

No. 777,835.

PATENTED DEC. 20, 1904.

N. K. BOWMAN.
MINE GATE.

APPLICATION FILED APR. 25, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

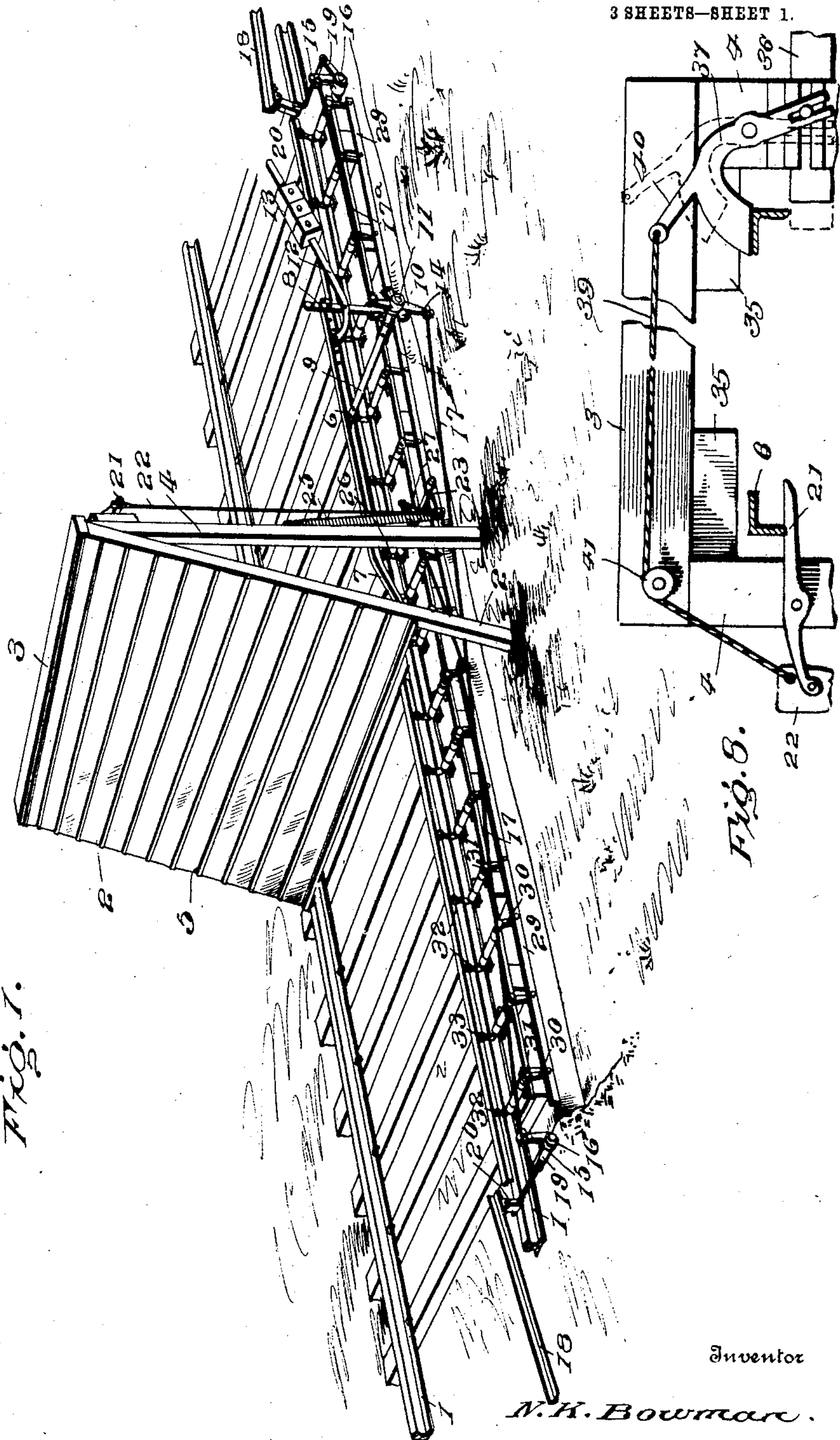


Fig. 1.

Fig. 2.

