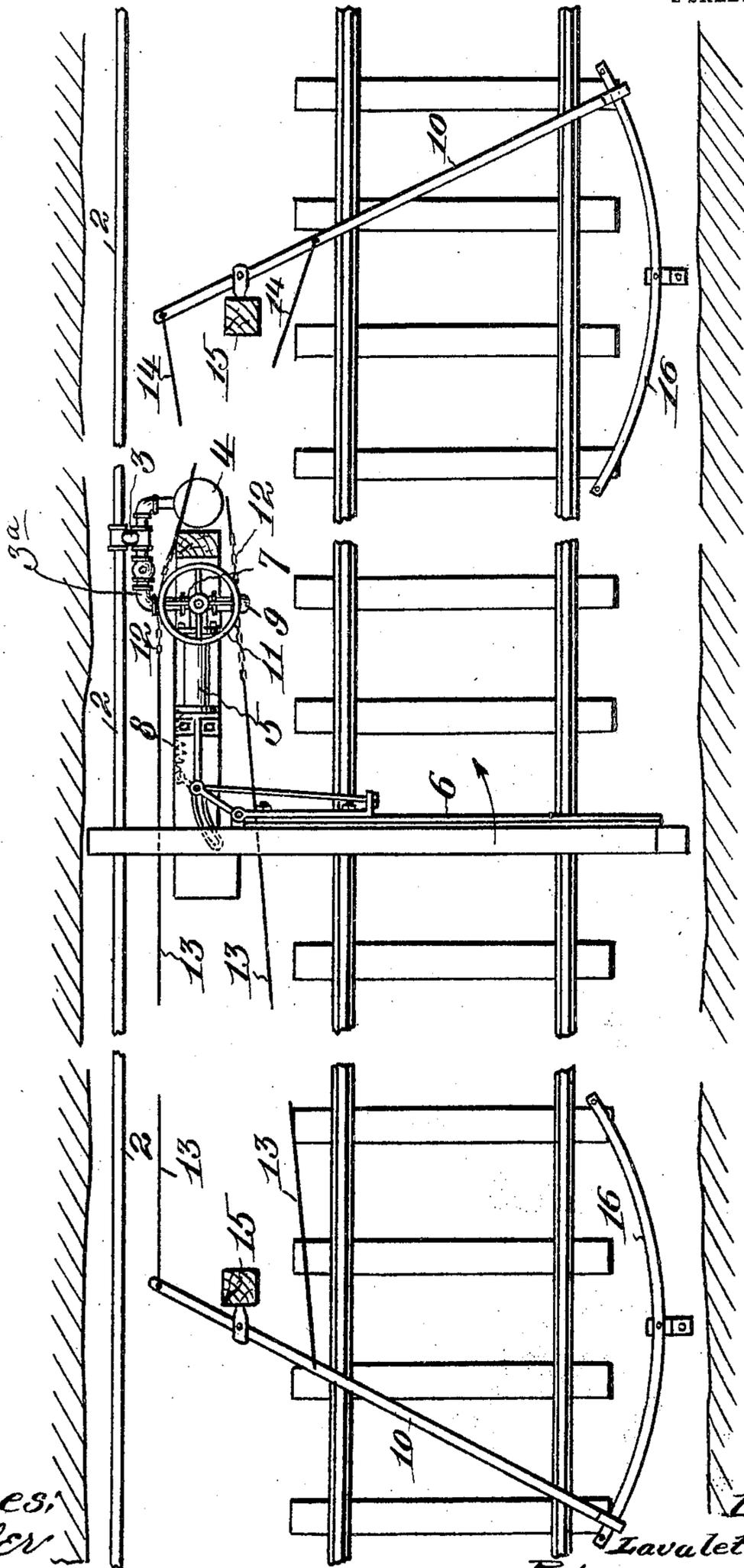


L. L. LOGAN.
MINE DOOR.

APPLICATION FILED APR. 29, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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MINE-DOOR.

No. 798,518.

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To all whom it may concern:

Be it known that I, LAVALETTE L. LOGAN, a citizen of the United States, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented new and useful Improvements in Mine-Doors, of which the following is a specification.

This invention relates to mine-doors.

In a contemporaneously-pending application filed December 15, 1904, serially numbered 237,043, I disclose hydraulic door-operating means of an advantageous character. The present invention contains certain additional features of utility, as will hereinafter more particularly appear.

In the drawings accompanying and forming a part of this specification I have illustrated a simple form of embodiment including my invention, which, to enable those skilled in the art to practice the same, I will describe in detail in the following description, while the novelty thereof will be included in the claims succeeding said description.

Referring to the drawings, Figure 1 is a top plan view of a mine-door and its associated parts involving my invention, the door mechanism being shown in a mine and the latter being in cross-section. Fig. 2 is a sectional side elevation of the parts represented in the preceding figure.

