

No. 668,600.

Patented Feb. 19, 1901.

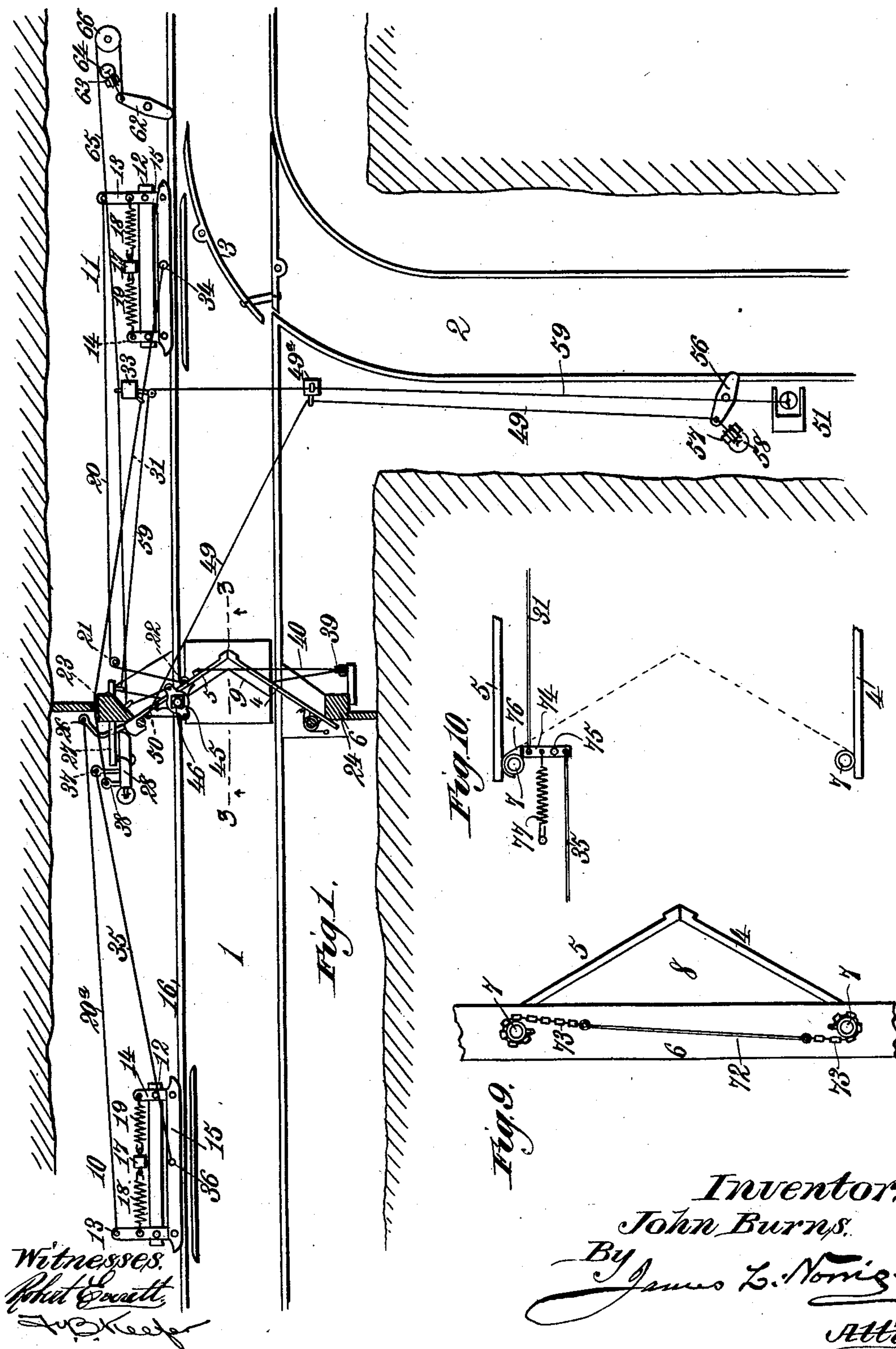
J. BURNS.

MINE DOOR OPERATING AND SIGNAL SYSTEM.

