

No. 813,067.

PATENTED FEB. 20, 1906.

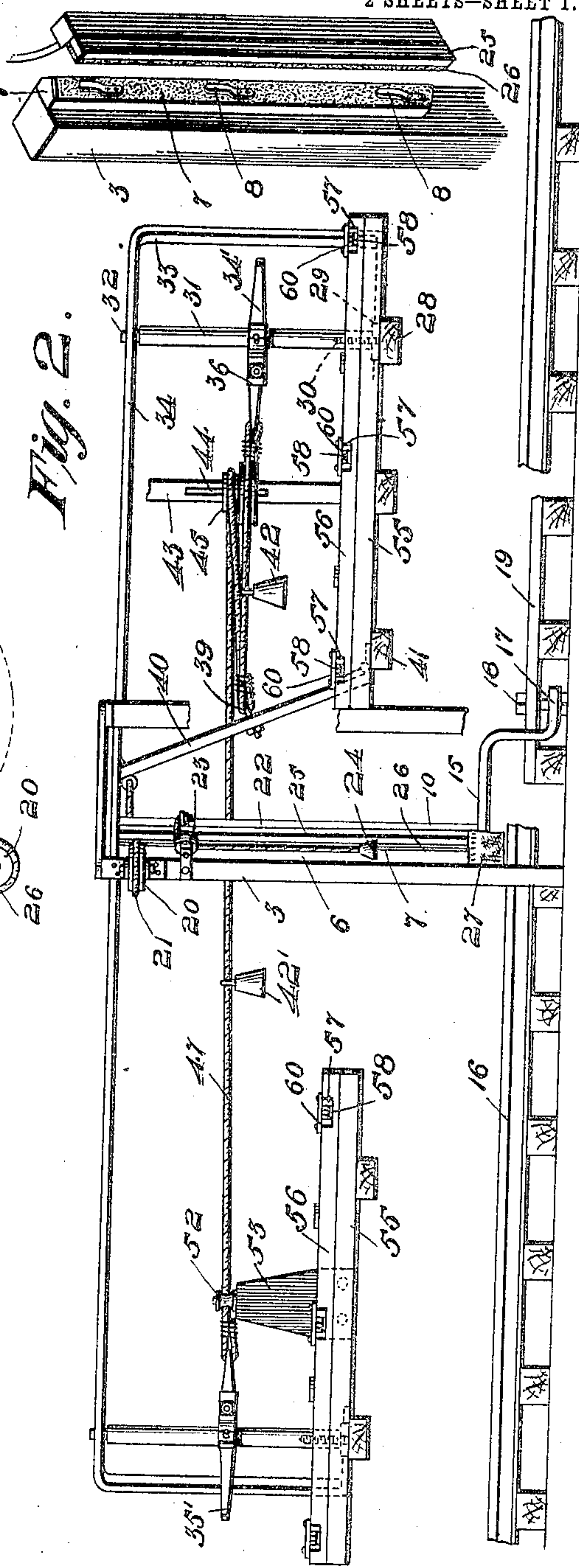
