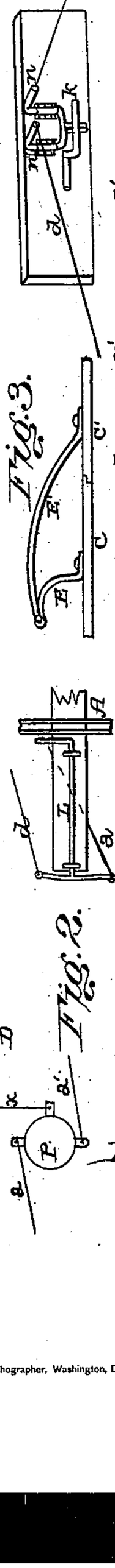

Fig. 2.

Fig. 3.

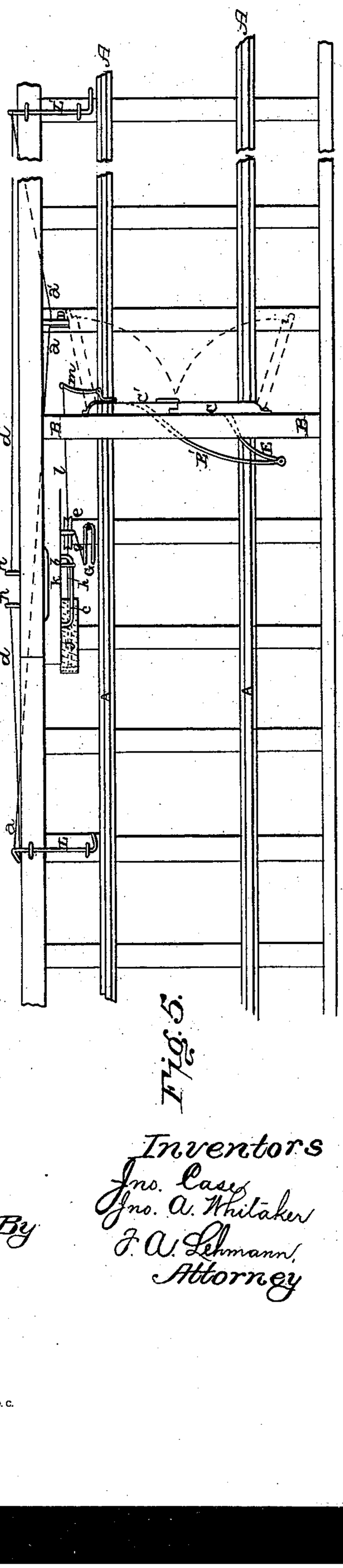

Fig. 5.

Witnesses
Wm. L. Dannel
L. L. Burket.

Inventors
Jno. Case
Jno. A. Whitaker
By F. A. Lehmann,
Attorney

(No Model.) 2 Sheets—Sheet 2.

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DEVICE FOR AUTOMATICALLY OPENING AND SHUTTING DOORS IN COAL MINES.

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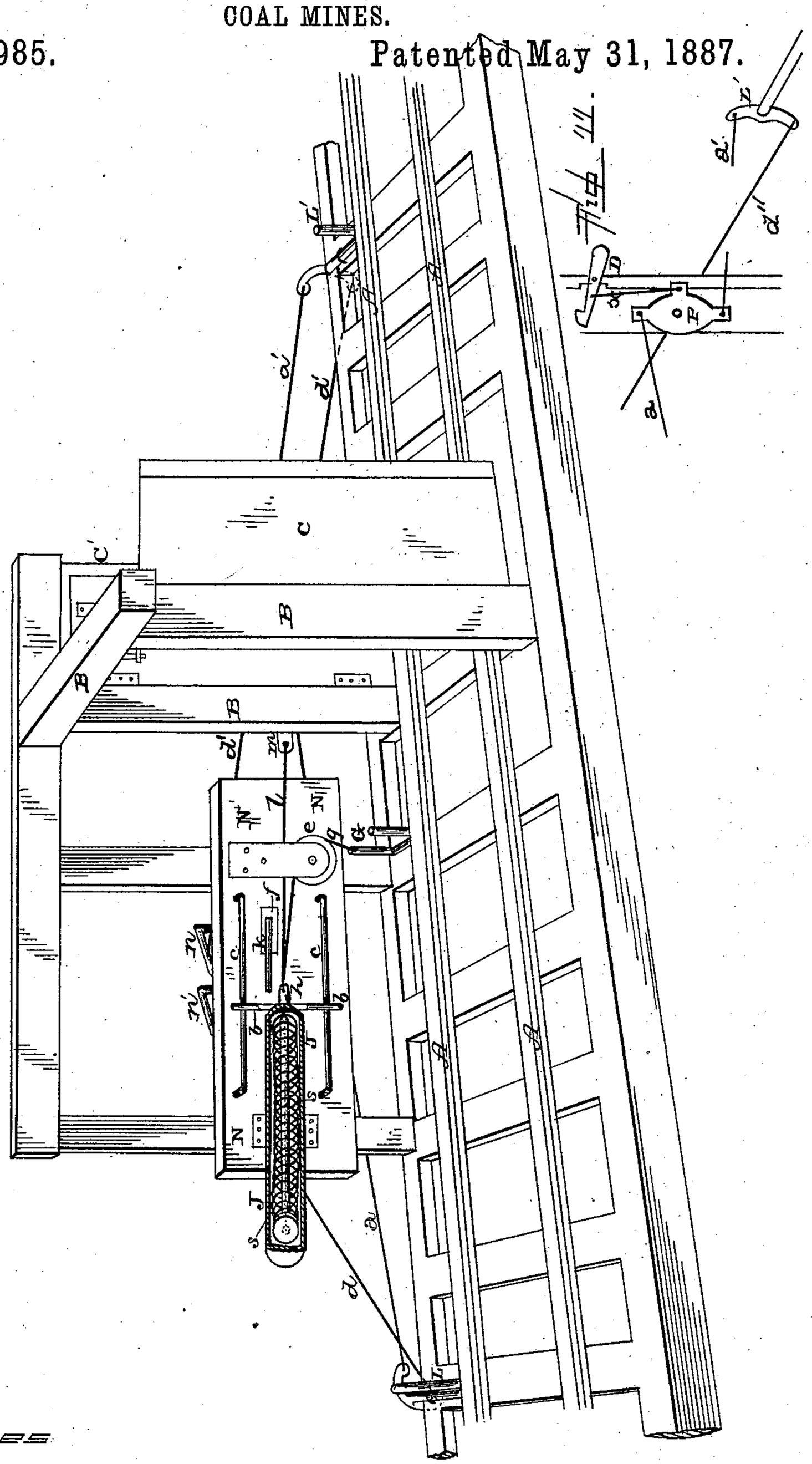