(Application filed Feb. 24, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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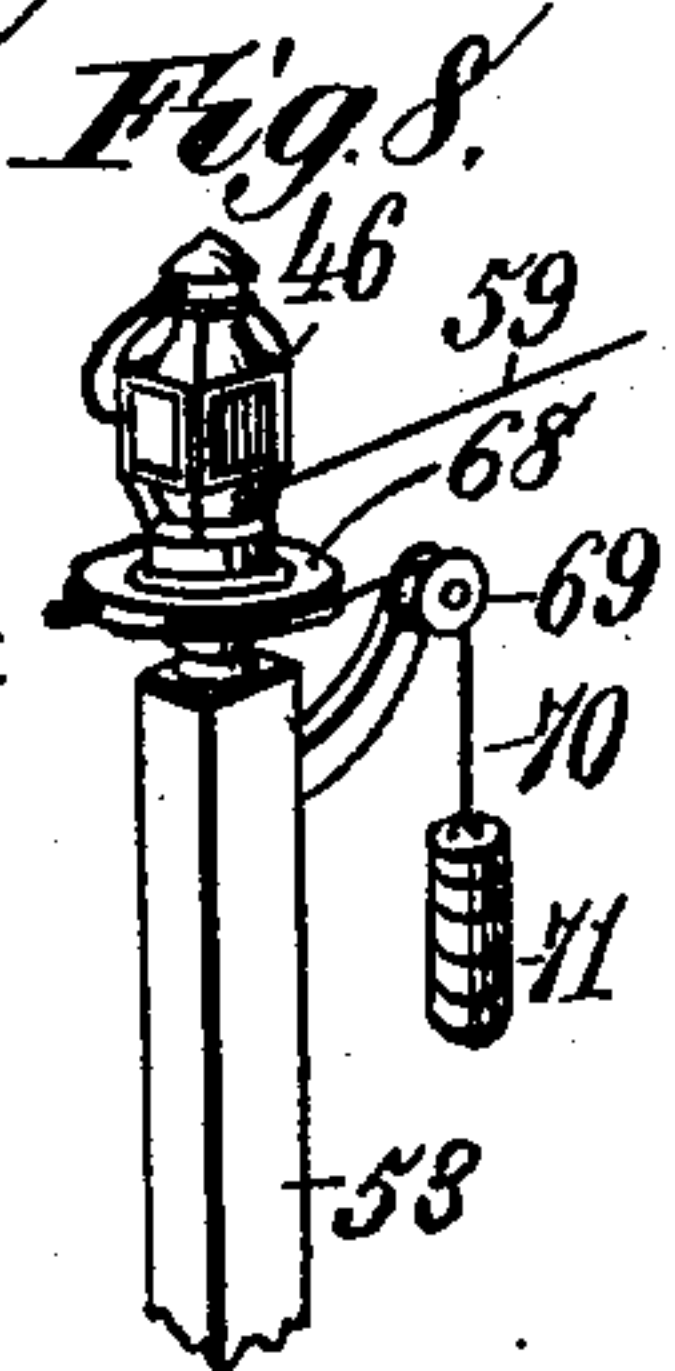
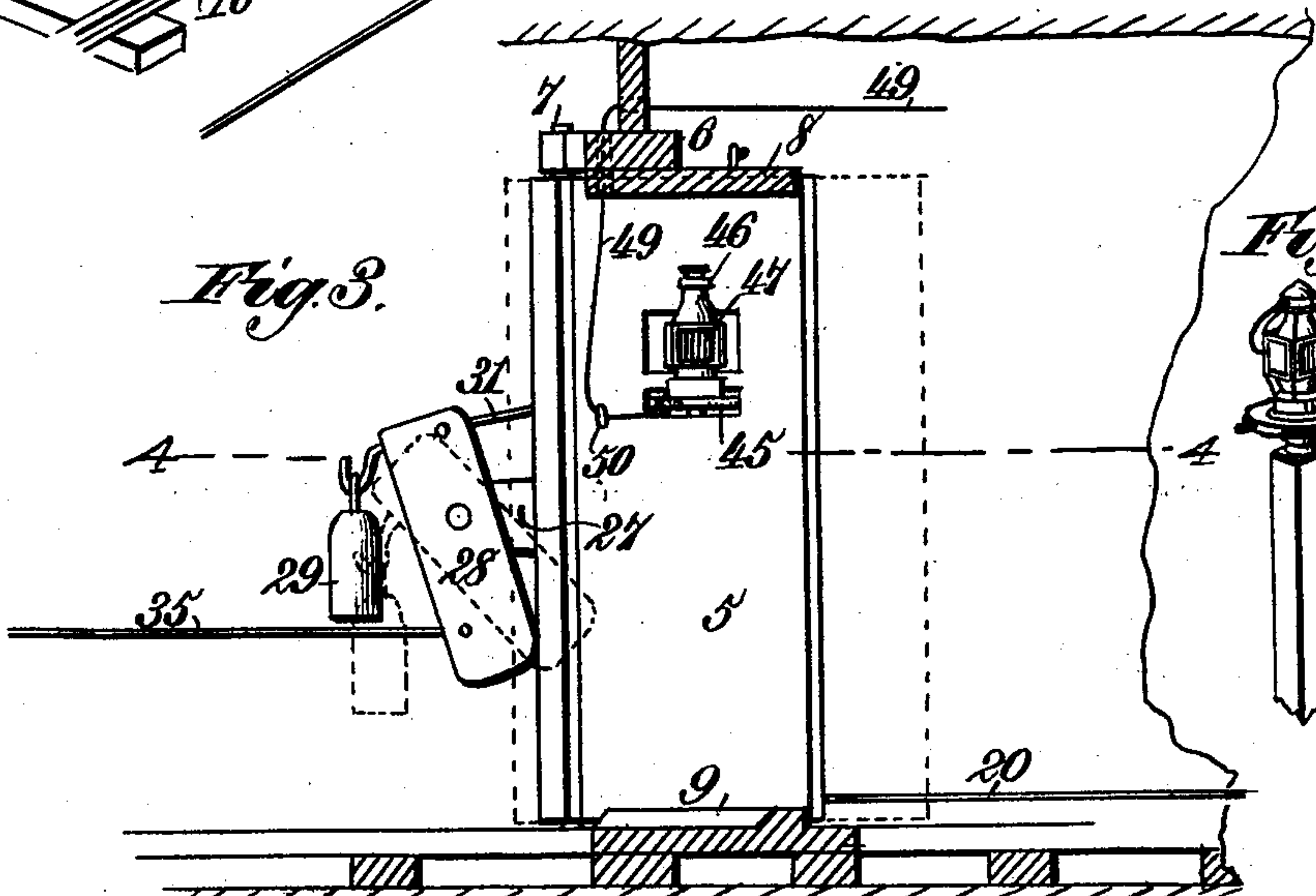
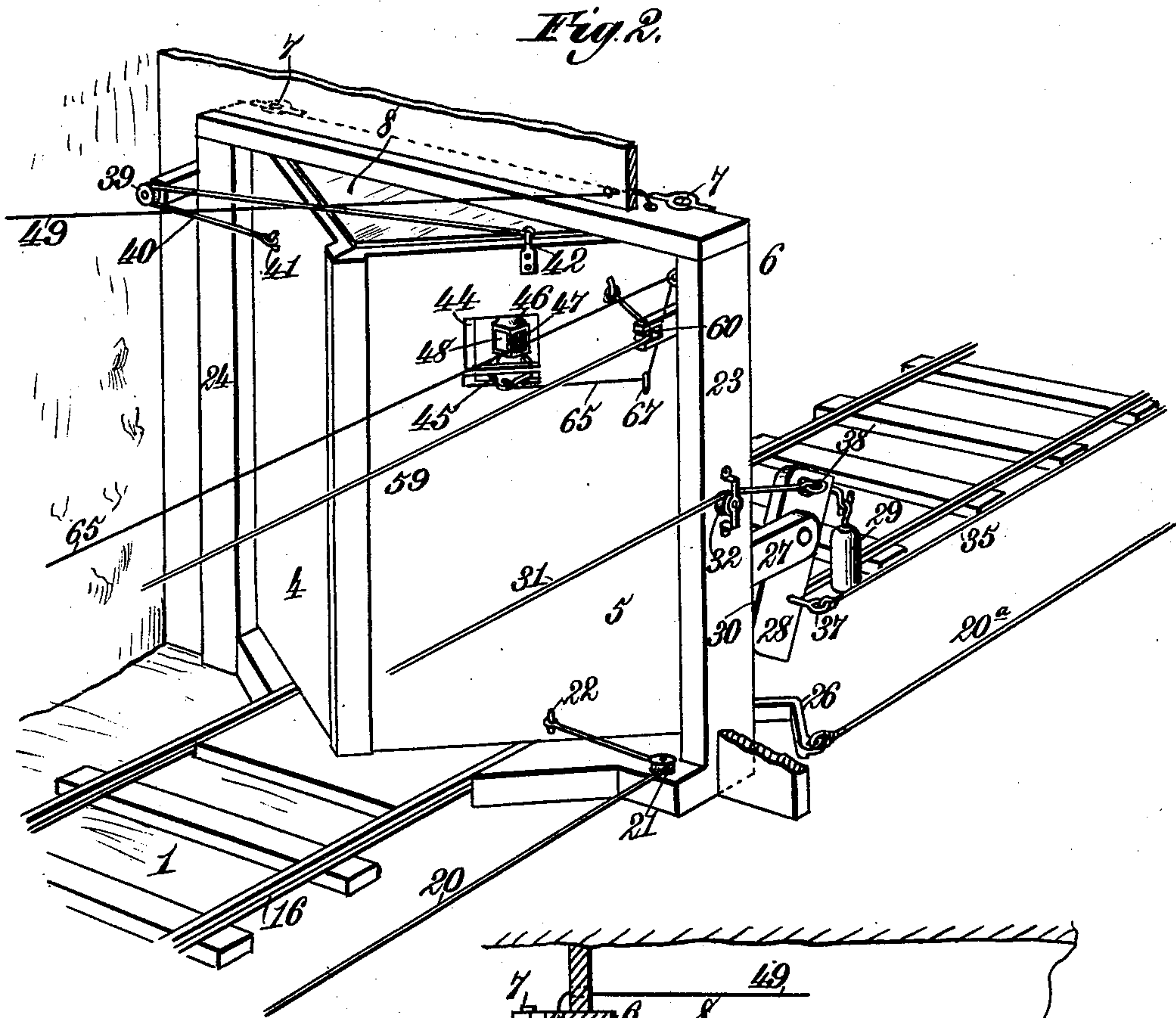
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MINE DOOR OPERATING AND SIGNAL SYSTEM.

