

No. 676,835.

Patented June 18, 1901.

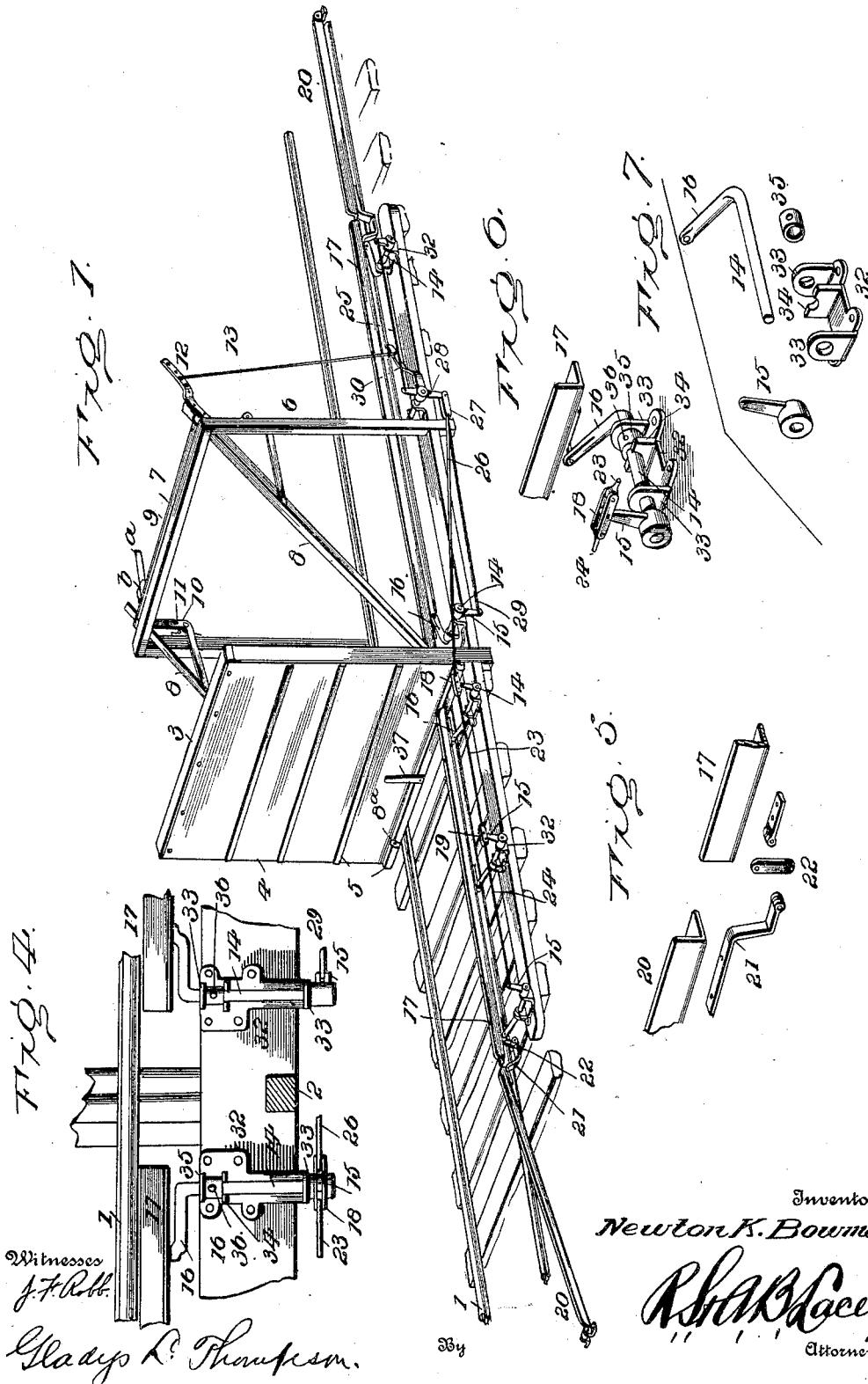
N. K. BOWMAN.

## MINE GATE.

(No Model.)

(Application filed Nov. 2, 1900.)

