

No. 689,183.

Patented Dec. 17, 1901.

P. F. HARAN.
COAL SEPARATOR.

(Application filed Apr. 12, 1898.)

(No Model.)

2 Sheets—Sheet 1.

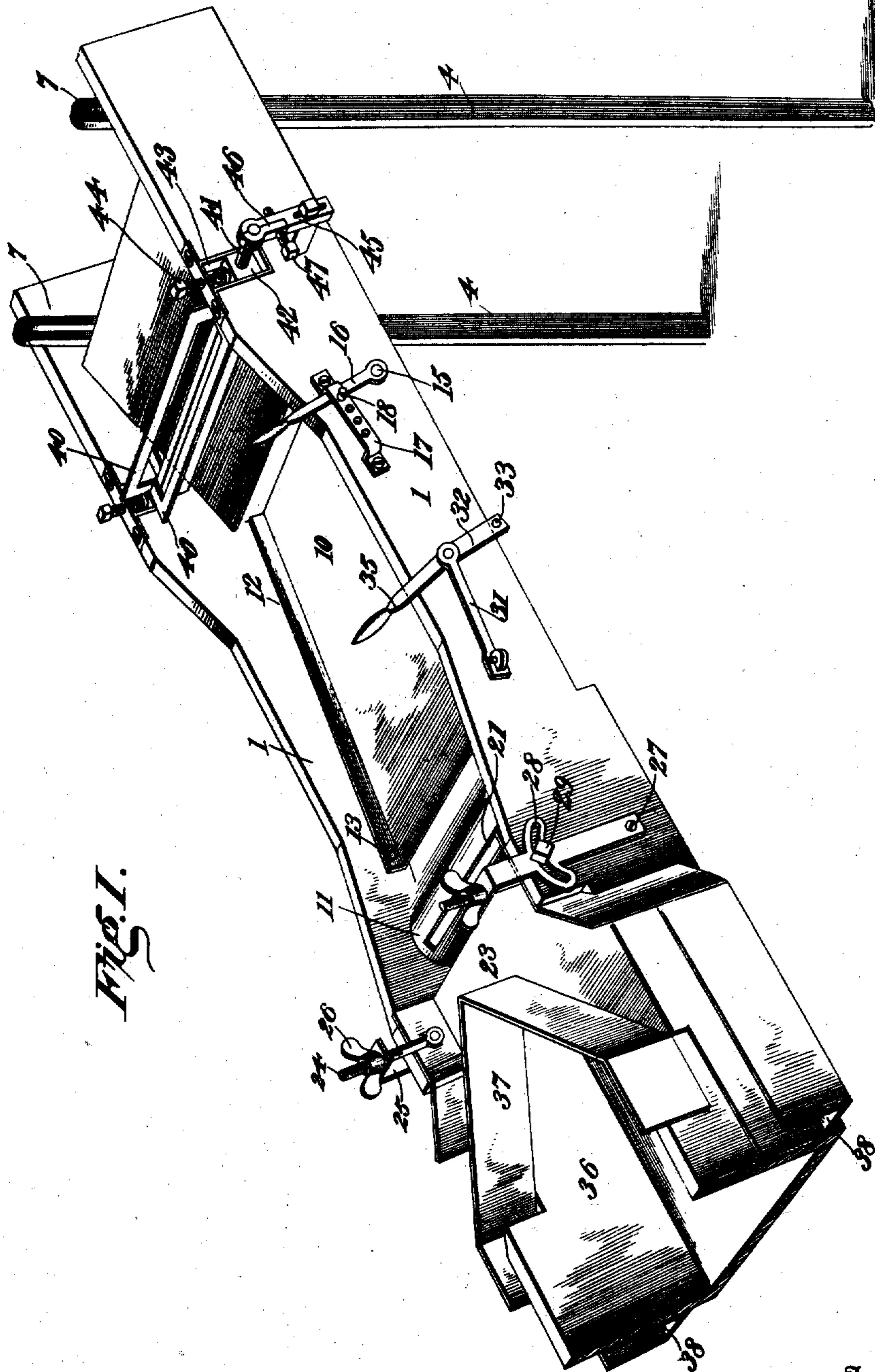


FIG. 1.