(Application filed Feb. 24, 1900.)

(No Model.)

3 Sheets—Sheet 2.



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No. 668,600.

Patented Feb. 19, 1901.

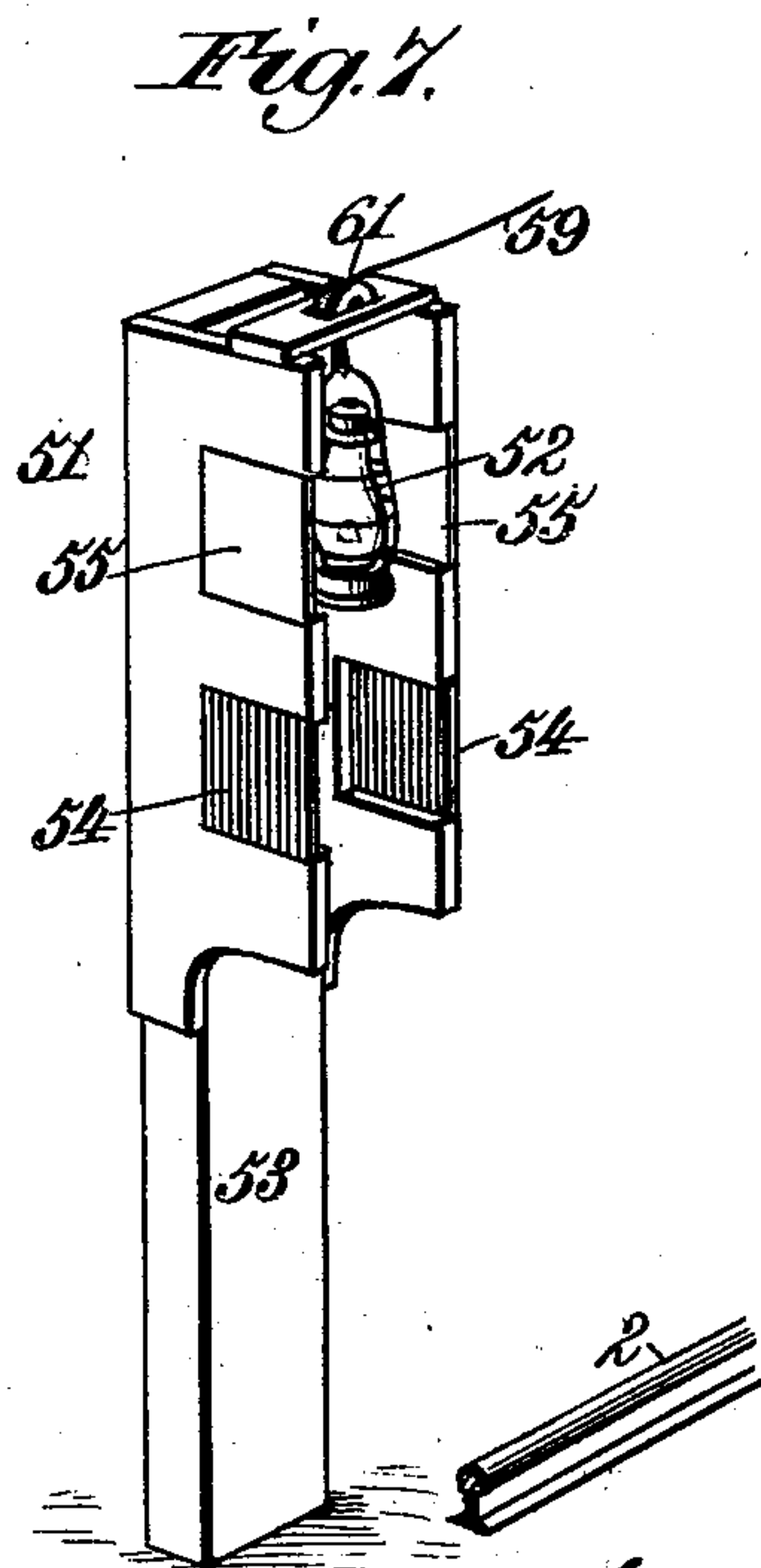