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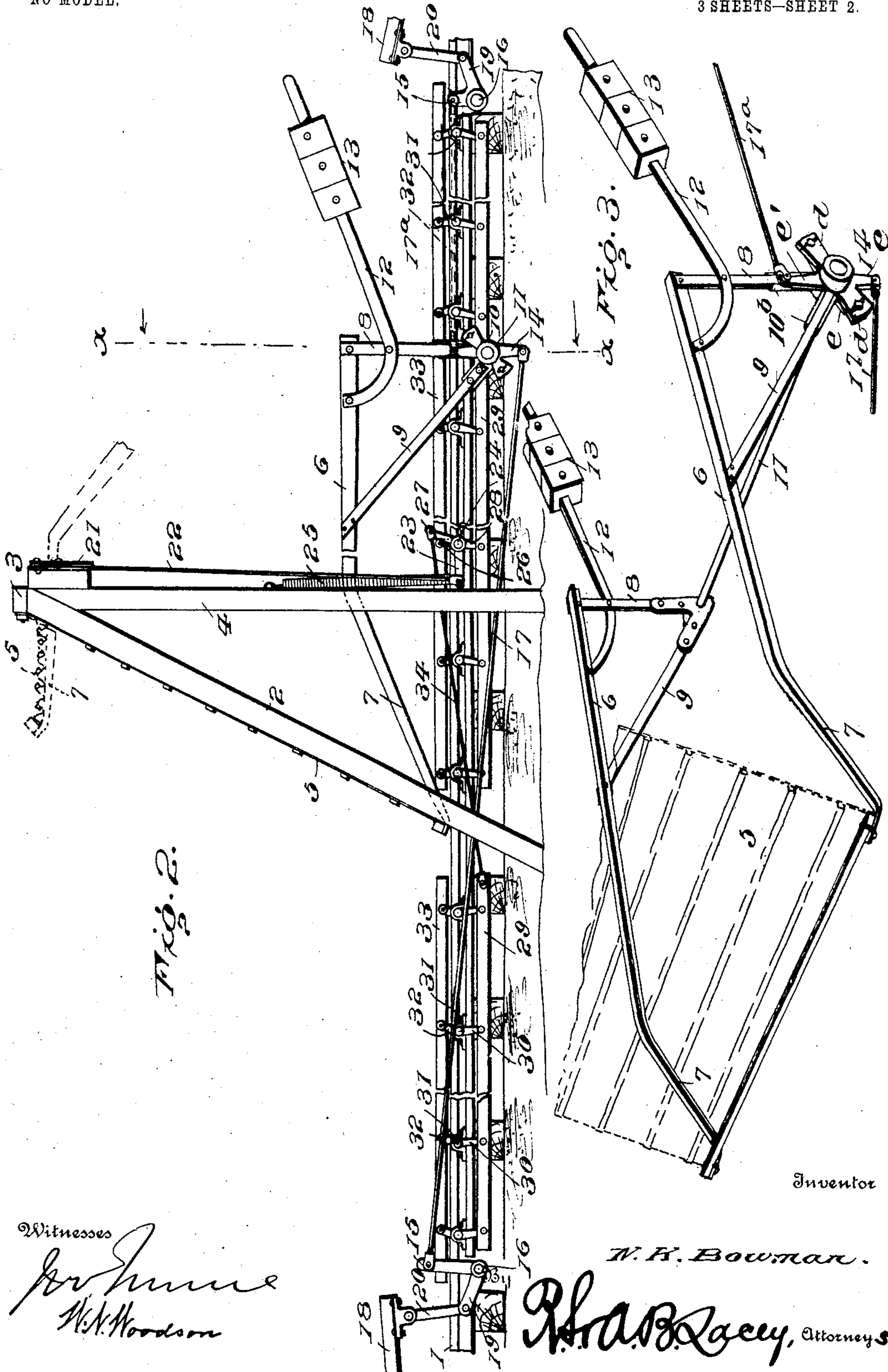
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3 SHEETS—SHEET 3.

