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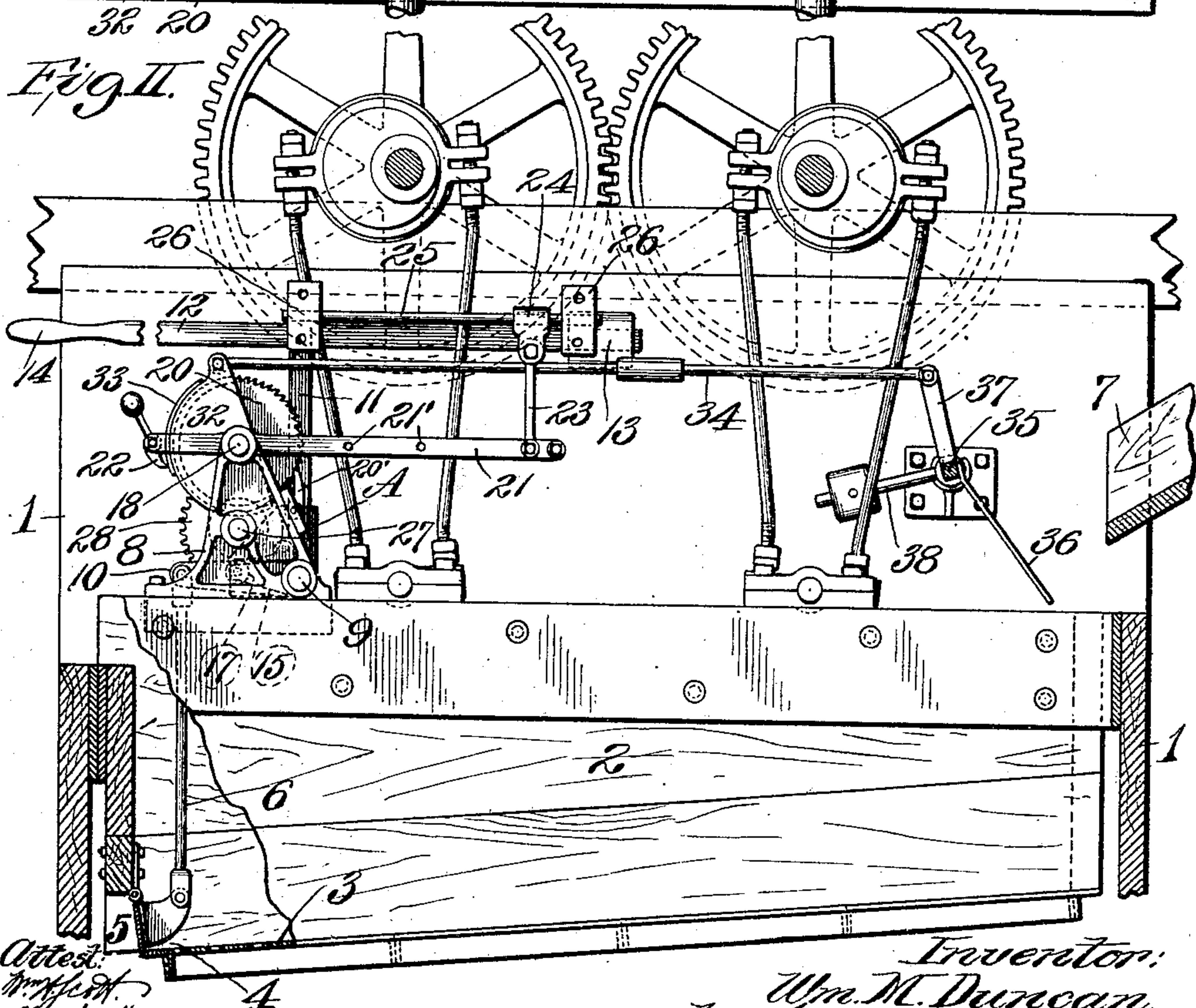