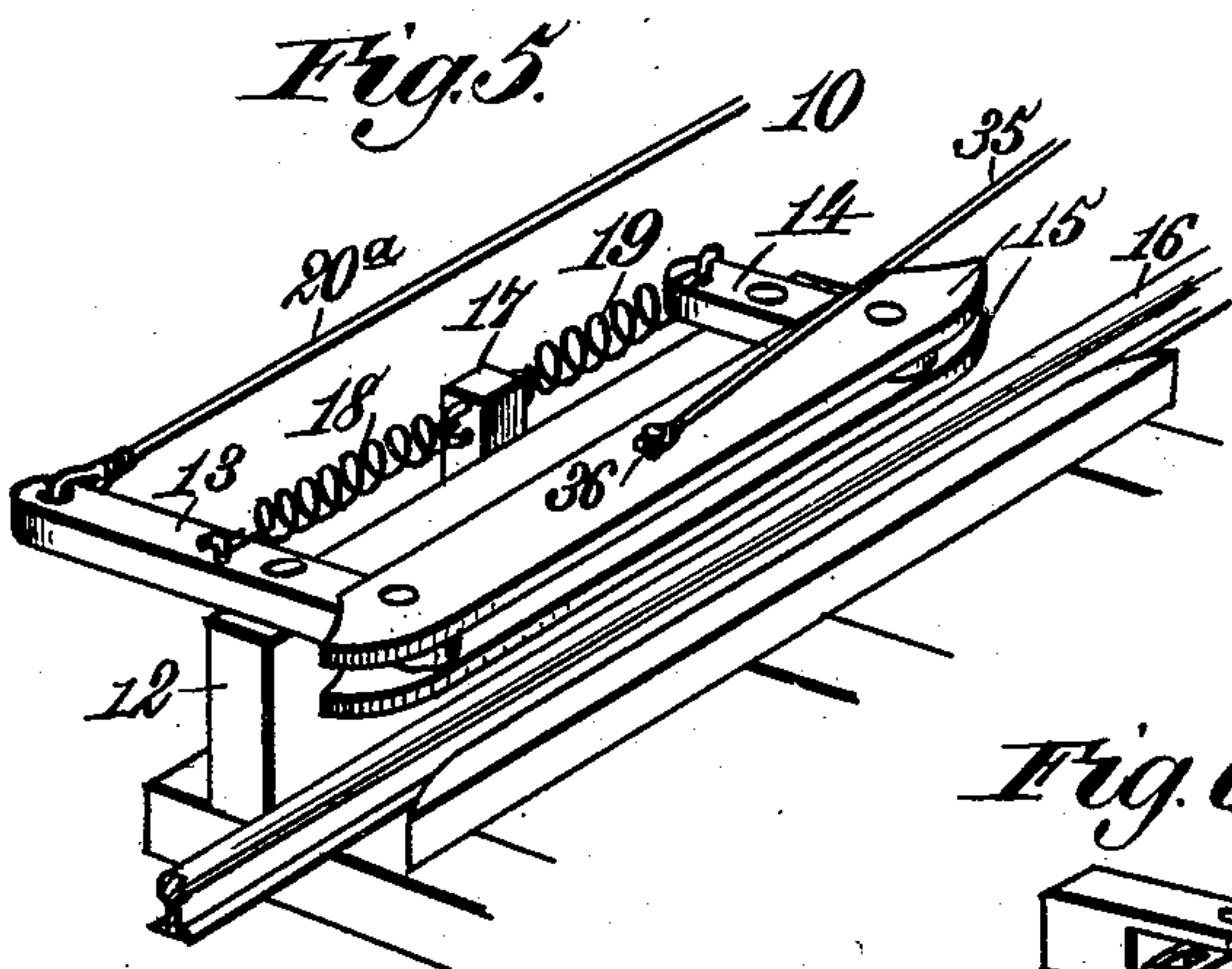
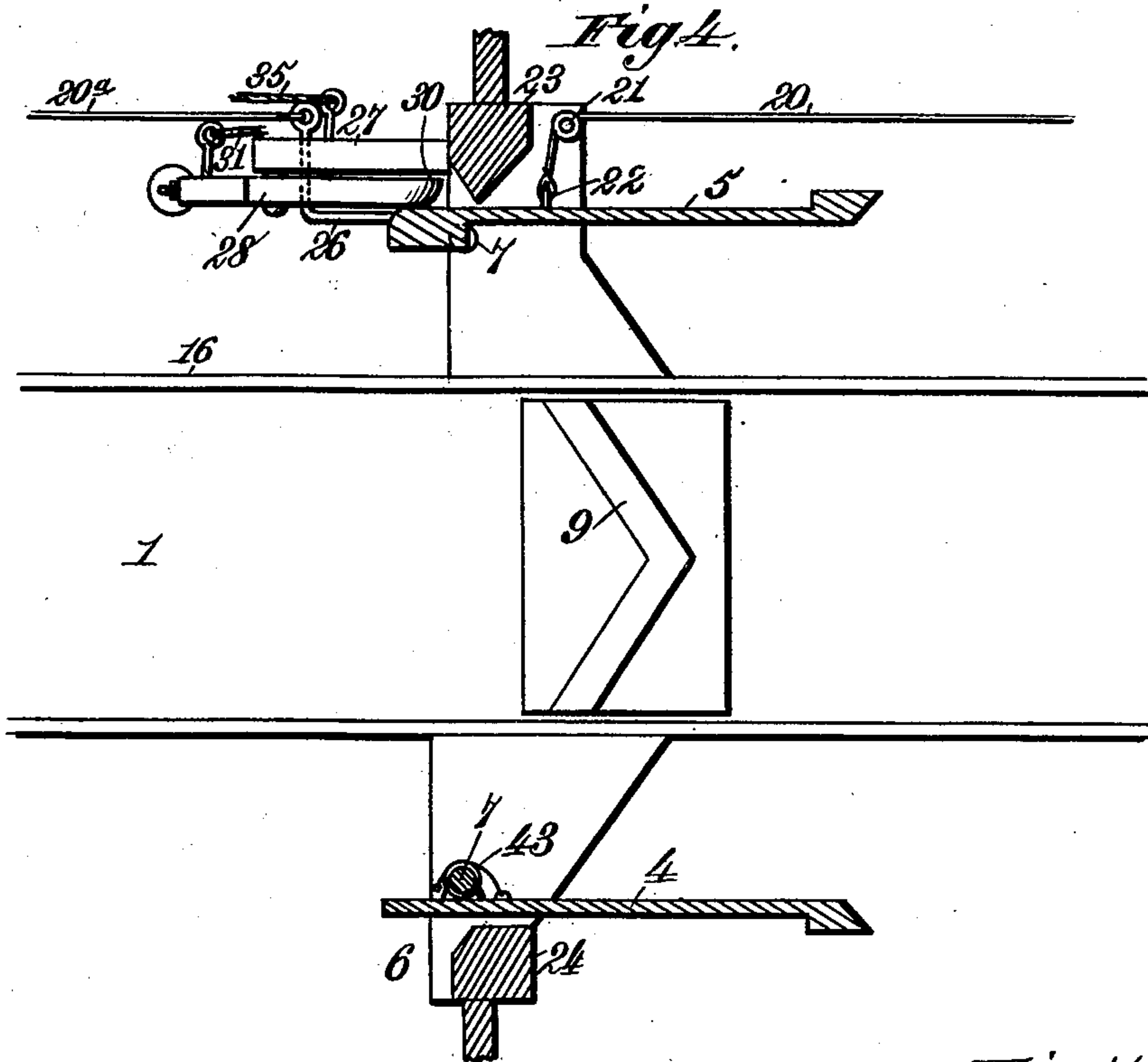
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MINE DOOR OPERATING AND SIGNAL SYSTEM.

