J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 1.

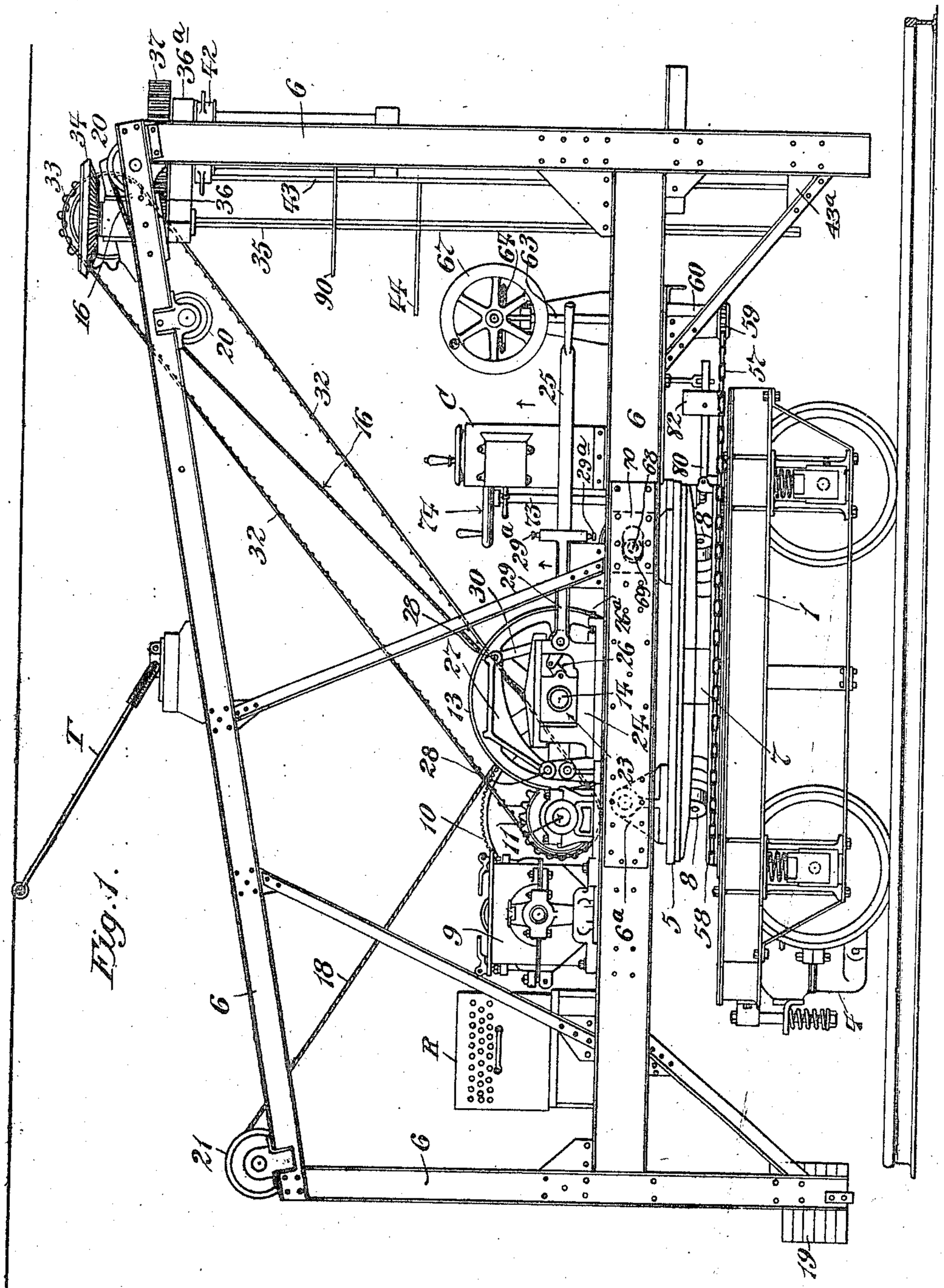


Fig. 1.

Witnesses:
Edward C. Rowland
Charles Engel

Inventor
John H. Huhn
By his Attorney
Wilcox Lawrence Butler

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

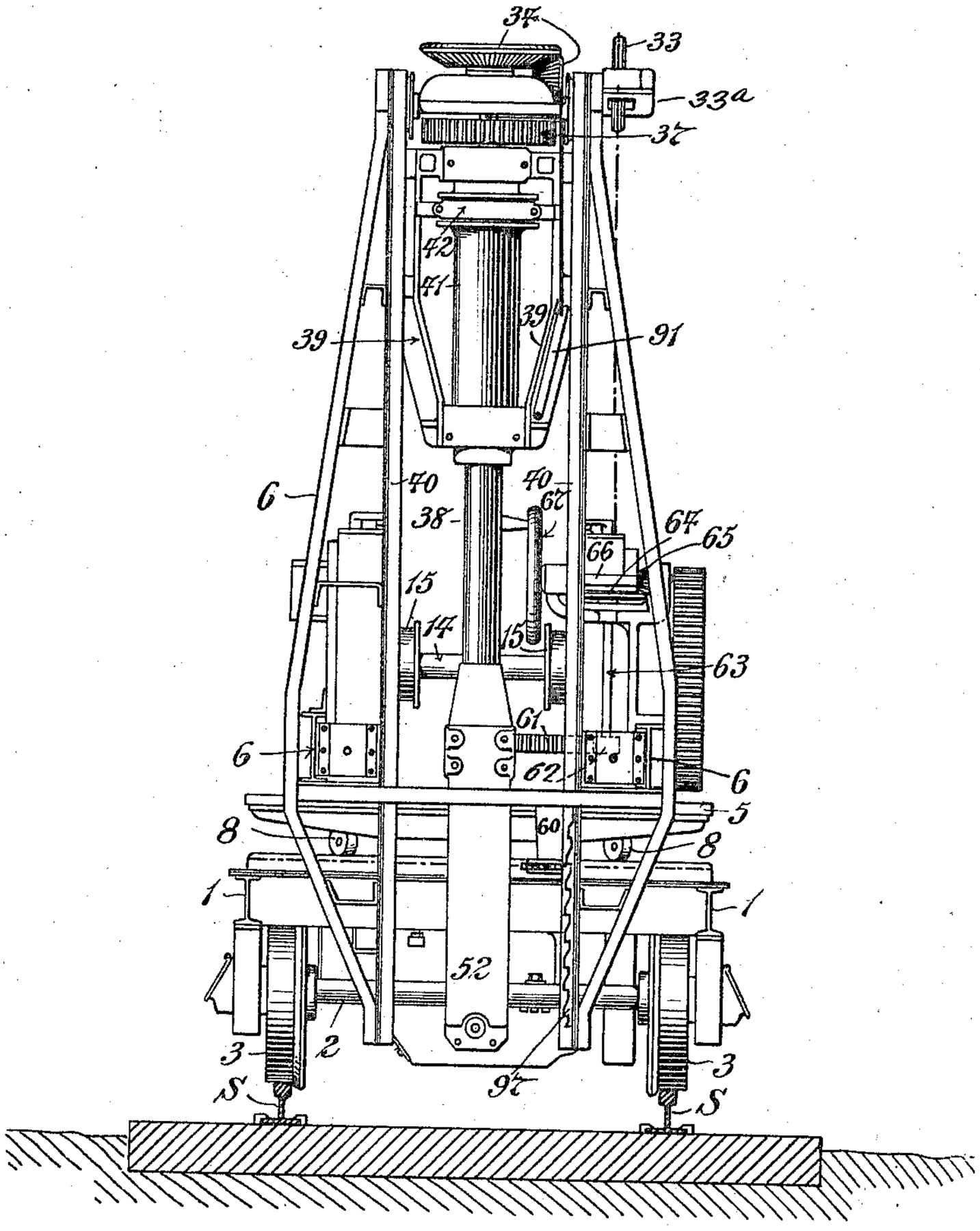
APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
Edward C. Rowland.
Charles Engel