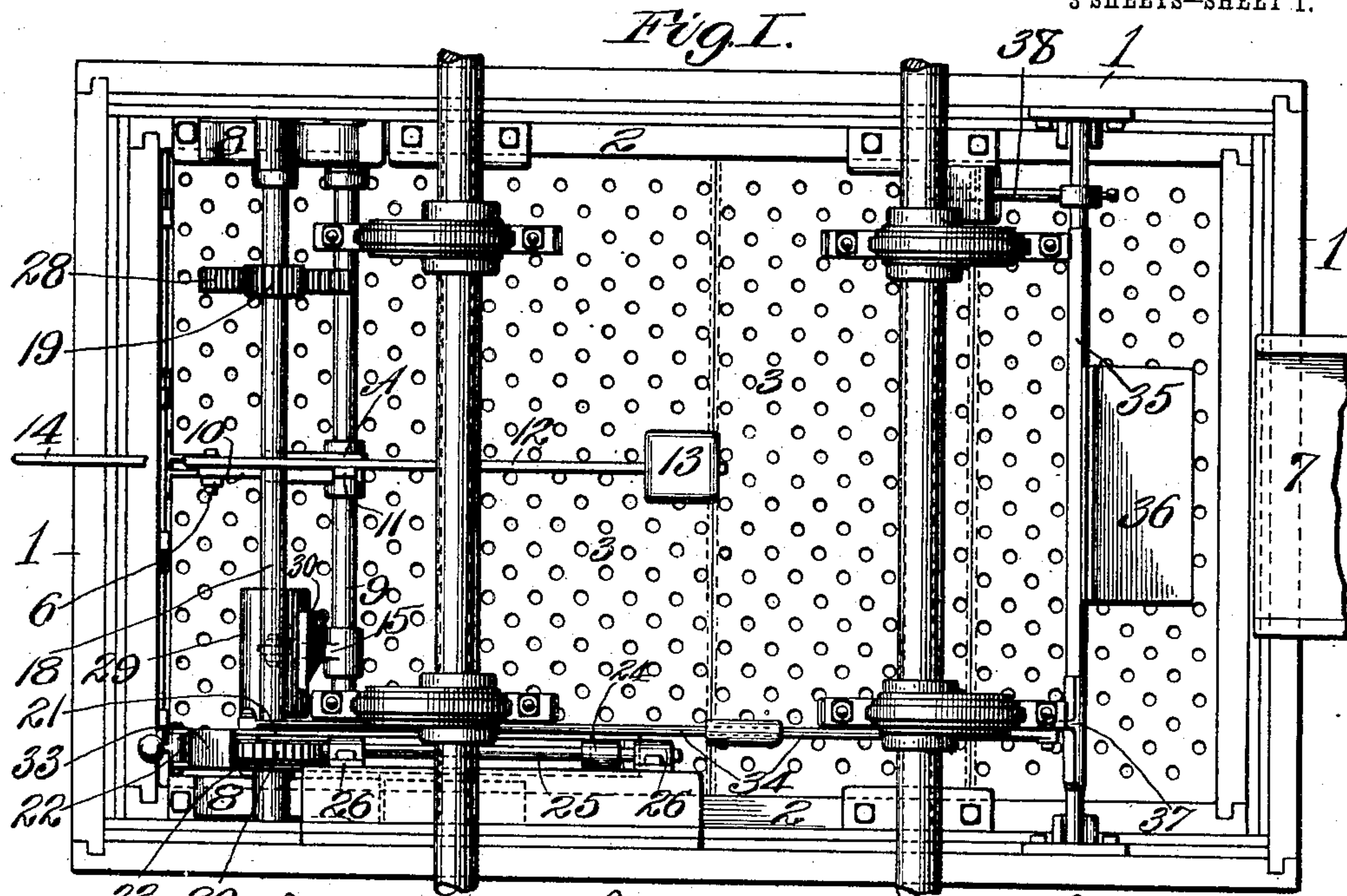
PATENTED JUNE 23, 1908.