(Application filed Feb. 24, 1900.)

(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

JOHN BURNS, OF KENSEE, KENTUCKY, ASSIGNOR OF THREE-FOURTHS TO
HYWEL DAVIES, JOHN H. BARKER, AND WILLIAM L. MCKARSIE, OF SAME
PLACE.

MINE-DOOR-OPERATING AND SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 668,600, dated February 19, 1901.

Application filed February 24, 1900. Serial No. 6,394. (No model.)

To all whom it may concern:

Be it known that I, JOHN BURNS, a citizen of the United States, residing at Kensee, in the county of Whitley and State of Kentucky, have invented new and useful Improvements in Mine-Door-Operating and Signal Systems, of which the following is a specification.

This invention relates to a combined mine-door-operating apparatus and signal system.

The objects of the invention are to combine with mechanism for operating the doors of a mine a system of signals, whereby a car approaching the doors on a main track in either direction will at the same time that it operates the doors cause to be exhibited a danger-signal to a car approaching the doors from the opposite direction on the same track or when approaching the main track from a cross or branch track or a car approaching the main track on a cross or branch track will signal a car on the main track approaching the junction of the two tracks from either direction.

To this end the invention resides in the features of construction and the combination and operation of parts hereinafter described, and particularly pointed out in the claims.

I have illustrated the invention in the accompanying drawings, in which—

Figure 1 is a plan view illustrating the invention applied to a main and branch track. Fig. 2 is an enlarged perspective view of the mine-doors and the mechanism immediately connected therewith for operating the same. Fig. 3 is a section on the line 3 3, Fig. 1, and viewed in the direction of the arrows. Fig. 4 is a sectional plan view on the line 4 4 of Fig. 3, showing the doors in an open position. Fig. 5 is a detail perspective view of one member of the mechanism for operating the doors. Fig. 6 is a similar view of a trip mechanism for operating a signal, and Fig. 7 is a perspective view of a signal-box with a lantern therein. Fig. 8 is a similar view illustrating a modified construction of signal. Fig. 9 is a top plan view illustrating a modification in the means for causing the simultaneous movement of the two doors, and Fig. 10 is a plan view illustrating a modification of the latch mechanism for engaging one of the doors.

