(No Model.) 2 Sheets—Sheet 1.

# L. S. MINERD.

## MINE DOOR.

No. 551,780. Patented Dec. 24, 1895.

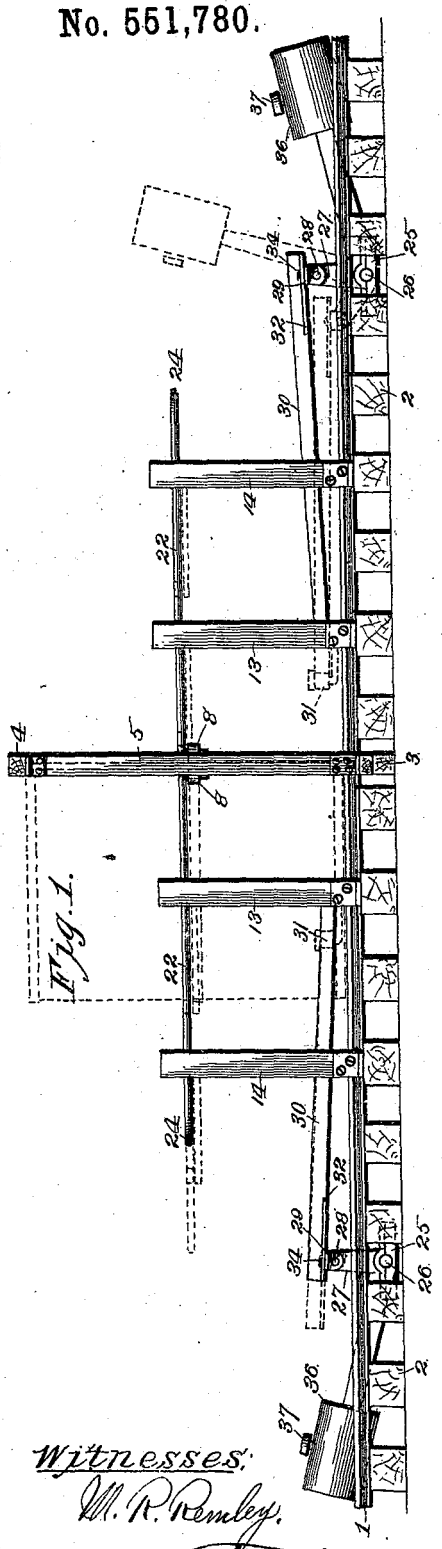

Fig. 1.