Inventor
John H. Huhn
By his Attorney
Reed Parker Butler

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915

7 SHEETS—SHEET 3.

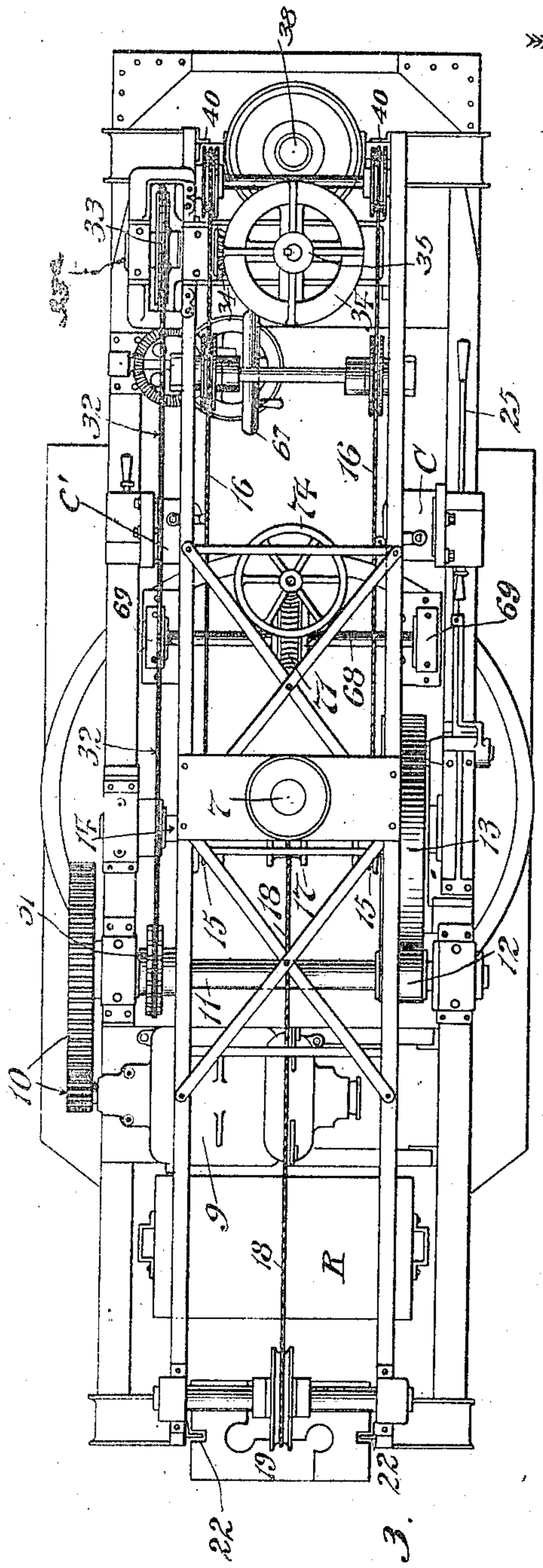


Fig. 3.

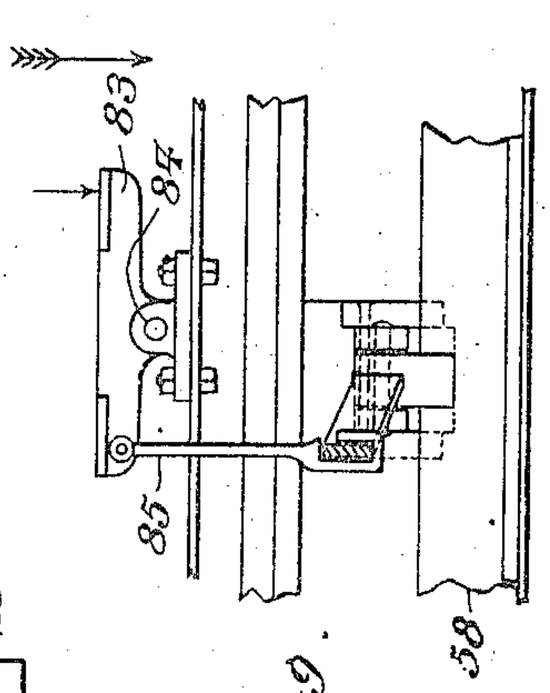


Fig. 9.

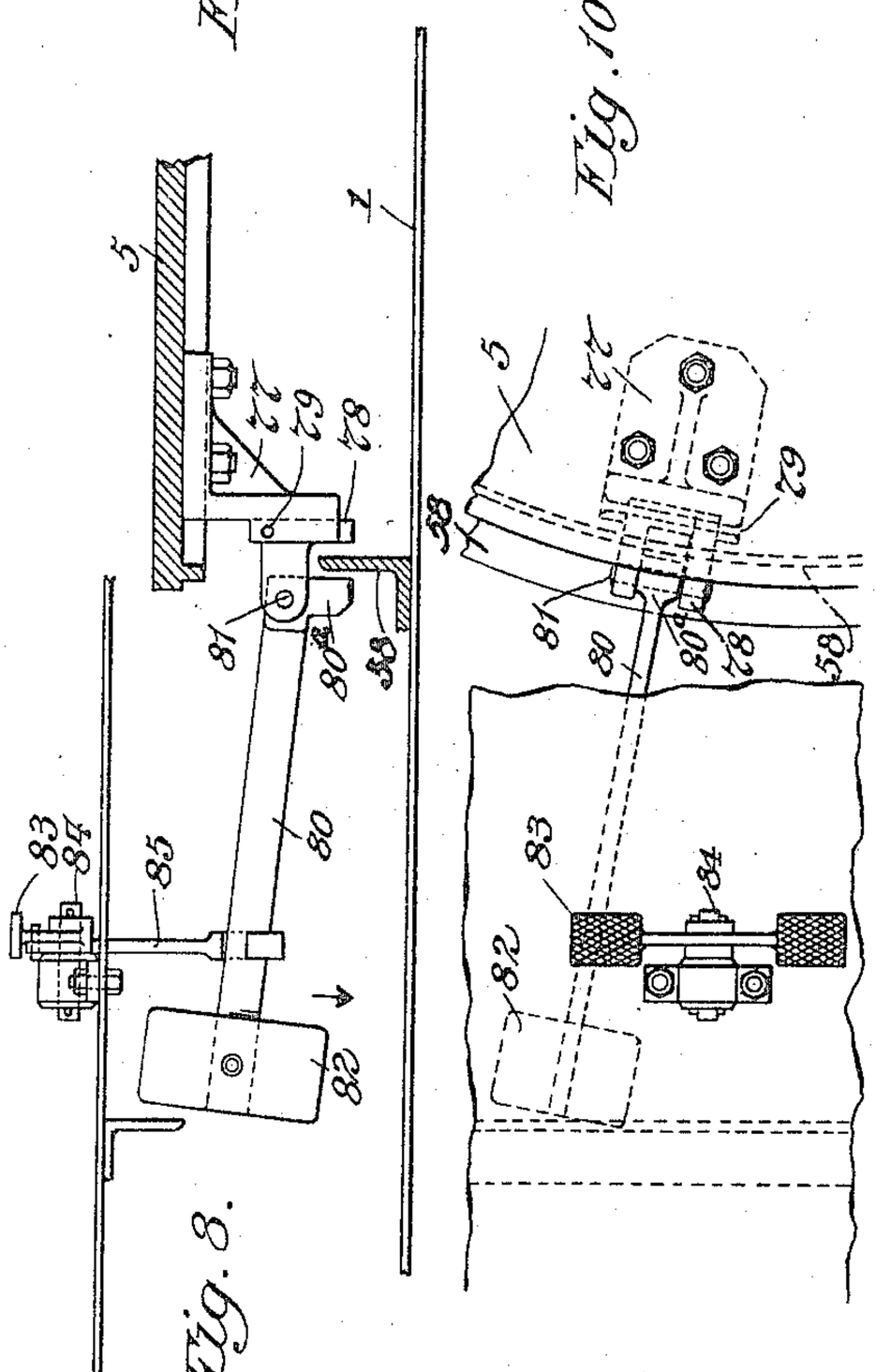


Fig. 8.