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2 Sheets—Sheet 2.

(No Model.)

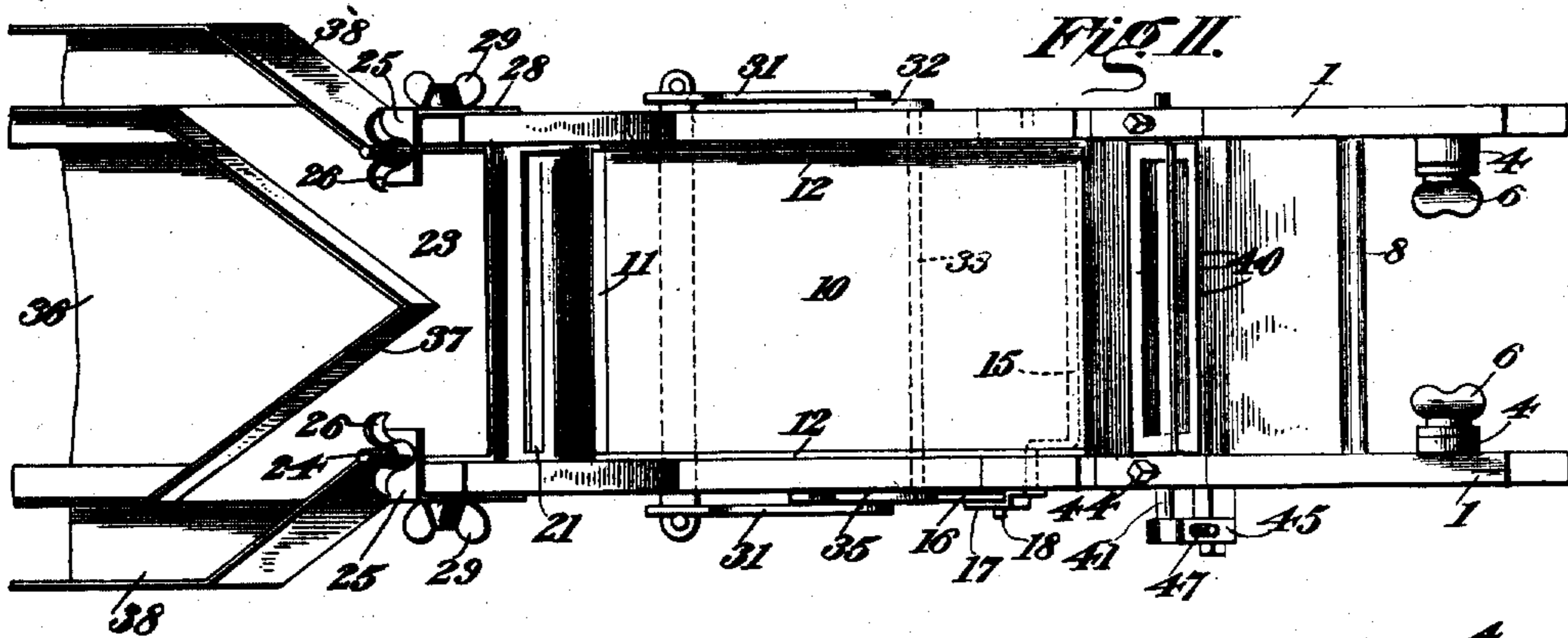


FIG. III.

