A. C. HOECKER.

COAL WASHING JIG.

APPLICATION FILED JUNE 27, 1910.

994,160.

Patented June 6, 1911.

4 SHEETS—SHEET 1.

FIG. 1.

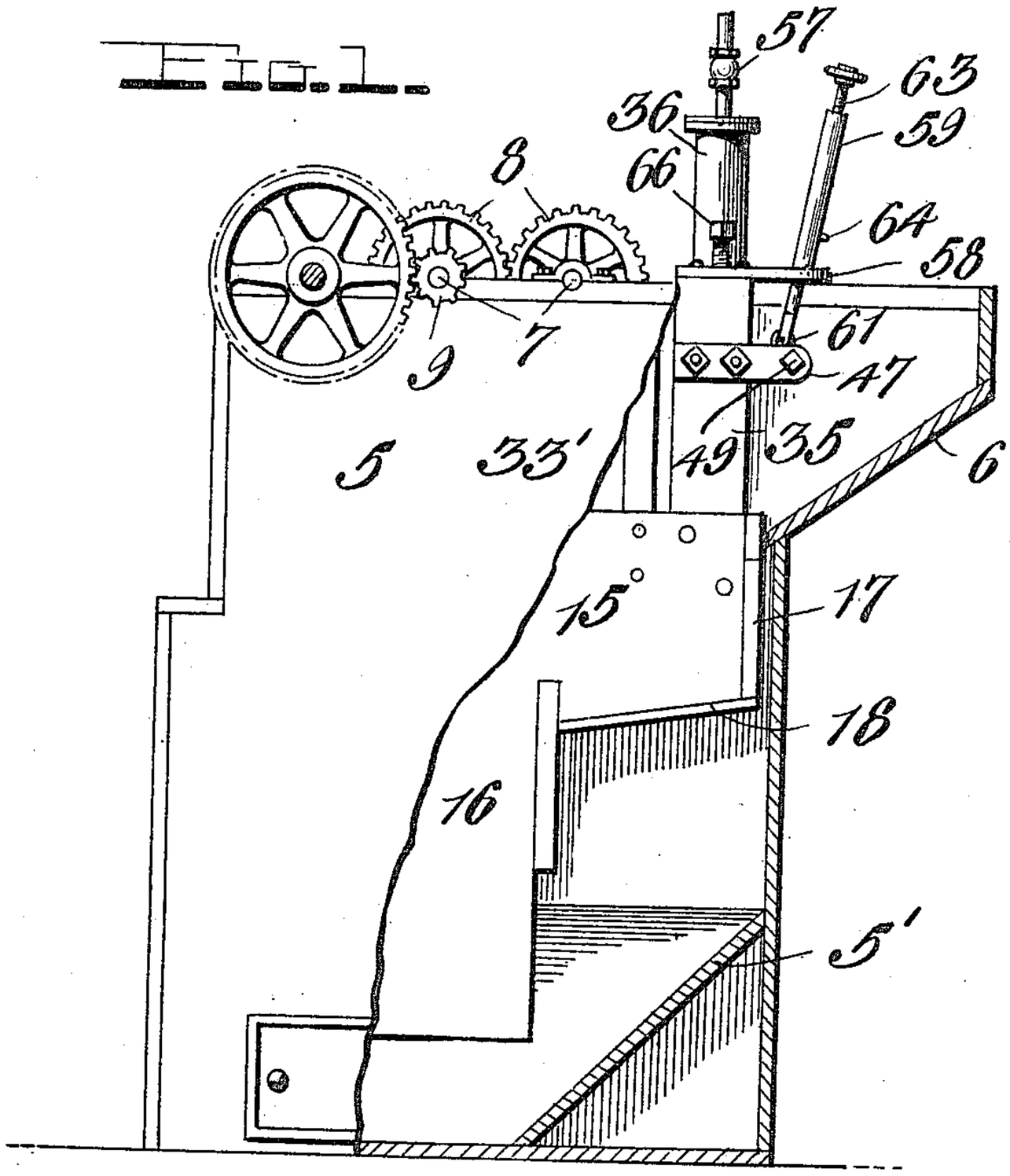
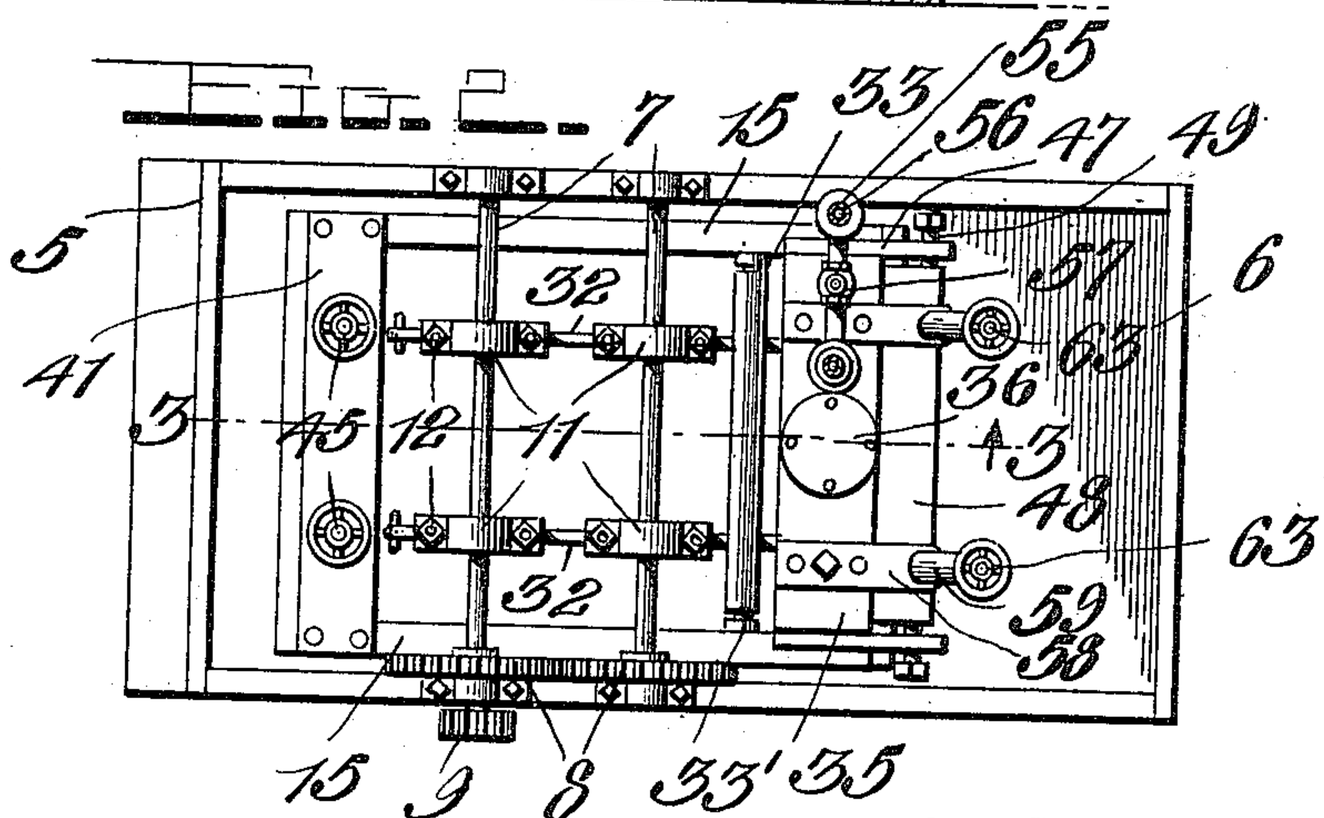