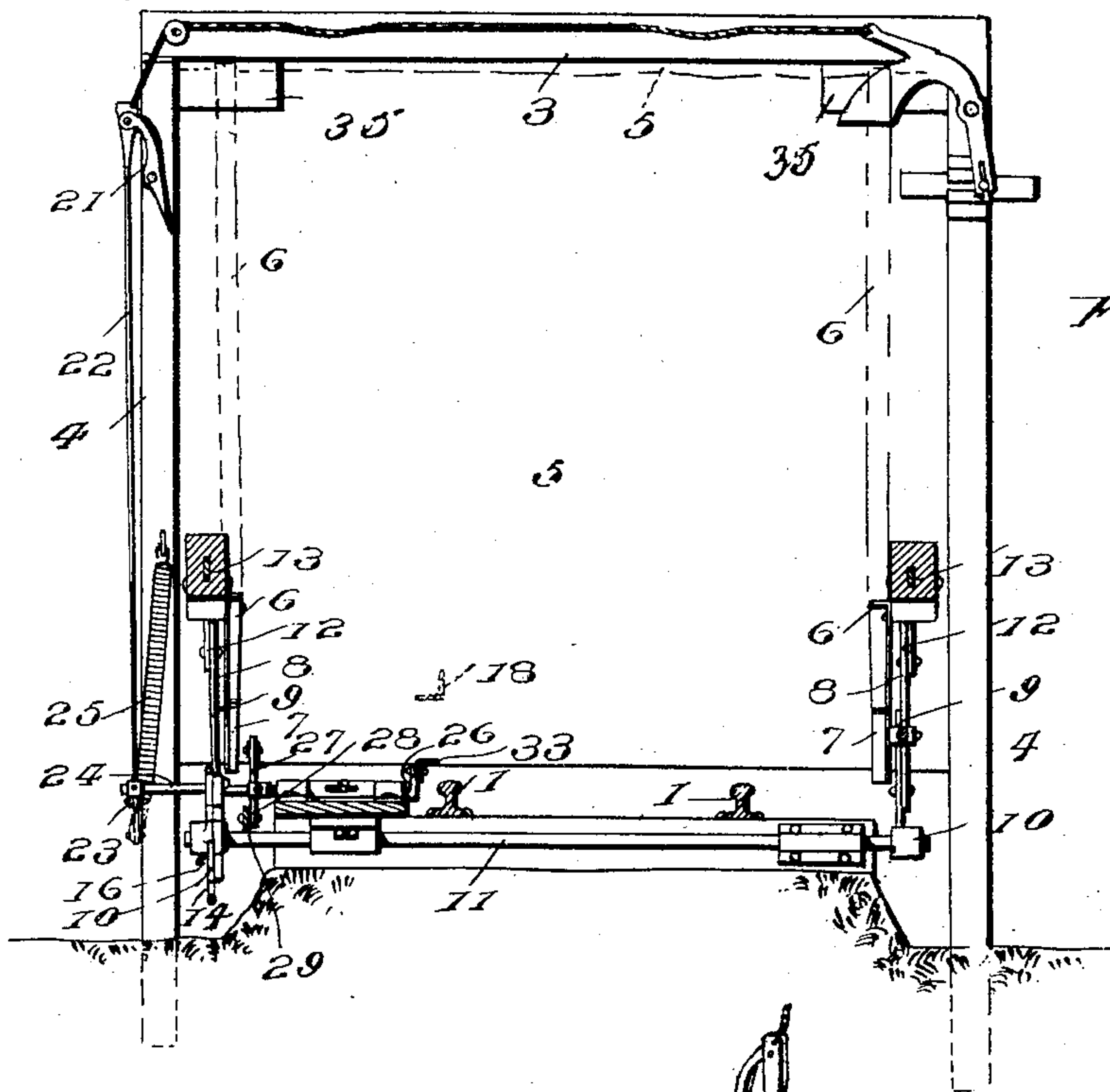


Fig. 4.