W. M. DUNCAN.

MECHANISM FOR CONTROLLING THE GATES OF COAL WASHER JIGS.

APPLICATION FILED FEB. 21, 1908.

3 SHEETS—SHEET 1.



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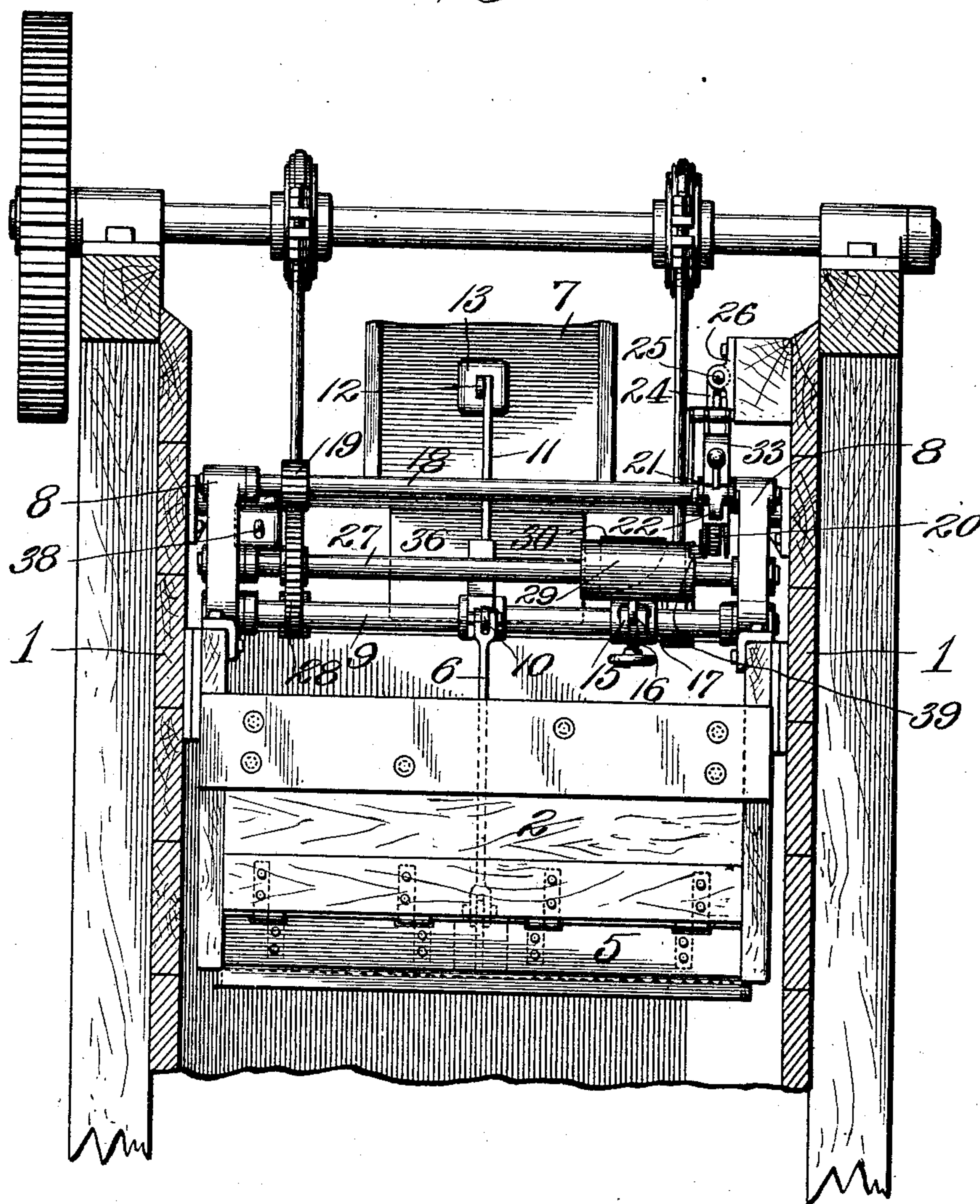
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Fig. III.