Referring now to the drawings, the numeral 1 indicates the main track, and 2 a

branch track leading therefrom, a switch-rail 3 being provided at the junction-point.

The numerals 4 5 indicate, respectively, two swinging doors which are mounted in a framework 6 by means of pivot-bolts 7 to close across the track 1. These doors close against a triangular block 8, located at the top of the frame and against a triangular ledge 9, supported upon the road-bed. The numeral 10 indicates a mechanism for operating these doors, located at one side of and at a distance from the doors and adjacent to the outer rail of the main track, and the numeral 11 indicates a similar mechanism located in a like manner on the other side of the doors and upon the line of the main track. Each of these mechanisms comprises a support 12, upon the top of which and near opposite ends are pivotally mounted two arms 13 14, and pivotally secured upon the top and bottom sides, respectively, of the ends of these arms on the track side and operatively connecting them are two slide-bars 15, which extend parallel with and overhang the outer rail 16 of the main track. Secured intermediate the ends of the support 12 is a block 17, and secured to opposite sides of this block are coiled springs 18 19, the opposite ends of which are secured, respectively, to the arms 13 14. Each arm 13 projects beyond or is longer than the arm 14. Secured to the outer end of the arm 13 of the mechanism 11 is one end of a cable 20, which after passing over a pulley 21, mounted adjacent to the outer post of the frame 6, is secured to the bottom of the door, near the center thereof, as indicated at 22. The outer post of the frame 6 is designated by the numeral 23 and the opposite post by the numeral 24. The cable 20 is shown to extend from the door-operating mechanism indicated by 11 in Fig. 1. The door-operating mechanism 10 is similar in all respects to that just described, and from the outer end of its arm 13 a cable 20^a extends to and is connected with a curved arm 26, secured on the bottom of the door 5. Secured to the post 23 is a bracket 27, extending beyond the rear side of the door 5, and pivotally secured centrally of its length to the outer end of this bracket is a wedge-block 28, having pendent from its rear side, near its upper end, a weight 29. The forward edge 30 of the wedge-block

may be slightly sharpened, and as the doors are opened the weight 29 operates to turn said wedge-block upon its pivot and cause its lower end to be inserted between the rear edge of the door 5 and the post 23 to hold the doors open. Secured to the upper end of the wedge-block 28 is a cable 31, working over a pulley 32, mounted on the side of the post 23, which after passing through a suitable guide or eye on an upright 33, located adjacent to the outer rail of the track, has its opposite end secured to the upper slide-bar 15 of the mechanism 11, as indicated at 34. To the lower end of the wedge-block 28 one end of a similar cable 35 is connected, which has its other end secured to the upper slide-bar 15 of the door-operating mechanism 10, as indicated at 36. The connection of the cable 35 with the wedge-block 28 is indicated at 37, and the connection of the cable 31 therewith is indicated at 38.

In order to provide for moving both doors 4 5 simultaneously, I mount on the post 24 a pulley 39, over which passes a cable 40, one end of which is connected to the door 4, as indicated at 41, and its opposite end to the door 5, as indicated at 42. As either one of the mechanisms 10 11 is operated to open the door 5, it will be seen that the connection with the opposite door 4 of the cable 40 will cause said door to open at the same time. The doors are caused to close automatically when the wedge-block 28 is moved out of engagement with the door 5, as hereinafter explained, by means of a coiled spring 43, connected with the door 4.

The operation of the device thus far described is as follows: Say, for example, that a car is approaching the doors on the tracks 1 from the right hand of the view shown in Fig. 1, its front wheel on the outer side will strike the slide-bars 15 of the mechanism 11 and carry them forward, the wheels of the truck moving along in contact with said slide-bars. This movement of the slide-bars will cause the arm 13 to be rocked on its pivot in a manner to pull the cable 20 and open the door 5, which movement, through the medium of the cable 40, as previously described, will also open the door 4. As the slide-bars 15 are carried forward by the truck of the car this movement will slacken the cable 31 and permit the weight 29 to operate the wedge-block 28 and insert its forward edge between the post 23 and the rear edge of the door 5, and thus hold the doors open after the car has passed the operating mechanism 11. This movement of the slide-bars 15 will have compressed the spring 18 and extended spring 19, so that said springs are in a position to return the slide-bars 15 to their normal position after the doors are released. After the car has passed through the doors it will engage the slide-bars 15 of the mechanism 10, carrying them forward in the manner just explained, which movement will pull the cable 35 and withdraw the wedge-block 28 from engage-

ment with the door 5, when the spring 43 will cause said doors to close. After the car has passed the operating mechanism 10 the springs 18 19 thereof will return the slide-bars 15 to their normal position. Should the car be approaching the doors in the opposite direction from that just described, the same operation would take place, the slide-bars 15 of the mechanism 10 being engaged by the car and pushed forward, thereby, through the medium of the cable 20^a, connected to the arm 26 of door 5, opening said door and at the same time slackening the cable 35 and allowing the wedge-block 28 to be inserted between the door 5 and post 23, as previously explained. After the car has passed through the doors it will engage the slide-bars 15 of the mechanism 11, carrying them forward, and thereby pulling the cable 31 and withdrawing the wedge-block 28 from engagement with the door 5, the spring 43 then operating to close the doors 4 5. The springs 18 19 of each of the mechanisms 10 11 will be alternately compressed or extended, according to the direction of travel of the car engaging said mechanisms, and the purpose of these springs is to return the slide-bars 15 to their normal position immediately upon the closing of the doors.