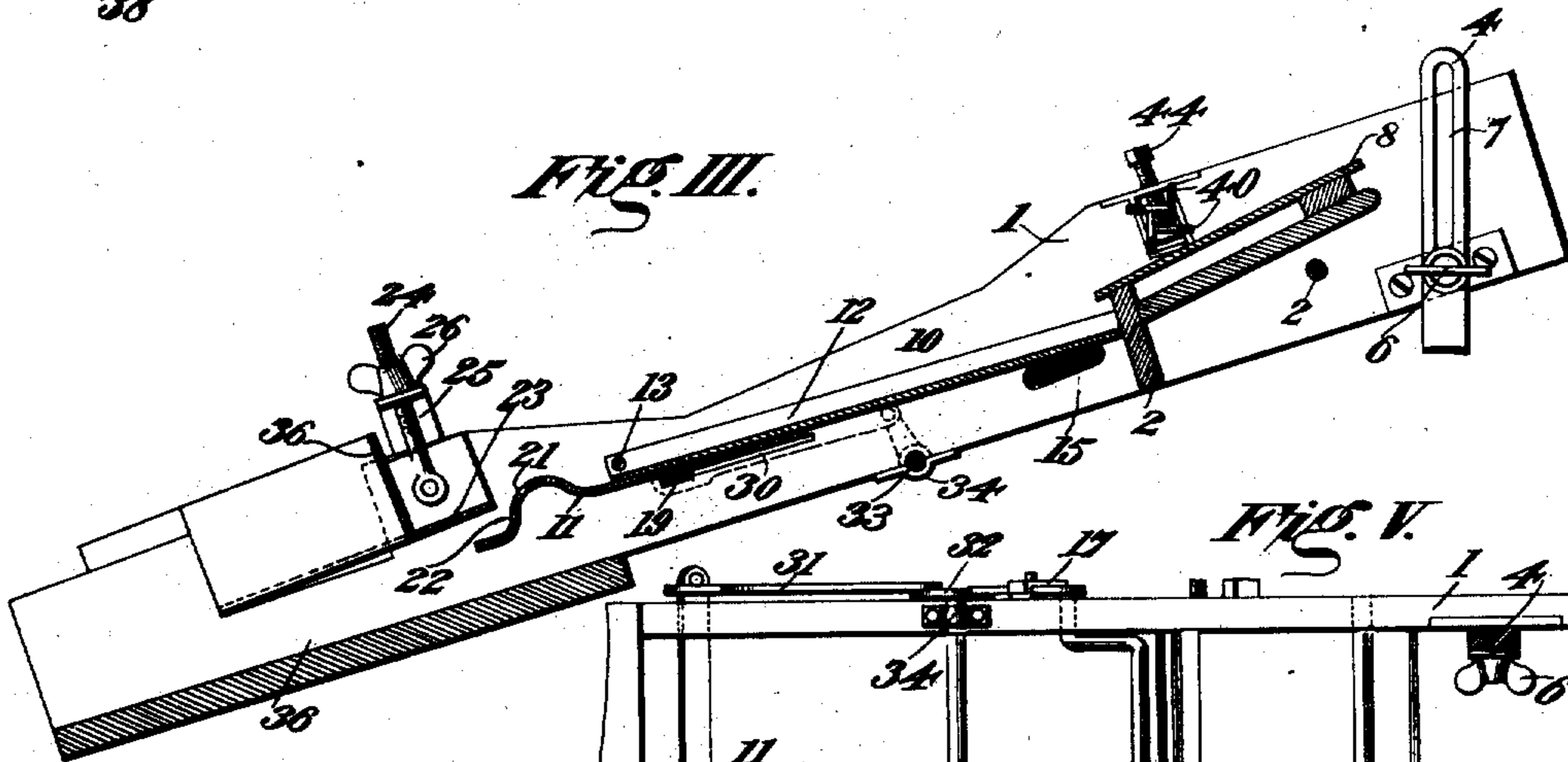


FIG. V.