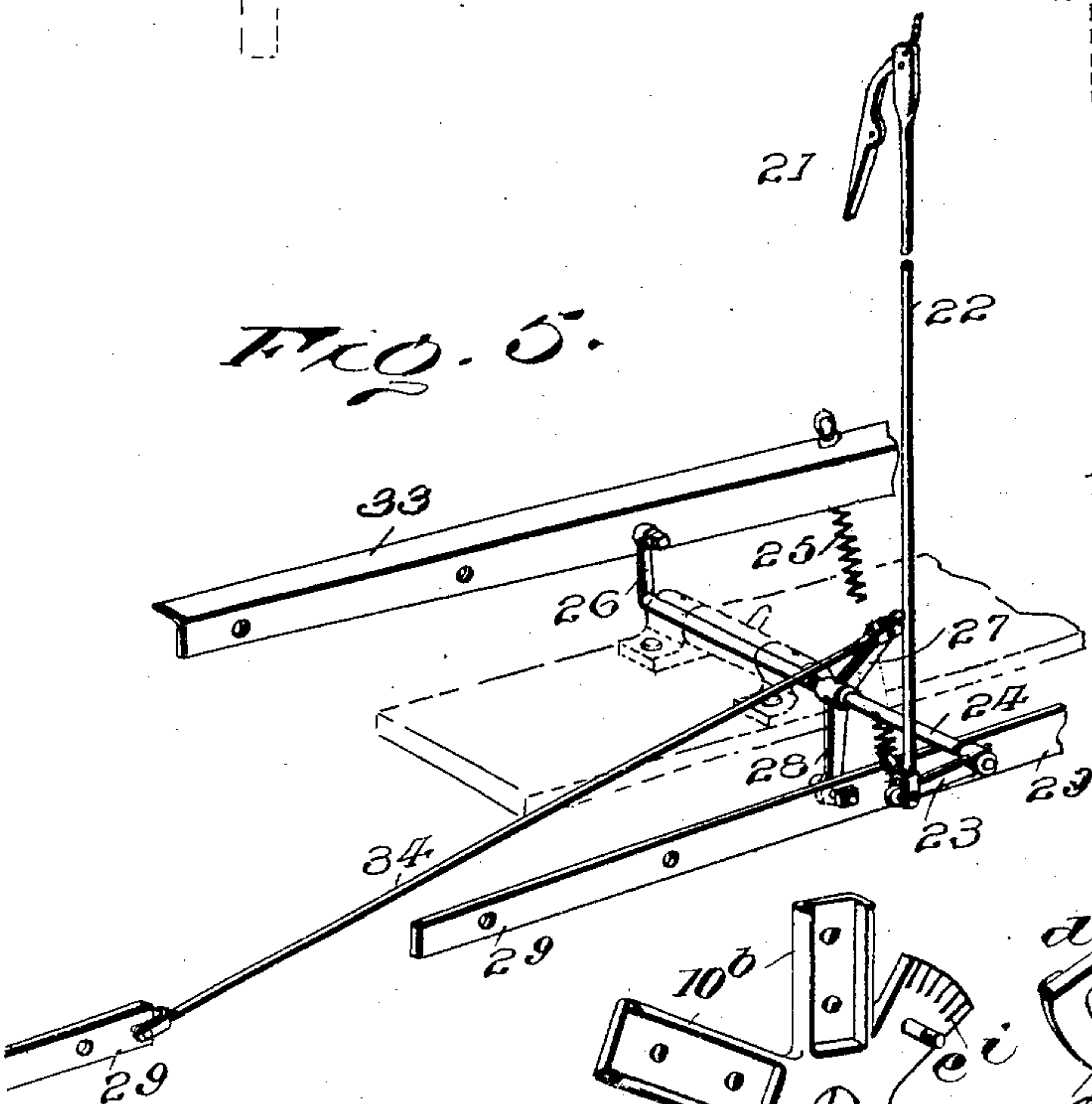


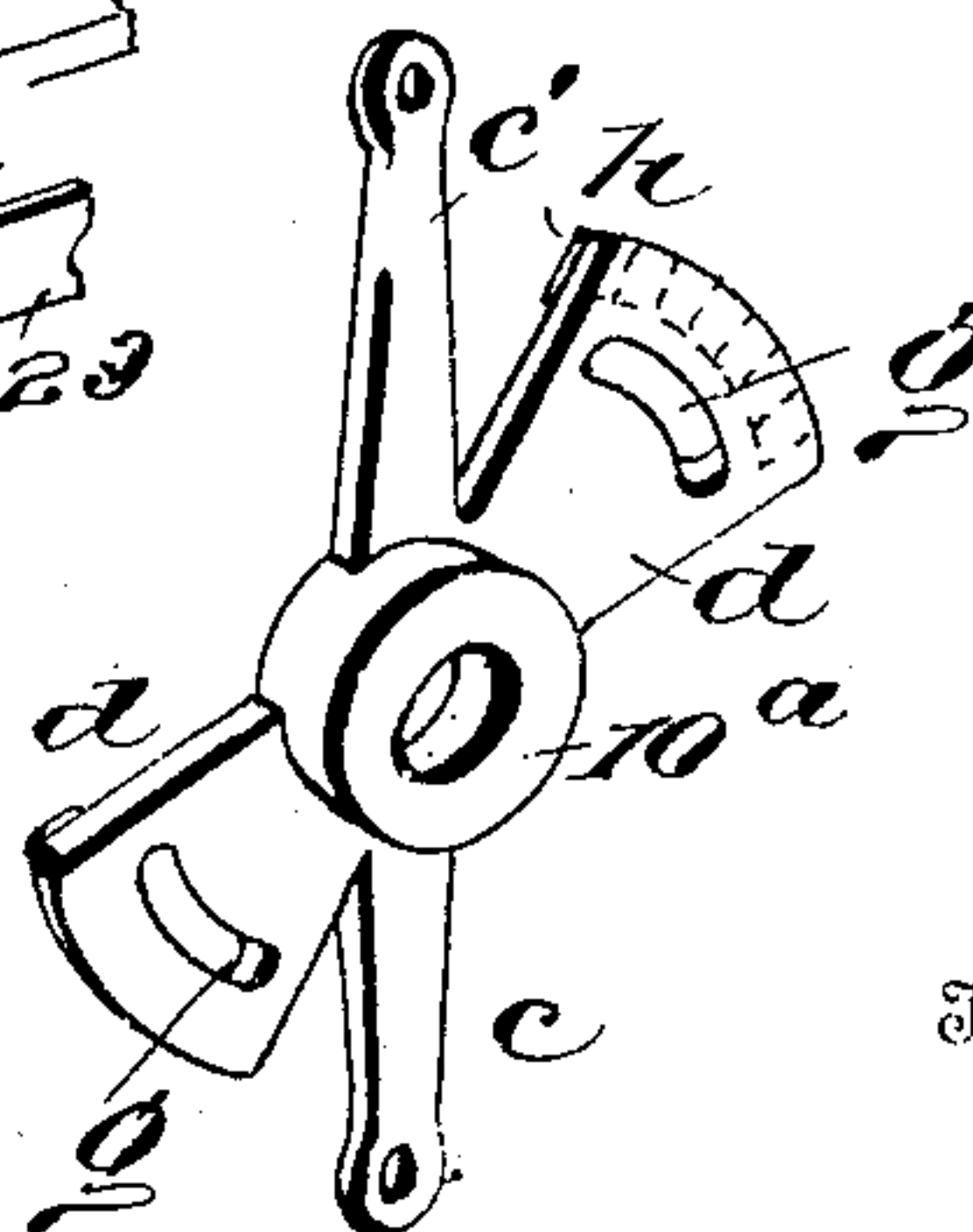