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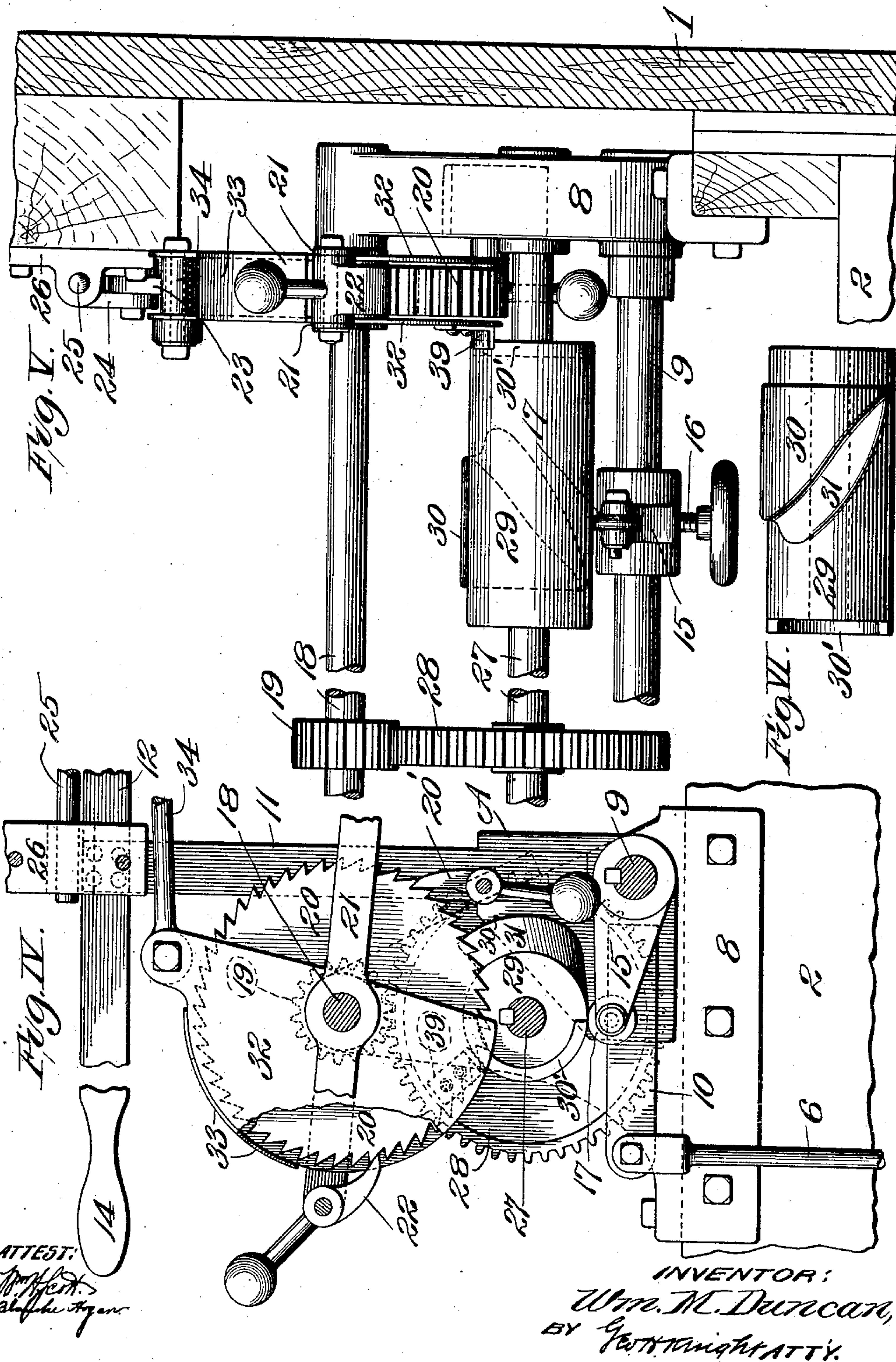
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM M. DUNCAN, OF ALTON, ILLINOIS.

MECHANISM FOR CONTROLLING THE GATES OF COAL-WASHER JIGS.

No. 891,610.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed February 21, 1908. Serial No. 417,027.

To all whom it may concern:

Be it known that I, WILLIAM M. DUNCAN, a citizen of the United States of America, residing in Alton, county of Madison, and State of Illinois, have invented certain new and useful Improvements in Mechanisms for Controlling the Gates of Coal-Washer Jigs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

My invention relates to that character of mechanisms used for controlling the gates or valves that govern the outlets of coal washer jigs through which slate or other heavy matters are discharged, and an example of which is to be found in Letters Patent of the United States issued to me, February 21st, 1905, No. 783,249.

The present invention has for its object, the production of a mechanism of the kind named, whereby the jig gates may be opened at intervals and retained in an open position for definite periods, and further a mechanism whereby the length of time that the gates are held in open positions, may be regulated.

Figure I is a top or plan view of a coal washer having my mechanism incorporated therein. Fig. II is a vertical longitudinal section taken through the coal washer. Fig. III is a vertical cross section through my apparatus. Fig. IV is an enlarged side elevation of the gate moving members of my mechanism, which are controlled by the coal governed part of the mechanism. Fig. V is a front elevation of the parts shown in Fig. IV. Fig. VI is an elevation of the cam member that controls the jig gate and which forms a part of the mechanism illustrated in detail in Figs. IV and V.