FIG. 2.



Witnesses

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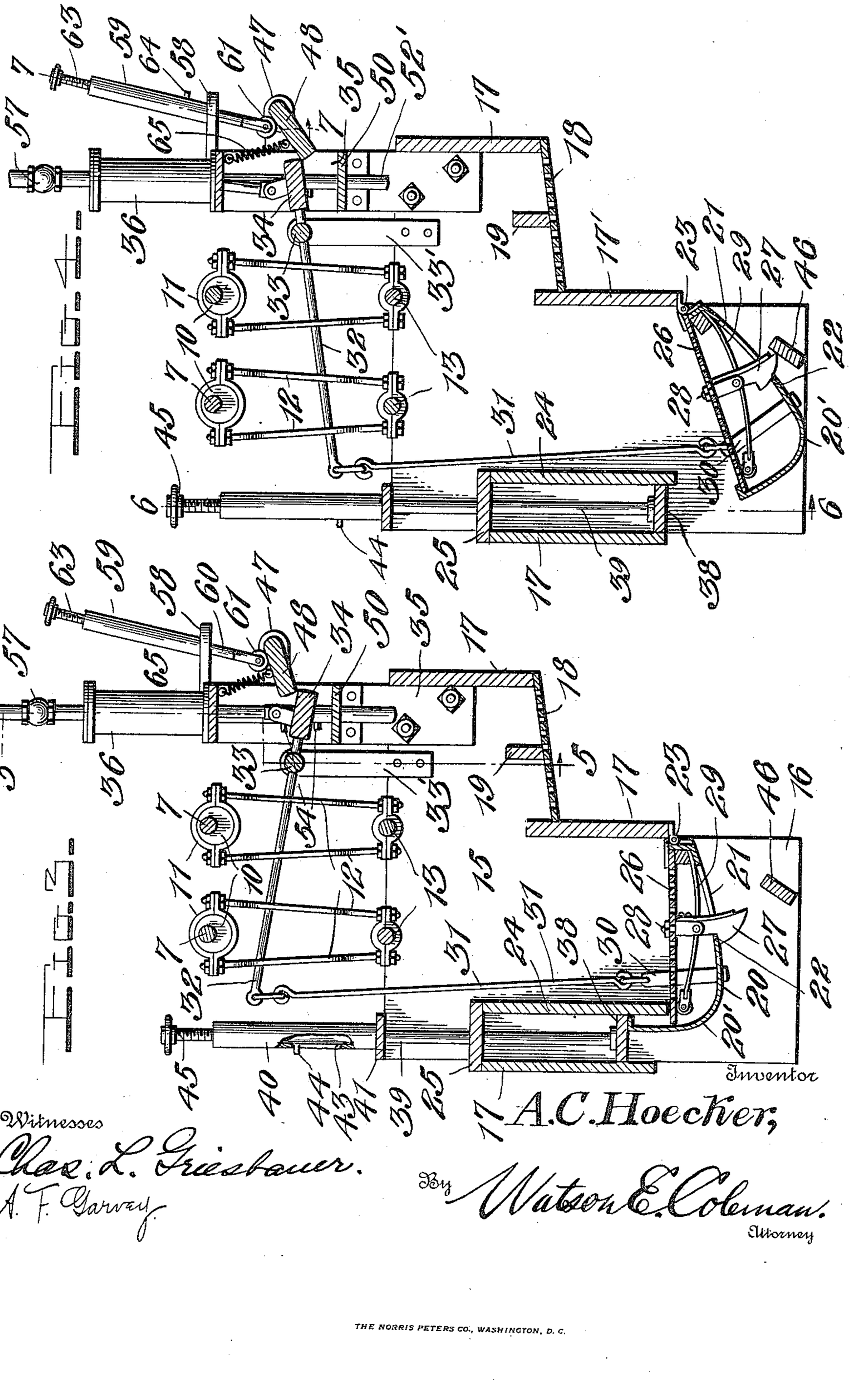