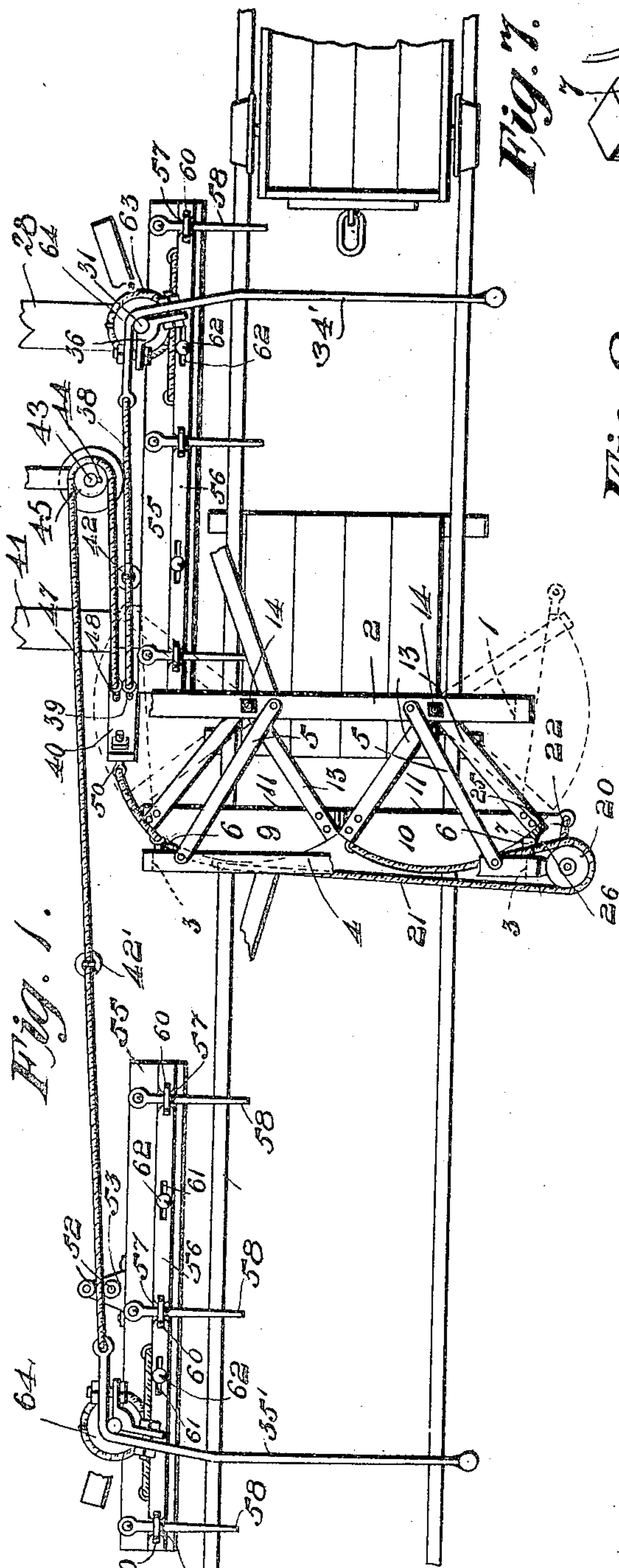
I. WHITNEY, DEC'D.