In the accompanying drawings: 1 designates the washing tank of a coal washer, and 2 is the jig of said washer, which is supported and operated within the tank with a rise and fall motion by mechanism such as that shown in the drawings, and for which no invention is herein claimed. The jig is provided with the usual perforated bottom 3 and has an outlet 4 at its front and lowermost end that is controlled by a movable gate 5 (see Figs. II and III). The outlet 4 provides for the discharge of slate, or other heavy matters, from the jig in the ordinary manner, and the gate 5 has connected to it an operating rod 6, which is united to one of the members of my gate operating mechanism to be hereinafter

described. Coal is delivered to the jig 2 through a chute 7.

8 designates a pair of posts or standards mounted upon the side walls of the jig 2 and which serve as supports and journal members for several shafts that enter into my mechanism as will hereinafter appear.

9 designates a rock shaft that extends transversely of the jig 2 and is journaled in the posts 8 near the bottoms thereof. This shaft has fixed to it a bell crank lever A comprising a forwardly extending arm 10 to which the gate operating rod 6 is pivotally connected, and an upwardly extending arm 11. The bell crank lever A is adapted to be oscillated in conjunction with the rocking of the rock shaft 8 for the purpose of moving the outlet gate 5 of the jig from closed to open positions and vice-versa.

12 is a counter-balance arm attached to the upper end of the vertical arm 11 of the bell crank lever A and extending rearwardly therefrom (see Figs. I to III inclusive). The arm 12 bears an adjustable weight 13. The normal tendency of the counter-balance arm 12 is to so operate the bell crank lever A that it will exert a pull upon the gate operating rod 6 and hold said gate, which opens outwardly relative to the outlet 4 of the jig, in a closed position.

14 is a hand lever extending forwardly from the upper end of the bell crank lever arm 11 and through the medium of which the bell crank lever A may be manually actuated for the purpose of opening and closing the gate 5.

15 designates a crank arm that is feathered to the rock shaft 9, as seen in Fig. IV thereby providing for lateral adjustment of the arm upon said shaft. This crank arm, which extends forwardly from the shaft or in the same general direction as the arm 10 of the bell crank lever A, is adapted to be held in a fixed position upon said rock shaft by a set screw 16 and in the free end of the arm is an anti-friction roller 17 that coöperates with a member to be hereinafter more particularly referred to, for the purpose of automatically rotating the rock shaft 9 with the result of causing it to move the bell crank arm 10 and the gate operating rod 6 whereby the gate 5 is moved to an open position.

18 designates a drive shaft that is journaled in the upper ends of the posts 8 and which has fixed thereto a pinion 19.

20 is a ratchet wheel also fixed to the drive

shaft 18 and which is adapted to be actuated during the rise and fall motion of the jig 2.

21 is a lever loosely mounted intermediate of its ends, upon the drive shaft 18 adjacent to the ratchet wheel 20.

22 is a weighted pawl mounted in one of the arms of the lever 21, and adapted to engage the teeth of the ratchet wheel 20. The other arm of said lever 21 has connected to it a link or resistance member 23. The link 23 is supported by a sleeve 24 that is slidably fitted to a hanger rod 25 attached by blocks 26 to one of the side walls of the washing tank 1. It will be seen that when the jig 2 is raised and lowered, and the ratchet wheel 20, which is supported by the jig upon the shaft 18 is raised and lowered with said jig, the point of connection between the link 23 and the lever 21 remains a fixed point, and that as a result the lever 21 moves vertically, so that the pawl 22 carried by said lever may, by engagement with the ratchet wheel, impart rotation to the ratchet wheel and to the drive shaft 18. The rotation of the ratchet wheel and drive shaft is thus accomplished in a step by step manner and the mounting of the sleeve 24 upon the hanger rod 25 provides for the adjustment of the link 23 to different points relative to the arm of the lever 21 to which said link is attachable. Several bolt holes 21' are provided in the arm of the lever just mentioned, for the reception of the bolt that connects the link 23 to said arm, and it will be readily understood that when it is desired to cause the pawl 22 to impart a slight degree of rotation to the ratchet wheel 20, the link 23 is attached to the arm of the lever near the outer end of the arm, and when it is desired to cause the pawl to impart greater degrees of movement to the ratchet wheel, the link is shifted to points nearer the axis of the ratchet wheel.

20' designates a detaining pawl supported by one of the posts 8 and which acts to prevent retrograde rotation of the ratchet wheel 20 during the operation of said wheel.