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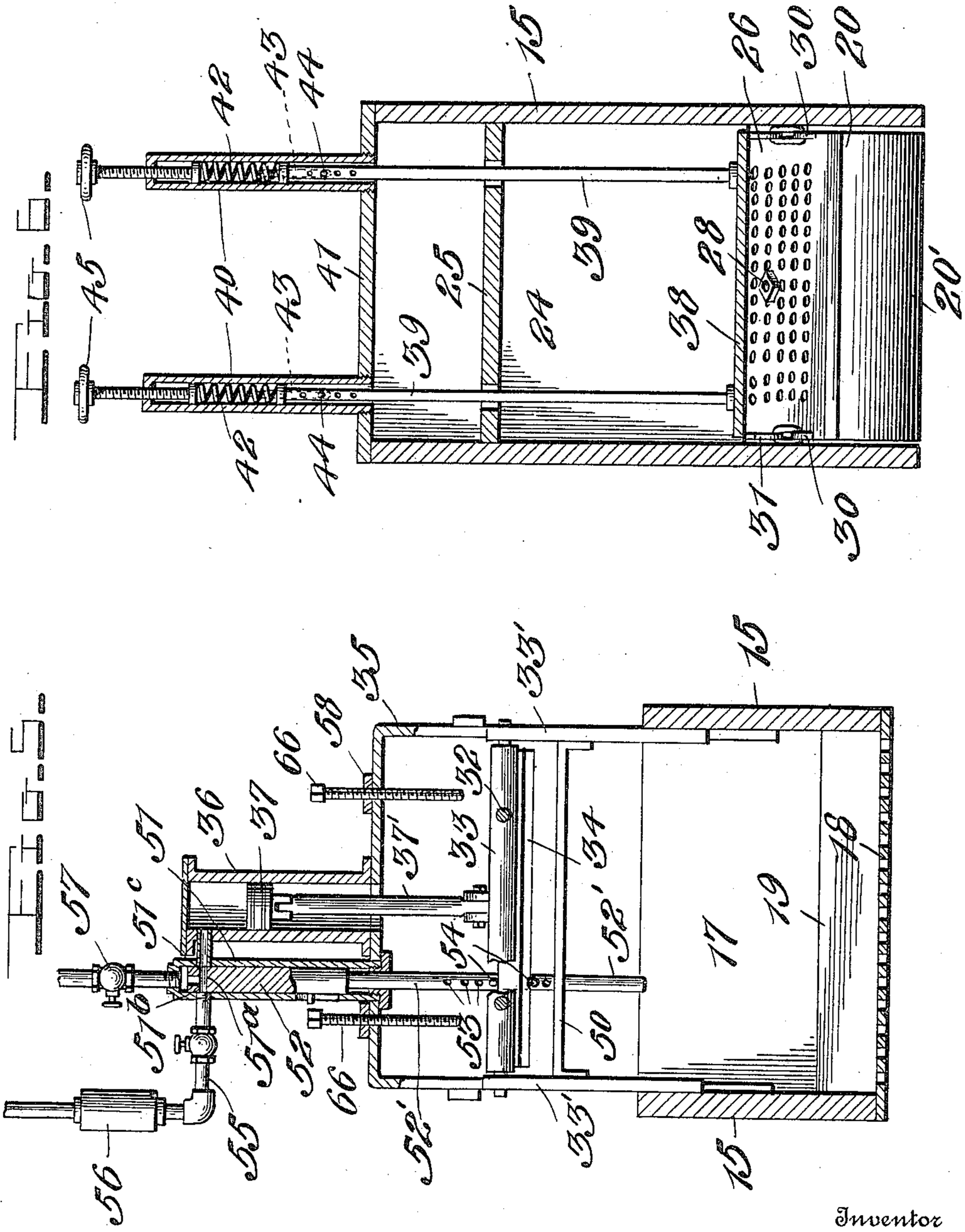

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4 SHEETS—SHEET 4.

Fig. 7.

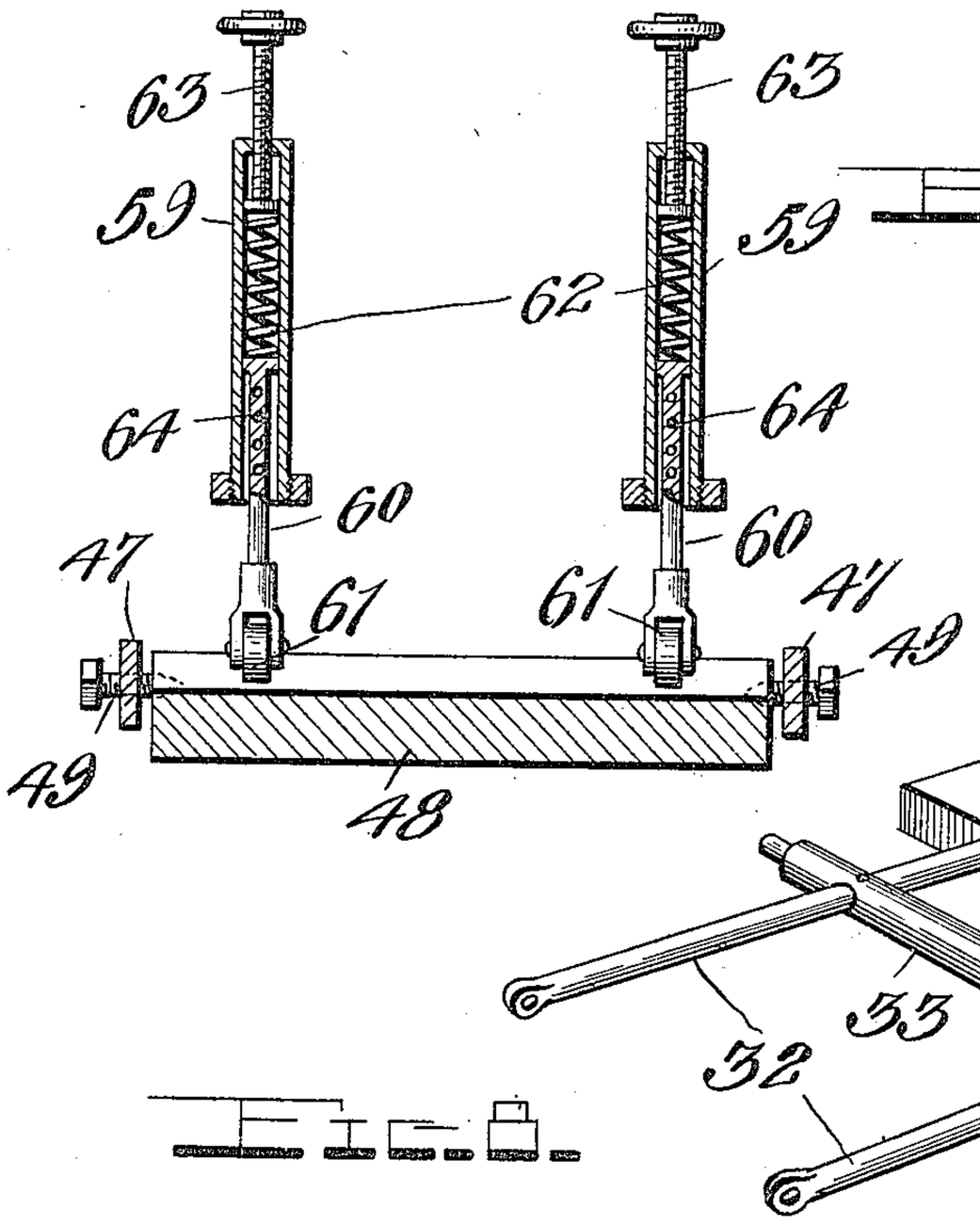
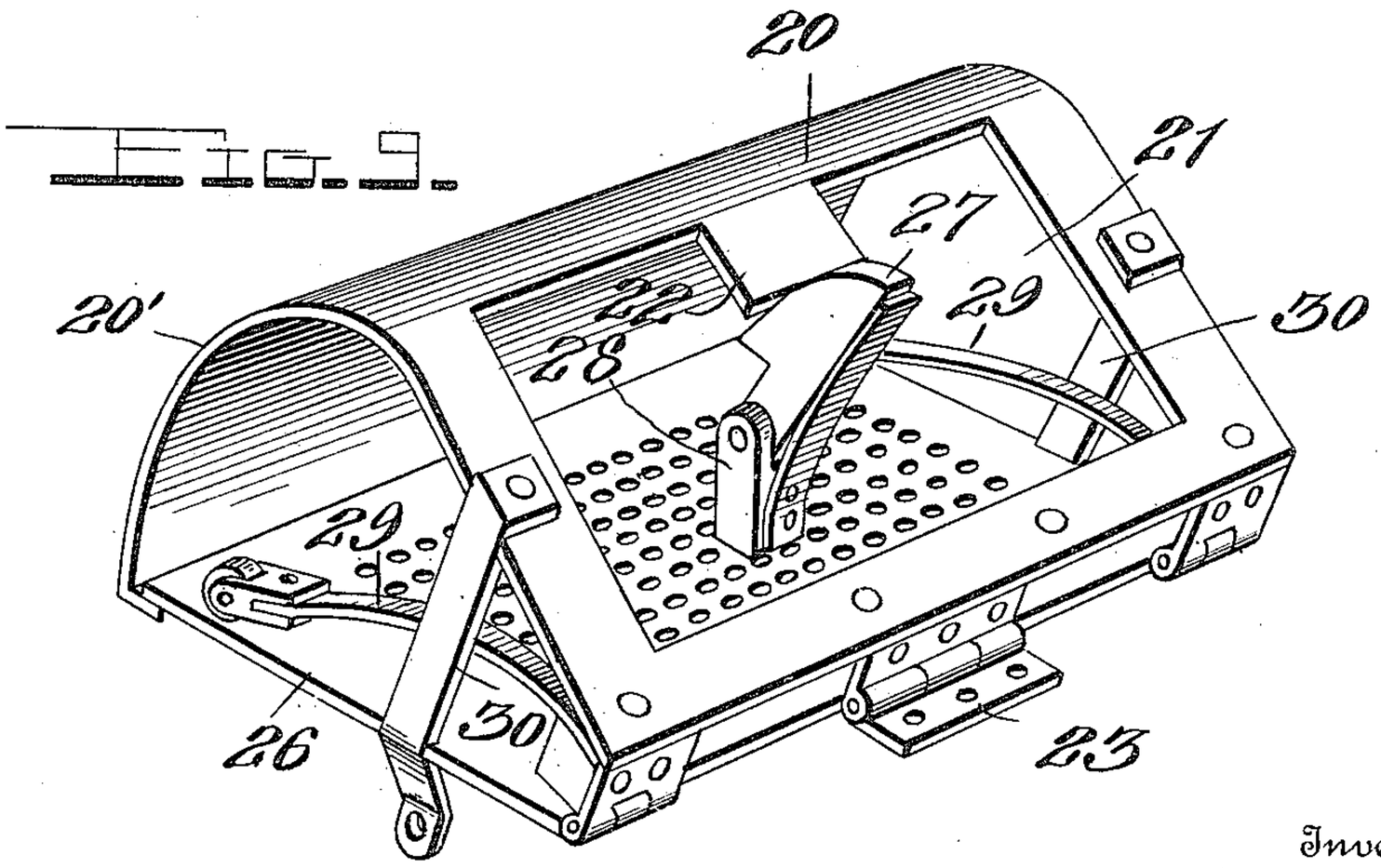


Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

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COAL-WASHING JIG.

994,160. Specification of Letters Patent. Patented June 6, 1911.

Application filed June 27, 1910. Serial No. 569,105.

To all whom it may concern:

Be it known that I, ALBERT CHARLES HOECKER, a citizen of the United States, residing at Collinsville, in the county of Madison and State of Illinois, have invented certain new and useful Improvements in Coal-Washing Jigs, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to coal washing jigs and has for its object to provide a machine of this character of comparatively simple construction which is entirely automatic in its operation and will separate and discharge the slate from the coal as it is washed.

A further object is to provide a coal washing machine having a movable gate adapted to be actuated by the weight of the slate deposited thereon and which is automatically returned to its normal position by means actuated by compressed air.

A still further object of the invention resides in the provision of means for regulating the amount of slate necessary to cause the operation of the coöperatively connected elements of the mechanism.

A further object of the invention is to provide means for preventing the loss of fine particles of coal when the feed of the coal to the jig is stopped and also in new and novel means for controlling the automatic supply and exhaust of air to the compressed air cylinder.

With these and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a coal washing jig embodying my improvements, part of the water tank or casing being broken away; Fig. 2 is a top plan view; Fig. 3 is a vertical longitudinal section taken on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 3 showing the arrangement of parts after the slate gate has moved to its discharging position; Fig. 5 is a section taken on the line 5—5 of Fig. 3; Fig. 6 is a section taken on the line 6—6 of Fig. 4; Fig. 7 is a section taken on the line 7—7 of Fig. 4; Fig. 8 is a detail perspective view of the pivoted gate actuating member; Fig. 9 is an inverted detail perspective view of the hinged cut-off member and movable slate gate carried thereby.

Referring more particularly to the drawings 5 indicates the tank or casing in the lower portion of which the water is contained in which the jig proper is adapted to be vertically reciprocated. At one end of the casing and the top thereof a feed spout or hopper 6 is formed into which the coal is poured and from which it is discharged into the jig. The sides of the tank or casing 5 extend above the forward end thereof and have arranged upon their upper edges suitable bearings in which the transverse shafts 7 are journaled. Each of these shafts has fixed thereon a gear 8. These gears have intermeshing engagement and are adapted to transmit power from one shaft to the other and to rotate said shafts at the same relative speeds. Upon the end of one of the shafts 7 a pinion 9 is secured which is adapted to be connected to an engine or other source of power supply to operate the jig. Upon each of the shafts 7 and adjacent to the opposite sides of the tank or casing 5 an eccentric 10 is secured. Yokes or bands 11 are arranged upon the peripheries of these eccentrics and rods 12 connect the ends of the yokes to transverse stationary rods or shafts 13 secured upon the upper edges of the body of the jig. The connecting rods 12 are provided with slots intermediate of their ends through which the longitudinally disposed rods 32 extend and are movable. These rods 32 serve to prevent transverse bodily movement of the jig in the tank but are adapted for another and more important purpose which will be later set forth. It will be obvious that when power is applied to the shafts 7 they will be rotated through the medium of the intermeshing gears 8 and the eccentrics carried by said shaft will move the jig vertically in the tank or casing and the coal carried thereby will thus be agitated in the water contained in the tank.