2 Sheets—Sheet 1.



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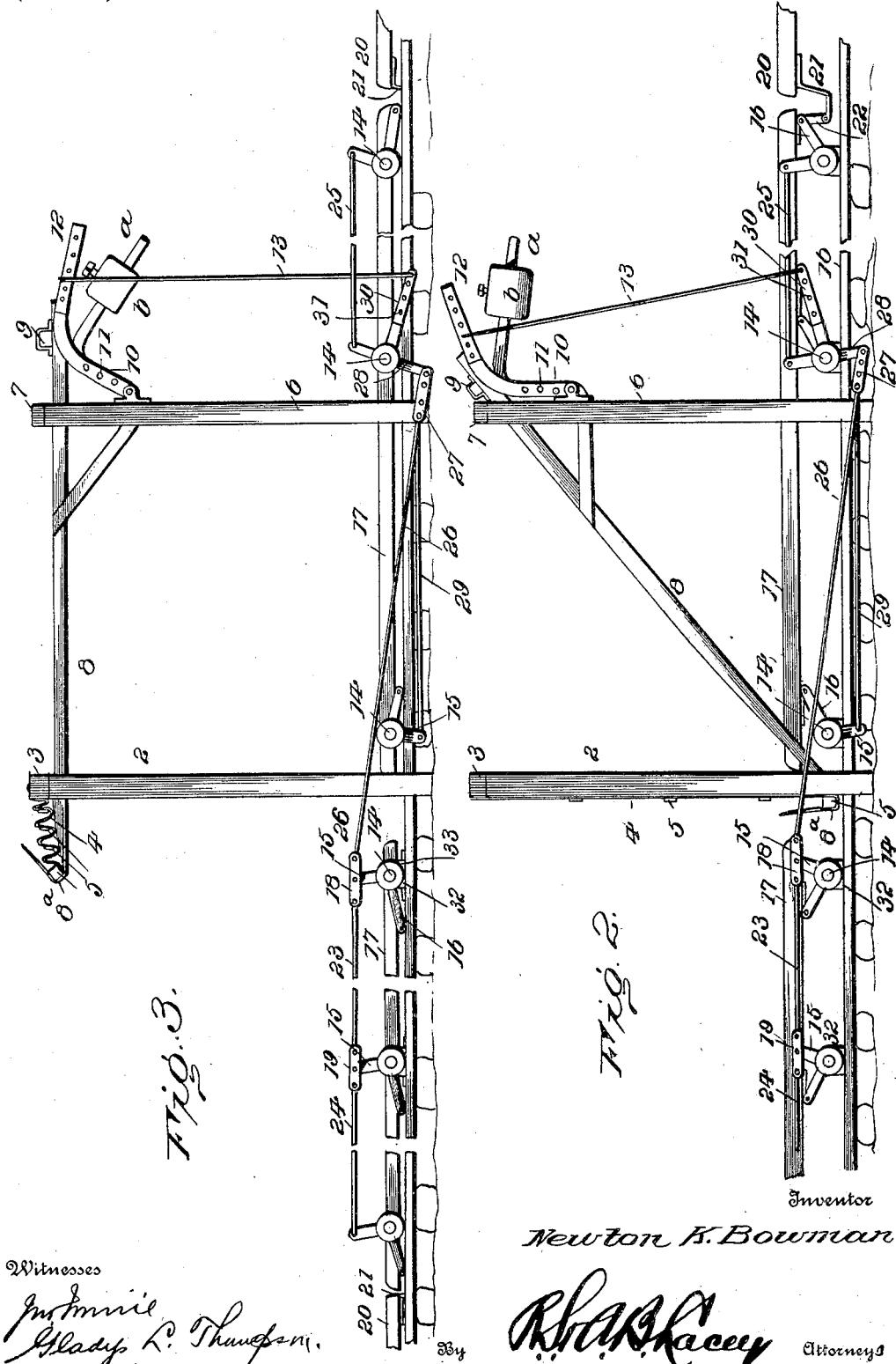
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2 Sheets—Sheet 2.



# UNITED STATES PATENT OFFICE.

NEWTON K. BOWMAN, OF NORTH LAWRENCE, OHIO.

## MINE-GATE.

SPECIFICATION forming part of Letters Patent No. 676,835, dated June 18, 1901.

Application filed November 2, 1900. Serial No. 35,280. (No model.)

To all whom it may concern:

Be it known that I, NEWTON K. BOWMAN, a citizen of the United States, residing at North Lawrence, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Mine-Gates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In gates for controlling the drafts of air in the entries, passages, and drifts of mines it is desirable to secure quick action of the gate in opening and closing—in opening to prevent the car from running against and injuring the gate and in closing so as not to appreciably interrupt the predetermined currents of air necessary to ventilate the working parts of the mine. Simplicity of construction in the gate-operating mechanism is likewise an item of vital consequence.