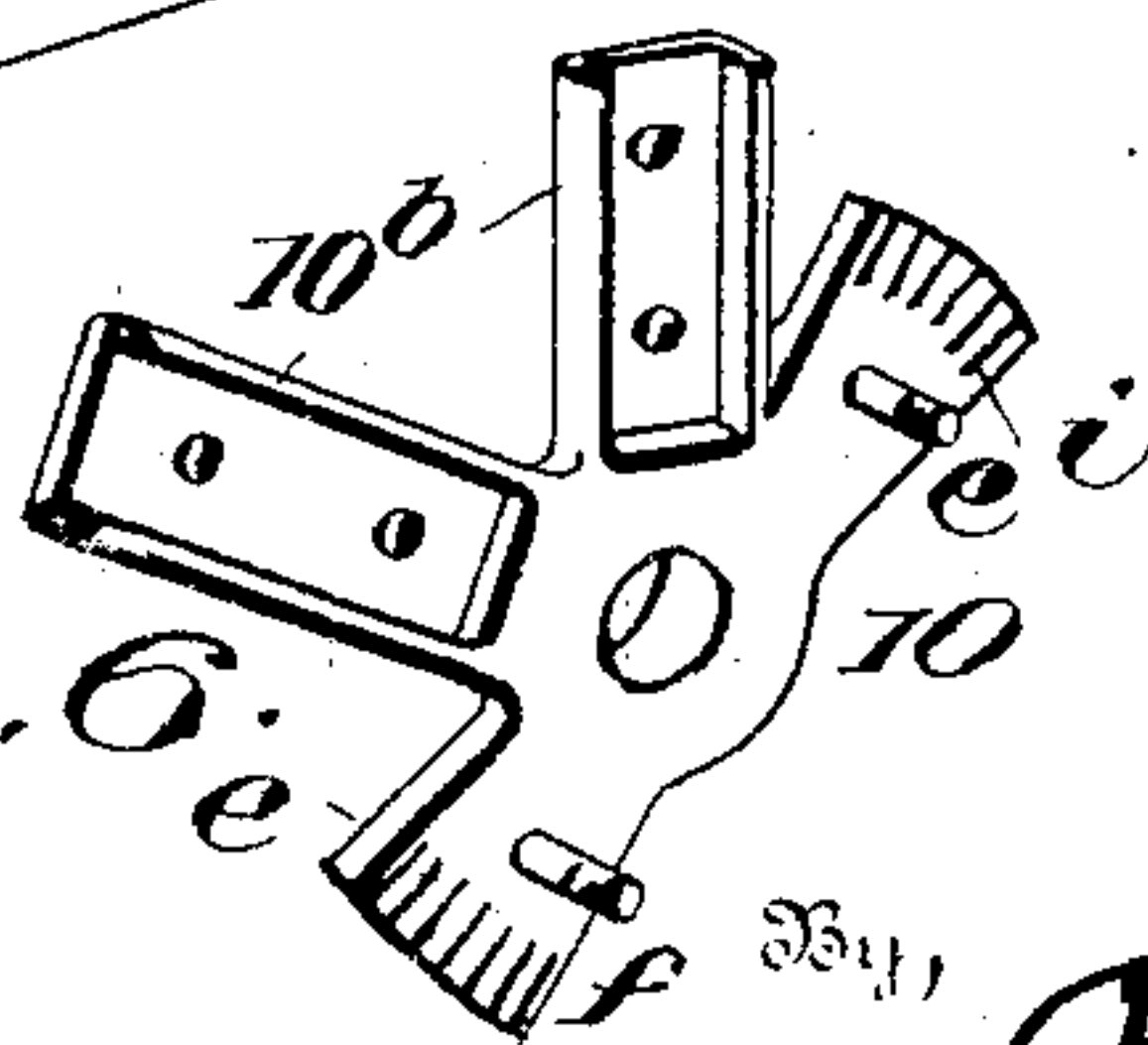
Fig. 5.