Fig. 10.

Witnesses.
Edward C. Rowland.
Charles Engel

Inventor
John H. Huhn
By his Attorney
Miller Barker Bartlett

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

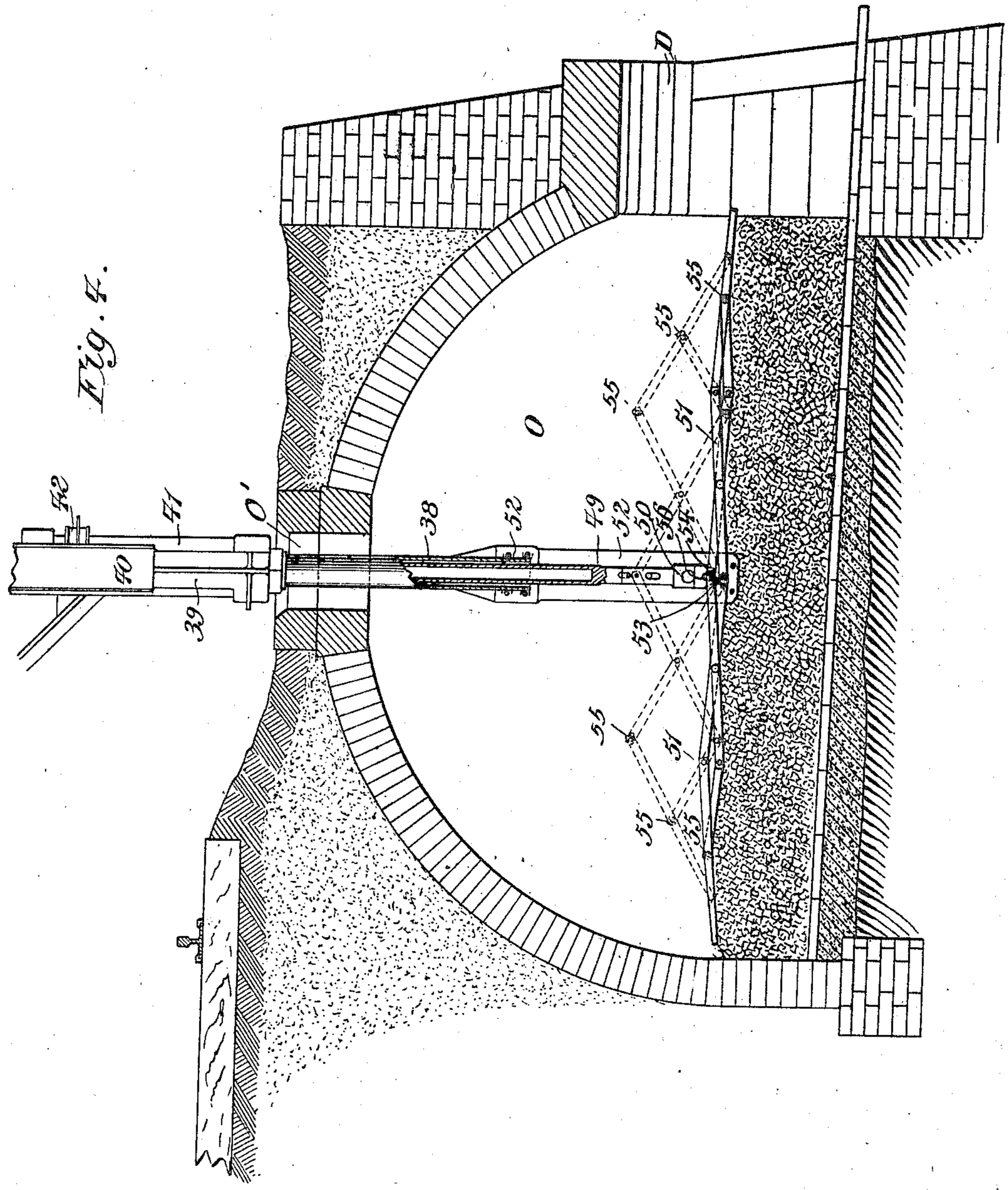
APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 4.

Fig. 4.



Witnesses:
Edward C. Fairbairn.
Charles Engel.

Inventor
John H. Huhn
By his Attorney
Marcus Parker Hollis

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 5.

Fig. 7.