H. D. LANE, ADMINISTRATOR.

MINE SHAFT DOOR.

APPLICATION FILED JUNE 30, 1904.

2 SHEETS—SHEET 1.



Witnesses
E. J. Stewart
Jno E. Parker

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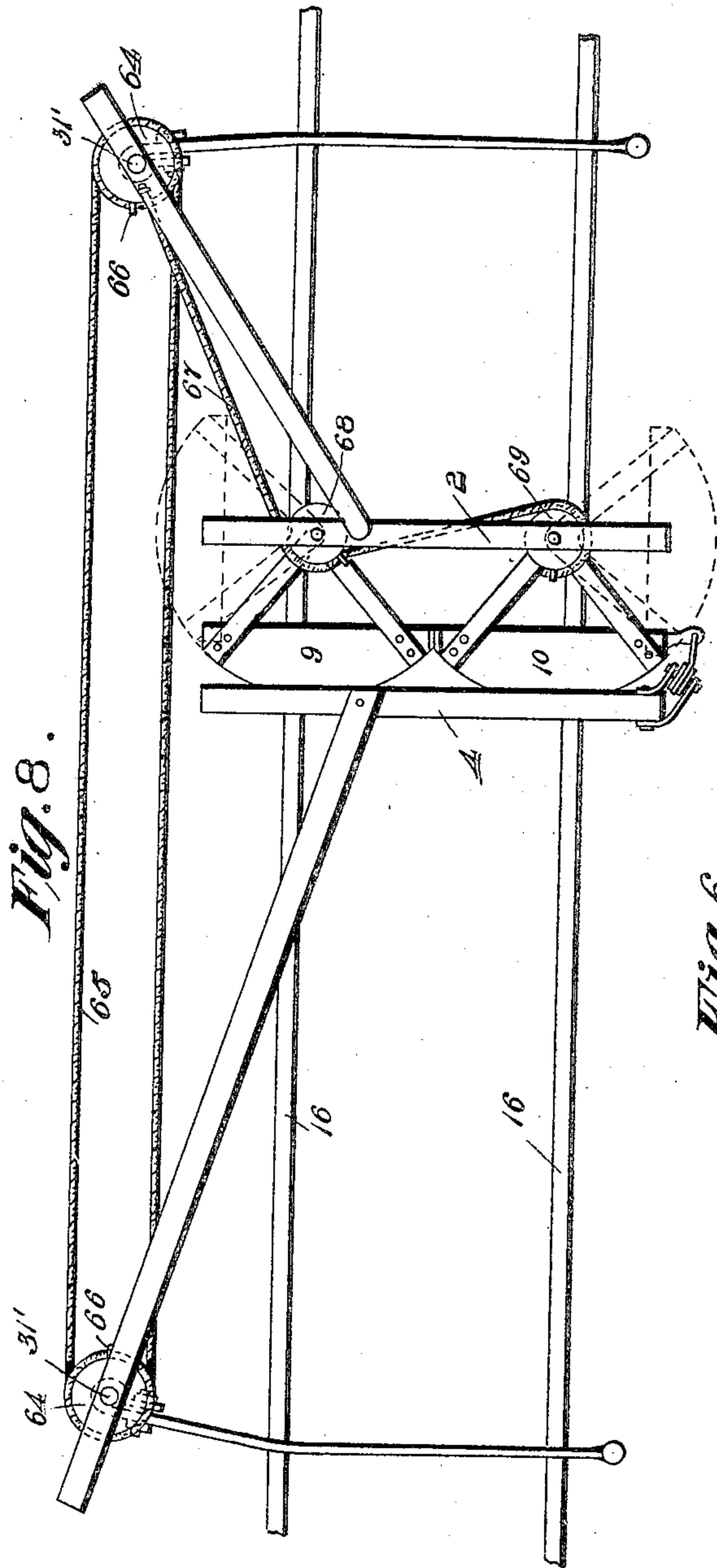


Fig. 8.

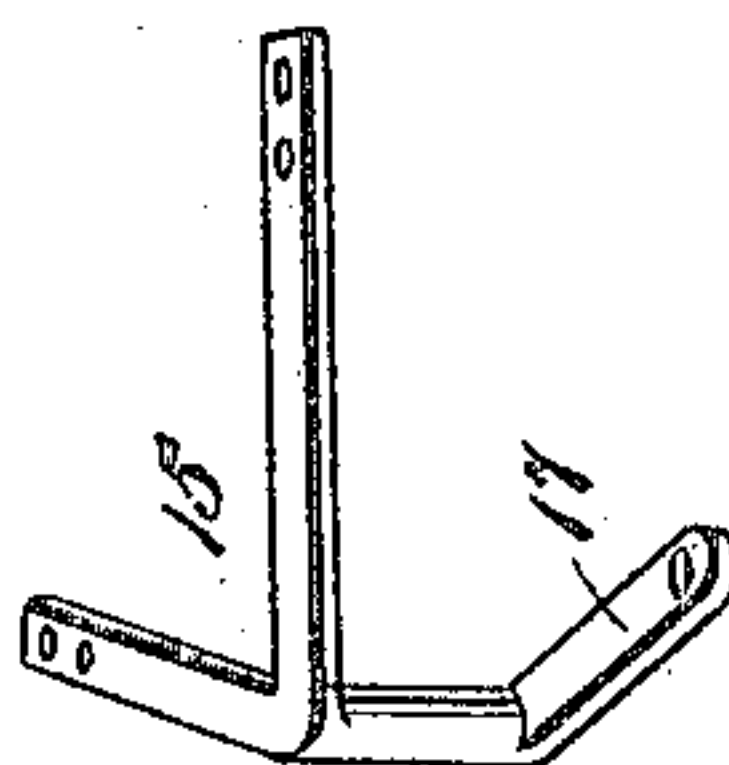


Fig. 5.