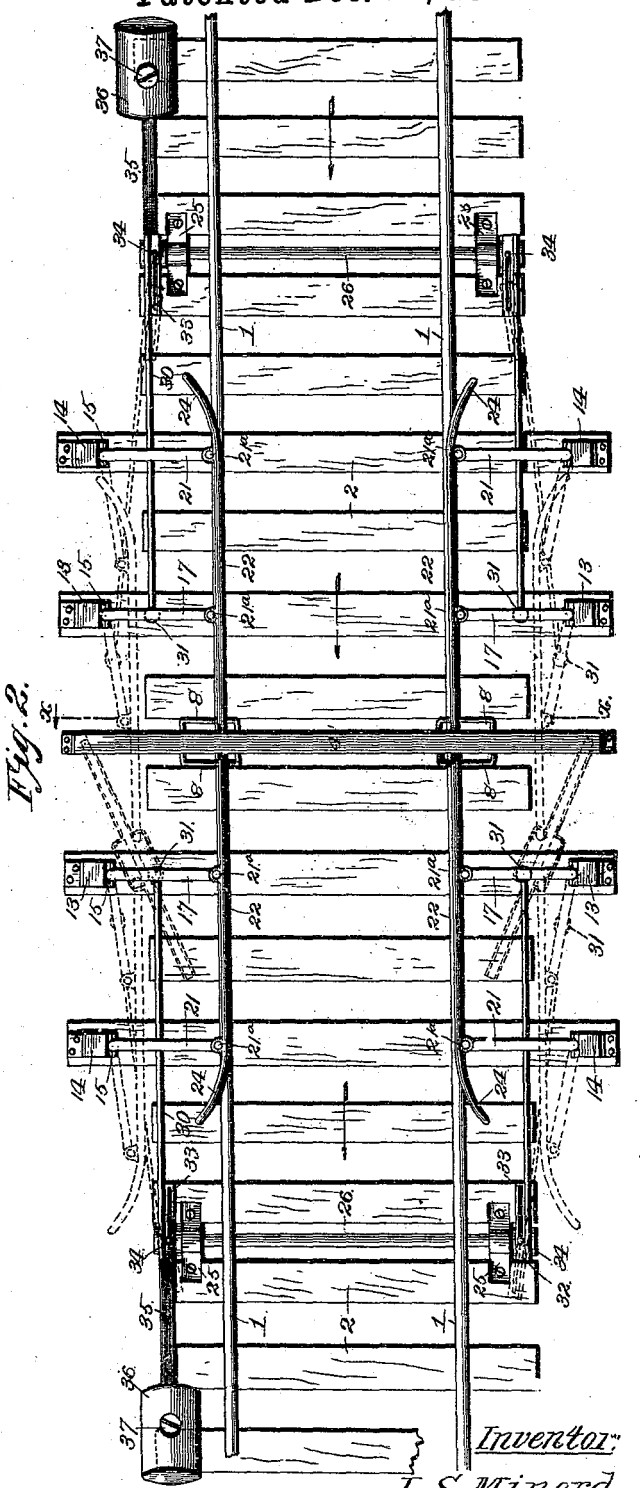

Fig. 2.

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G. L. Thorpe.

Inventor:
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Attys.

(No Model.)

2 Sheets—Sheet 2.

# L. S. MINERD.

## MINE DOOR.

No. 551,780. Patented Dec. 24, 1895.

Fig. 3.

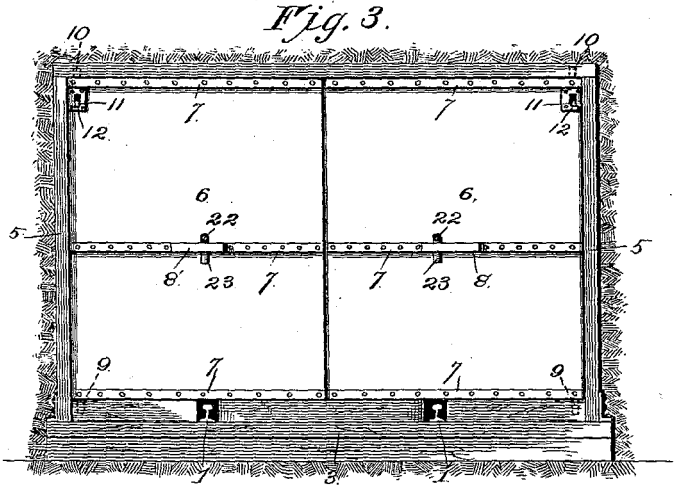


Fig. 4.

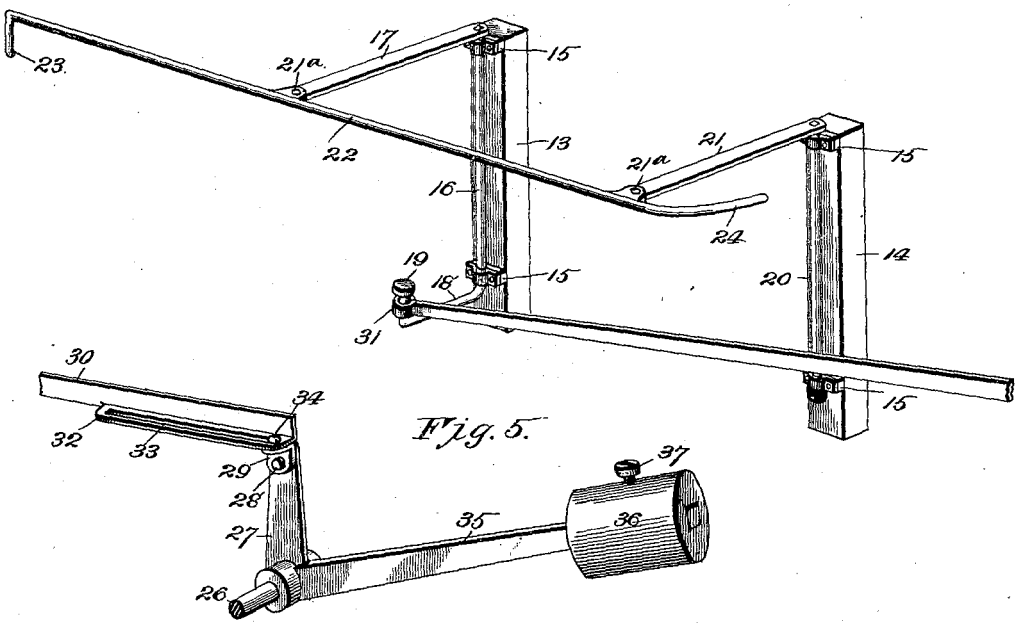


Fig. 5.