The jig proper comprises the parallel side members 15 which are formed with the depending legs or extensions 16, said side members being of substantially inverted L-shaped form. These side members are connected by means of a plurality of transverse bars 17, 17′ and 17″. One of these connecting bars 17 is arranged upon the rear edges

of the depending legs 16 and extends below the horizontal portions of the side members. Between the intermediate connecting bar 17′ and the rear connecting bar 17 a foraminous plate 18 is secured. A transverse cleat 19 is centrally arranged upon this plate between the two connecting bars 17 and 17′ and divides the same into two sections. It will also be noted that the intermediate connecting bar 17′ extends slightly above the foraminous plate 18. The feed hopper or spout 6 extends rearwardly and above the connecting bar 17 and is adapted to deposit the coal and slate upon the foraminous plate 18. The transverse bar or cleat 19 will prevent all of the slate from moving forward over the intermediate connecting member 17′ and into the leg or extension of the body of the jig. By allowing a portion of the slate to remain upon the perforated plate 18 the possibility of the fine coal sifting through the perforations when the feed of the coal is cut off is overcome. It will of course be understood that as the coal is deposited in the rear end of the jig, it is being vertically reciprocated, and owing to the fact that the slate contained in the coal is heavier than the coal, the slate will thus sink upon the rear foraminous plate 18 and into the forward leg of the jig body while the lighter particles of coal will be floated.

The manner in which the slate is automatically collected and discharged after a predetermined amount of the same has accumulated will now be set forth in detail. To this end I provide a cut-off member 20 which is shown in detail in Fig. 9 and comprises a substantially rectangular plate curved or bent at one end as shown at 20′. The remaining portion of the plate has its central body part cut out as shown at 21 and from one longitudinal edge of the rectangular opening thus formed in the plate a tongue or finger 22 extends into the opening. One end of the plate 20 is secured to the lower edge of the intermediate connecting bar 17′ by means of a hinge 23. Thus the hinge will permit of the free swinging movement of the cut-off member 20. A transverse partition 24 is arranged between the sides 15 of the body of the jig and in spaced relation to the forward connecting member 17″. To the upper ends of the members 17″ and 24 a bar 25 is secured. The member 24 extends into the leg of the jig to a point slightly below the connecting bar 17″. A slate gate 26 is hinged upon the hinged end of the cut-off member 20 and is adapted for movement independently of said member as will more clearly hereinafter appear. This slate gate carries a spring pressed trip 27 which is pivotally mounted upon a stud 28 centrally secured to the under side of the gate. Leaf springs 29 secured to each side of the cut-off member 20 have their free ends engaging with the forward edge of the slate gate and normally hold the same up flush with the upper free edge of the cut-off member so as to provide a smooth surface over which the slate moves as it is discharged. An arm 30 is secured to each side of the cut-off member and extends above the slate gate adjacent to the partition 24. To these arms the lower ends of the rods 31 are connected, the upper ends of said rods being connected to the longitudinally disposed spaced arms 32. These arms are rigidly secured and extend through a transverse rock shaft 33 mounted in the upper ends of the bars 33′ secured to the side members 15 of the jig. On the rear ends of the longitudinally disposed arms 32 a plate 34 is secured. This plate is disposed between the vertical arms of a yoke 35 secured to the sides of the jig. Upon the intermediate portion of the yoke which connects these arms an air cylinder 36 is vertically mounted. A piston 37 which reciprocates in the cylinder has the lower end of its rod or stem 37′ pivotally connected to the plate 34 and is adapted to oscillate the same between the arms of the yoke.

It will be obvious from the above description that upon the reciprocation of the piston 37, the shaft 33 will be rocked in its bearings and the rods 31 connected to the ends of the arms 32 will be vertically moved to swing the cut-off member 20. Therefore it will be seen that upon the down stroke of the piston the rods 31 will be raised and draw upon the cut-off member so as to carry the same together with the slate gate upwardly between the sides of the leg of the jig. As this upward movement continues, the slate gate engages with the lower edge of the partition 24 which stops its continued movement. The cut-off member 20, however, continues to move, the upper edge of said member being disposed between the partition 24 and the rear connecting bar 17″. This movement of the member 20 is limited by the engagement of the same with a transverse plate 38 vertically movable in the chamber or housing formed between the partition 24 and the bar 17″. This plate is yieldingly held against vertical movement and is adapted to exert a certain amount of pressure upon the cut off member. The plate 38 is carried by the vertically disposed rods 39 to the lower ends of which it is secured. These rods extend through openings formed in the bar 25 and have telescoping engagement in the tubes 40 the lower ends of which are threaded into a cross plate 41 secured upon the upper edges of the sides of the jig. A coiled spring 42 is arranged in the upper end of each of said tubes and bears upon the rods 39. These tubes are each formed adjacent to their lower ends with a longitudinal slot 43 and the rods 39 each