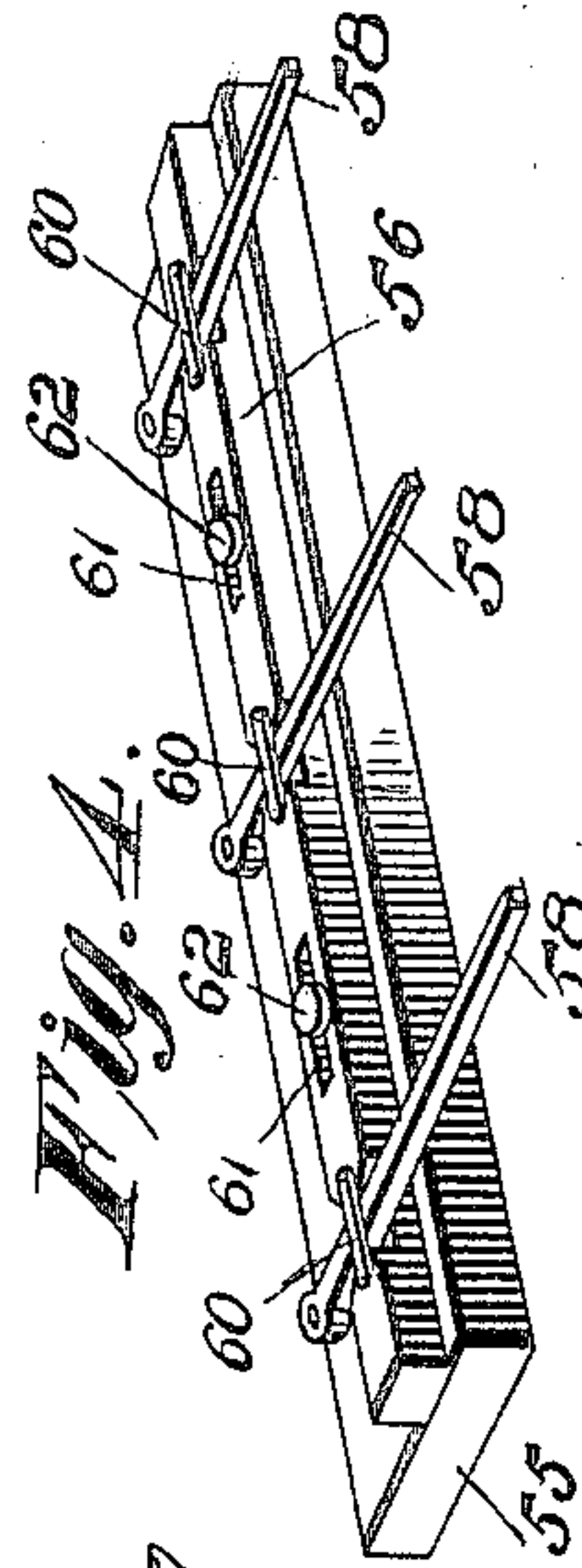


Fig. 4.