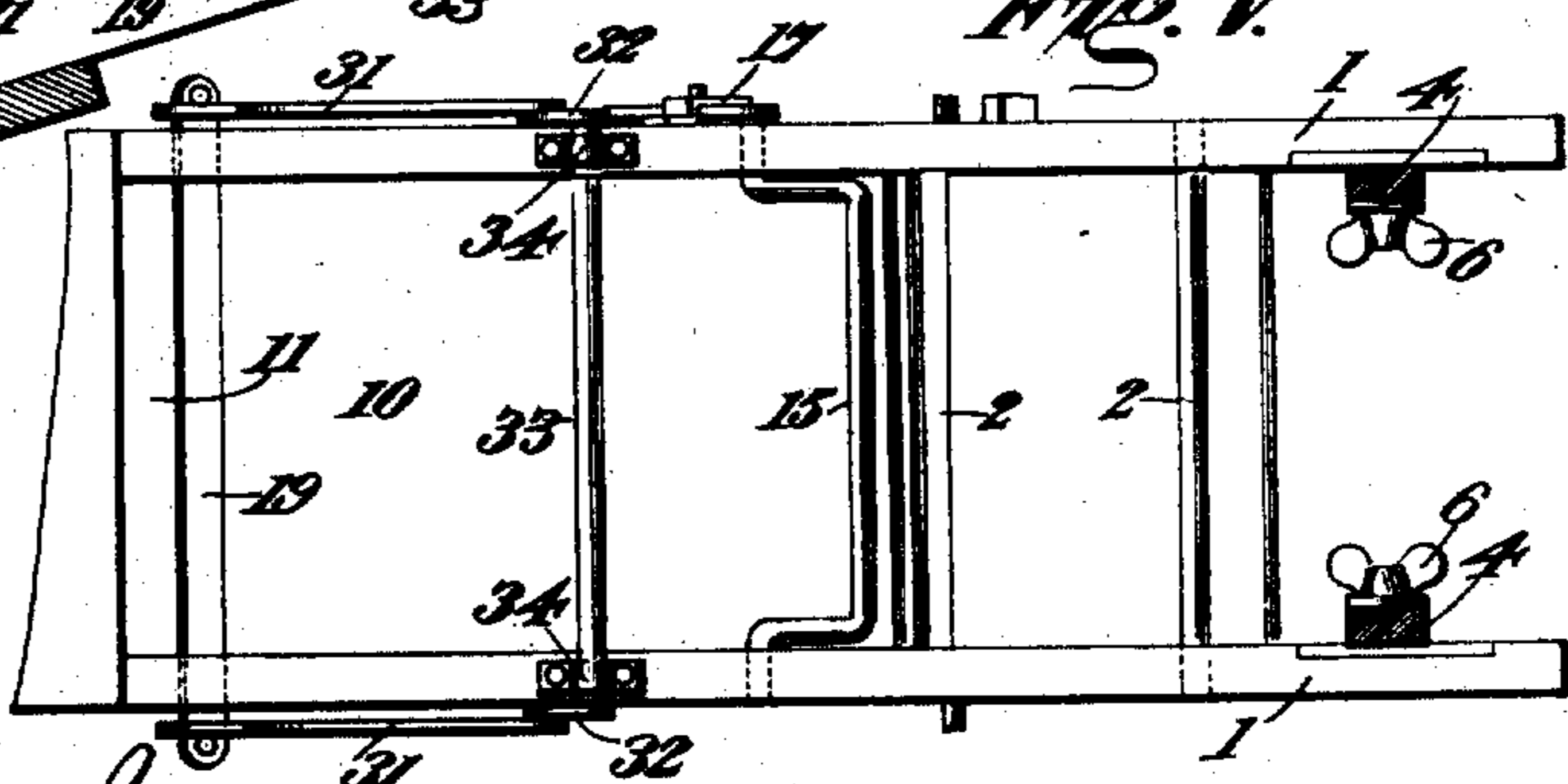
