J. H. HUHN, E. H. ABRAHAM & J. S. HAM.

COAL LEVELING MACHINE.

APPLICATION FILED AUG. 24, 1908.

1,067,221.

Patented July 8, 1913.

4 SHEETS—SHEET 1.

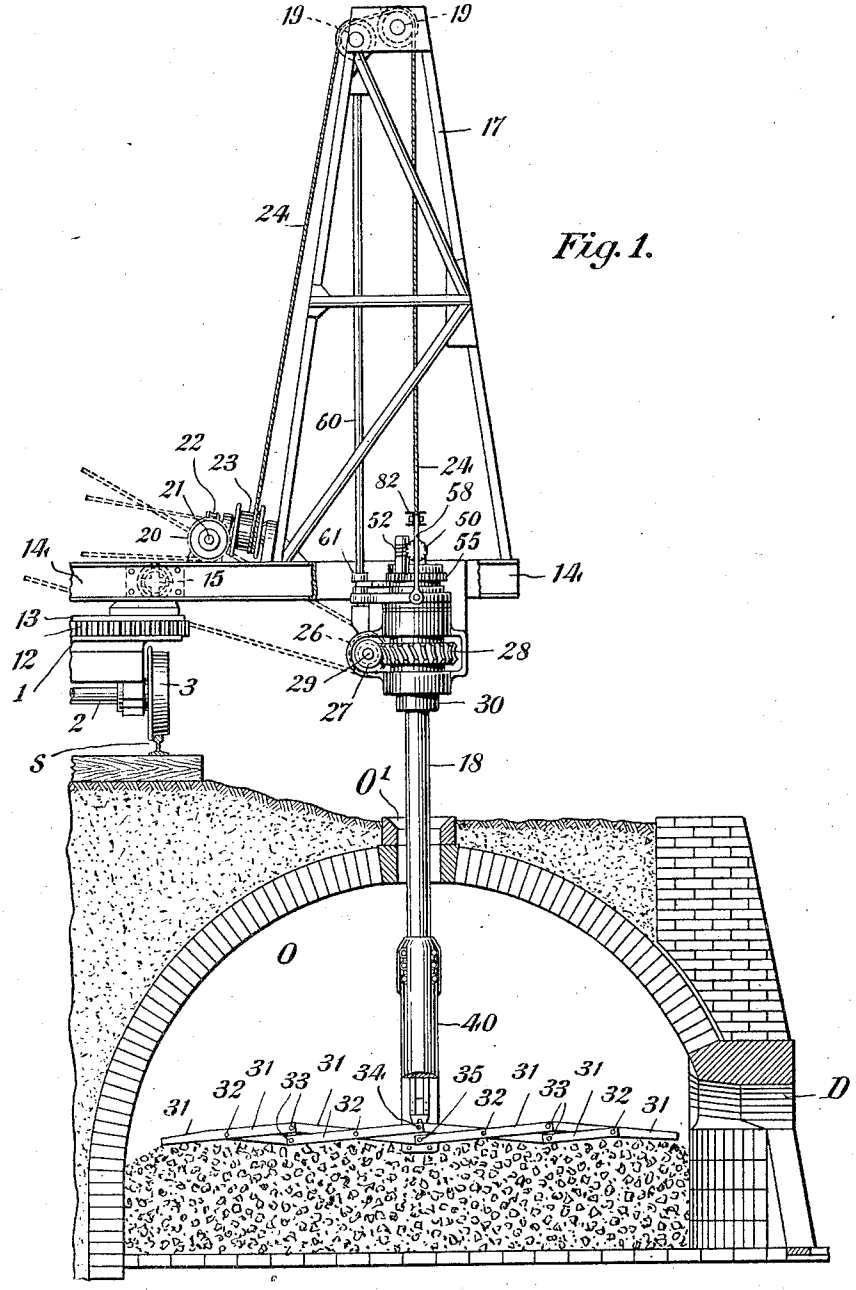


Fig. 1.