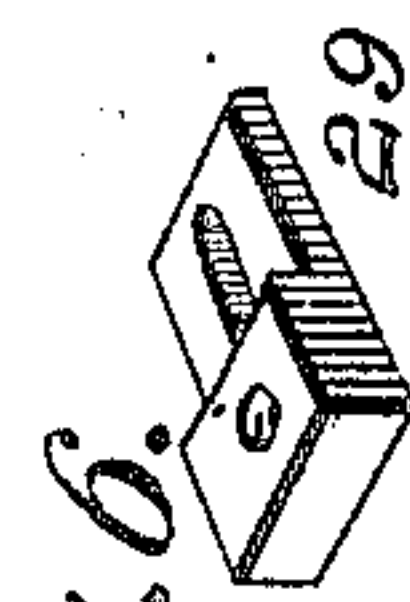
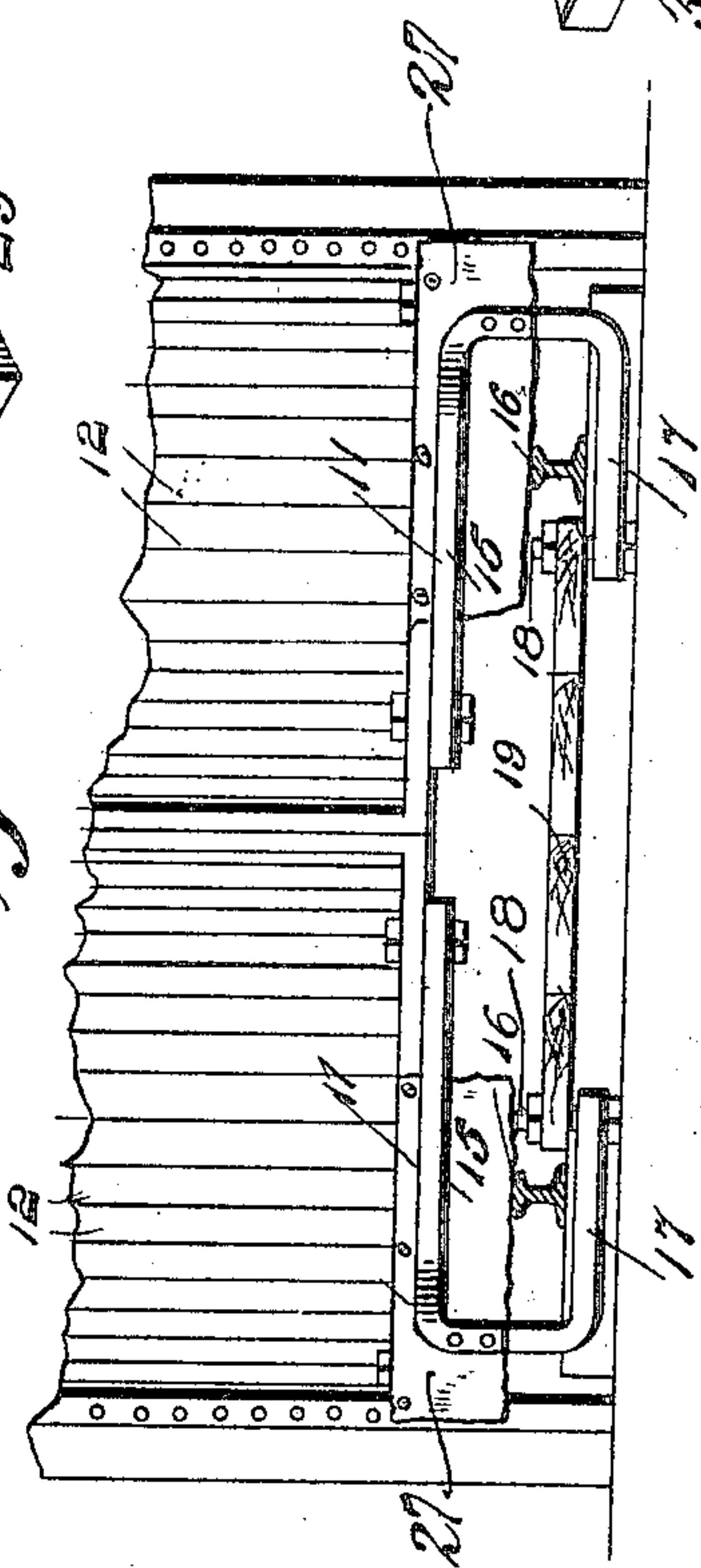


Fig. 6.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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TRATOR OF SAID ISAAC WHITNEY, DECEASED.

MINE-SHAFT DOOR.

No. 813,067.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed June 30, 1904. Serial No. 214,827.