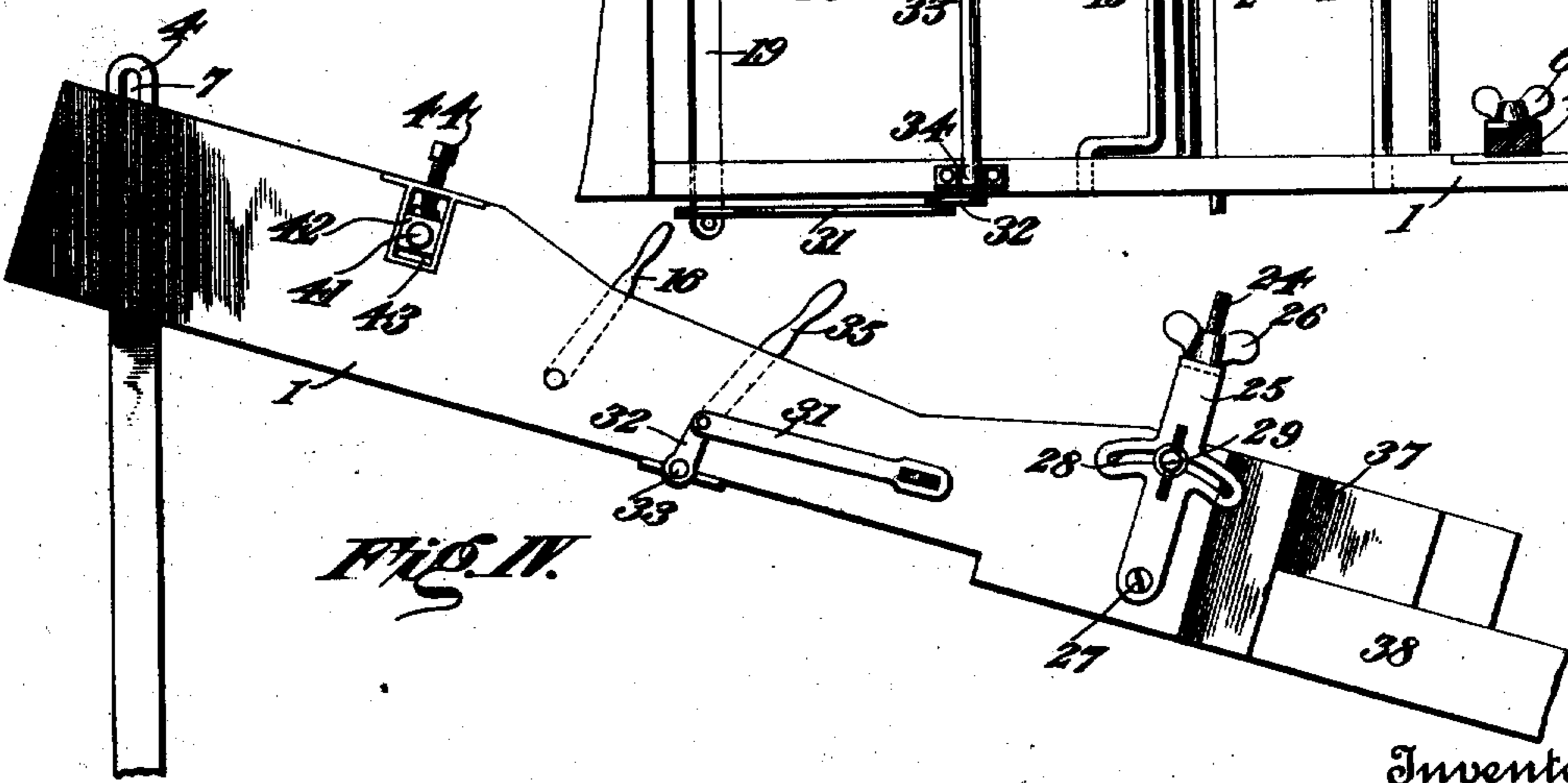