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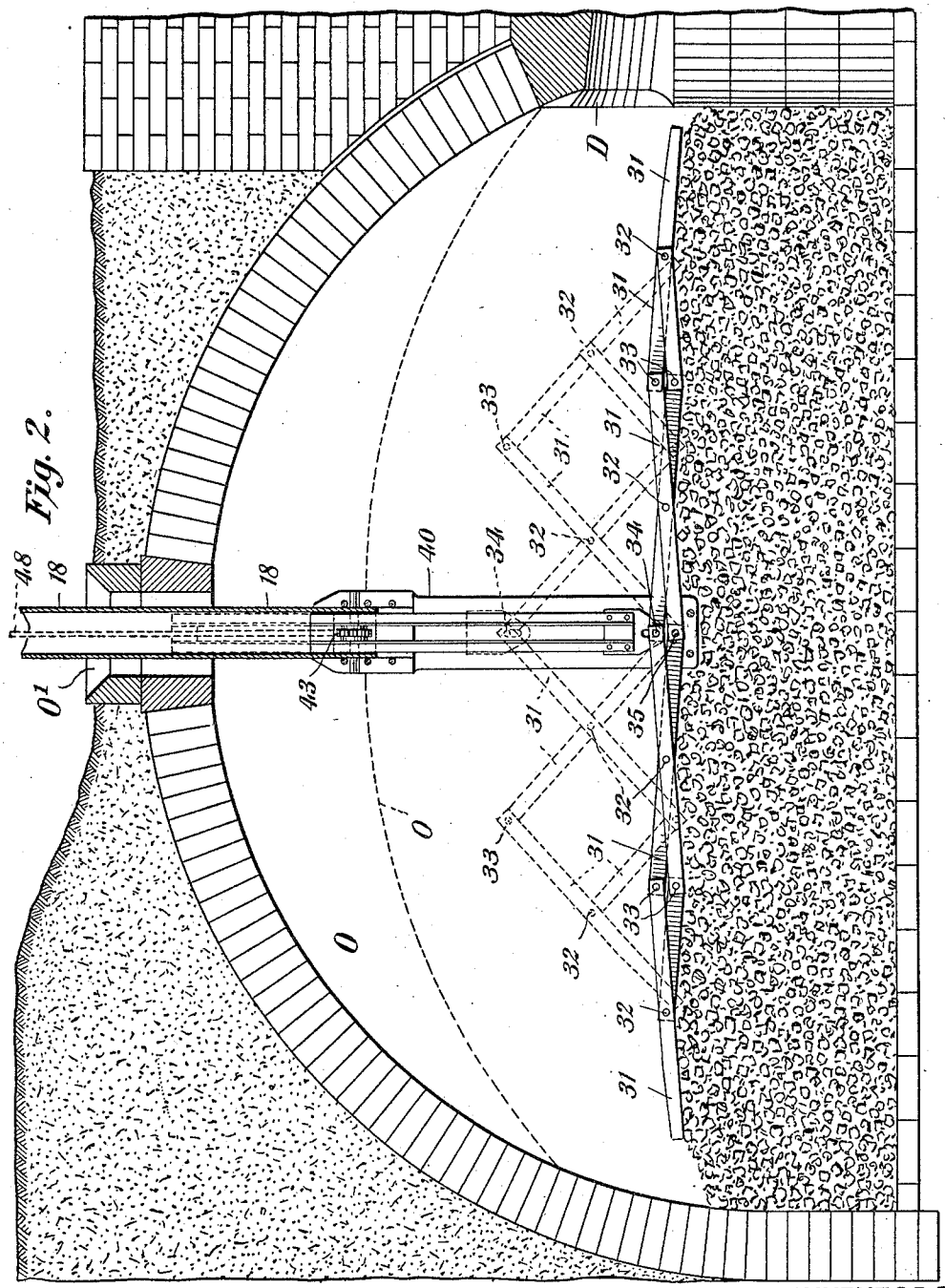
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4 SHEETS—SHEET 2.

Fig. 2.



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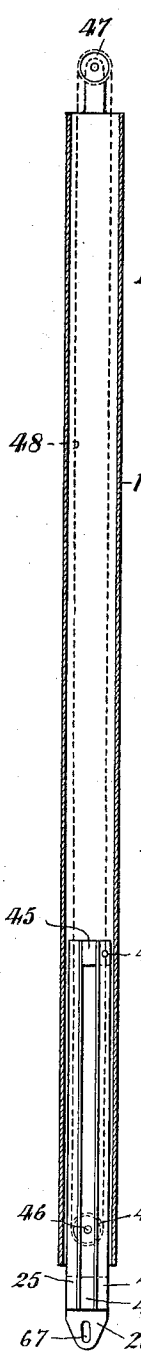


Fig. 5.

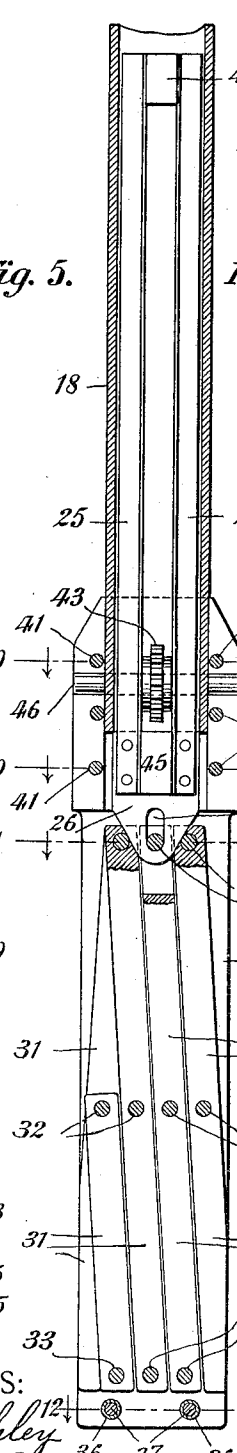


Fig. 4.