The signal mechanism will now be described.

Revolubly mounted near an opening 44 of the door 5 is a disk 45, upon which is secured a lantern 46, having a rectangular casing or chimney, two opposite sides of which have red glass (indicated by 47) and the other two sides having white or clear glass, as indicated by 48. Connected to one side of the disk 45 is a cord 49, which after passing through an eye 50 on the door 5 extends through suitable guides in the frame 6 to and through a guide on a post 49^a to a trip-lever 56, to one end of which it is secured, said trip-lever being pivotally mounted near the outer rail of the track 2 and having its free end projecting over said rail. Mounted in a suitable support adjacent to the trip-lever 56 is a pulley 57, and a cord is connected at one end to the outer end of the trip-lever 56, and passing over the pulley 57 is provided at its opposite end with a weight 58, the purpose of which is to return the trip-lever 56 to its normal position after it has been actuated, as presently explained. Secured near the upper end of the door 5 is a cord 59, which after passing over a pulley 60, mounted upon the post 23, and through guides on posts 33 and 49^a, passes to a signal-box 51, where it is secured to the bail of a lantern 52. The signal-box 51 is supported on a post 53, located by the side of one of the rails of the branch track 2 and at an appropriate distance from the junction-point of the tracks 1 and 2. Said signal-box is of rectangular configuration and is provided on the sides, extending parallel with the track 1, with two sets of openings, one of which openings is located above the other. The lowermost openings

are provided with red glass, as indicated at 54, for the purpose of giving a danger-signal, and the uppermost openings are provided with white or clear glass, as indicated at 55, to denote that the main track is clear. The signal-box 51 is provided in its top with a pulley 61 for the cord 59 to pass over.

In the normal position of parts—that is, when the doors 4 and 5 are closed—the lantern 46 throws a white light up and down the track 1, as shown in Fig. 2, and the lantern 52 is held raised by the cord 59 to display a white light up and down the branch track 2. Should the doors be operated by a car on the main track, the door 5 in opening will slacken the cord 59 and permit the lantern 52 to fall opposite the openings covered by the red glass 54, so that it will display a danger-signal upon the branch track 2. When the door 5 is open, the red light of the lantern 46 will be thrown up and down the track 1, so as to display a danger-signal to a car approaching on the main track from an opposite direction. The change of position of the lamp 46 just described is caused solely by the opening of the door 5, the disk 45 not revolving under the movement of the door. When the car has passed through the doors and the mechanism 10 or 11 has been operated to permit the doors to close, the lantern 46 will in such closed position of the doors display a white light up and down the track 1, while the lantern 52 will be raised to display a white light up and down the branch track 2. Taking now the case of a car on the branch track 2 approaching the junction with the main track 1, as this car passes the signal-box 51, which would be displaying a white light, it would strike the trip-lever 56, thereby pulling the cord 49 and revolving the disk 45 in the door 5 to turn the lantern 46 around, so that it will throw a red light up and down the track 1. This would give notice to a car approaching the doors on the main track from either direction that a car was on the branch track near to the junction, and said car could then switch off on a side track, as usual. Located adjacent to one of the rails of the main track, a short distance beyond the junction of the tracks 1 and 2, is a trip-lever 62, similar to the trip-lever 56 and provided with a cord extending over a pulley 63, which cord is provided with a weight 64, which operates to hold the trip-lever 62 in its normal position, with its free end extended over the outer rail of the track 1. Secured to the upper end of the trip-lever 62 is a cord 65, which after passing over a pulley 66, suitably mounted adjacent to the rail, passes through a suitable guide on the post 33 and through suitable guides in the frame 6 and an eye 67 on the door 5 to the disk 45, with which it is connected. As the car which has operated the trip-lever 56 passes along the track 2 the weight 58 restores the trip-lever to its normal position. As the car passes onto the main track 1 it strikes the trip-lever 62, which pulls the cord 65 and revolves the

lantern 46 to cause the same to again display a white light up and down the main track. Thus it will be seen that with the use of the apparatus described it will be impossible for a car to pass onto a track on which another car is moving in an opposite direction or for two cars to collide at the junction of two tracks by reason of the fact that the driver of a car moving on either track and in either direction will always be informed by the signals as to whether or not the track or tracks are clear.

In practice at the junction-point of two tracks in the shafts of a mine it is common to station a boy with a signal-lantern, who warns the drivers approaching the junction-point from opposite directions or from a branch track of the approach of another car. My apparatus will dispense with the services of such an attendant, as both the doors and the signals will be automatically operated by the car itself.

As indicated in the drawings, modifications of certain parts of the apparatus above described may be adopted, and I will now describe the modifications illustrated by Figs. 8, 9, and 10.

Referring to Fig. 8, which illustrates a modification of the signal apparatus shown in Fig. 7, I mount upon the post 53 a revoluble disk 68, having secured upon its upper side a signal-lantern 46, such as is mounted upon the disk on the door 5, and having on opposite sides colored lights for displaying a danger-signal and plain glass for displaying a safety-signal, respectively. The cord 59 is secured to the periphery of this disk and is normally partly wound about the same, so that when the doors 4 and 5 are opened the pull on the cord 59 will operate to revolve the disk 68, and thereby the lantern 46, to cause it to display a danger-signal along the branch track. Supported on the post 53 is the pulley 69, and a cord 70 passes over said pulley and has one end secured to the disk 68 at a point opposite that at which the cord 59 is secured to said disk, and the other end of the cord 70 is provided with weights 71. The purpose of the weighted cord 70 is to return the lantern to its normal position when the doors are closed by revolving the disk 68 in a direction opposite that in which it was revolved by the pull on the cord 59.