Fig. 10.

Witnesses
R. F. Gardner
Saml. J. Wallace.

Inventors
Jno. Case
Jno. A. Whitaker
per F. A. Lehmann

UNITED STATES PATENT OFFICE.

JOHN CASE AND JOHN A. WHITAKER, OF McDONALD, PENNSYLVANIA.

DEVICE FOR AUTOMATICALLY OPENING AND SHUTTING DOORS IN COAL-MINES.

SPECIFICATION forming part of Letters Patent No. 363,985, dated May 31, 1887.

Application filed September 30, 1886. Serial No. 215,017. (No model.)

To all whom it may concern:

Be it known that we, JOHN CASE and JOHN A. WHITAKER, citizens of the United States, residing at McDonald, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Devices for Automatically Opening and Shutting Doors in Coal-Mines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to improvements in devices for automatically opening and shutting doors in coal-mines, and are improvements on our former invention for which Letters Patent of the United States No. 282,269, dated July 1, 1883, were granted to us, and they consist in alterations hereinafter described.

In the above-mentioned Letters Patent the door is described as being of a width to extend from side to side of the passage in the mine. This, in our present improvement, has been changed into a door divided into halves, so that instead of one heavy door we have now two lighter ones that meet over the middle of the road, with suitable levers attached to them, that if one of the doors is opened or shut the other is likewise acted upon. Instead of two treadles in our former invention, we only use one lever, and make other alterations by which the mechanism is simplified but much improved.

The accompanying drawings represent our invention.

Figure 1 is a side elevation of an apparatus to which our invention is applied. Figs. 2, 3, 4, 6, 7, 8, 9 are detail views of the different parts. Fig. 5 is a plan view of the apparatus complete. Fig. 10 is a perspective of the same. Fig. 11 is a perspective of the latch.

The posts B are placed opposite one another near the rails and connected by a cross-tie on top. To these posts are hinged the doors C in a manner that when not obstructed they close themselves by their own gravity over the middle of the road. At the upper part of the doors are arms E E′, Figs. 3 and 5, so formed and interlocked in a manner that when one door is opened or shut the other becomes so likewise. One of the doors has a suitable plate projecting beyond its edge to be caught by a latch, D, on a post, by which the doors, when open, are held until the latch is removed, allowing the doors to shut themselves. There is also a lever, *m*, projecting beyond the hinged side of the door, by which it is to be opened.

An oblong board, N, of sufficient length and thickness, is fastened to posts on a line parallel with the rails in proximity to the doors at the side opposite to their opening. In the middle of the board is an opening, *f*, cut lengthwise, at the end of which is secured the end of a spring, *k*, so as to extend the spring over the opening, and, being bent at a right angle, to pass through to the rear, where it is bent again at an angle to give it the form of a ⌴. The part of the spring *k* in front over the opening in the board N projects beyond the face of the board and can be pushed or drawn into the opening. At the rear of the board are two triggers, *n* and *n′*, Figs. 4, 6, 8, 9, placed vertically, of which the upper ends extend at right angles backward, and their lower ends first bent inwardly toward each other and then downward, which latter parts pass under the rear end of the spring *k*, so that when the triggers are moved their lower ends pull the spring back into the opening in the board N.

