

No. 822,241.

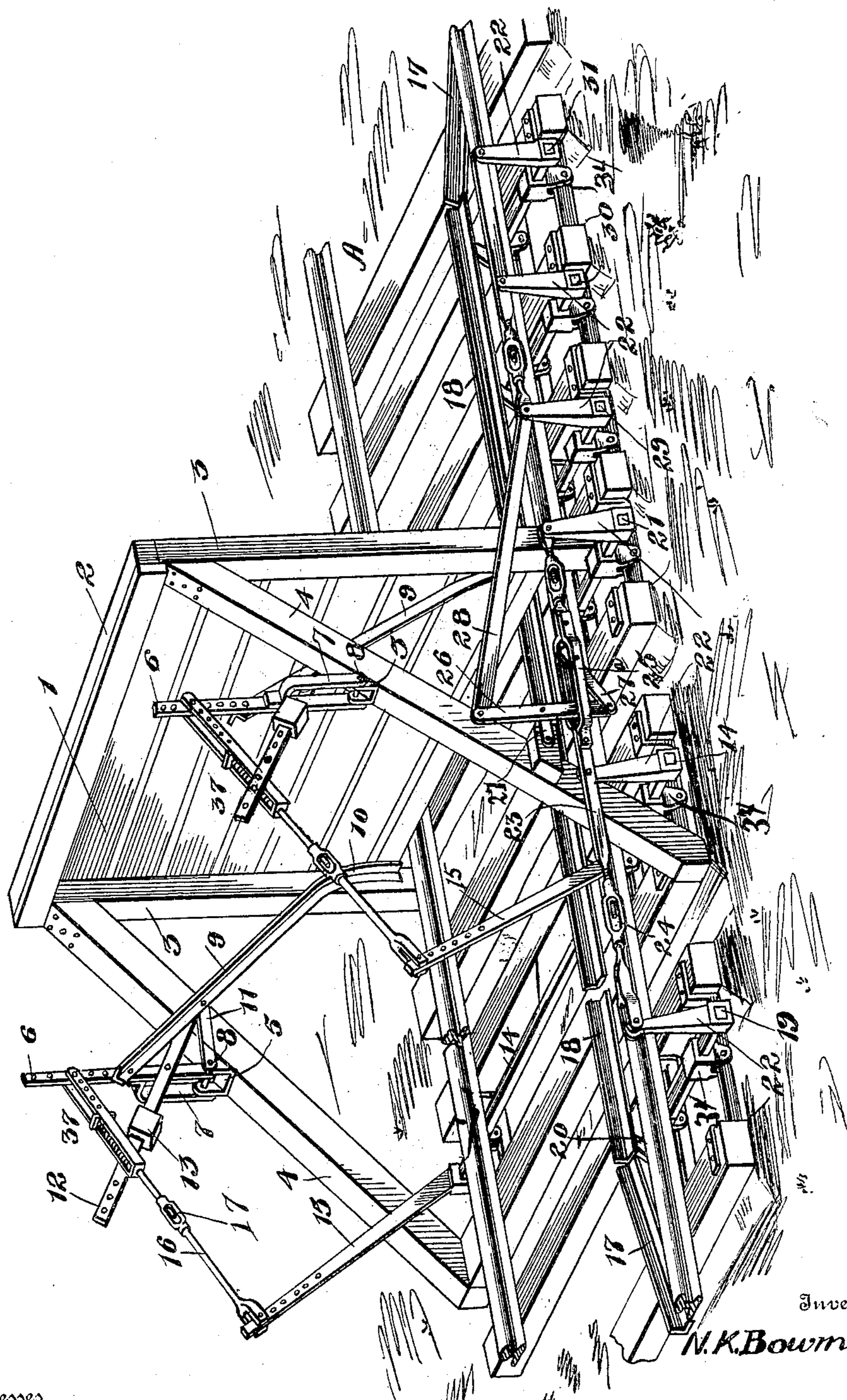
PATENTED JUNE 5, 1906.