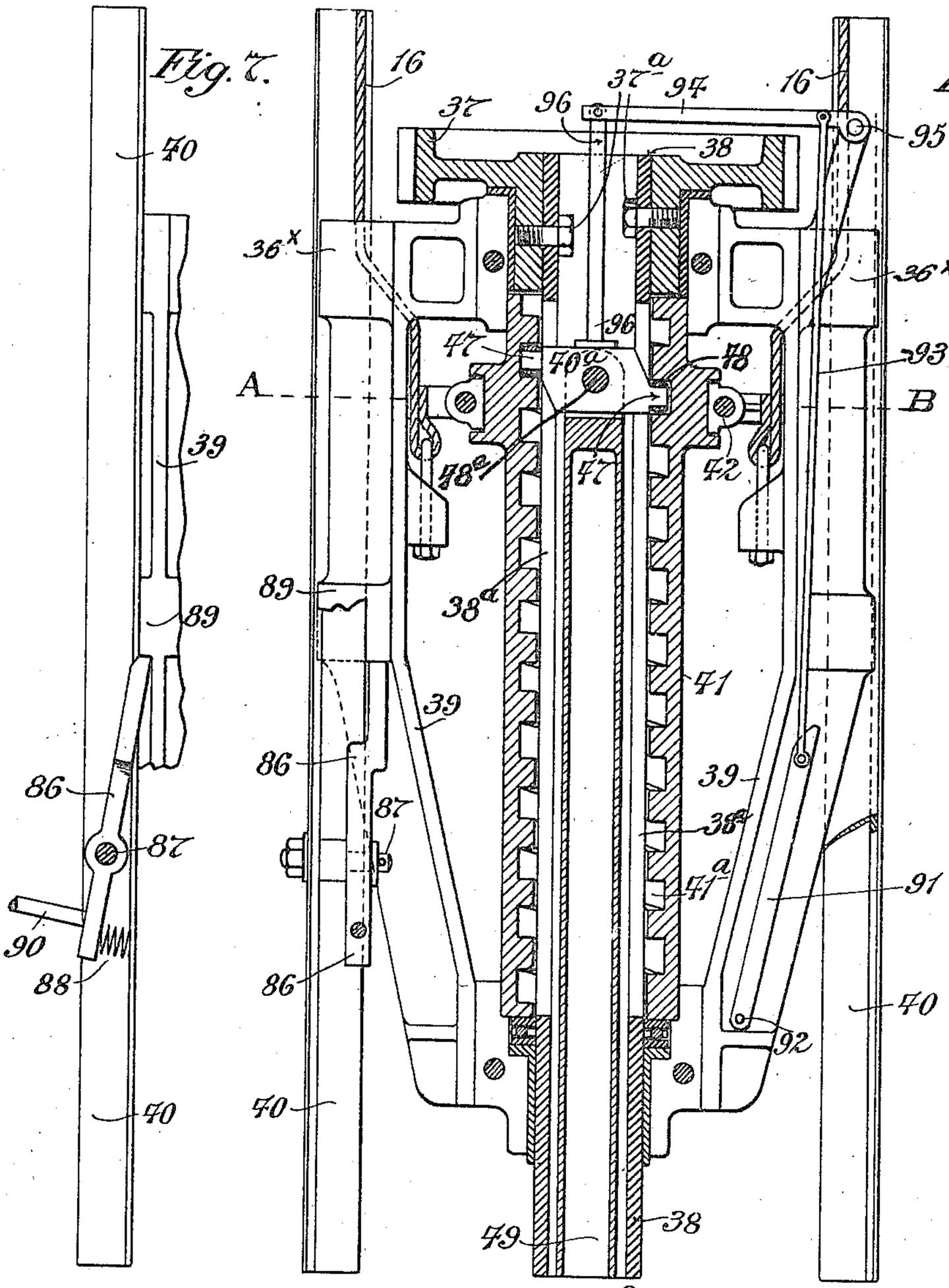
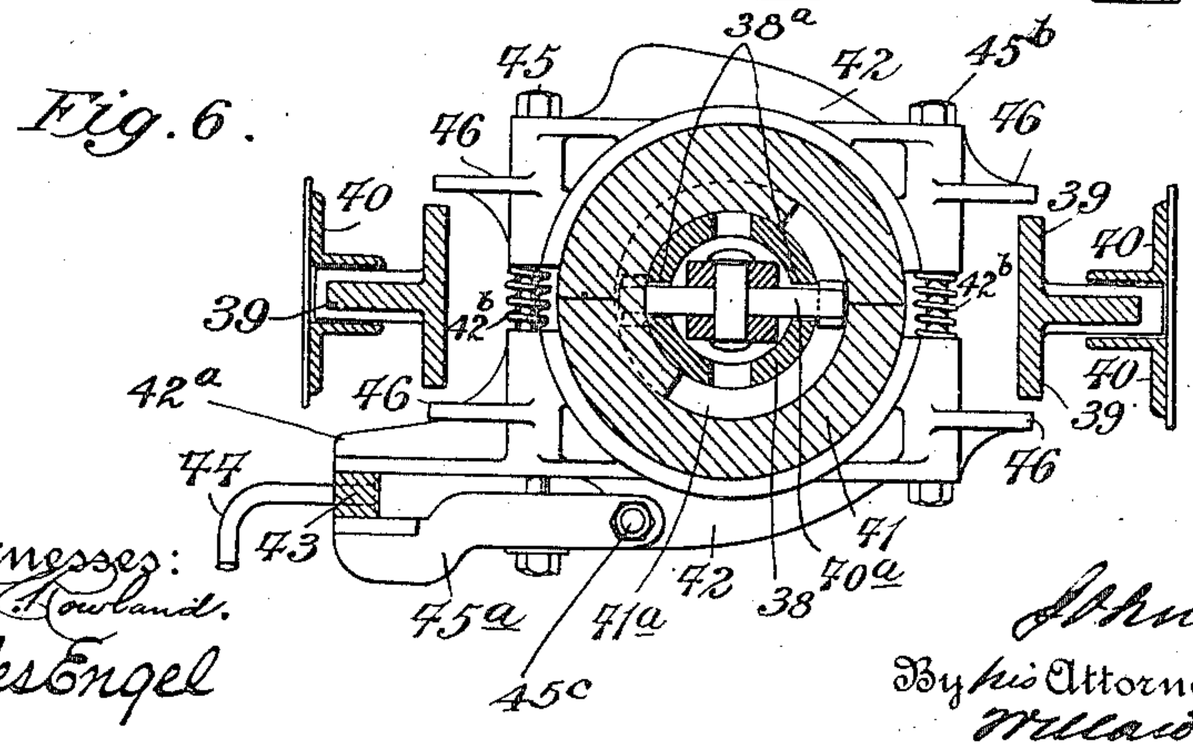


Fig. 5.

Fig. 6.



Witnesses:
Edward Howland.
Charles Engel

Inventor
John H. Huhn

By his Attorney
Millard Parker Butler

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

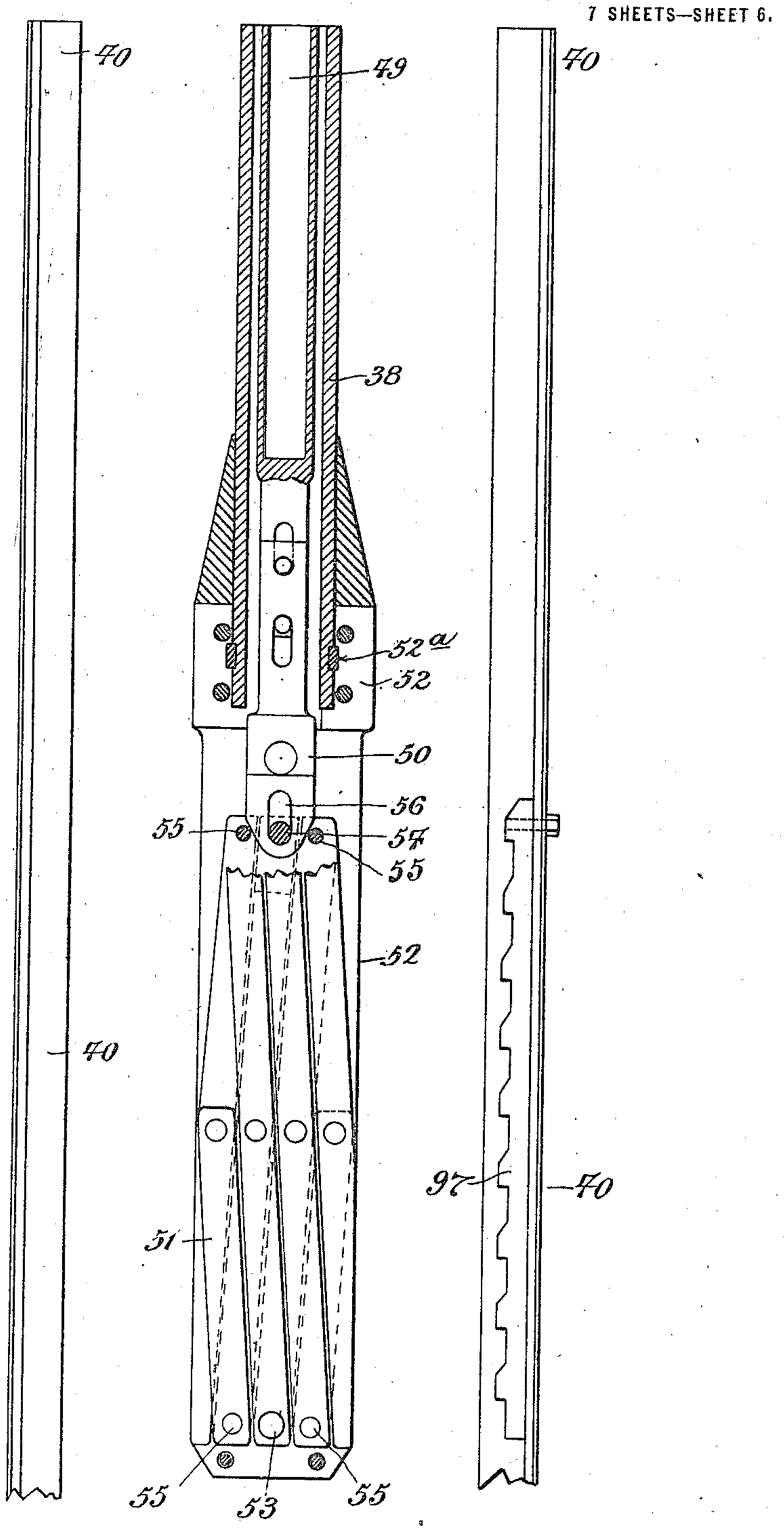
APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 6.