In the drawings I have shown a water-main 2, which is carried through the different parts of a mine and which may be supplied with water at a suitable pressure from a conveniently-located supply-tank. (Not shown.) Leading from the main pipe 2 to the respective doors are auxiliary pipes. In the drawings I have shown only one door, and it follows, therefore, that only one auxiliary pipe, as 3, is illustrated. The auxiliary pipe is of greater proportionate capacity than the main pipe 2; but through the intervention of an accumulator I am enabled to apply to the water in the auxiliary pipe a pressure substantially the same as that of the water in the main pipe.

Communicating with the auxiliary pipe 3 is a casing 4, shown as of cylindrical form and as vertically disposed. This casing or cylinder receives water from the auxiliary pipe 3 and in turn supplies the same by a branch 3^a to hydraulic door-actuating means, which may comprise a cylinder, as 5, and its piston, the latter being operatively connected with the door 6, which is arranged to be opened in the direction indicated by the ar-

row in Fig. 1. The lower end of the pipe 3, it will be seen by referring to dotted lines in Fig. 2, opens into the lower end of the cylinder 4, the branch 3^a of said pipe extending laterally therefrom between its ends. The flow of water from the auxiliary pipe 3 to the cylinder 5 is controlled by a valve, as 7, of some familiar three-way type in the branch 3^a of said auxiliary pipe 3. The valve 7 is normally closed, the same applying to the door 6. In stating that the valve is closed I mean that it cuts off communication between the auxiliary pipe 3 and cylinder 5. Upon the flow of water through the pipe 2 such water will pass therefrom and into the pipe 3 and from the latter into the cylindrical casing 4. The water will rise in said casing until it compresses the air above it to a pressure equal to the head of the water, at which instant the further flow of water into the cylinder or casing 4 will be interrupted. It will therefore be understood that normally the casing contains a body of water and compressed air. When the valve 7 is opened, the compressed air in the casing 4 will expel the water therefrom and in a large volume into the cylinder 5 by way of the pipe 3 for operating the piston in said cylinder in a direction to swing the door 6 open in opposition to the spring 8. The door may be hinged or otherwise suitably mounted.

Connected with the casing of the valve 7 is a vent or discharge pipe 9, which when the valve is in its normal position will be in communication with the cylinder 5. When the valve is opened to put the auxiliary pipe 3 in communication with the cylinder 5, the discharge-pipe 9 will be cut off from said cylinder. When, however, the valve is again closed to permit the shutting of the door, the discharge-pipe 9 will be put into communication with the cylinder 5, thereby freeing the piston in said cylinder, so that the piston can be returned to its primary position through the intervention of the spring 8 in closing the door. The water in the cylinder 5 is expelled backwardly therefrom and caused to flow into and then through the discharge-pipe 9.

I have described in brief certain features common to the invention covered by the application hereinbefore referred to and also forming part of the present invention.

In certain prior mine-door-operating mechanisms the doors are operated from mechanism acted upon by moving cars. By the mechanism described I do not impart to any of the

working parts a sudden blow or shock, as is sometimes the case with the prior mechanisms just alluded to. I provide for the opening of the door from either side thereof by means
 5 arranged above the tracks or overhead. The means for effecting the opening of each door includes two levers, each designated by 10, as they are of duplicate construction and arranged at opposite sides of the door 6. The
 10 levers are so mounted and related that they always move in the direction the cars travel in passing toward and through a door, and I prefer to have them at such a height that the driver of a car or the motorman can readily
 15 reach overhead and place his hand against either of them to move it toward the door and simultaneously to move the opposite lever also toward the door.

The stem of the valve 7 is extended vertically upward for some distance and is provided at its upper end with a wheel 11 in horizontal alinement, or practically so, with the two hand-levers 10. The wheel 11 is provided with superposed grooves in which are placed
 25 chains or their equivalents, as 12, connected at their free ends with what might be considered the inner ends of wires 13 and 14. I have applied different characters to the wires, for the reason that the wires on the right, or
 30 those designated by 14 in Fig. 1, are crossed, so as to give the motion hereinbefore described to the levers. Normally the parts will occupy the positions represented in the drawings, the valve 7 and the door 6 being closed. It will
 35 be assumed (see particularly Fig. 1) that a car or train is traveling from the left toward the right, or toward the door 6 in said Fig. 1, and that a motorman or driver in charge of the car or train desires to pass through the
 40 door. When he reaches the hand-lever 10 on the left, he will swing it toward the door, thereby, through the wires 13 and wheel 11, opening the valve 7, so that water can flow from the accumulator-casing 4 to the cylinder 5 in the manner hereinbefore described to bring about the opening of the door, so that the car or train can pass said door. As the
 45 lever 10 on the right was swung toward the door the other lever 10 was also moved toward the door, so that when the motorman reaches the lever on the right he can swing it away from the door to move the valve 7, through the described connections, to its closed position, the piston in the cylinder 5 being
 50 released and the same applying with respect to the door, whereby the latter can be at once shut by the spring 8. Each lever is fulcrumed between its ends at one side of the track, as shown in the drawings, and the wires 13 and
 55 14—there being, as understood, two in each case—are connected to the respective levers at equal distances from the two fulcrums. As a support for the levers I show posts or uprights, as 15, which may be provided with

brackets or other suitable bearings, which 65 directly sustain the levers.