To all whom it may concern:

Be it known that I, ISAAC WHITNEY, a citizen of the United States, residing at Oskaloosa, in the county of Mahaska and State of Iowa, have invented a new and useful Mine-Shaft Door, of which the following is a specification.

This invention relates to mine-shaft doors, and has for its principal object to provide a practically air-tight door that may be automatically opened by animals, cars, or other objects traveling in either direction and maintained in open position until after the passage of the animal and the car or cars, after which the doors are automatically closed.

A further object of the invention is to provide a novel construction of double doors in which both doors are pivotally mounted and swing toward and from each other, the two doors being connected for mutual movement.

A still further object of the invention is to provide a device of this character in which a plurality of operating devices are connected to the doors and arranged to be successfully engaged by a car or cars, so as to maintain the doors in open position until the cars have passed them.

A still further object of the invention is to provide means for lessening the shock of closing of the doors and for making such doors practically air-tight.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in the novel construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a plan view of a mine-shaft door arranged and constructed in accordance with the invention. Fig. 2 is a side elevation of the same, portions being broken away in order to more clearly illustrate the construction. Fig. 3 is a detail elevation of the lower portion of the doors, showing the manner in which they

are pivotally supported below the traffic-rails. Fig. 4 is a detail perspective view of one of a series of levers to be engaged by the cars for the automatic opening of the door. Fig. 5 is a detail perspective view of the lower door-supporting bracket detached. Fig. 6 is a similar view of one of the adjustable supports. Fig. 7 is a detail perspective view of a portion of one of the doors and door-jambs, showing the packing or cushioning strips for excluding air. Fig. 8 is a view similar to Fig. 1, illustrating a slight modification of the invention.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

At a suitable point in the entry is arranged a frame including a pair of uprights 1 and an upper transversely-disposed cross-bar 2, the latter forming a support for the upper door-pivots, and at a point slightly in advance of these is a second frame including upright door-posts 3 and a cross-bar 4, the two cross-bars being connected and rigidly braced by metallic bars 5.

To the door-post 3 are secured battens 6, having strips of felt or similar material 7 and being further provided with a plurality of leaf-springs 8, which are engaged by the doors when moved to closed position, thus materially reducing the shock of closing. When closed, the leaf-springs are fully compressed, and the strips of felt or similar yieldable material will form a practically air-tight closure.

The doors 9 and 10 are each provided at their upper and lower ends with substantially segmental plates 11, to which are secured vertical strips 12, the row of strips of each bar being arranged on a line struck from the center of movement of said bar. To the upper segments are secured radially-disposed brace-bars 13, that are pivotally connected to the cross-bar 2 by means of bolts 14, the connection being such as to permit free swinging movement of the door. To the lower segments are secured diagonal bars 15, that converge at a point outside of the rails, and from the point of convergence extends an arm 17, leading out under the track and pivoted by a bolt 18 to a platform 19, that is secured to the cross-ties. The pivot-

bolts 14 and 18 are in vertical alinement, and the doors are free to swing from closed position across the track to the dotted-line position at the sides of the track, as shown in Fig.

1. The doors being curved and moving edge-wise, there is little or no resistance, and the door may be more freely opened and closed than flat doors of the usual type.

At one side of the main frame is mounted a pulley or sheave 20, around which extends a rope or cable 21, having its opposite ends connected to the respective doors, so that movement imparted to the door 9 will result in corresponding movement in the opposite direction of the door 10. To the door 10 is secured a cord or chain 22, passing over a sheave 23 and provided with a counterweight 24, that tends to close the door and maintain the same in closed position, the adjacent edges of the two doors coming into contact with each other and the contacting edges being provided with strips of felt or similar material, so as to form an air-tight closure. To the rear or outer edge of each door is secured a batten 25, having a covering 26 of felt or similar material, which engages the strip of felt 7 on the door-post and further serves to make the door air-tight. Depending from each of the doors is a strip 27, formed of canvas or other suitable material, that comes into contact with the rails, the strip yielding as the doors are opened and closed in case lumps of coal or other objects have been accidentally dropped in the path of movement of the doors. The doors may further be rendered air-tight by constructing them of a fibrous or other material and by lining them with canvas, felt, or the like.