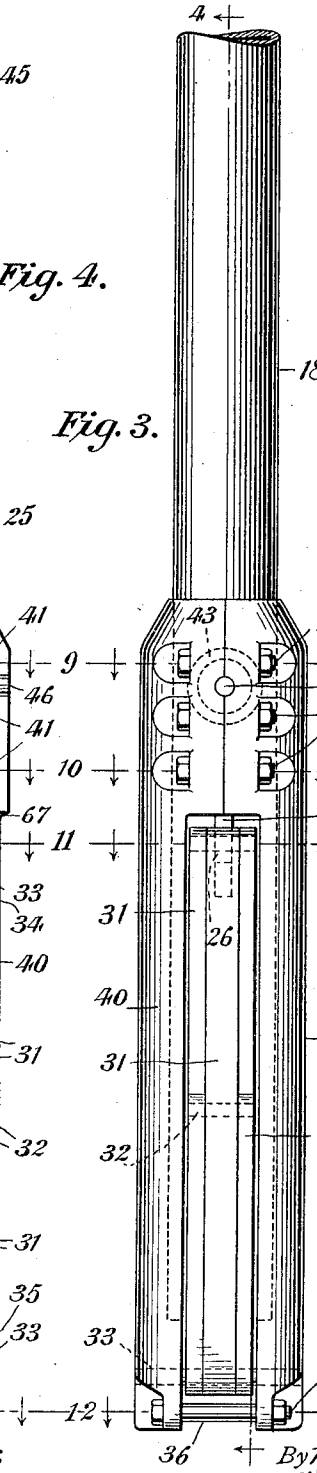


Fig. 3.

Fig. 9.

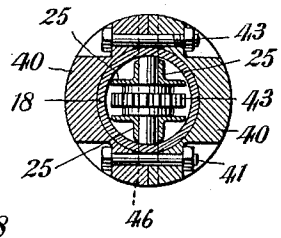


Fig. 10.

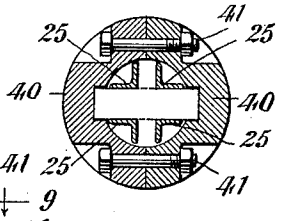


Fig. 11.

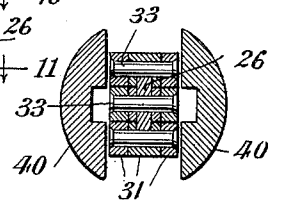
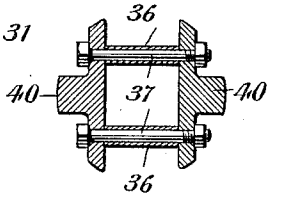


Fig. 12.



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4 SHEETS—SHEET 4.

Fig. 7.

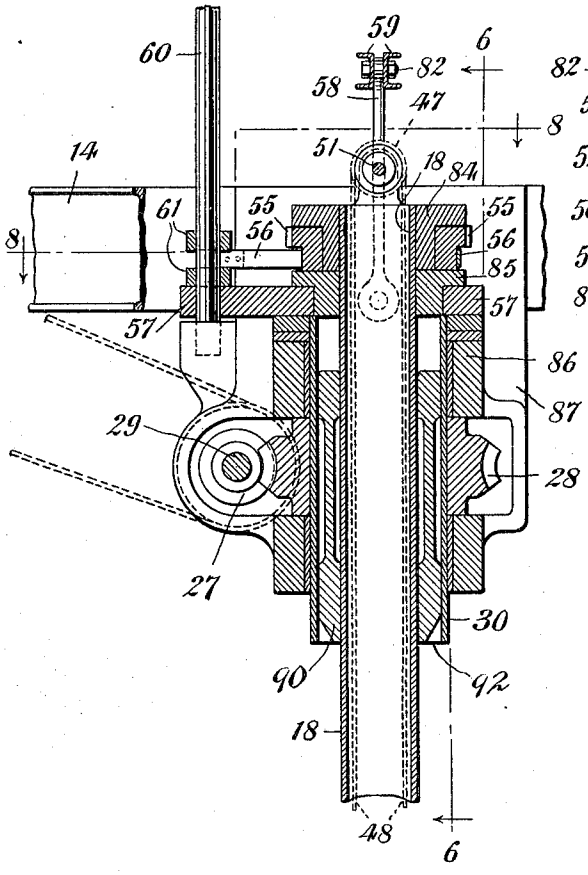


Fig. 6.