In front of the board N is a cylinder, J, fastened in a horizontal position, and in the cylinder a rod, *h*, surrounded by a spiral spring, *s*, by which the rod, when drawn out and then set free, is forcibly drawn back. On the outer end of the rod *h* is a cross-bar, *b*, through which the guides *c* pass. The rod *h*, when drawn out, is on a line with the spring *k*, that becomes pressed into the opening in the board by the cross-bar *b* until the rod is fully drawn out. When released from the pressure of the cross-bar, the spring is set free to occupy its former position, and its projecting prevents the rod from being drawn back into the cylinder. In front of the cylinder is a pulley, *e*, over which passes a rope, *g*, from a U shaped treadle, G, to the rod *h*. By bending down the treadle the rod is drawn out of the cylinder and held by the spring *k*.

Approaching the doors from either side, a car encounters a lever, L or L′, secured at the side of the road upon a cross-tie. The levers are made of bars, one end of which is bent to a right angle and turned up to be struck by a passing car. At the other end of the bars are

two arms opposed to one another, so that by depressing the lever the two arms move in opposite directions.

The latch D, Figs. 1, 5, 7, 11, by which the doors are held after being thrown open, consists of a flat bar, of which one end is a hook to catch under the projecting piece on the edge of the door and the other is much enlarged or weighted. This flat bar is pivoted to the side of a post at a proper distance from the door and in a manner that the projecting hooked end is forcibly raised by the weighted end if not obstructed. Connected by a rod, *x*, with the forward end of the latch is a disk or circular plate, P, with three projections on its circumference, of which one is on top, another underneath on a perpendicular line with the former, and the third half-way between the two, that serves for an attachment of a rod to connect the disk P with the latch. The disk is pivoted in front of the post, to the side of which the latch is attached, and faces the railroad.

The connection of the various parts heretofore mentioned is as follows: To the outer end of the rod *h* a rope, *l*, is attached, of which the other end is fastened to the lever *m* on the door, and is of a length to pull the door open when the rod *h* is released and returns to its seat in the cylinder. Another rope, *g*, that passes over the pulley *e* to a treadle, G, is also attached to the rod *h*, which rope, when the rod *h* is being drawn into the cylinder by the spiral spring *s*, lifts the treadle G to a vertical position. From the under arms of both levers L and L′ ropes *d* and *d′* reach to the triggers *n* and *n′*, and to the upper arms of the same levers the ropes *a* and *a′* are fastened, to connect them with the projections on the circumference of the disk P, *a* to the upper one and *a′* to the lower.

The operation is as follows: The doors being closed, the rod *h* is drawn out and held by the spring *k*. Supposing a car to be approaching and encountering the lever L, depressing the lever, the rope *d*, at its lower arm, pulls the trigger *n*, whereby the spring *k* is drawn away from the cross-bar *b*, whereby the rod *h* becomes instantly free to return into the cylinder. The simultaneous effect is the pulling of the ropes *l* and *g*, whereby the doors are pulled open and the treadle G restored to its upright position. The doors are caught and held by the latch D. After having struck the lever L, the car, proceeding, reaches the treadle G and bends it over, whereby the rod *h* is again drawn out and held by the spring *k*, ready for another car. After passing through the open doors, the car strikes the lever L′ and bends it over. The upper arm of the lever now pulls the rope *a′*, that is also attached to the upper projection on the disk P, and partly turns it. The rod *x*, by which the disk is connected with the latch, being also pulled downward by the disk's motion, draws the latch from under the plate on the door and sets it free to close by its gravity. The weighted end of the latch, as soon as the hook is drawn down and the doors have been moved, descends and pulls up the disk to its former position by means of the rod *x*, and pulls the rope *a′*, that raises the lever L′ to a vertical position, to be prepared for a car that may arrive from either side. The lever L or L′ having been first depressed by a car before passing through the door, and made to pull one of the triggers, is immediately raised up again by the pressure of the rear end of the spring *k* exerted upon the lower end of the trigger, whereby it is returned to its former position, the rope raising up the lever.

Having thus described our invention, we claim—

1. The combination of the track, the doors which open and close above the track, the lever G, placed beside the track, and which is operated by the passing cars, a cord, wire, or chain which connects the said lever to the spring-actuated rod *h*, a latch with which the outer end of the rod engages when drawn outward by the movement of the lever G, and a mechanism, substantially as shown, for operating the latch which holds the doors open, substantially as described.

2. The combination of the two doors which open and close over the track, bent arms for connecting them together, the latch D, for keeping the doors open, the levers L L′, arranged on opposite sides of the doors, cords or wires connected both to the latch and the levers, and cords or wires extending from the levers to the spring-actuated rod *h*, the latch for engaging with the rod, and the lever G, placed beside the track and connected to the rod, substantially as set forth.

3. The combination of the doors which open and close over the track, the arms which connect them together, the latch D, for holding the doors open, cords or wires which are connected to the latch, and which extend outward in opposite directions and are connected to the levers L L′, the levers L L′, placed beyond opposite sides of the doors, cords or wires extending from the levers, the triggers, the spring-latch, the spring-actuated rod connected to the latch by means of a cord or wire, and the lever G, placed beside the track and connected to the rod by means of a cord or wire, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN CASE.
JOHN A. WHITAKER.

Witnesses:
LOUIS MOESER,
TG. STAUFFER.