N. K. BOWMAN.  
MINE GATE.

APPLICATION FILED JUNE 30, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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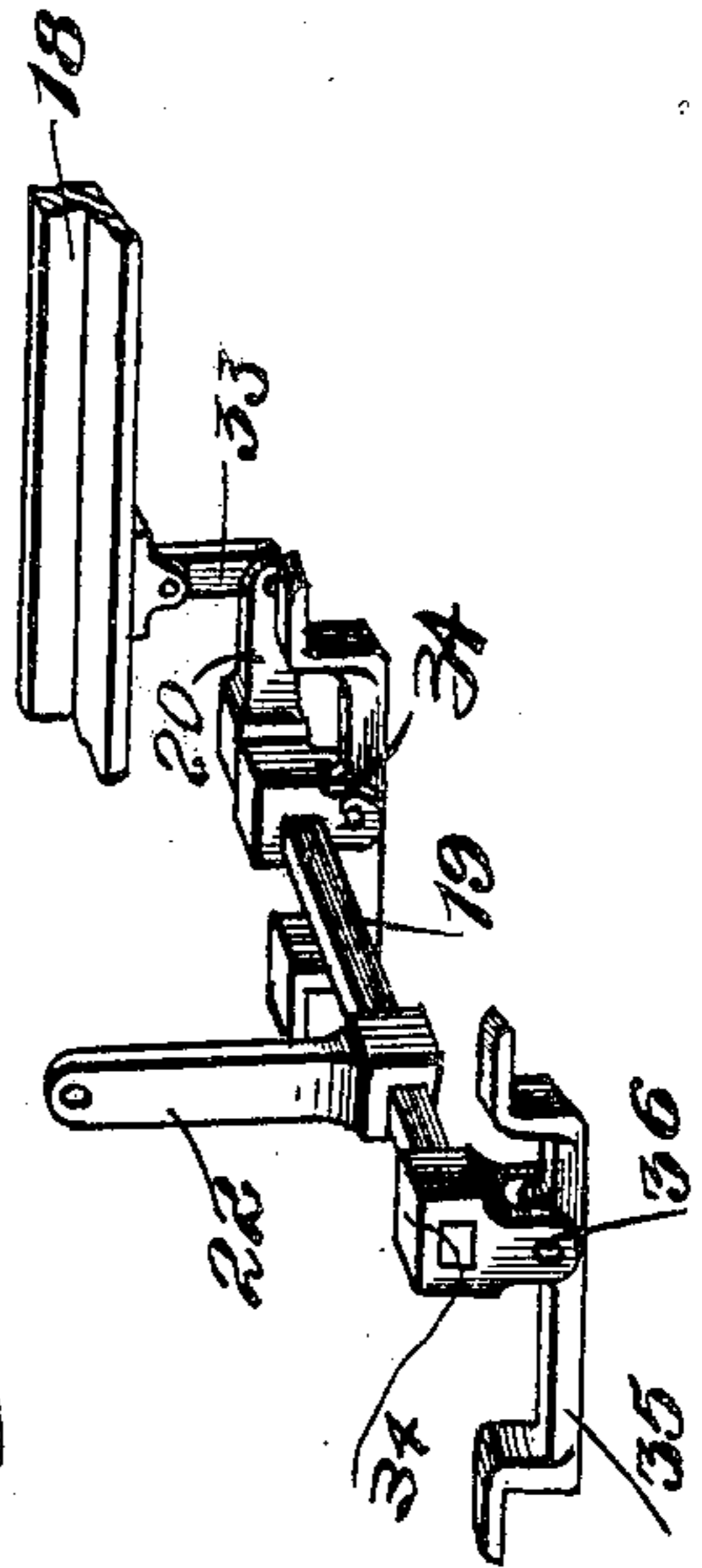
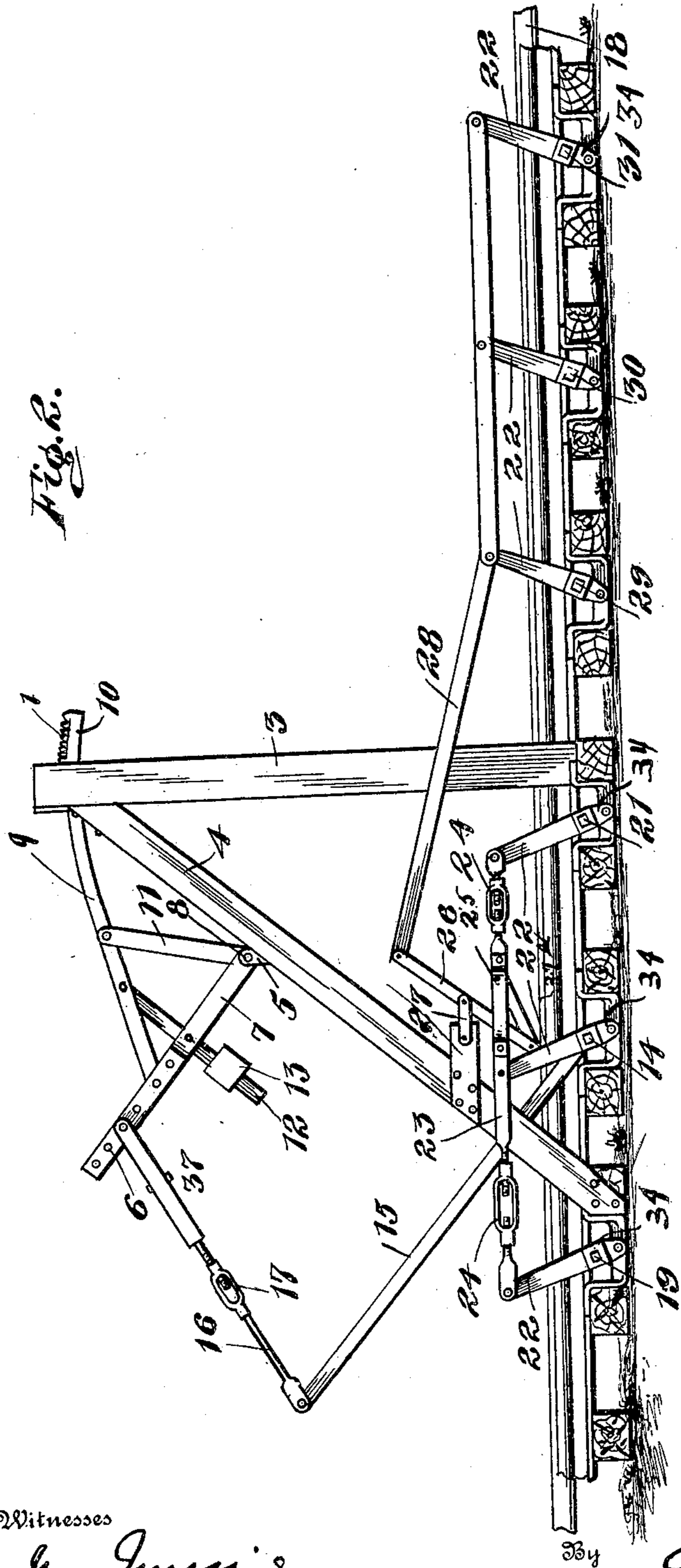
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# UNITED STATES PATENT OFFICE.