At one side of the entry is a horizontally-disposed timber 28, secured in the coal or other material at the side of the entry and carrying an adjustable bearing 29, in which rests a pivot-pin 30, carried by a vertically-disposed shaft 31. The opposite end of the shaft carries a pivot-pin 32, extending through an opening formed in a metallic bracing-frame 33, that is supported by the timber 28, and the upper end of this frame may be braced in any suitable manner, as by connecting it to the cross-bar 2 by means of a diagonally-disposed timber 34.

To the shaft 31 is secured a bell-crank lever 34', that is bent to pass around the rear portion of the shaft and is clamped in place by means of bolts passing through a bar 36 and the main arm of the bell-crank lever and so arranged that the bell-crank lever may be vertically adjusted to suit the height of the animals. To effect the adjustment, it is merely necessary to loosen the securing-bolts and, after raising or lowering the bell-crank lever, to again turn the bolts and clamp the lever in its adjusted position. The longer arm of the bell-crank lever extends out from

the railway-track in a position to be engaged by an animal, and the shorter arm of said bell-crank lever is connected by a cord or chain 38 to an adjustable eyebolt 39, extending through an opening in a pivotally-mounted gate-operating bar 40, the lower end of which is pivoted to a beam 41, projecting from the side of the entry. The rope or chain 38 is held taut by means of a weight 42, and its tension may be readily adjusted by turning the securing-nut of the eyebolt.

The framework at the side of the entry is provided with bearings for the support of a vertically-disposed shaft 43, having a keyway 44, and mounted on the shaft is a sheave or sprocket-wheel 45, which may be raised or lowered on the shaft in accordance with the vertical adjustment of the bell-crank lever 34'.

Extending around the sheave or sprocket-wheel 45 is a cable or link belt 47, one end of which is secured to an eyebolt 48, extending through an opening in the pivotally-mounted door-operating lever 40, and the opposite end of said cable or link belt is rigidly secured to the shorter arm of a bell-crank lever 35', mounted in the entry at the opposite side of the door and provided with a weight 42' for the purpose of taking up slack. The lever 35' is of a construction similar to the construction of the bell-crank lever 34' and extends out over the railway in a position to be engaged by an animal.

The upper end of the door-operating lever 40 carries an eyebolt 50, that is connected to one end of the cable 21, the latter being extended beyond its point of connection with the door 9, and when a pulling strain is exerted on either of the cables 38 or 47 the lever 40 will be rocked, and the strain may be exerted from either side of the door by animals approaching in either direction. In order to render the operation of the lever 35' more effective in both directions, sheaves 52 are arranged at the upper end of a bracket 53, carried by the fixed frame and in a position to be engaged by the cable 47 on the bell-crank lever 35' turning inward in the direction of the door.

The two horizontal timbers 28 and 41 serve as supports for a horizontally-disposed plank 55, on which rests a bar 56, provided with a plurality of notches 57, the side walls of the notches tapering outward toward the edge of the bar from the longitudinal center of said bar. Through each of the notches extends a car-operated lever 58, that is pivoted to the plank 55, and said levers are held in place by straps 60, extending across the slots. Each of the bars 56 (there being one at each side of the door) is provided with a pair of longitudinally-arranged slots 61, through which pass guide-bolts 62 for the purpose of maintaining the bar in proper position. To this bar are

secured the opposite ends of a short chain or cable or link belt 63, that extends around a sheave or sprocket-wheel 64, rigidly secured to the lower end of the shaft 31, and at a point intermediate of its length this cable or belt is loosely secured to the sheave.

In the operation of the device an animal traveling in the direction of the door will come into contact with the longer arm of the bell-crank lever 35, and moving in the direction of the closed doors said bell-crank lever will be turned and exert a pulling strain on the cable 38. This will be transmitted to the lever 40 and from thence to the cable 21 and the doors, resulting in movement of the doors to the open position. After the animal has passed through the doors the latter are returned to closed position by means of the counterweight.