carry a pin 44 movable in these slots. The rods are provided with a plurality of transverse openings so that the pins 44 may be adjusted therein. Thus as the cut-off member 20 moves upwardly and engages the transverse vertically movable plate 38, it will force the rods 39 upwardly in the tubes 40 and place the springs 42 under tension. The engagement of the pins 44 with the upper ends of the slots 43 will limit this upward movement of the rods. The tension of the springs in the tubes may be readily adjusted by means of the hand wheels 45 which carry shanks threaded in the upper ends of the tubes and engage with the springs. By adjusting the tension of these springs, a greater or less amount of pressure of the plate 38 upon the cut-off member 20 may be obtained so that it will require a corresponding variation of weight upon the slate gate to cause the descent of the gate and cut-off member. It will be noted from reference to Fig. 3 that when the cut-off member reaches the limit of its upward movement, the trigger 27 engages over the end of the tongue 22 formed upon the cut-off member thereby locking said plate and member together so that when sufficient slate has accumulated upon the gate these parts will move together downwardly in the leg of the jig. Between the depending leg portions 16 of the sides of the jig body, a transverse cross bar 46 is secured. As the slate gate and the cut-off member are forced downwardly by the weight of the slate, the curved edge of the trigger 27 engages said bar whereupon the trigger is forced off of the end of the tongue 22 to disconnect the parts. The leaf springs 29 which are placed under tension by the connection of these elements will immediately force the slate gate upwardly and outwardly to the position shown in Fig. 4 where it will be noted the slate gate is inclined and is disposed flush with the upper edge of the cut-off member. This downward movement of the slate gate will force the piston 37 upwardly in its cylinder and at the same time is adapted to automatically operate a suitable valve to admit air to the cylinder to provide sufficient pressure to again force the piston downwardly and cut off the discharge of the slate. The tongue trip 27 when engaged with the spring of the cut-off member 20 relieves the slate gate of the pressure of the springs 29. To the sides of the U-shaped member 35 the forwardly extending arms 47 are secured. A plate 48 is arranged between these arms and has formed on each end adjacent to its forward edge a trunnion 49 which is journaled in the arms. A transverse plate 50 is secured to the vertical arms of the U-shaped member below the plate 34. A valve casing 51 is secured in the U-shaped yoke 35 adjacent to the air cylinder. In this casing a slide valve 52 is arranged, the stem 52′ of said valve extending below the casing and through an opening in the connecting plate 50. This valve stem is provided with a plurality of openings 53 in which the pins 54 are adapted to be inserted. The movable plate 34 is positioned between these pins and is provided with a notch or recess 34′ to receive the valve stem or rod 52′. A supply pipe 55 communicates with the valve casing and with the air cylinder 36. On this supply pipe a stuffing box 56 is arranged, said pipe being formed in two sections one of which is connected to the source of air supply and is slidable in the stuffing box.

On the upper end of the valve casing 51 an exhaust valve 57 is secured which is adapted to exhaust the air from the cylinder 36. When the slate gate 26 is in position to receive the slate as shown in Fig. 3, the front edge of the plate 34 is engaged beneath the rear longitudinal edge of the plate 48. To the top of the U-shaped member 35 and adjacent to each side thereof a bar 58 is secured. These bars extend forwardly and have secured in their outer ends the vertically disposed tubes 59. A rod 60 is disposed in each of these tubes and has mounted in its lower end a roller 61 which engages upon the plate 48. In order to regulate the pressure of these rollers upon the plate, a coiled spring 62 is arranged in the upper ends of the tubes 59. A threaded stem 63 is engaged in the upper end of each tube and is adapted to be adjusted therein upon the springs to regulate their tension on the rods 60. Tubes 59 are provided with longitudinal slots in which pins 64 carried by the rods are disposed, said pins limiting the vertical movement of the rods in said tubes. When sufficient slate has been deposited upon the slate gate 26 to cause the same and the cut-off member 20 to move downwardly in the leg of the jig, the plate 34 carried by the arms 32 will be moved upwardly between the sides of the U-shaped member 35 from beneath the forward pivotally mounted plate 48. This movement will force the piston 37 upwardly in the air cylinder and engage the upper pin 53 carried by the sliding valve and admit air from the source of supply directly into the air cylinder above the piston. As the plates 48 and 34 are disengaged, the plate 48 will drop beneath the forward edge of the plate 34. A spring 65 is secured to the U-shaped frame member 35 and to said plate to limit its downward movement. Stop pins 66 are secured in the top of the frame 35 and engage with the plate 34 to limit its upward movement. When the slate gate and the cut-off member 20 are in their lowermost positions the slate will be discharged as previously described. After the discharge of this slate and when sufficient air has entered the cylinder 36, the piston there-

in will be forced downwardly and this downward movement of the piston will also rock the shaft 33 in its bearings and move the plate 34 downwardly, engaging the same with the lower pin 54 carried by the valve stem 52. The arms 32 will be elevated by this movement of the piston and move the slate gate and the cut-off member upwardly into position to again receive the slate, said cut-off member and gate being locked together as shown in Fig. 3. The engagement of the plate 34 with the pin 54 carried by the valve stem again opens the valve and exhausts the air from the cylinder 36 as the piston reaches the limit of its downward stroke. The slate gate 26 is perforated as clearly shown in Fig. 9 to permit the water to pass through the same and float the lighter particles of coal over the end of the jig while the slate is deposited in the tank. The bottom of the tank is transversely inclined as shown at 5′ and a door is provided in one side of the tank through which the same may be discharged upon a suitable conveyer.

In order to regulate the amount of slate discharged with each operation of the machine, the plate 38 is adjusted in the leg of the jig by manipulating the hand wheels 45 to adjust the tension of the springs 42 in the upper ends of the tubes 40. The stop pins 66 are then adjusted above the movable plate 34 and the pins 54 are also adjusted in the openings provided in the valve stem 52. In accordance with these adjustments the slate gate will be lowered to a greater or less extent and a corresponding amount of slate thus discharged beneath the lower end of the partition 24. In the event that the slate gate drops too soon or before a sufficient quantity of slate has accumulated thereon, the tension of the springs 62 in the tubes 59 is increased so as to cause greater pressure of the wheels 61 upon the pivotally mounted plate 48 which engages upon the plate 34. Thus the slate gate will be held up in its proper position until a sufficient quantity of slate accumulates thereon to raise the plate 34 from beneath the edge of the plate 48.

The slide valve 51 is of the usual construction and is provided with a port 51ª which communicates directly with the inlet pipe to the air cylinder when the slate gate is down and as the slate gate is raised the slide valve is moved in its casing to register a second port 51ᵇ above the inlet port 51ª, with the pipe communicating with the air cylinder. This port 51ᵇ communicates with the central bore 51ᶜ of the valve from whence the air is exhausted through the valve secured on the upper end of the valve casing.

From the foregoing it is thought that the construction and operation of my improved coal washing jig will be readily understood without necessitating any further description. The machine is entirely automatic in its operation, the accumulation of slate on the gate causing the same to drop to discharge the slate and automatically admit compressed air to return the slate gate to its operative position. This constitutes the principal feature of my invention and while I have shown a specific arrangement of the parts in the accompanying drawings and set forth the same in detail in the above description, it will be understood that this arrangement of elements is capable of being greatly modified without departing from the essential principle involved and it will be understood that I reserve the right to make such changes and alterations as I may deem best within the scope of the appended claims.

Having thus described the invention what is claimed is:—

1. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon to discharge the same, said gate comprising two relatively movable elements, means for permitting the movement of one of said elements with relation to the other, and compressed air actuated means connected to said gate and controlled by the movement thereof to return the gate to its normal position.

2. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, said gate comprising two relatively movable elements, means for holding said elements in different relative positions, means for effecting such relative movement of the gate elements, and fluid actuated mechanism connected to said gate to return the same to its normal position after the discharge of material therefrom.

3. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, said gate comprising two relatively movable elements, means for effecting such relative movement of the elements, means for locking said elements together for simultaneous movement, means for actuating said locking means when the gate reaches its discharging position, and means for returning said gate to its normal operative position.

4. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, said gate comprising two hingedly connected relatively movable elements, means yieldingly engaging said gate and adjustable to vary the amount of material necessary to move the gate, locking means securing the gate elements together for unitary movement, means for permitting an initial movement of the gate without discharging material therefrom, means for automatically actuat-

ing the locking means to permit relative movement of the gate elements when the gate reaches its discharging position, and means for returning said gate to its normal operative position.

5. In a machine of the character described, a movable gate adapted to be actuated by the accumulated weight of material thereon to discharge said material, means movable with the gate to cut off the discharge of material therefrom, and fluid actuated means connected to said gate to return the same to its normal operative position.

6. In a machine of the character described, a movable gate adapted to receive material thereon to discharge the same, said gate comprising two relatively movable elements, means interposed between said elements normally acting to force the same apart, means carried by one of said elements engaging with the other to hold them together for unitary movement against the action of said separating means to permit of an initial movement of the gate without discharging the material therefrom, means for releasing said holding means when the gate reaches its discharging position, and means coöperatively connected to said gate and controlled by the discharging movement thereof to return the gate to its normal position.

7. In a machine of the character described, a pivotally mounted gate adapted to be actuated by the weight of material thereon to discharge the same, cut-off means movable with said gate and independently thereof to normally prevent the discharge of material, means connected to said gate adapted to return the same and said cut-off means to their normal positions, and means for regulating the amount of material to be discharged by said gate.

8. In a machine of the character described, a body, a gate pivotally arranged in said body for swinging movement, a cut-off member movable with said gate and independently thereof, independent means for limiting the extent of movement of said gate and cut-off member, said gate and member being simultaneously movable by the accumulated weight of material on the gate to position said gate and member to discharge the material, and means for returning said gate and cut-off member to their normal positions.

9. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, said gate comprising two relatively movable elements, means for supporting said gate in position to receive the material, and means for moving one of said elements when the gate reaches its discharging position to forcibly discharge the material therefrom.

10. In a machine of the character described, a movable gate adapted to be actuated by the accumulated weight of material thereon to discharge the same, a piston cylinder, a reciprocating piston therein, movable connections between said piston and the gate, a valve controlling the admission of actuating fluid to the cylinder, said connecting means operating said valve upon the movement of the gate to its discharging position to admit the actuating fluid to reciprocate the piston and return the gate to its normal position.

11. In a machine of the character described, a movable gate adapted to be actuated by the accumulated weight of material thereon, a reciprocating piston, movable connections between the piston and the gate, a valve, said connecting means automatically operating said valve upon the movement of the gate to its discharging position to admit actuating fluid to the piston cylinder, and means engaging the connecting means between the piston and the gate to maintain said gate in its normal operative position.

12. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, a reciprocatory piston and cylinder for the same, means connecting the piston to said gate, and a slide valve adapted to be automatically actuated by the connecting means between the piston and the gate to admit the actuating fluid to the piston cylinder when the gate reaches its discharging position, whereby the piston is reciprocated to return the gate to its normal operative position.

13. In a machine of the character described, a pivotally mounted gate adapted to be moved by the weight of material thereon to discharge said material, said gate comprising two relatively movable elements, means connecting said elements for simultaneous movement as the gate moves to its discharging position, means co-acting with said last named means to disconnect said elements, and means for moving one of said elements to discharge the material therefrom.

14. In a machine of the character described, a pivotally mounted gate adapted to be moved by the weight of material thereon to its discharging position, said gate comprising two relatively movable elements, means arranged between said elements to move one of them with respect to the other, means for locking said elements together for simultaneous movement as the gate moves to its discharging position, and means engaging said locking means to disconnect said elements whereby the material is forcibly discharged from the gate.

15. In a machine of the character described, a body having a depending leg, a plate transversely arranged and vertically

movable in the leg, a discharge gate disposed in said leg and forming the bottom thereof, a cut-off member pivoted to said leg, and extending below the same, said discharge gate being pivoted at one edge to the cut-off member and movable independently thereof, means locking said members together for simultaneous swinging movement, said cut-off member being adapted to engage said vertically movable plate, spring actuated means to return the plate to its normal position, the accumulated weight of material upon the discharge gate being adapted to move said gate and cut-off member downwardly in the leg, means for automatically disconnecting the gate and said member to discharge the material, and fluid actuated means connected to said member to return the same and the gate to their normal positions.

16. In a machine of the character described, a body having a depending leg, a transverse partition arranged in said leg, a plate movably arranged between the partition and the rear of the leg, rods connected to said plate, tubes to receive said rods for sliding movement, springs arranged in the tubes engaging with the rods, a cut-off member hingedly mounted in the leg and movable beneath the same, said member being adapted for engagement with said plate to move the same against the tension of said springs, a discharge gate carried by said member and independently movable thereof, said gate being adapted to support the material to be discharged, the weight of the material moving said gate and member downwardly in the leg, and means operated by compressed air connected to said member to return the same and the gate to their normal positions.

17. In a machine of the character described, a body having a depending leg, a discharging gate arranged in said leg and forming the bottom thereof, a cut-off member pivotally mounted in said leg, said discharge gate being hinged to the cut-off member and movable therewith, means yieldingly holding said gate and cut-off member in spaced relation, a spring controlled locking dog carried by the gate engaging said member and locking said member and gate together for simultaneous movement, spring held means arranged in the upper end of the leg adapted to be engaged by said actuating member to place the springs under compression, said gate being adapted to receive the material to be discharged, the accumulated weight of the material moving said gate and cut-off member downwardly in the leg, a cross bar arranged in said leg adapted to engage the locking dog to disconnect the gate and member to permit independent upward movement of the gate to discharging position, and fluid actuated means carried by said body connected to the cut-off member adapted to return the same and the gate to their normal operative positions.

18. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, means for permitting an initial movement of the gate without discharging the material, a fluid actuated reciprocatory piston, means coöperatively connecting the piston and the gate, a pressure device engaging said connecting means to prevent gravity movement of the gate, and a slide valve actuated by said connecting means to admit the actuating fluid to the piston cylinder when the gate reaches its discharging position, to reciprocate said piston and return the gate to its normal operative position.

19. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, means for permitting an initial movement of the gate without discharging the material, an air actuated reciprocatory piston and cylinder therefor, means coöperatively connecting the piston and the gate, a yieldingly held pressure device engaging upon said connecting means to prevent gravity movement of the gate, means for regulating the pressure of said device on the connecting means, a slide valve controlling the admission of the compressed air to the piston cylinder, and means carried by said slide valve adapted to be engaged by the connecting means between the piston and the gate to actuate said slide valve to admit and exhaust the air to and from the cylinder at the extremes of movement of said gate.

20. In a machine of the character described, a pivotally mounted gate adapted to be moved to its discharging position, by the weight of material thereon, said gate comprising two relatively movable elements, means to lock said elements together for simultaneous movement, means to engage said locking means and disconnect said elements when the gate reaches its discharging position, and means arranged between said elements to move one of them with respect to the other and forcibly discharge the material from the gate.

21. In a machine of the character described, a pivotally mounted gate adapted to be moved to its discharging position by the weight of material thereon, said gate comprising two relatively movable elements, means to lock said elements together for simultaneous movement, means to engage said locking means and disconnect said elements when the gate reaches its discharging position, means arranged between said elements to move one of them with respect to the other and discharge the material from the gate, and means co-acting with one of said relatively movable gate elements to

regulate the amount of material to be discharged.

22. In a machine of the character described, a movable discharge gate adapted to be moved to its discharging position by the weight of material thereon, a cylinder, a piston to reciprocate in said cylinder, oscillatory means connected to said gate and to said piston, means engaging said oscillatory means to normally support the gate in position to receive the material, and means automatically actuated by said oscillatory means in the movement of the gate to its discharging position to admit the actuating fluid to said cylinder to return the gate to its normal position after the discharge of material therefrom.

23. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon to discharge the same, a cylinder, a piston mounted to reciprocate in said cylinder, an oscillatory plate, the lower end of said piston being connected to said plate, parallel arms extending from said plate, connections between said arms and the discharge gate, a valve to admit and exhaust the actuating fluid to and from the cylinder, and means engaging said plate to support the gate against the cumulative weight of material thereon, said oscillatory plate automatically actuating said valve in the movement of the gate to its discharging position to admit actuating fluid to the cylinder to reciprocate the piston therein and return the gate to its normal position after the discharge of material.

24. In a machine of the character described, the combination with a body, of a movable gate mounted in said body actuated by the weight of material thereon to discharge the same, a cylinder mounted on said body, a piston to reciprocate in said cylinder, an oscillatory plate mounted on said body beneath the cylinder, the lower end of the piston being pivotally connected to said plate, a second plate engaging the first named plate, means yieldingly engaging said second plate adapted to be adjusted to regulate its pressure upon the first named plate, a supply pipe communicating with the cylinder, a slide valve arranged therein, means carried by the slide valve disposed above and below the oscillatory plate and adapted to be engaged thereby to actuate the valve to admit and exhaust the actuating fluid to and from the cylinder, and means coöperating with the gate to regulate the amount of material to be discharged.

25. In a machine of the character described, the combination with a body, of a discharge gate pivotally mounted in one end of the body and adapted to be moved to its discharging position by the weight of material thereon, a transversely disposed plate mounted on the body for oscillatory movement, means connecting said plate and the gate, a compressed air cylinder arranged above the plate, a piston to reciprocate in said cylinder connected to said plate to oscillate the same, a supply pipe communicating with said cylinder, a slide valve to control the admission and exhaust of compressed air to and from the cylinder, the stem of said valve extending below the oscillatory plate, pins adjustable in the valve stem disposed above and below the oscillatory plate and adapted to be engaged thereby to slide the valve to admit or exhaust air to and from the cylinder, means yieldingly engaging said plate, means for adjusting said last named means to regulate the pressure of the same upon the plate whereby the weight of material necessary to actuate the discharge gate may be varied, and stops adapted to be engaged by the oscillatory plate to regulate the extent of the discharging movement of the gate.

26. In a machine of the character described, a movable discharge gate adapted to be actuated by the weight of material thereon, a piston cylinder, a reciprocatory piston therein, a slide valve controlling the admission and exhaust of actuating fluid to and from the cylinder, oscillatory connecting means between the piston and the gate, said means engaging and actuating the slide valve in the movement of the gate to admit and exhaust the actuating fluid, and an adjustable pressure device engaging said oscillatory connecting means to normally support the gate against movement under the weight of material thereon, said connecting means between the piston and the gate actuating said valve to admit the fluid to the piston cylinder when the gate reaches its discharging position whereby said gate is returned to its normal operative position.

27. In a machine of the character described, a movable gate adapted to be actuated by the weight of material thereon, a piston cylinder, a reciprocating piston in the cylinder, means coöperatively connecting the gate and the piston, an adjustable pressure device engaging said connecting means to support the gate in its normal operative position, pressure means engaging the gate and tending to move the same to its discharging position, and a valve automatically actuated by the connecting means between the piston and the gate in the movement of the gate to its discharging position, to admit actuating fluid to the piston cylinder whereby the gate is returned to its normal position.

28. In a machine of the character described, a pivoted gate adapted to be actuated by the weight of material thereon, a piston cylinder, a reciprocatory piston therein, oscillatory means connecting the piston and the gate, a slide valve controlling the

admission of the actuating fluid to the piston cylinder adapted to be actuated by said connecting means in the movement of the gate to control the admission and exhaust of the fluid, a pivoted pressure plate engaging said oscillatory connecting means to support the gate against gravity movement, means for regulating the pressure of said plate upon the connecting means, and a plurality of pressure devices engaging the gate and acting in opposition to said pressure plate to move the gate to its discharging position under the weight of the material thereon.

29. In a machine of the character described, a movable gate adapted to be actuated by the accumulated weight of material thereon, said gate comprising two relatively movable elements, means yieldingly holding said elements against relative movement, means for locking said elements together against action of said last named means for simultaneous movement, one of said elements being extended at right angles to the other and adapted to support the material to prevent its discharge in the initial movement of the gate, means for actuating said locking means and releasing the elements for relative movement to discharge the material, and fluid actuated means connected to said gate and controlled by the discharging movement of the same to return the gate to its normal operative position.

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

ALBERT CHARLES HOECKER.

Witnesses:
C. A. AMBROSIUS,
J. A. CARR.