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## MINE-GATE.

No. 822,241.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed June 30, 1905. Serial No. 267,825.

*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, of which the following is a specification.

In the ventilation of mines gates of various kinds are used for controlling the currents of air. These gates are manipulated in various ways to admit of the passing and repassing of cars. Automatic appliances are replacing the boys heretofore generally utilized for this purpose, the mechanism being actuated from some moving part of the car and generally embodying rock-shafts or their equivalent means.

This invention is designed to increase the sensitiveness of the gate-operating mechanism and make the same more responsive, so as to obviate accidents that are traceable to tardy action of the gate, especially when the car is moving rapidly. As a result of the invention it is possible to locate the gate-operating mechanism in a space nearer the gate and to reduce the wearing-surfaces.

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 accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a mine-gate embodying the invention, showing the arrangement of the parts when the gate is closed. Fig. 2 is a side elevation thereof, showing the relative disposition of the parts when the gate is open. Fig. 3 is a detail perspective view of one of the movable bars and its mountings.

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 gate 1 illustrated is of the flexible type and is adapted to open upward in a series of folds, as shown most clearly in Fig. 2, and is suspended from a cross-bar 2, arranged above

the entry drift or passage in which the current of air is to be controlled. Posts 3, located at opposite sides of the track A, support the cross-bar 2 and are stayed by braces 4. The posts 3 and cross-bars 2 constitute a frame which is vertically arranged and which supports the gate or curtain.

A bracket 5 is attached to each brace 4 at a point between its ends, and a bar 6 is pivoted at its lower end thereto and is strengthened by means of a brace 7, which is secured at its upper end to the bar 6 and has its lower end connected to the same pin 8 which constitutes the pivot-support of the bar 6. An arm 9 is attached to each of the bars 6 at one end, and its opposite end 10 is curved and is attached to the lower portion of the gate or curtain 1 in a way to insure proper opening and closing of the gate in the operation of the invention. A brace 11 connects the pivot-fastening 8 with the arm 9. An arm 12 is connected to each of the arms 9 and to the bar 6 and is provided with a weight 13 for counterbalancing the gate or curtain 1, the weight 13 being adjustable, so as to admit of varying the effective force of the counterbalance to meet any conditions that may arise. A bar 14 is located some distance from the gate or curtain and extends beneath the rails of the track A and is provided at each end with an arm 15, which is coupled by connection 16 to a corresponding bar 6. The connection 16 is extensible and comprises sections or parts which are connected by means of a turnbuckle 17. In addition to the connection 16 being extensible it likewise has independent adjustable connection with the arm 15 and with the bar 6, thereby making provision for adapting the connections to meet any requirements of location when installing the gate or allowing for wear after the same has been in use for any length of time.

A yielding connection is interposed between the parts 6 and 16 to relieve the operating mechanism of strain in the event of the gate being suddenly thrown open by a rapidly-moving car, and this connection also provides compensating means for imperfect adjustment of the depressible rails or angle-bars 17 and 18, upon which the car-wheels travel. This yielding connection is shown at 37 and consists of a yoke, a slide, and a spring, the latter being mounted upon a section of the connection 16 and confined between said

slide and the outer closed end of the yoke, through which the connection 16 is adapted to play freely.