Fig. 5A



Witnesses:
Edward L. Rowland,
Charles Engel

Inventor
John H. Huhn
By his Attorney
Millard Parker Butler

J. H. HUHN.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE OVENS.

APPLICATION FILED MAR. 5, 1910.

1,155,066.

Patented Sept. 28, 1915.

7 SHEETS—SHEET 7.

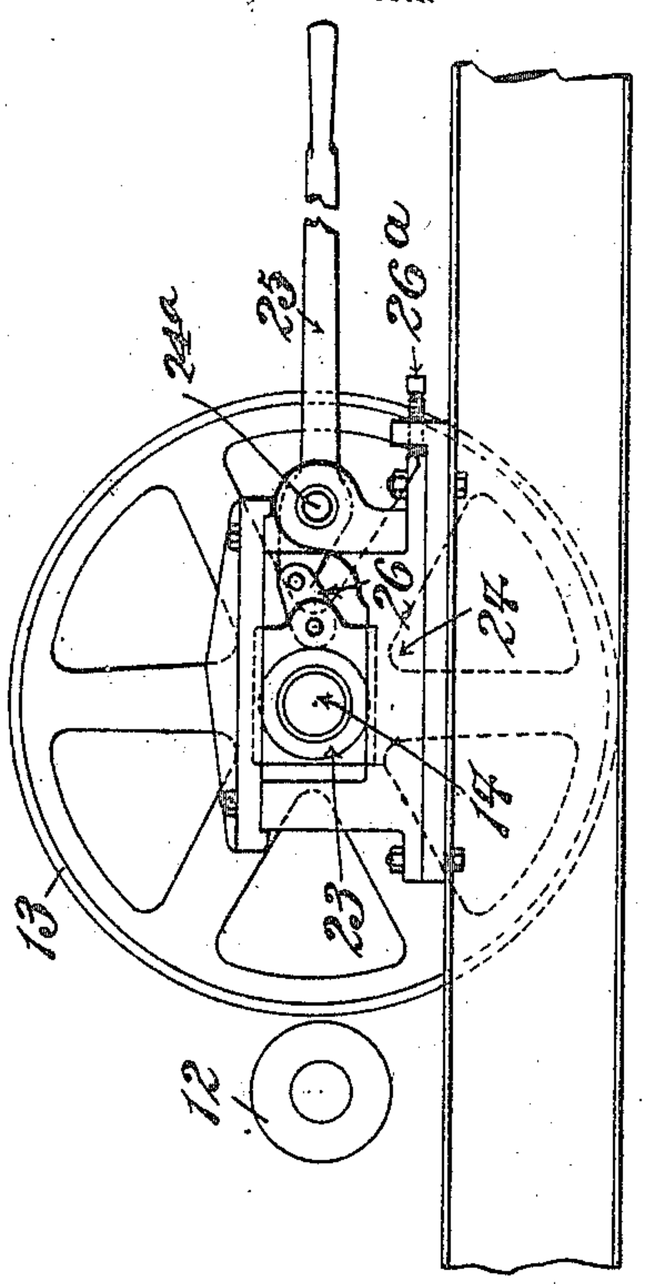


Fig. 13.

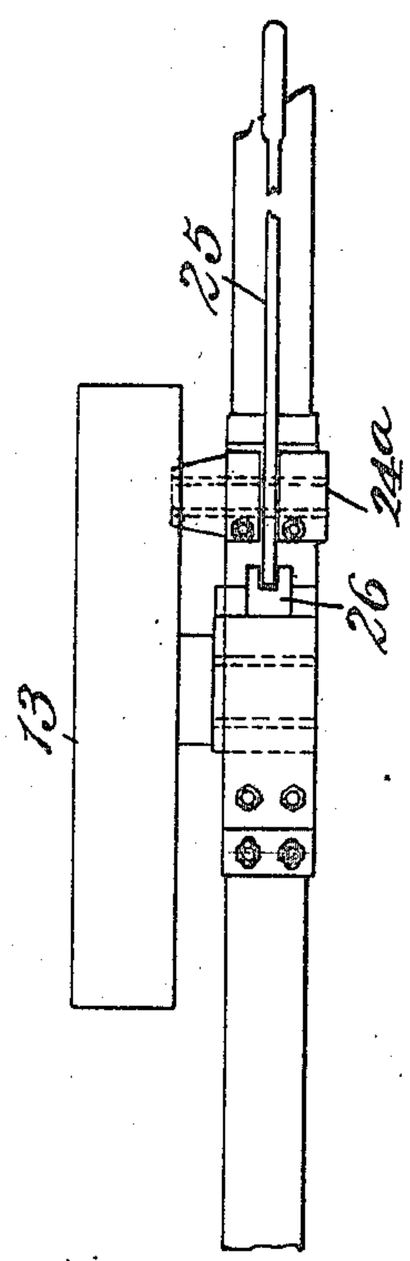


Fig. 14.

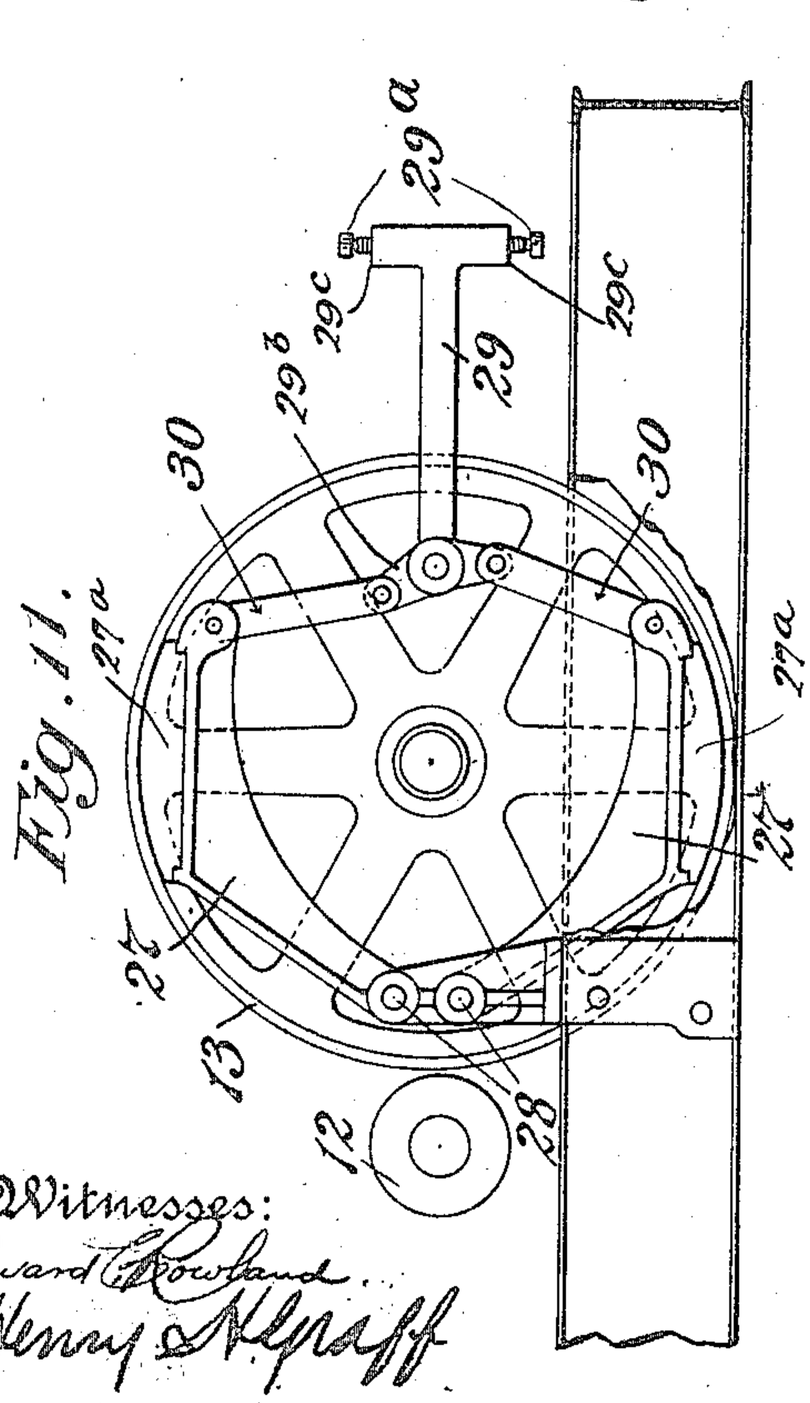


Fig. 11.