Fig. 7.

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Fig. 6.



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UNITED STATES PATENT OFFICE.

NEWTON K. BOWMAN, OF NORTH LAWRENCE, OHIO.

MINE-GATE.

SPECIFICATION forming part of Letters Patent No. 777,835, dated December 20, 1904.

Application filed April 25, 1904. Serial No. 204,855.

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.

The entries, passages, and drifts of mines are usually supplied with gates for controlling the draft and insuring a circulation in the chambers and leads being worked, whereby the gas-laden and foul atmosphere is rendered fit for respiration and less dangerous to the workmen.

This invention relates to gates of the automatic type actuated by means of the cars and which are normally held closed by positive means, the invention contemplating two separate mechanisms, one for opening the gate and the other for holding it open prior to the car reaching the gate and after the car has passed by the gate a determinate distance, thereby minimizing the work of each mechanism and enabling the gate-opening devices to respond quickly and with certainty.

The invention consists of the novel features, details of construction, and combinations of parts, which hereinafter will be more particularly set forth, illustrated, and finally claimed.

In the accompanying drawings, forming a part of the specification, Figure 1 is a perspective view of a mine-gate embodying the invention. Fig. 2 is a side elevation of the gate and the operating mechanism on a larger scale, the dotted lines showing the position of the gate and the operating-arms when said gate is open. Fig. 3 is a detail perspective view of the lower portion of the gate and the operating-arms therefor. Fig. 4 is a transverse section on the line XX of Fig. 2 looking in the direction of the arrows. Fig. 5 is a detail perspective view of the holder for sustaining the gate when open and the operating means co-acting with said holder. Fig. 6 is a perspective view of the plate secured to the shaft, having the gate operating-arms attached thereto. Fig. 7 is a perspective view of the plate adjustable upon the shaft supporting the gate-operating arms to which the operating connections are attached. Fig. 8 is a detail

view of the upper portion of the frame supporting the gate, showing the means for holding the gate-operating arms elevated.

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-rails are indicated at 1; and at the sides of the track are erected the supports 2, said supports being inclined to the vertical and connected at their upper ends by a cross-piece 3 and braced by vertical stays 4. This arrangement provides a substantial support for the gate. The gate is indicated at 5 and is of the flexible type and may consist of textile, sheet metal, or kindred material, permitting the gate to open in a series of folds. Slats or strips are attached to the material comprising the gate and strengthen the same transversely.

The arms 6 for operating the gate have their front portions deflected or inclined, as shown at 7, the major portion of the arms occupying an approximately horizontal position and their front portions being forwardly and downwardly inclined when the gate is closed, as shown most clearly in Fig. 2. Bars 8 project from the rear ends of the arms 6 about at a right angle and are stayed by braces 9. The braces 9 and bars 8 are connected to a rod or shaft 11, arranged transversely of the track and preferably beneath the rails 1, so as to be out of the way of trolley-lines and other operating parts. Levers 12 have their inner ends curved and attached to the bars 8 and arms 6 and are provided at their outer ends with weights 13 for counterbalancing the gate 5, arms 6, and coöperating parts, whereby the work of the gate-opening mechanism is rendered comparatively light and the wear and tear consequently reduced to the smallest amount possible.