Referring to Fig. 9, which, as stated, illustrates a modification of the manner of causing the door to operate simultaneously, the numeral 72 indicates a rod resting on the upper side of the door-frame 6 and having at opposite ends short lengths of chain 73, which chains are wound about the pivot-posts 7 of the doors in opposite directions, so that when the door 5 is opened the chain 73 will be wound about its pivot-post 7, thereby unwinding the opposite chain 73 from about the pivot-post 7 of the door 5 and causing said door to open simultaneously with the door 5. The reverse operation occurs when the door 5 is

permitted to close under the action of the spring controlling the doors.

In Fig. 10 is illustrated a modification of the latch mechanism, which may be used in place of the wedge-block 28 or in connection therewith. In this figure the numeral 74 indicates a rectangular latch pivotally mounted at 75 below the lower edge of the door 5, to one end of which latch is secured the cable 31 and to the other end thereof the cable 35. Upon the pivot-post 7 of the door 5 is formed a lug 76, with which the latch 74 is automatically brought into engagement by means of a coil-spring 77, secured to said latch, the engagement of the latch 74 with the lug 76 operating to hold the door open, as will be understood. The latch is moved out of engagement with the lug 76 by means of the cables 31 and 35 in the same manner as described with reference to the wedge-block 28.

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

1. In a mine-door-operating and signal system, in combination with a main and a branch track, a pair of swinging spring-controlled doors mounted to work in unison and closing across the rails of the main track, mechanism located on opposite sides of the door and operatively connected therewith and adapted to be actuated in turn by a car approaching the doors in either direction to open the latter and then permit them to close, a signal apparatus on the branch track, a cord connected at one end with said signal apparatus and at its other end with one of said doors, whereby the signal on the branch track will be actuated by the movement of said doors, a signal-lantern mounted adjacent to an aperture in one of said doors, a trip-lever mounted adjacent to one of the rails of said branch track, and a cord connecting said trip-lever and said signal-lantern whereby a car on the branch track approaching the main track will strike said trip-lever and actuate the signal-lantern on said door, substantially as described.

2. In a mine-door-operating and signal system, in combination with a main and a branch track, of a pair of swinging, spring-controlled doors mounted to work in unison and closing across the rails of the main track, mechanism located on opposite sides of the door and operatively connected therewith and adapted to be actuated in turn by a car approaching the doors in either direction to open the latter and then permit them to close, a signal-post located near the branch track, a disk revolubly mounted on said post, a signal-lantern mounted on said disk to turn therewith, a cord connected to one side of said disk and being connected with one of said doors whereby said disk will be turned upon the opening of the doors to cause the lantern to display a danger-signal along the branch track and a weighted cord also secured to said disk for returning it to its normal position to cause the lantern to display a safety-signal on the branch track

when the doors are closed, substantially as described.

3. In a mine-door-operating and signal system, in combination with a main and a branch track, a pair of swinging spring-controlled doors mounted to work in unison and closing across the rails of the main track, mechanism located on opposite sides of the doors and operatively connected therewith and adapted to be actuated in turn by a car approaching the doors in either direction to open the latter and then permit them to close, a signal-lantern mounted adjacent to an aperture in one of said doors, a trip-lever mounted adjacent to a rail of said branch track, a cord connected at one end to said trip-lever and at its other end operatively connected with said signal-lantern, a trip-lever mounted adjacent to a rail of the main track beyond the point of junction therewith of the branch track, and a cord connected at one end with said trip-lever and at its other end operatively connected with said signal-lantern, whereby a car on the branch track approaching the main track will actuate the first of said trip-levers to turn said lantern and display a danger-signal upon the main track and after passing onto the main track will actuate the second of said trip-levers to turn the lantern to display a safety-signal upon the main track, substantially as described.

4. In a mine-door-operating and signal system, the combination with a main and a branch track, of a pair of swinging, spring-controlled doors mounted to work in unison and closing across the rails of the main track, mechanism located on opposite sides of the door and operatively connected therewith and adapted to be actuated in turn by a car approaching the doors in either direction to open the latter and then permit them to close, a disk revolubly mounted adjacent to an aperture in one of said doors, a signal-lantern secured upon said disk and in a position normally to throw a safety-signal along the main track and when said doors are open to throw a danger-signal along the main track, a trip-lever mounted adjacent to a rail of the branch track, a cord secured to said trip-lever at one end and at its other end to one side of said disk, a trip-lever mounted adjacent to a rail of the main track beyond the point of junction therewith of said branch track, a cord connected to said trip-lever at one end and at its other end to the opposite side of said disk whereby a car on the branch track approaching the main track will actuate the first of said trip-levers and cause the disk to revolve and the lantern to display a danger-signal along the main track and after passing onto the main track will actuate the second of said trip-levers to revolve the disk in the opposite direction and return the lantern to its normal position, substantially as described.

5. In a mine-door-operating and signal system, the combination with a main and a branch track, of a pair of swinging, spring-

controlled doors mounted to work in unison
and closing across the rails of the main track,
mechanism, as described, for operating said
doors, a signal apparatus located on the
5 branch track, and operatively connected with
one of said doors to be actuated by the move-
ment thereof, a signal-lantern mounted adja-
cent to an aperture in one of said doors, a
trip-lever mounted adjacent to a rail of said
10 branch track, and a cord connected with said
trip-lever at one end and at its other end op-
eratively connected with said lantern, where-
by a car on the main track actuating said.

doors will display an appropriate danger-sig-
nal on the branch track, and a car on the 15
branch track approaching the main track will
engage said trip-lever to cause said signal-
lantern to display a danger-signal on the main
track, substantially as described.

In testimony whereof I have hereunto set 20
my hand in presence of two subscribing wit-
nesses.

JOHN BURNS.

Witnesses:

DAVID C. BARKER,
HYWEL DAVIES.