FIG. IV.



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UNITED STATES PATENT OFFICE.

PATRICK F. HARAN, OF SCRANTON, PENNSYLVANIA, ASSIGNOR OF SEVENTWELFTHS TO JOHN R. RICHARDSON, OF SCRANTON, PENNSYLVANIA, AND EDWARD G. COTTON, OF WILKESBARRE, PENNSYLVANIA.

COAL-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 689,183, dated December 17, 1901.

Application filed April 12, 1898. Serial No. 677,338. (No model.)

To all whom it may concern:

Be it known that I, PATRICK F. HARAN, of Scranton, in the county of Lackawanna, State of Pennsylvania, have invented certain new
5 and useful Improvements in Coal-Separators, of which the following is a complete specification, reference being had to the accompanying drawings.

The object of my invention is to produce
10 an apparatus for more effectually cleaning coal as it comes from the mine and separating the same from slate or other debasing material more thoroughly than by means now in common use.

15 In the accompanying drawings, Figure I is a perspective view of my separator complete. Fig. II is a top plan view of the same. Fig. III is a longitudinal vertical section of the subject-matter of Fig. I. Fig. IV is a side
20 elevation of the separator, taken from the side opposite that shown in Fig. I. Fig. V is a bottom plan view of a portion of the separator.

Referring to the figures on the drawings, 1
25 indicates each of the frame side pieces of my chute, which may be, if desired, continuous throughout the length of the chute.

2 indicates cross-pieces, which serve to unite the side pieces into a stiff rectangular frame. The frame thus formed is in practice supported
30 as upon uprights 4, which may be adjustably secured to the side pieces, as by means of wing-screws 6, passing through longitudinal slots 7 in the uprights.

By means of the adjustable connection between the supports and the side pieces a general angle of inclination may be imparted to the frame, of which the side pieces constitute
35 a part.

In the upper part of the chute between the
40 side pieces and suitably secured thereto I provide the head-section 8 of the chute-floor. It is preferably made of sheet metal, and being the section of the floor which receives the coal as it comes from the mine is preferably made
45 rigid and separate from the lower portions of the chute-floor.

Between the side pieces 1 I provide an additional length of receiving-chute 10, which for the purpose of distinction I call the "intermediate" floor-section, it being located be-
50

tween the head-section and the controlling member 11. The intermediate section 10 is preferably made of sheet metal, having upturned sides 12, and is preferably pivoted at points approximate to its lower end to the side
55 pieces 1, as indicated at 13. The upper end of the intermediate section 10 is free to move to and from the head-section 8. By means of this arrangement the angle of inclination of the intermediate floor-section may be ad-
60 justed independently of the general angle of inclination of the side pieces 1, derivable through the aid of the adjustable connection between them and the uprights 4 above referred to. This is a distinct advantage in
65 practice, inasmuch as the separators are frequently employed in connection with mines that penetrate a plurality of strata from which different grades of coal are mined. The different grades vary in many respects—that of
70 one stratum being heavier, for instance, than that of another. Consequently a different angle of inclination of the floor-chute is desirable to secure the best results.

In operating the chute it is important, there-
75 fore, in order to facilitate the adaptability of the separator to all grades of coal that may be delivered to it that the best angle of inclination may be readily obtainable. This is accomplished by the adjustable intermediate
80 section 10.

For fixing the adjustment of the floor-section 10 I provide in suitable opposite bearings in the side pieces 1, underneath the free end of the intermediate floor-section, a crank-
85 rod 15, to one extremity of which is secured a lever 16. The lever works under a strap 17 on one of the side pieces, and the strap is perforated at intervals to accommodate a pin 18, which being inserted in place serves to
90 fix the position of the lever, and thereby to sustain the intermediate floor-section 10 in any required position.

The coal-controlling member 11 is preferably constructed of sheet metal, whose upper
95 edge 19 underlaps the lower end of the intermediate floor-section 10. It is essentially curved in cross-section, constituting a rib, and is preferably, but not necessarily, provided with a longitudinal slot 21. In shape
100

the controlling member is preferably distinguished as to its upper side by a gradually-rising curve and as to its lower side by a more abrupt descent 22. The "controlling" member is so called because it controls the leap of the coal from one chute to another. It is found in practice that its shape above defined controls the leap of the coal to the best advantage, the gradually-curved upper surface imparting to the descending mass of commingled slate and coal from the receiving-chute a change in direction of movement with the least interruption of its momentum. If the interposition of the controlling member be too abrupt, it tends to cause both coal and slate to leap or bounce excessively if the angle of inclination of the receiving-chute impart to it sufficient momentum to clear the controller. On the contrary, if the momentum be insufficient there is a tendency of the mass to catch against the controlling member and interfere with or altogether interrupt the operation of the machine. Upon the other hand, if the member which is intended to perform the office of the controlling member be not positive in its action of changing the direction of the descending mass of material to be separated the operation of the separator will be ineffectual, and a large percentage of coal will be lost with the slate. The longitudinal slot 21 in the controlling member when employed is designed to separate from the coal the finer particles of dust or culm, which might otherwise pass over with the coal.