Depressible rails 17 and 18 are located at each side of the gate, so as to be actuated by means of an approaching car, so as to insure opening of the gate in advance of the car reaching the same. Suitable connecting means are interposed between the respective sets of depressible rails and the bar 14 to effect operation of the latter upon advance of the car from either approach. The following means have been devised for effecting this end: A bar 19 is arranged some distance from the bar 14 and parallel therewith and is provided at its inner end with a crank-arm 20, suitably connected with an end portion of a rail 18. A second bar 21 is mounted like the bars 14 and 19 and is arranged close to the plane of the gate. Each of the bars 14, 19, and 21 is provided at its outer end with a crank-arm 22, said crank-arms being in series by means of a rod or bar 23, composed of sections adjustably connected by turnbuckles 24, the latter being arranged between adjacent crank-arms 22 to admit of varying the effective length of the part of the bar connecting adjacent crank-arms. A loop 25 is formed in the length of the connecting-bar 23 and is located in the part thereof connecting the crank-arms of the bars 14 and 21. A lever 26 is fulcrumed to a swinging link 27, pivoted to a block attached to the bars 4, adjacent to the gate-operating means. This lever is connected at its lower ends to the members of the loop 25 by means of the link 27<sup>a</sup>, the latter being pivoted at one end to the lever 26 and at its opposite end to the members of the bar 23 comprising the loop 25. A link 28 connects the upper end of the lever 26 with a crank-arm 22, attached to a bar 29, located upon the opposite side of the gate from the parallel bars provided with the other crank-arms 22. Other bars 30 and 31 are located at different distances from the gate upon the same side of the bar 29, and each is provided with a crank-arm 22, said crank-arms being connected in series by means of a bar 32. It is to be understood that each of the bars 19, 21, 29, 30, and 31 is provided at its inner end with a crank-arm 20, which is connected to the cooperating rail 18 either by means of a link 33, as shown in Fig. 3, or in any operative manner. Under normal conditions—that is, when the rails 18 are elevated—the crank-arms 20 are inclined to the horizontal, so as to insure movement of the series of bars upon actuation of the depressible rails to effect opening of the gate. The bars 14, 19, 21, 29, 30, and 31 are similarly mounted and constructed, each being formed of a length of bar-iron of square or angle formation in cross-section. These bars, designated hereinafter and in the claims as “rocking bars,” are fitted into brackets 34,

which in turn are pivotally connected to suitable supports 35, the latter consisting of irons having their end portions bent so as to abut against the sides of adjacent ties and overlap the same. The lower end of each of the brackets 34 is bifurcated so as to embrace the support 35, thereby equalizing the strain on said support and the pivot-fastening 36. The bar 19, which is typical of the series of rocking bars, moves bodily instead of rocking or oscillating in bearings in the usual manner of a rock-shaft, the center of motion corresponding with the pivot-support of the bracket 34. As a result of thus mounting the rocking bars it has been found that the mechanism is rendered more sensitive and more responsive to the force expended for operating the gate, thereby diminishing the chances for casualties incident to tardy action of the gate, while at the same time enabling the gate-operating mechanism to be comprised within a comparatively small space over what has heretofore been required.

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

1. In a gate structure, the combination of a gate, a frame therefor, a brace for strengthening the frame, a bar mounted upon said brace, an arm attached to said bar and movable therewith and having connection with the gate to effect movement thereof, a counterbalanced arm attached to said bar and the arm for operating the gate, and actuating means adapted to be operated by a moving car to effect opening of the gate.
2. In combination, a gate, a supporting-frame therefor, braces for strengthening said frame, bars mounted upon the braces midway of their ends, arms connected at one end to said bars and having their opposite ends curved and connected with the gate to effect opening thereof, counterbalanced arms connected with said bars and with the arms connected to the gate, gate-actuating means adapted to be operated by a moving car, and adjustable connections between the gate-actuating means and the aforesaid bars.
3. In combination, a gate, a supporting-frame therefor, braces for strengthening said frame, a bar mounted upon each brace, arms connected at one end to the respective bars and having their opposite ends connected with said gate, a counterbalanced arm for each bar, a rocking bar extended beneath the rails of the track, arms fast to each end of said rocking bar, and adjustable connections between said arms and the aforesaid bars.
4. In combination, a gate, a series of rocking bars mounted at each side of the gate, connecting means between one of the said rocking bars and the gate, crank-arms and bars connecting the series of rocking bars, a lever, links connecting opposite ends of the lever with the bars connecting each series of the aforesaid rocking bars, and connecting

means between the gate and the said series of rocking bars and their coöperating connecting means.

5 5. In combination, a gate, a rocking bar, connecting means between said gate and rocking bar, and a mounting for the rocking bar consisting of a bracket having rigid connection with the rocking bar and pivotally

supported to permit said rocking bar to oscillate with the said bracket.

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

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