The gate is of the type adapted to fold upward in puckles and is attached overhead to a cross-piece and strengthened transversely by bars, slats, or the like.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and the drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a mine-gate, illustrating the application of the invention. Fig. 2 is a side elevation showing the gate closed. Fig. 3 is a view similar to Fig. 2, showing the gate open. Fig. 4 is a top plan view of the shafts adjacent to and upon opposite sides of the gate. Fig. 5 is a detail perspective view of the connections between the adjacent ends of coacting depressible rails. Fig. 6 is a perspective view of a shaft and its mounting. Fig. 7 is a perspective view of the parts shown in Fig. 6, the elements being separated and arranged in a group.

Corresponding and like parts are referred to in the following description and indicated

in all the views of the drawings by the same reference characters.

The track 1, upon which the cars (not shown) run, is of ordinary construction. The frame 55 for the gate consists of uprights 2 and a cross-piece 3. The gate 4 is flexible, being preferably a piece of textile fabric, and is attached at its upper end to the cross-piece 3 and is of a width to extend across the entry or passage 60 and overlap the uprights 2 at its edges. Bars, slats, or strips 5 are attached to the gate and stiffen it transversely and are of a length to overlap the uprights 2 at their ends.

A frame is located a short distance from 65 the gate and consists of posts 6 and a cross-bar 7. Arms 8 are pivoted to the posts 6, and their front ends are attached to the lowermost bar 5 of the gate. The arms are formed of angle-iron and taper toward their front 70 ends, which latter are bent up at 8<sup>a</sup> and receive the lowermost bar 5. A weighted bar 9 connects the rear ends of the arms and serves as a counterbalance for the gate and arms, whereby the actuation of the gate is 75 rendered comparatively easy. Elbow-brackets 10 are secured to the arms 8 and brace them and admit of their pivotal connection with the post 6 some distance below the rear ends of the arms. The vertical members of 80 the brackets 10 are formed with a series of openings 11 to admit of a variation of the pivotal connection of the arms with the posts. One of the brackets is rearwardly extended at 12 and is formed with a series of openings 85 for adjustable connection therewith of a rod 13. An arm *a* extends rearwardly from the upper end of the vertical member of the other bracket and receives a weight *b*, adjustable 90 thereon and adapted to supplement the action of the bar 9 in counterbalancing the gate and arms 8.

A series of rock-shafts 14 are located upon opposite sides of the plane of the gate and are connected for simultaneous operation, 95 the shafts upon one side of the gate rotating in an opposite direction to the shafts on the other side. Cranks 16 are formed with or applied to the inner ends of the rock-shafts 14, and the depressible bars 17 are mounted 100 thereon. Other depressible bars 20, normally inclined and pivoted at their outer ends

to a tie or plate, have depending arms 21 at their inner ends connected by links 22 with the contiguous ends of the bars 17 to allow for the relative play between the adjacent 5 ends of the bars when in operation.

Arms 15 are keyed or otherwise secured to the outer ends of the rock-shafts 14 and are connected in a manner presently to be described, so as to effect a simultaneous operation 10 of the rock-shafts. The arms 15, secured to the rock-shafts adjacent to and upon opposite sides of the gate, project in opposite directions, the one being vertical and the other pendent, whereby the rock-shafts 15 rotate in reverse directions. A link 18 is pivoted midway of its ends to the vertical arm 15, adjacent to the gate, and a corresponding link 19 is simultaneously applied to the adjacent arm of the rock-shaft belonging to the 20 same series. A wire or analogous connection 23 connects the opposing ends of the links 18 and 19, and a wire 24 connects the outer end of the link 19 with the outermost arm 15, applied to the rock-shaft of the series located 25 upon the left-hand side of the gate. A wire 25 connects the arms 15, applied to the two outer rock-shafts located to the right of the gate, and a wire 26 connects the end of the link 18 adjacent to the gate with a 30 link 27, pivotally connected to a pendent arm 28 of the rock-shaft adjacent to the post 6. A wire or analogous connection 29 joins the link 27 with the pendent arm of the rock-shaft adjacent to the gate and located upon the 35 right-hand side thereof. An arm 30 projects outward from the outer end of the rock-shaft adjacent to the post 6 and is provided with a series of openings 31 to receive the lower end of the rod 13, by means of which adjustable 40 connection is had between the rear extension 12 and the arm 30, so as to allow for variations in the assembling of the parts when installing the gate in a mine. The provision of the links 18 and 19 prevents straining of the 45 wires or connections attached thereto when the rock-shafts move in their bearings to effect an actuation of the gate.