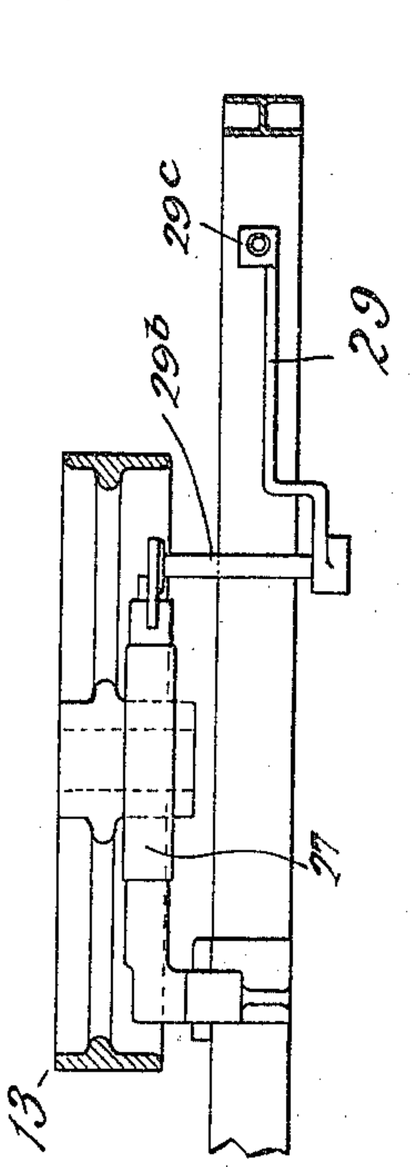


Fig. 12.

Witnesses:
Edward C. Rowland
Henry Klauff

Inventor
John H. Huhn
By his Attorney
Miller Lawrence Betts

UNITED STATES PATENT OFFICE.

JOHN H. HUHN, OF FAIRMONT, WEST VIRGINIA.

MACHINE FOR LEVELING COAL IN BEEHIVE COKE-OVENS.

1,155,066. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed March 5, 1910. Serial No. 547,441.

To all whom it may concern:

Be it known that I, JOHN H. HUHN, a citizen of the United States of America, and resident of Fairmont, in the county of Marion and State of West Virginia, have invented certain new and useful Improvements in Machines for Leveling Coal in Beehive Coke-Ovens, of which the following is a specification.

My invention relates to improvements in machines for leveling coal in bee-hive coke ovens, and particularly that class of leveling machine which is described and claimed in a certain application made by Enoch H. Abraham, John S. Ham and myself for Letters Patent for coal leveling machine, filed in the United States Patent Office on the 24th day of August 1908, under Serial Number 450,115.

The invention will be best understood by reference to the accompanying seven sheets of drawings, forming a part of this specification, in which—

Figure 1 is a vertical side elevation of the coal leveling machine; Fig. 2 an end elevation of the machine; Fig. 3 a plan of the machine; Fig. 4, cross-section of a coke oven showing the leveling tool in operation within the same, a portion of the mechanism of the tool being shown in cross-section; Figs. 5 and 5ª are a vertical section of the mechanism for actuating the leveling tool; Fig. 6 is a cross-section on the line A—B of Fig. 5; Fig. 7 is a side view of the yoke supporting mechanism shown in Fig. 5; Fig. 8 is a side view of the brake mechanism; Fig. 9 an end view of the same; Fig. 10 a plan view of the same; Figs. 11, 12, 13, and 14 are elevations and plan views of details.

Similar letters refer to similar parts throughout the several views.

In the drawings O represents the coke oven, which is provided with a central opening O′ in the top and a door D at one side.

S S represent a pair of rails extending along the top of a row of coke ovens, upon which moves the carriage carrying the leveling device. The main frame or truck 1 is carried on the axles 2, to which are attached the wheels 3, traveling on the rails S. Motion is given to these axles by the motor 4.

The motor 4 is of the reversing type, and by means of a suitable controller C and its rheostat contained in box R, the operator may propel the machine up and down the track as desired. The conical rollers 8 carry the turntable 5 on the truck 1, to which it is pivoted at 7. The table 5 carries the frame 6 which in turn carries all the hoisting mechanism for hoisting and operating the leveling tool.

The motor 9 controlled by the controller C′ and its rheostat in the box R, through the spur gears 10, imparts motion to the main shaft 11. The shaft 11 carries a friction drum 12, which, through the friction wheel 13, drives the drum shaft 14. The shaft 14 carries the two hoisting drums 15, which raise or lower the leveling tool by means of the cables 16. The shaft 14 carries also the drum 17, which by means of a rope 18, raises or lowers the counter balance 19. The rope 16 is guided by the sheaves 20, and the rope 18 by the sheave 21. The counter balance 19, is guided by the angle rails 22. The shaft 14 is moved forward or backward by means of a sliding bearing 23, shown in detail in Figs. 13 and 14, traveling in the guides 24, and moved by the bell crank lever 25, pivoted on the shaft 29ᵇ acting through the link 26. It will be apparent that by raising the outer end of the lever 25, as shown by the arrow, in Fig. 1, the inner end of the lever 25, travels downward causing the shaft 14 to slide thereby forcing the friction wheel 13 on the shaft 14 against the friction drum 12, and thus imparting motion to the friction wheel 13, the drums 15 and 17 and thereby raising or lowering the leveling tool as desired.

For the purpose of taking up any wear on the friction drum 12 a screw 26ª is provided whereby the guides 24 may be adjusted with respect to the drum 12. The friction wheel 13 is held from rotating by a brake device composed of the segments 27 which are arranged to press outward against inner face of the wheel 13 and which are shown in detail in Figs. 11 and 12. These segments 27 are provided with segmental shoes 27ª, are pivoted at 28 to the frame and are actuated by the bell crank and shaft 29ᵇ and by the lever 29 engaging with the links 30.

The lever 29 is attached to the bell crank of the shaft 29ᵇ, the shaft being pivoted at 24ª in bearing 24. The lever 25 turns freely on 29ᵇ. The lever 29 has two projecting lugs, 29ᶜ, with adjusting screws 29ª, the screws being so positioned that they bear on the top and bottom respectively of the lever 25, hence any movement of 25 causes a cor-

responding movement of lever 29 and bell crank 29[b]. By raising the outer end of the lever 29, in the direction of the arrow, the segments 27 will be drawn inwardly thus releasing the friction wheel 13, while by lowering the outer end of 25 forces the friction segments 27 outwardly against the friction wheel 13 locking it in position. The lever 29 being provided with the adjusting screws 29[a] and moving up or down with the lever 25, the screws 29[a] allow an independent adjustment between the movement of the brakes 27 and the movement of the friction wheel 13 against the drum 12.