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# UNITED STATES PATENT OFFICE.

LEVI SPRINGER MINERD, OF MINDEN MINES, MISSOURI.

## MINE-DOOR.

SPECIFICATION forming part of Letters Patent No. 551,780, dated December 24, 1895.

Application filed March 14, 1895. Serial No. 541,829. (No model.)

*To all whom it may concern:*

Be it known that I, LEVI SPRINGER MINERD, of Minden Mines, Barton county, Missouri, have invented certain new and useful Improvements in Mine-Doors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to mine-doors, and more particularly to doors which open both toward and from the operator.

The object of my invention is to produce mine-doors which are normally held closed by a yielding pressure, so that while currents of air are successfully intercepted, cut off, or confined to their proper sphere, yet at the same time the doors will be closed automatically after the passage of a car or after the force of an explosion is spent, and will also open independently of each other.

A further object is to produce doors of the character referred to, which are simple, strong, durable, and inexpensive of construction.

With these objects in view the invention consists in certain novel and peculiar features of construction and combinations of parts, as hereinafter described and claimed.

In order that the invention may be fully understood, reference is to be had to the accompanying drawings, in which—

Figure 1 represents in side view a portion of a subterranean railway-track for coal-cars, and shows the passage in which the said track is located divided or intercepted by swinging doors embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical cross-section of the same on the line $x\,x$ of Fig. 2. Figs. 4 and 5 are detail perspective views, enlarged, of portions of the door-operating mechanism.

In the said drawings, 1 designates the track-rails mounted upon cross-ties 2, as shown, or in any other suitable or preferred manner. Extending transversely of the subterranean passage in which said door is located are the bottom and top sills 3 and 4, respectively, of a door-frame, the bottom sill being located below said track and the top sill snugly against the top wall of the said passage. These sills, at their opposite ends, are connected by vertical or side sills 5, which also fit snugly against the side walls of the passage, as shown clearly in Fig. 3. Arranged so as entirely to close the space within said frame are the doors 6, of wood, preferably, and strengthened at each side by the transversely-extending metallic straps 7, of which there may be any desired number. The middle straps 7 at opposite sides of the door are preferably bent to form the elongated openings or slots 8, the object of which is hereinafter explained. These doors are pivotally mounted or hinged at their outer corners contiguous to the side sills 5, at their lower ends by pins 9 which enter depressions in the bottom sill 3, and at their upper ends by the pins 10, entering cavities in the top sill 4. The upper pin of each hinge is preferably secured in place by means of the key 11, which is driven into a slot in the door, and, engaging the lower end of the pin 10, forces the same vertically upward until it enters the cavity in the top sill 4, though it is to be understood that I may hinge the doors in any other suitable or preferred manner. The pivot-cavities in the top sill will be preferably bushed or lined with iron, while at the lower end the pivot-pins 9 preferably extend through holes in the wear-plate fastened to the bottom sill.

Located vertically upon cross-ties, or in any other suitable manner, at opposite sides and a suitable distance from the hinge-point of each door is a standard 13, and arranged outward and a suitable distance from said standards are the similar standards 14. Mounted to swing laterally in bearings 15, secured near the upper and lower ends of the standards 13, are cranes consisting of the vertical portion 16, and the transversely-extending arms 17 and 18 at the upper and lower ends, respectively, of the portion 16. The arms 18 are considerably shorter than the arms 17, and terminate in upwardly-projecting headed pins 19. Swinging cranes are also carried by the posts 14, and comprise the vertical rods 20 mounted in bearings 15, and the transversely-project-

ing arms 21 at their upper ends. The arms 17 and 21 of the cranes carried by the posts at the same side of the track and of the door are connected pivotally at $21^a$ to the longitudinally-extending rods 22, terminating at their inner ends in downwardly-disposed hooks 23, engaging loosely the elongated openings or slots 8, hereinbefore referred to, and at their outer ends incurved portions, as shown at 24, so that the outer ends of each pair of rods at the opposite sides of the door diverge, as shown clearly in Fig. 2, and for a purpose hereinafter explained.