In case a car or cars follow the animal they come into contact with the series of levers 58 at one side of the door and at the opposite side of said door will engage a similar set of levers. The contact of the car with the levers will move the bar 56 longitudinally, and this movement will be transmitted to the cable and the sheave 64 and result in the turning of the shaft 31 and the bell-crank lever 35 until the doors are opened in the manner previously described. The car or cars will keep in engagement with the levers, coming into contact successively with each of them until all of the cars have passed the doors, after which the latter are free to close.

The construction may be simplified to some extent by providing the two shafts 31' with sprocket-wheels or sheaves 64, that are connected together by a link belt or cable 65, as indicated in Fig. 8, the cable being rigidly secured to both sheaves by belts 66, so that turning movement of one will be imparted to the other. From one of the sheaves 64 extends a cable or chain 67, passing over and secured to sheaves 68 and 69, that are carried by the pivot-pintles of the two doors. The bell-crank levers and the remaining portions of the mechanism may be arranged substantially in the manner hereinbefore described, and when said levers are engaged by an animal or when the animals are followed by a car or cars the sheaves 31' will be turned and movement will be transmitted by the sheave 64 and the cable 67 to both of the doors.

With a device constructed in accordance with this invention the doors may be automatically opened by animals or cars and retained in full-open position until after the passage of the animal or cars through the doorway, after which the doors will be automatically closed.

Having thus described the invention, what is claimed is—

1. The combination with a door, of a plu-

rality of door-operating devices extending across a pathway or road leading to the door, and in a position to be successively engaged by an animal or object traveling over the track, each of said door-operating devices serving when operated to effect the complete opening movement of the door, and all acting as they are successively engaged to retain the door in full-open position.

2. The combination with a door, of a door-operating lever extending across a pathway or road leading to the door and being in a position to be engaged by an animal, and a plurality of levers also connected to the door and projecting partly across the roadway in position to be successively engaged by a car or other object following the animal.

3. In mine-doors, a pair of pivotally-mounted door members having upper and lower pivotal supports, the lower pivot being in the form of a bracket having portions extending both above and below the track, the lower portion being pivoted to a support below the track, and the upper portion being connected to the bottom of the door.

4. In mine-shaft doors, a pair of pivotally-mounted door members having arcuate faces and arranged to swing into recesses in the entry, a door-frame having battens, and projecting battens or ribs carried by the door members and in engagement therewith and serving to prevent the passage of air-currents.

5. In mine-doors, a pair of pivotally-mounted door members each including upper and lower segments, radiating braces connecting the upper segments to the pivot-point, and door supporting and bracing members arranged at the lower ends of the doors and each provided with an arm extending downward and inward under the track or road-bed.

6. In mine-doors, a pair of pivotally-mounted door members having arcuate faces arranged to swing into recesses in the entry, a door-frame having battens, springs projecting from the said battens and projecting battens carried by the doors and adapted to engage the springs to thereby lessen the shock of closing movement of the doors.

7. In mine-shaft doors, a pair of pivotally-mounted door members having arcuate faces, a door-frame having battens lined with a flexible material, and battens or bars carried by the doors and also faced with flexible material.

8. The combination with a pivotally-mounted entry-door, of a pivoted door-operating lever, a flexible connection between the free end of the lever and door, a pair of levers extending across the entry, a flexible connecting means between one of the levers and the door-operating lever, a flexible connection between the second lever and the door-operating lever, and a guiding means for the second of such flexible connection.

9. The combination with a pivotally-mounted door, of a pair of shafts, bell-crank levers vertically adjustable on said shafts, a pivoted door-operating lever having flexible
5 connection with the door, and flexible connections between such levers and the adjustable bell-crank lever.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ISAAC WHITNEY.

Witnesses:

WM. HIBBS,

O. A. MARTIN.