Adjacent to the abruptly-descending side 22 of the controlling member I provide a coal-discharge chute 23, which is preferably longitudinally and vertically adjustable with respect to the controlling member. It is provided for that purpose with threaded supporting-rods 24, which, passing through apertures in angle-arms 25, is adjustably sustained in position, as by wing-nuts 26. The angle-arms are respectively pivoted to the opposite side pieces 1, as indicated at 27, and are provided with segmental slot-pieces 28, which receive wing-bolts 29, that enter the side pieces, respectively, and serve to fix the angle-arms in any required position to which they may be swung upon their pivots 27. The wing-nuts 26, together with the threaded rods 24, afford means of vertical adjustment of the discharge-chute, while the swinging movement of the angle-arms afford means of imparting to it longitudinal adjustment. Other means of adjustment, however, may be substituted for those suggested.

The adjustment of the discharge-chute to and from the controlling member may be employed in connection with a stationary controlling member; but I prefer in conjunction with or independently of the adjustable discharge-chute to provide means of adjusting the position of the controlling member both with respect to the intermediate floor-section

and the discharge-chute. For this purpose the underlapping upper end of the controlling member may be provided with a rod that extends through longitudinal slots 30 in the side pieces 1. To the opposite extremities of the rod, respectively, are secured links 31, which are pivotally connected to cranks 32, secured to opposite ends of a rock-shaft 33, working in suitable bearings 34 in the opposite side pieces 1. One of the cranks, preferably the one adjacent to the lever 16, is prolonged into a handle 35, through whose manipulation the rock-shaft may be oscillated and the position of the controlling member thereby fixed. Friction may be relied upon to secure the position of the controlling member when adjusted, or other means for confining the prolonged crank may be provided.

Underneath the discharge-chute 23 I provide a slate-chute 36 and prefer to extend the same between the side pieces 1. In order to render the slate-chute open and accessible, I provide near the upper end of the discharge-chute an angular obstruction 37, which divides the volume of coal delivered to the discharge-chute and deposits it in lateral chutes 38, preferably extending upon opposite sides of and parallel and contiguous to the slate-chute.

My invention comprehends a revoluble wheel that is provided with a plurality of tangentially-disposed planes 40, which may be secured to the squared sides of a shaft, whose end journals 41 are mounted in suitable bearings in the side pieces 1. In practice the wheel is carried so that the edges of the planes 40 alternately sweep across the face of the floor-section 8, but preferably not in contact with it. The distance between the edges of the respective planes as they sweep across the floor 8 varies with different kinds of coal, and I prefer for that reason to mount the shaft 41 in journal-boxes 42, adjustable within suitable ways 43, as by means of swiveled bolts 44. Through the employment of the adjustable journal-boxes the distance between the planes and the surface of the floor 8 may be regulated as required. In practice the planes 40 are operated by the weight of the coal against them from the upper side, so as to allow only a certain quantity to pass downward over the floor at one time. In this manner it acts as a spreader, so that each particle of the mass which passes beneath it is brought practically into contact with the floor and is so delivered to the controlling member, which is thus enabled to act upon each particle separately and to impart to it that change of direction which is proportionate to the momentum of its descent and its comparative weight.

It may be observed that if a small quantity of coal be supplied at a time to the floor-section 8 it will pass underneath the feed-wheel without causing it to rotate or causing it to make but a slight rotary movement. On the

contrary, if a heavy weight of coal be supplied to the section 8 the wheel acts as a dam against the passage of the entire mass and rotates, so as to separate and spread the mass in the manner above described. In that way it operates automatically by the weight of the coal against it and without the objectionable application of an independent driving power.