The rock-shafts 14 are mounted alike. The bearings for the rock-shafts consist of plates 50 32, provided at their ends with vertical extensions 33 and between their ends with uprights 34, depressed in their top edges to receive the rock-shafts. The vertical extensions 33 are transversely apertured to receive the rock- 55 shafts which are journaled therein. The uprights 34 are adjacent to the inner extensions 33. Sleeves 35 are slipped upon the rock-shafts 14 and are secured thereto by means of clamp-screws 36, so as to admit of longitudinal 60 adjustment of the rock-shafts in their bearings when assembling the parts. These sleeves 35 are of a length to fit snugly in the space between the uprights 34 and the vertical extensions 33 at the inner ends of the plates 65 32, and when secured to the rock-shafts by means of the clamp-screws said rock-shafts are prevented from endwise movement or dis-

placement in their respective bearings. After the rock-shafts have been properly placed the arms 15 are secured to the outer projecting ends thereof. 70

The arms 8 normally incline downwardly from their supporting frame to the plane of the gate and are of a length to admit of its touching the uprights 2. As the arms move 75 upward at their free ends, the latter project beyond the plane of the gate, which folds thereon and is carried upward. The arms being of great length and the rod 13 being attached thereto a short distance from their 80 pivotal center, the movement of their outer ends is necessarily quick when the rock-shafts are actuated by a car entering upon and exerting a downward pressure upon the depressible rails. The current of air being against 85 the side of the gate carrying the slats, said gate is held close against the uprights 2 and is caused to fold snug upon the front ends of the arms 8.

The puckers or folds of the gate are prevented from falling over the free ends of the arms 8 when opening the gate by means of a guard 37, attached to the lowermost bar or slat 5 and projecting upward. 90

Having thus described the invention, what 95 is claimed as new is—

1. A flexible mine-gate suspended from a frame, pivoted arms extending beneath the gate for folding it upward and supporting the folds, and actuating mechanism for the pivoted arms, substantially as described. 100

2. A flexible mine-gate suspended from a frame, arms normally inclined downward toward and across the lower end of the gate and pivoted near their rear ends, and actuating 105 mechanism for the arms, substantially as specified.

3. A flexible mine-gate suspended from a frame, pivoted arms normally inclined downward toward the gate and having their free 110 ends bent upward to gather and support the folds of the gate, and actuating mechanism for the arms, substantially as set forth.

4. A flexible mine-gate suspended from above, arms pivoted near their rear ends and 115 inclining downward toward the plane of the gate and beneath its lower end to gather the same in folds, a counterbalance connecting the pivoted arms, and actuating mechanism for the arms, substantially as specified. 120

5. In a mine-gate, a frame consisting of a cross-piece and uprights, a flexible gate attached at its upper end to the cross-piece, posts located a distance from the gate, arms pivoted to the posts and inclining downwardly 125 toward the gate and attached to the lower end of the latter, a weighted bar connecting the rear ends of the arms, and operating mechanism actuated by the car for opening the gate, substantially as described. 130

6. A suspended flexible mine-gate, inclined arms extending beneath the lower end of the gate for folding it upward and gathering and supporting the folds, brackets pendent from

the arms and pivoted to posts, and actuating mechanism for the arms, substantially as described.

7. A suspended flexible mine-gate, in combination with pivoted arms attached at their free ends to its lower edge, means for imparting movement to the pivoted arms from the moving car, a cross-bar connecting the free ends of the pivoted arms, and a guard attached to said cross-bar and extended upward therefrom to prevent the folds of the gate from falling over the extremities of the pivoted arms, substantially as specified.

8. A flexible mine-gate, in combination with operating-arms therefor, brackets of ap-

proximately elbow shape secured to the rear ends of the arms, a frame on which said brackets are pivoted, counterbalancing means for the pivoted arms, depressible rails adapted to be actuated by the moving car, and connections substantially as set forth between the pivoted arms and the depressible rails, substantially as set forth.

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

NEWTON K. BOWMAN. [L. S.]

Witnesses:

WM. S. SPIDLE,

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