The connecting means between the parts 8, 9, and 11 are shown most clearly in Figs. 6 and 7 and consist of the plates 10 and 10^a. The plate 10 is secured to the shaft 11, whereas the plate 10^a is loose on said shaft. The bars 8 and braces 9 are bolted or otherwise fastened to extensions 10^b of the plate 10. The plate 10^a is formed with opposite projec-

tions d to match corresponding projections e of the plate 10. The plates 10 and 10^a are relatively adjustable to admit of varying the effective leverage of the connections 17 and 17^a. The projections d have arcuate slots g and teeth h , and the projections e have openings to receive bolts or fastenings f and teeth i to match the teeth h and prevent possible slipping of the parts 10 and 10^a when properly secured by means of the fastenings f , passing through the openings of the parts e and the slots g . Arms c c' project from the plate 10^a in opposite directions, and the inner ends of rods or connections 17 and 17^a are attached, respectively, thereto and to the arms 15 at opposite sides of the gate.

The air-pressure varies in different mines from a one-quarter inch water-gage to a four-inch water-gage. The heavy pressure requires a gate with stout stiffening-strips, and for the light pressure the stiffening-strips need not be so stout and heavy. When the gate is open, the arms 6 sustain the weight thereof, and when closed said arms are relieved of all weight of the gate. Hence it is desirable to vary the effective leverage of the arms c c' , according to different air - pressures and weights of gates.

The gate-opening mechanism and holding means are duplicated, a set being arranged at each side of the gate to be actuated by the car approaching the gate from either direction. The means for opening the gate consist of a depressible rail 18, mounted in any suitable manner for vertical movement and normally projecting above the tread of the track-rail 1, so as to be engaged by the flange of the car-wheel or other determinate part of the truck. A shaft 16 is arranged transversely of the track and is provided with arms 15 and 19, the latter being connected by link 20 to the inner end of the depressible rail 18 and the arm 15 being connected to either one of the arms c c' by means of the connection 17^a or 17. The arms 15 and 19 are so arranged as to constitute parts of a bell-crank lever, which is pivoted at 16. When the rail 18 is depressed, the arms 15 and 19 are rocked or oscillated and the operating-arms 6 caused to turn with the shaft 11 by a pull upon either one of the connections 17 or 17^a. As the operating-arms 6 move from the position shown by full lines in Fig. 2 to the position shown by dotted lines in said figure the gate is opened. After the car has passed by the gate and cleared the rail 18 upon the opposite side the gate automatically closes, the preponderance of weight being sufficient to overcome the counterbalancing-weight 13, so as to admit of the positive and automatic closing of the gate when released from all controlling influence.

A holder 21 is arranged at one side of the gate and consists of an arm pivoted to a stay or brace 4 and arranged so as to project across the path of an arm 6 and hold the gate open

during the interval that the car travels between the rails 18 at opposite sides of the gate. A rod or analogous connection 22 is interposed between the holder 21 and an arm 23, attached to a rock-shaft 24, journaled transversely of the track adjacent to the stay or brace 4, to which the holder 21 is pivoted. A spring 25 connects the arm 23 with the stays 4 and normally holds the part 21 out of the path of the operating-arm 6. The rock-shaft 24 is provided at its inner end with an arm 26 and at a point between its ends with arms 27 and 28, the latter being connected to a bar 29, arranged upon one side of the gate 5 and supported by means of a plurality of rocker-arms 30, pendent from a series of rock-shafts 31, from which rocker-arms 32 project vertically and support a rail 33, which is of a length corresponding approximately to the distance between the inner end of the depressible rail 18 and the gate 5. Upon the opposite side of the gate is arranged a corresponding rail 33, bar 29, and connecting parts 30, 31, and 32. A rod or like connection 34 is interposed between the inner end of the bar 29 and the arm 27. Inasmuch as the operating parts are the same at each side of the gate, like reference characters have been employed to designate corresponding parts to avoid confusion and simplify the description.