27 designates a driven shaft that is journaled in the posts 8 carried by the jig 2 and located beneath the drive shaft 18. This shaft 27 receives power from the drive shaft 18 through the medium of the pinion 19 upon said drive shaft, and a spur wheel 28 that is fixed to the shaft 27.

29 is a cam member that is rigidly mounted upon the driven shaft 27 and which includes a peripheral cam extension 30, most clearly seen in Figs. IV to VI, inclusive. The cam member 29 is in the main of cylindrical shape and is arranged to contact with the anti-friction roller 17 mounted in the crank arm 15, thereby providing for the crank arm being unaffected by the cam member during a partial rotation of said cam member in order that it may remain in-

active and have no effect upon the rock shaft 9 and the outlet controlling gate of the coal washer jig. During each complete rotation however, of the driven draft 18 and the cam member 29, while being driven in the manner previously explained, the cam extension 30 of the member 29 is brought into contact with the anti-friction roller 17 and as a consequence, the crank arm 15 is depressed with the result of imparting rotation to the rock shaft 9 and causing the gate 5 to be moved to an open position. The gate is maintained in such position for a length of time that is governed by that required for the cam extension 30 to travel in contact with the anti-friction roller 17 of the crank arm 15, and immediately after the cam extension has traversed said anti-friction roller, the roller returns into contact with the cylindrical portion of the cam member 29, thereby permitting the gate to be returned to its closed position, under the influence of the bell crank lever A and its counter-balance arm 12.

To provide for a variation in the length of time that the gate 5 is retained in an open position, during the operation of the mechanism herein described, I make the cam extension 30 of the cam member 29 of tapering shape, or in other words, narrow said cam from its butt end to its point, this construction of the cam extension being facilitated by beveling the cam extension at 31. It will be seen that by shaping the cam extension as explained, I provide for a wide variation in the length of time required for the cam extension to traverse the anti-friction roller 17 of the gate actuating crank arm 15, by simply shifting said crank arm longitudinally upon the rock shaft 9, and longitudinally of the cam member 29. When the crank arm is so positioned that a wider portion of the cam extension traverses the anti-friction roller of the crank arm, a certain period of time will elapse during which the crank arm 15 is held depressed to retain the gate in an open position, whereas when the crank arm is shifted toward the narrower end of the cam extension, a shorter period of time will elapse during which the crank arm is held depressed and the gate held open.

The automatic mechanism described is designed to be operable only during the time that coal is being delivered into the jig of the coal washer and is thrown out of operation when the delivery of coal ceases. To provide for the control of the mechanism to the end just noted, I utilize the following parts:— 32 is a guard loosely mounted upon the drive shaft 18 adjacent to the ratchet wheel 20 and which is provided with a shield and trip member that is located at the periphery of the ratchet wheel. The member 33 is adapted to occupy a position in front of the ratchet wheel actuating pawl 22 when coal

is not being delivered into the jig, as seen in Fig. II, thereby rendering said pawl inactive upon the ratchet wheel, but it is adapted to be withdrawn from the position just stated into the position shown in Figs. IV and V, when coal is being delivered into the jig. 34 is a controlling rod pivoted to the guard 32. 35 is a rock shaft that is supported by the tank 1 of the coal washer, and 36 is a plate attached to said rock shaft and located in juxtaposition to the lower end of the coal chute 7, so that the coal passing to the jig from said chute, will strike the plate before it falls into the jig. Connection between the rock shaft 35 and the controlling rod 34 is provided by a crank arm 37, and the rock shaft has associated with it a rearwardly extending counter-balance arm 38 by which the plate 36, against which the coal strikes, is maintained in an uplifted position, when coal is not striking thereagainst to hold the plate depressed. The counter-balance arm 38 also serves at such time to move the crank arm 37 and the controlling rod 34 in a backward direction, in order that the guard 32 will be held in a position to prevent actuation of the ratchet wheel by the pawl 22.