A suitable distance outward of the standards 14, boxings 25 are mounted upon crossties, as shown, or in any other suitable manner, and extending transversely of the passage and below the track are the shafts 26, which are provided at each end with the upwardly-projecting arms 27. Pivoted at 28 to said arms so as to swing in a vertical plane are the vertical arms of angle-plates 29. Pitmen 30 are loosely pivoted, as shown at 31, so as to operate laterally and also vertically to a limited extent, to the upwardly-projecting headed pins 19 of the cranes carried by the standards 13, and at their opposite ends are provided with the laterally-projecting ears 32, having longitudinal slots 33, which engage pivotally the headed pins 34 projecting upwardly from the horizontal arms of the angle-plates 29, as shown most clearly in Fig. 5. It is necessary to employ the pivoted angle-plates 29 or their equivalent in this connection, because the pitmen move longitudinally and swing laterally at the same time, as shown in dotted position, Fig. 2. Each shaft 26 is furthermore provided with a lever 35, upon which is slidingly mounted a weight 36, which may be secured at any point in its adjustment upon said lever by the set-screw 37.

From the foregoing, taken in connection with the accompanying illustration, it will be apparent that the doors are normally held closed by either or both of the weights 36, and that air-currents in the mine are therefore confined to their proper sphere. When a miner or other person wishes to pass, it is necessary only to employ sufficient force against one of the doors to overcome the resistance offered by and raise one of the weights 36. When a coal-car is propelled by miners along the track it comes in contact with the diverging ends of the rods 22 at the corresponding side of the door, and forces them, with the doors, and also the rods at the opposite sides to the position shown in dotted lines, and raises only the weight which is located in the portion of the passage from which the car emerges. When the car has passed beyond the diverging ends of the rods at the opposite side of the doors, said weight immediately descends and returns the doors and their operative parts to their original position, thus obviating the waste of a large amount of air by holding the doors open until the cars approach and pass through. It will be apparent that the "off-side" weight will not be operated, because of the longitudinal slots 33 in the contiguous pitmen 30, which permit said pitmen to slide inoperatively upon pivots 34. If on a grade a train of cars should run away, as frequently happens, the doors will open to accommodate their passage and then automatically close, and thus prevent the great waste of air from the mine which always takes place when doors of the ordinary construction are torn from their fastenings by run-away trains. Also, in the case of an explosion, the shock will force all the doors open in unison without injuring them, and as soon as the force or disturbance is spent the weights will move back to their normal position and close all the doors, thus intercepting the passage and confining the air-currents to their proper sphere. It will be understood, also, that the effects of an explosion would not be nearly so dangerous to life and property, because the doors would yield and give the gas room to expand, and the after-damp could not gather.

From the above description it will be apparent that I have produced a mine-door which is positive and reliable in operation, and is comparatively simple, durable, and inexpensive of construction.

The employment of equivalent parts in lieu of the swinging cranes and the weights for operating the same, and changes in form, proportion, and arrangement of parts will all come within the spirit and scope of my invention.

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

1. A mine door, comprising a pair of doors pivoted at their upper and lower outer corners contiguous to the side-walls of a subterranean passage of a mine, and provided with transverse slots, standards located at opposite sides of said doors contiguous also to the side-walls of said passage, cranes carried by said standards, rods pivotally connected to said cranes and provided with hooks engaging the slots of said doors, and curved at their opposite ends, so that each pair of rods at the same side of the doors will diverge from the same to afford a beveled or inclined surface, against which a coal-car is adapted to contact, shafts at opposite sides of said doors, pitmen operatively connecting said arms and said cranes, a lever also carried by each shaft, and a weight carried by each lever, substantially as set forth.

2. A mine door, comprising a pair of doors located above a subterranean track, and pivoted to swing to one side or the other and provided with transverse slots, standards located at opposite sides of said doors, swinging cranes carried by said standards, rods pivotally connected to said cranes and provided with hooks

engaging the slots of the doors, and with diverging opposite ends, rock-shafts at opposite sides of said doors, provided with crank-arms and with weighted levers, pitmen pivotally connected to said cranes and provided with longitudinal slots, angle-plates pivotally mounted upon said crank-arms, and pivot-pins projecting from said angle-plates and engaging the longitudinal slots of the pitmen, so that the pressure of one weight only has to be overcome in opening the doors, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

LEVI SPRINGER MINERD.

Witnesses:

D. F. SCHOCH,

S. L. MEEK.