To neutralize the thrust of the arms 6 when thrown upward against the cross-piece 3, buffers 35 are secured to the lower side of said cross-piece and receive the impact of the arms. The arms 6 when thrown upward are prevented from any appreciable rebound by means of a temporary holder 36, which is slidably mounted on the stay or upright 4, opposite to that supporting the holder 21. A trip 37 is pivoted to the part 4 and has one end connected with the holder 36, so as to effect movement thereof. The opposite end portion of the trip 37 is curved and weighted, as shown at 38, and normally holds the part 36 out of the path of the proximal arm 6, the terminal portion of the part 38 projecting below the adjacent buffer 35, so as to be struck by the operating-arm 6 when the latter is thrown upward. The instant the curved end 38 of the trip is moved upward the holder 36 is shot beneath the operating-arm 6, so as to prevent any material rebound thereof and to form a support for the gate during the time occupied in the travel of the car over the rail 18. A flexible connection 39 is attached at one end to a projection 40 of the trip 37 and is fastened at its opposite end to the connection 22 and passes over a guide-pulley 41. When the car clears the rail 18 and exerts a pressure upon the rail 33, the shaft 24 is actuated and the part 22 drawn downward, thereby throwing the holder 21 across the path of the opposite operating-arm 6. Simultaneously with the downward movement of the part 22 the connection 39 is pulled upon and the trip 37 returned to a normal po-

sition and the holder or part 36 withdrawn from the path of the operating-arm 6, previously supported thereby. The trip 37 and holder 36 are held in this the normal position by the weighted end 38 of the trip. After the car has cleared the gate-operating mechanism upon the opposite side the parts assume a normal position and the gate closes in the manner stated.

10 A car approaching the gate from either direction operates the rail 18 by depressing the same and effects an opening of the gate in the manner herein stated. As the wheels of the car clear the rail 18 they come in contact with
15 the rail 33 and move the same, so as to effect a rocking of the shaft 24, whereby the connection 22 is drawn downward and the holder 21 extended across the path of the adjacent operating-arm 6, thereby holding the gate
20 open so long as pressure is exerted upon either one of the rails 33. When the car clears the rail 33 at the opposite side of the gate, it depresses the rail 18 in traveling away from the gate, and when the rail 18 is cleared the gate
25 automatically closes.

By having the gate-opening and the holding mechanisms separate each performs its special office without reference to the other, thereby enabling the working parts to be of lighter
30 construction, more responsive to the controlling means, and subjected to less strain and wear, and as a result the mechanism has a prolonged period of usefulness. By having the gate inclined to the perpendicular it is not
35 liable to be opened by reversed currents, such as is the case where the gates have a vertical arrangement, thereby compelling guideways and other means to hold them closed.

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

1. In combination, a gate, operating means for effecting an opening of the gate including a depressible rail, a holder, a second depressible rail, and connecting means between the
45 last-mentioned depressible rail and the holder to project the latter across the path of the gate when open, substantially as set forth.

2. In combination, a gate, operating means for effecting an opening of the gate, a holder, a
50 depressible rail and bar, rocker connections at intervals in the length of said depressible rail and bar, and means connecting said bar with

the holder to project the latter across the path of the gate when open, substantially as set forth.

3. In combination, a flexible gate, operating-arms therefor having their front portions forwardly and downwardly inclined, a bar projected downward from the rear end of each operating-arm, a rock-shaft arranged transversely of the track between the rails and having the aforesaid bars connected thereto, and a depressible rail connected to a bar of the operating-arms, substantially as set forth.

4. In combination, a flexible gate, a support therefor inclined to the vertical, operating-arms arranged normally to have their rear portions extend approximately horizontally and their front portions forwardly and downwardly inclined, and operating means connected to said operating-arms to effect an opening of the gate, substantially as set forth.

5. In combination, a gate, operating means therefor, a holder adapted to be projected across the path of the gate or a part thereof to hold the gate open, and a weighted trip for normally maintaining said holder out of the path of the gate, substantially as described.

6. In combination, a gate, operating means therefor, a holder for securing the gate when open, a trip actuated by the opening of the gate to throw said holder into position for sustaining the gate, a second holder, operating means for the second holder, and a connection between the two holders, whereby the first-mentioned holder is thrown out of the path of the gate when the second holder is thrown into position for supporting the gate, substantially as set forth.

7. In combination, a gate, a rock-shaft, a plate secured to said rock-shaft and having the gate connected therewith, a second plate loose upon the rock-shaft, means for adjustably connecting the two plates, and actuating means connected with said second plate to effect an opening of the gate, substantially as set forth.

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

NEWTON K. BOWMAN. [L. s.]

Witnesses:

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