Motion is imparted to the square vertical operating shaft 35 carried in the head 36[a] on which is mounted the sliding spur pinion 36, meshing with the spur gear 37 on the leveling shaft 38, and attached to the shaft by the bolts 37, by means of the sprocket 31 on the opposite end of the shaft from the drum 12, acting through the chain 32, sprocket 33 and bevel gear wheels 34.

The smaller of the bevel gears 34 is keyed to the horizontal shaft 33[a], and the larger to the vertical shaft 35. The spur gear 37 and the leveling shaft 38, are both carried in the yoke 39 as shown in Fig. 5 which yoke is guided in the rails 40 of the vertical frame 6 as shown in Fig. 2. As the yoke 39 is raised or lowered it carries with it the sliding pinion 36, so that at all times a rotative motion may be given to the leveling shaft 38 when desired. The ropes 16 are connected to the yoke 39 as shown in Fig. 5.

The sleeve 41 is carried by and freely revolves in the yoke 39 around the leveling shaft 38. This sleeve when desired, is prevented from rotating by means of a friction brake 42, shown in detail in Figs. 5 and 6. The brake 42 is made in two pieces. One half has pivoted to it at 45[c] the loose jaw 45[a] and is extended forming the jaw 42[a]. The two halves of the brake are ordinarily forced apart by the springs 42[b] to the limits allowed by the bolts 45 and 45[b] to permit the free movement of the sleeve 41 within the brake 42.

The square rotating shaft 43, up and down which the jaws 42[a] and 45[a] slide, is pivoted at 43[a] in the bottom of frame 6, as shown by Fig. 1, and in a similar bearing at the top of the frame, which is not shown. The shaft 43 is controlled by the lever 44. By pulling the lever 44 and rotating the shaft 43, the jaws 42[a] and 45[a] are forced apart. By the outward movement of the outer end of 45[a], and the consequent tightening of the bolt 45, the further half of the brake 42 is drawn inwardly against the sleeve 41, and at the same time by the inward movement of 45[a] at 45[c], using bolt 45 as a fulcrum, the nearer half of brake 42 is pressed against the sleeve 41. The two halves of brake 42 being thus forced against the sleeve 41 prevent the latter from turning. By releasing lever 44 the springs 42[b] force open the brake 42 permitting the sleeve 41 to revolve. The brake is prevented from rotating by means of lugs 46, which engage with the sides of the yoke 39. The leveling shaft 38 is provided at its upper end with two slots, 38[a], in which a cross-head 40[a], travels up and down. This cross-head extends at either end outwardly through the slots and is provided at each end with a pin 47, carrying a roller 48. As the cross-head 40[a] passes through both slots 38[a] of the shaft 38, it necessarily rotates with the latter. These rollers are arranged to travel in the internal thread 41[a] on the inner surface of the sleeve 41. The cross-head 40[a] is pivoted at 48[a] to the upper end of the plunger rod 49. The lower end of this plunger rod 49 is provided with an adjustable head or wedge 50 as shown in that portion of Fig. 5 which is found on sheet 6 of the drawings and which operates the pantographic leveling arms 51. These arms are carried in the leveling head 52, which is keyed to the leveling shaft 38 as shown in Fig. 5 by the key 52[a]. The lower end of the leveling arms 51 are pivoted to the bottom of this head at 53, as shown in Figs. 4 and 5. The upper ends of the arms 51 are pivoted in the head 50 by the pin 54, arranged to slide in the slot 56. The head 50 is shaped as shown and in descending presses against the pivot pins 55 of the arms 51, and forces them apart. A continued movement downward of the plunger rod 49 and head 50 brings the upper edge of the slot 56 in the head 50 against the pin 54 forcing down the pin 54 and also the inner ends of the arms 51 until the latter have been extended to their horizontal or open position. An upward movement of the plunger rod 49 and head 50 brings the lower edge of slot 56 in contact with the pin 54. A continuance of this movement draws the pin 54 and inner ends of the arms 51 up into the head of the machine, until the arms 51 are retracted to their vertical or closed position.

Owing to the friction exerted by the rollers 48 on the internal thread 41[a] within the sleeve 41, the latter is ordinarily caused to rotate with the cross-head 40[a] and shaft 38. When, however, it is held stationary by the brake 42, the shaft 38 continues to rotate within the sleeve 41, causing the crosshead 40[a] to travel up or down on the rollers 48, in the spiral pathway 41[a] in the inner periphery of the sleeve 41 according to the direction in which the leveling shaft 38 is rotated, and as the crosshead moves up or down in the sleeve 41, the rod or plunger 49 and the head 50 will move with it and the leveling arms will be retracted or extended, according to the direction of the rotation of the shaft 38. Through the friction drum 12 and wheel 13, the leveling tool is raised or

lowered according to the direction of rotation of the motor. The proper rotation of the motor is secured by means of a suitable controller. The turntable 5 and frame 6 are rotated on the truck 1 by means of a chain 57 surrounding and attached to the stationary drum 58 on the truck 1. Movement to the chain is given by the mechanism shown in Figs. 1 and 3. This consists of a sprocket 59, mounted on a vertical shaft in a bearing 60, carrying the spur gear 61. This in turn meshes with the spur gear 62, mounted on the shaft 63, having at its upper end a bevel gear 64, meshing with a pinion 65, mounted on a shaft 66, motion to which is given by a wheel 67. The chain 57 being attached to the drum 58 at a suitable point, when the sprocket 59 is rotated by means of the hand wheel 67 it is caused to travel along the chain 57 which, being held stationary, forces the turntable 5 and the frame 6 either to the right or the left, according to the direction in which the sprocket 59 is revolved.

In order that the desired inclination for leveling the oven may be given the leveling arms, devices are provided for raising one end of the frame 6, on the turntable 5. The frame is pivoted at the outer ends on trunnions 6^a. A shaft 68 is supported in suitable bearings on the table 5 and carries eccentrics 69 at either end, which operate in slotted guides 70 within the frame 6. Motion is given to the shaft 68 by the worm and wheel 71, the worm being mounted on the vertical shaft 73, which carries at its upper end the hand wheel 74. According to the direction of rotation given the hand wheel 74, the eccentrics 69 change their position relative to the turntable 5, and operating in the bearings 70 rotate the frame 6 and the leveling tool around the trunnions 6^a to suit any desired inclination of the oven bottoms. Current is furnished to the machine through a suitable swinging trolley T shown in Fig. 1. For the purpose of stopping the turntable at any desired point, the mechanism in Figs. 8, 9 and 10 is provided.

The bracket 77, secured to the lower side of turntable 5, carries the brake jaw 78 pivoted at 79. The lever 80 with its jaw 80^a, pivoted at 81 in the jaw 78, is provided at its outer end with the weight 82. The weight forces together the jaws 78 and 80^a, gripping the drum 58 on the truck 1, and holding the turntable 5 in a stationary position. To release the bracket the pedal 83, pivoted at 84, is pressed down in the direction of the arrow in Fig. 9, raising the link 85 and with it the lever 80, which draws apart the jaws 78 and 80^a, and allows movement to turntable 5. For the purpose of holding the leveling tool at its top position and preventing it from dropping down while traveling along the ovens the safety dog 86, pivoted at 87 to the guide 40 is provided. This is pushed out by the spring 88 under the projection 89 on the yoke 39, as shown in Figs. 5 and 7. The dog is lifted out by means of the lever 90.