In the practical use of a coal washer provided with my gate operating mechanism, the coal descending through the chute 7 strikes against the plate 36 and by depressing said plate, causes the rock shaft 35 to be rotated, and the controlling rod 34 to be moved toward the chute, with the result of elevating the shield 33 of the guard 32 from the position shown in Fig. II where it interferes with the engagement of the pawl 22 with the ratchet wheel 20. The coal washer being in active operation, vertical rocking movement is imparted to the lever 21, and the ratchet wheel 20 is rotated by the engagement of the pawl 22 carried by said lever. As the ratchet wheel rotates, it imparts rotation to the drive shaft 18 and causes said shaft to drive the driven shaft 27 and carry the cam member 29 with it. As a consequence, the cam extension of said cam member operates at each complete rotation of the driven shaft 27 to actuate the crank arm 15 and cause said crank arm to rotate the rock shaft 9, so that the gate 5 of the jig will be opened and held in an open position for a specified period after which it will close and remain closed until the cam extension again moves into operative engagement with the crank arm 15. When there is cessation of delivery of coal through the chute 7, the counter-balance arm 38 acts to so shift the guard 32 as to move its shield 33 to the pawl 22 and trip said pawl out of engagement with the ratchet wheel, thereby allowing the gate, if open, to be returned to a closed position under the action of the counter-balance arm 12 associated with the bell crank lever A.

It is, as will be appreciated, important that

the pawl 22 should not be thrown out of active position by the shield of the guard member 32, during the time that the gate is held in an open position, under the influence of the cam member extension 30. To provide against the pawl being thrown out of action at this time, I supply the cam member 29 with a segmental cam 30' located at one of its ends and attach to the guard member 32, a lip 39 that is adapted to ride upon the cam 30' throughout the period that the cam extension is coöperating with the crank arm 15, thereby furnishing support for the guard 32 until the cam extension has performed its office, during each complete rotation of the driven shaft 18.

I claim:

1. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a rock shaft having connection with said gate, an arm shiftable on said rock shaft, a rotatable tapering cam for coöperation with said rock shaft arm, a drive member with which said cam is coöperable, and means whereby said drive member is operated, substantially as set forth.

2. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a rock shaft having connection with said gate, an arm shiftable on said rock shaft, a rotatable tapering cam for coöperation with said rock shaft arm, a drive member with which said cam is coöperable, and means connected to a stationary member whereby said drive member is operated, substantially as set forth.

3. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a driven member whereby said gate is actuated, a drive member with which said driven member coöperates, a lever for operating said drive member, a link adjustably connected to said lever, and a supporting rod fixed to a stationary part of the coal washer to which said link is slidably connected, substantially as set forth.

4. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a driven member whereby said gate is actuated, a drive member with which said driven member coöperates, means whereby said drive member is operated, and means operable by the coal delivered to said jig whereby said drive member operating means is rendered active during the delivery of coal to the jig and is rendered inactive upon the cessation of delivery of coal to the jig, substantially as set forth.

5. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said

outlet, a driven member whereby said gate is actuated, a drive member with which said driven member coöperates, means having connection to a stationary member whereby said drive member is operated, and means operable by the coal delivered to said jig whereby said drive member operating means is rendered active during the delivery of coal to the jig and is rendered inactive upon the cessation of delivery of coal to the jig, substantially as set forth.

6. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a driven member whereby said gate is actuated, a drive member with which said driven member coöperates, means having connection to a stationary member whereby said drive member is operated, a guard adjacent to said drive member, and means operable by the coal delivered to said jig whereby said guard is moved to a position to permit the actuation of said drive member by the operating means provided therefor and to a position to prevent the actuation of said drive member by said operating means, substantially as set forth.

7. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a cam member whereby said gate is actuated, a drive member with which said cam member coöperates, means having connection with a stationary member whereby said drive member is operated, a guard member associated with said drive member where-

by said drive member operating means may be thrown out of actuation upon said drive member, and means operable by the coal delivered to said jig for controlling said guard; said cam member being provided with means for preventing movement of said guard into a position to throw said drive member operating means out of action until the cam member has been sufficiently moved to permit the closing of said gate, substantially as set forth.

8. The combination with a vertically reciprocating coal washer jig having a heavy matter outlet, of a gate for controlling said outlet, a cam member whereby said gate is actuated, a drive member with which said cam member coöperates, means having connection with a stationary member whereby said drive member is operated, a guard member associated with said drive member whereby said drive member operating means may be thrown out of actuation upon said drive member, and means operable by the coal delivered to said jig for controlling said guard; said cam member being provided with a segmental cam for preventing movement of said guard into a position to throw said drive member operating means out of actuation until the cam member has been sufficiently moved to permit the closing of said gate, substantially as set forth.

W. M. DUNCAN.

In presence of—

H. H. HEWITT,
L. M. CARR.