Supported by hangers suspended from the ceiling of the mine-chamber, at opposite sides of the door, are the segmental strips 16, each of which is adapted to support a lever as the
 70 same is swung toward and from the door. These segmental strips 16 are located near the track along which the cars travel and are upon the side of the track opposite the posts 15.

In describing the parts 13 and 14 as wires 75 and the parts 12 as chains I do this simply for convenience for the parts so designated need not necessarily be of wire form nor need they consist of chains in each case. As a matter of fact, the wires and chains constitute suitable connecting devices between the
 80 levers and the wheel for operating the latter from either lever and for also shifting either lever by the power of the other to effect in sequence the opening and closing of the door. 85

The organization hereinbefore described is of particular advantage where many roads branch off close to a door, for only the driver or motorman who wishes to pass through said
 90 door need manipulate a lever in advance thereof in order to open it. In such cases there is frequently not room at either side of a door for automatic mechanism which cars strike to operate a controlling-valve, such as 7. The
 95 space on one side of a door from thirty to forty feet may be common to several roads, and with mechanism operable from a car any car might come close enough to said door to open it, whether it was intended for said car to pass through the door or not. By the construction described the difficulty just mentioned is obviated and in a simple, effective, and feasible manner. 100

In the auxiliary pipe 3 between the main 2 and the accumulator-casing 4 I may arrange
 105 a check-valve, as 17, so that in case the main is broken the water in the accumulator cannot escape, but will be retained therein in order to open a door with which it is directly associated when occasion is required. This
 110 is important, for in case the main be broken a door may be operated by stored energy until the main is repaired.

Having thus described my invention, what I claim is— 115

1. The combination of a door, a main water-pipe, an auxiliary water-pipe, a pressure-accumulator in communication with the auxiliary water-pipe, hydraulic door-opening means in communication with the accumulator, a valve for controlling the flow of water from the accumulator to the hydraulic door-actuating means and normally closed to cut off communication between the two, and operatively-connected overhead hand-levers each
 120 connected with the valve for opening the same and each arranged to move toward the door when the valve is opened. 125

2. The combination of a door, a main water-pipe, an auxiliary water-pipe, a pressure-accumulator in communication with the auxiliary water-pipe, hydraulic door-opening means in communication with the accumulator, a valve for controlling the flow of water from the accumulator to the hydraulic door-actuating means and normally closed to cut off communication between the two, the valve having an upwardly-extended stem provided with a hand-wheel, levers at opposite sides of the door and connecting means between the levers, arranged to cause the opening of the valve by either lever when the latter is moved toward the door.

3. The combination of a door, a main water-pipe, an auxiliary water-pipe, means for opening the door, arranged for operation by water flowing from the auxiliary pipe, means independent of the main pipe for automatically applying a pressure to the water flowing through the auxiliary pipe, a valve between the door-opening means and the pressure-applying means, and hand-levers arranged at opposite sides of the door, said levers being operatively connected with each other and with the valve, and each being arranged to open the valve as it moves toward the door and also to move the other lever toward said door.

4. The combination of a door, a main water-pipe, an auxiliary water-pipe, means for opening the door, arranged for operation by water flowing from the auxiliary pipe, means independent of the main pipe for automatically applying a pressure to the water flowing through the auxiliary pipe, a valve between the door-opening means and the pressure-applying means, having an extended stem provided with a hand-wheel, chains around the hand-wheel, levers arranged at opposite sides of the door, crossed wires connected with one lever at opposite sides of its fulcrum and also with one chain, and straight wires extending between the other chain and the other lever, each lever being arranged to move toward the door to move the other lever also toward the door and to also open the valve.

5. The combination of a door, a main water-pipe, an auxiliary water-pipe, means for opening the door, arranged for operation by water flowing from the auxiliary pipe, means independent of the main pipe for automatically applying a pressure to the water flowing through the auxiliary pipe, a valve between the door-opening means and the pressure-applying means, having an extended stem provided with a hand-wheel, chains around the hand-wheel, levers arranged at opposite sides of the door, crossed wires connected with one lever at opposite sides of its fulcrum and also with one chain, straight wires extending between the other chain and the other lever, each lever being arranged to move toward the door to move the other lever also toward the door and to also open the valve, and supports upon which the free portions of the levers rest, as they travel back and forth.

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

LAVALETTE L. LOGAN.

Witnesses:

R. W. ILLINGWORTH,
D. G. LOGAN.