In order that the leveling shaft 38 may not be withdrawn until the arms 51 are closed the dog 91 pivoted at 92 to the yoke 39 and operated through the link 93 by the lever 94, pivoted at 95 and controlled by the stem 96, is provided. The dog 91, when the leveling arms are opened within the oven, drops down, engaging with the teeth in the rack 97, shown in Fig. 2, attached near the lower end of the guide 40, and preventing the lifting up of the tool. As the arms close the crosshead 40^a is elevated and impinging against the stem 96, raises the lever 94, drawing the dog 91 out of contact with the rack 97, and allowing the shaft 38 to be withdrawn from the oven.

The operation of the machine is as follows: The operator, by means of the motor 4, propels the machine along the track over the top of an oven, rotating the turntable 5 and frame 6 by means of the hand wheel 67 until the leveling shaft 38 is over the center of the opening 0^1. He then starts the motor 9 in the proper direction raises the hand lever 25 to throw forward the friction wheel 13 and slightly lift the yoke 39 until the pressure is removed from the yoke 86, and it may be pulled out of position by the lever 90. He then lowers the lever 25, allowing the leveling tool to drop by gravity into the oven. Lever 44 is then thrown to one side, tightening the friction brake 42, holding the nut 41 from turning, and when the power is applied forcing down the crosshead 40^a and the head 50. This movement pushes open the arms 51 and levels the oven. If necessary the operator may slightly lower the leveling shaft 38 and arms 51 in order to level the oven to the proper depth. When the coal is leveled the rotation of motor 9 is reversed, lever 44 thrown to one side, tightening the brake 42, holding the nut 41, and raising the crosshead 40^a and the head 50, and bringing together again the arms 51. The lever 25 is then lifted up, throwing the friction pulley 13 against the drum 12, and the leveling shaft 38 is raised to its upper position. The operator then proceeds to the succeeding ovens where the operation is repeated.

I claim as my invention:

1. In a coal leveling machine, the combination substantially as hereinbefore described, of a movable truck; a vertical frame mounted on the truck; a suitable yoke arranged to be raised and lowered within suitable guides at one end of the vertical frame; a hollow cylindrical, or leveling shaft, provided with slotted openings on either side at the top, rotating in bearings in the yoke; means for rotating the leveling shaft with-

in the yoke; a hollow sleeve surrounding the leveling shaft, and rotating loosely in the yoke around the shaft; leveling arms attached to the bottom of the leveling shaft, arranged to be spread laterally; a vertically moving shaft or plunger within the leveling shaft for spreading or closing the leveling arms; a cross-head attached to the top of the plunger, the ends of which slide in the slotted openings in the leveling shaft, and move in a spiral pathway in the interior of the sleeve whereby when the sleeve is held stationary, the shaft is rotated, the plunger is raised or lowered by the movement of the cross-head, and means for preventing the sleeve from rotating and causing the plunger to ascend or descend within the leveling shaft, and its lower end to engage with and close or spread the leveling arms.

2. In a coal leveling machine, the combination, substantially as hereinbefore described, of a movable truck; a vertical frame mounted on the truck; a suitable yoke arranged to be raised and lowered within suitable guides at one end of the vertical frame; a hollow cylindrical, or leveling shaft, provided with slotted openings on either side at the top, rotating in bearings in the yoke; means for rotating the leveling shaft within the yoke; a hollow sleeve surrounding the leveling shaft; and rotating loosely in the yoke around the shaft; leveling arms attached to the bottom of the leveling shaft, arranged to be spread laterally; a vertically moving shaft or plunger within the leveling shaft for spreading or closing the leveling arms; a cross-head attached to the top of the plunger, the ends of which slide in the slotted openings in the leveling shaft; and move in a spiral pathway in the interior of the sleeve, whereby when the sleeve is held stationary the shaft is rotated, the plunger is raised or lowered by the movement of the cross-head; means for preventing the sleeve from rotating and causing the plunger to ascend or descend within the leveling shaft, and its lower end to engage with and close or spread the leveling arms, and means for raising the yoke and its contained mechanism, substantially as described.

3. In a coal leveling machine the combination, substantially as hereinbefore described, of a movable truck; a vertical frame mounted on the truck; a suitable yoke arranged to be raised and lowered within suitable guides at one end of the vertical frame; a hollow cylindrical, or leveling shaft, provided with slotted openings on either side at the top, rotating in bearings in the yoke; a gear wheel at the top of said shaft engaging with suitable driving mechanism for rotating the leveling shaft within the yoke; a hollow sleeve surrounding the leveling shaft; and rotating loosely in the yoke around the shaft; leveling arms attached to the bottom of the leveling shaft, arranged to be spread laterally; a vertically moving shaft or plunger within the leveling shaft for spreading or closing the leveling arms; a cross-head attached to the top of the plunger, the ends of which slide in the slotted openings in the leveling shaft, and move in a spiral pathway in the interior of the sleeve whereby when the sleeve is held stationary, the shaft is rotated the plunger is raised or lowered by the movement of the cross head, and means for preventing the sleeve from rotating and causing the plunger to ascend or descend within the leveling shaft, and its lower end to engage with and close or spread the leveling arms, and means for raising the yoke, and its contained mechanism, substantially as described.

4. In a coal leveling machine the combination with a vertical frame carrying leveling mechanism, of a yoke arranged to slide thereon, a device connected with the yoke arranged to engage with and limit movement of the yoke upon the frame, and means for disengaging the same from the yoke at will.

5. In a coal leveling machine, the combination with a vertical frame carrying leveling mechanism, of a yoke arranged to slide thereon, a dog pivoted upon the frame, arranged to engage therewith and limit the downward movement of the sliding yoke upon the frame, a spring for keeping the dog in an extended position and in engagement with the yoke, and a lever for retracting the same at will.

6. In a coal leveling machine the combination with a vertical frame carrying leveling mechanism of a yoke arranged to slide thereon, a device arranged to engage with a suitable rack on the vertical frame in which the yoke slides, and prevent the upward movement of the yoke, until the leveling arms are raised, and a tripping device engaging with the plunger of the leveling mechanism for disengaging the dog from the frame when the plunger has reached the limit of its vertical movement.

7. In a coal leveling machine the combination of a shaft carrying at its lower end a leveling device, means for rotating the shaft, a sleeve at the top of the shaft arranged to rotate with the shaft, a suitable brake composed of spring pieces surrounding and engaging with the rotating sleeve at the top of the leveling shaft for preventing the former from rotating with the latter, at the desired time, and a hand lever for compressing the springs of the spring pieces, and bringing the springs of the brake together.

8. In a coal leveling machine the combination of a main driving shaft, three drums on said shaft, ropes connecting the

two outer drums with a yoke carrying leveling mechanism, and passing over suitable pulleys, whereby when the shaft turns in one direction the leveling mechanism is raised and when it turns in the other the mechanism is lowered, a rope connecting with the third drum, passing over a suitable pulley and suitable counterweight to which the rope is connected, whereby the weight of the leveling mechanism is counterbalanced by the counterweight.

9. In a coal leveling machine the combination substantially as hereinbefore described of a vertical frame mounted on a truck, a suitable yoke arranged to move vertically in the frame, leveling mechanism carried in the yoke, a shaft for actuating the leveling mechanism, a gear wheel at the top of the leveling shaft, a polygonal shaft carried in the frame, a sliding pinion on said shaft, a gear wheel on the leveling shaft engaging with said sliding pinion, cog mechanism at the upper end of the polygonal shaft, a sprocket on the main driving shaft of the machine, a shaft on the top of the frame carrying at one end a sprocket wheel and at the other a cog mechanism engaging with the mechanism at the upper end of the polygonal shaft, and a sprocket chain connecting the two sprockets whereby the motion from the driving shaft is imparted to the cog mechanism.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twenty-eighth day of February, 1910.

JOHN H. HUHN.

Witnesses:
JENNIE MCDANALD,
M. S. NOFFSINGER.