It is desirable to provide means for regulating or limiting the speed of movement of the wheel under certain conditions. For this reason I prefer to provide suitable governing mechanism. Such, for example, may consist of an arm 45, secured at one end to one of the side pieces and provided at the other end with a split collar 46, that encircles and engages one of the journals 41. A tension-screw 47 may be provided for controlling the brake action of the walls of the split collar upon the sides of the journal. If conditions are favorable, the tension-screw may be loosened, so that the split collar does not bear upon the journal to any appreciable extent, or it may be tightened, as required, to limit the rate of speed of the shaft, as desired.

In operation the frame, which includes the side pieces 1, having been adjusted at a proper angle and the distance between the controlling member and the discharge-chute having been properly fixed, a mass of debased coal is deposited upon the head-section 8 of the chute-floor. Descending thence under the revolving blades 40 and over the intermediate section 10 it strikes the controlling member. The heavier particles, as of slate, slip between the lower side of the controlling member and the upper edge of the discharge-chute and escape into the slate-chute. The coal being of lighter weight in proportion to its bulk leaps across the space between the controlling member and the discharge-chute and landing upon the discharge-chute is conducted away to the lateral chutes.

The slate received by the slate-chute, if it contain any considerable percentage of coal, may be subjected to a subsequent operation of another separator, or if the percentage be small it may be picked out by hand from the slate-chute and passed into the lateral chutes upon the opposite sides thereof.

What I claim is—

1. In a separator, the combination with side pieces and floor constituting a chute, of a second chute, and an inclined controlling member underneath the chutes and provided with an upwardly-curved and longitudinally-slotted transverse portion intermediate of the chutes and extending above their bottom walls, substantially as specified.

2. In a separator, the combination with receiving and discharge chutes, of a controlling member located below said chutes and provided with a longitudinally-slotted transverse rib extending upwardly between the adjacent extremities of said chutes, and means for ad-

justing the controlling member longitudinally, substantially as specified.

3. In a separator, the combination with receiving and discharge chutes and a controlling member intermediate thereof, of a slate-chute, lateral chutes beyond the sides of the slate-chute and an obstruction in the discharge-chute for causing delivery of the material from the discharge-chute to said lateral chutes, substantially as specified.

4. In a separator, the combination with a receiving-chute pivoted at one end, and mechanism for effecting the pivotal adjustment thereof, of a longitudinally-adjustable controlling member below the pivoted end of the receiving-chute, and provided with a transverse rib extending above the floor of the chute, means for effecting the longitudinal adjustment of the controlling member, a discharge-chute beyond the controlling member and means for effecting the vertical and longitudinal adjustment of the discharge-chute, substantially as specified.

5. In a separator, the combination with a terminally-pivoted receiving-chute, of a longitudinally and vertically adjustable discharge-chute, means for effecting the pivotal adjustment of the receiving-chute, a longitudinally-adjustable controlling member below the receiving-chute and provided with a transverse slotted rib extending upwardly between the adjacent ends of the chutes, means for effecting the longitudinal adjustment of said controlling member, swinging arms, a support for said arms, and rods adjustably carried by said arms and pivoted to the discharge-chute, substantially as specified.

6. In a separator, the combination with a support, receiving and discharge chutes, and an intermediate controlling member, of pivoted angle-arms carried by the support, means for effecting the pivotal adjustment of said arms, rods pivoted to one extremity of the discharge-chute, and means for adjustably connecting said rods with the angle-arms, substantially as specified.

7. The combination with a side piece and a floor constituting a chute, of a longitudinally-slotted coal-controlling rib provided in the floor, the slot in the rib being located near its highest part, and a second chute in proximity to the rib, substantially as set forth.

8. In a separator the combination with side pieces and floor constituting a chute, of a second chute, a coal-controller section carrying a controller between the first and second chutes, and means for adjusting the coal-controlling section longitudinally between the side pieces, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

PATRICK F. HARAN.

Witnesses:

J. G. HOPKINS,

A. E. GRANT.