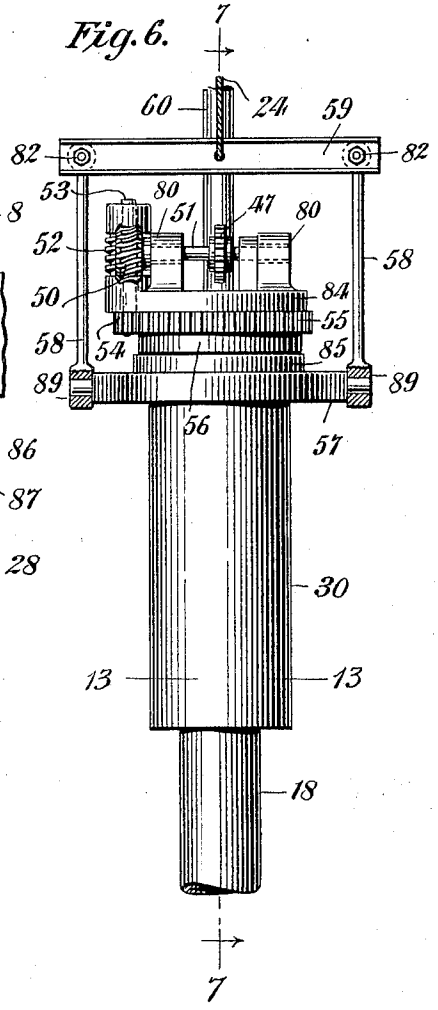


Fig. 8.

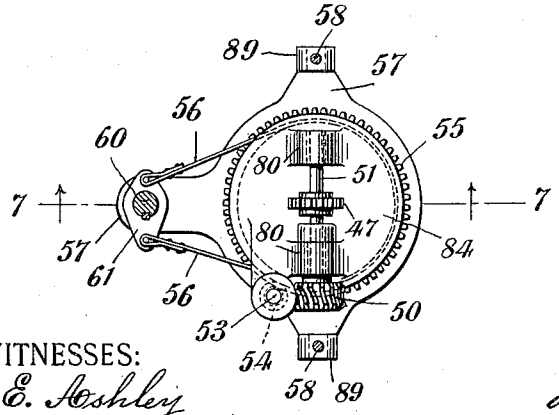
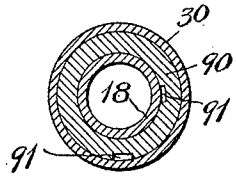


Fig. 13.



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UNITED STATES PATENT OFFICE.

JOHN H. HUHN, OF FAIRMONT, WEST VIRGINIA, ENOCH H. ABRAHAM, OF UNIONTOWN, PENNSYLVANIA, AND JOHN S. HAM, OF COVINGTON, VIRGINIA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO COVINGTON MACHINE COMPANY, A CORPORATION OF VIRGINIA.

COAL-LEVELING MACHINE.

1,067,221. Specification of Letters Patent. **Patented July 8, 1913.**

Application filed August 24, 1908. Serial No. 450,115.

To all whom it may concern:

Be it known that we, JOHN H. HUHN, a citizen of the United States, and resident of Fairmont, Marion county, West Virginia, ENOCH H. ABRAHAM, a citizen of the United States, and resident of Uniontown, Fayette county, State of Pennsylvania, and JOHN S. HAM, a citizen of the United States, and resident of Covington, Alleghany county, State of Virginia, have invented certain new and useful Improvements in Coal-Leveling Machines, of which the following is a specification.

The invention will be best understood by reference to the accompanying four sheets of drawings, in which—

Figure 1 is a vertical elevation of the leveling tool in the carriage upon which it moves shown in connection with the oven in vertical cross-section, a portion only being shown in connection with the beehive oven in vertical cross-section. Fig. 2 is a vertical elevation partly in cross-section of the arm of the leveling tool. Fig. 3 is a vertical elevation of the mechanism for actuating the tool. Fig. 4 is a vertical cross-section of the parts shown in Fig. 3 on the line 4—4 of that figure. Fig. 5 is a vertical cross-section of the upper portion of the mechanism which actuates the tool. Fig. 6 is a vertical elevation of the driving mechanism taken on the line 6—6 of Fig. 7, looking in the direction of the arrows. Fig. 7 is a vertical cross-section of the upper end of the driving mechanism on the line 7—7 of Fig. 8, looking in the direction of the arrows. Fig. 8 is a plan view of the driving mechanism on the line 8—8 of Fig. 7. Figs. 9, 10, 11 and 12 are cross-sections of the parts of the mechanism shown in Figs. 3 and 4 on the lines 9—9, 10—10, 11—11, and 12—12 respectively, looking in the direction of the arrows. Fig. 13 is a cross section on the line 13—13 of Fig. 6.

Similar letters refer to similar parts throughout the several views.

In the drawings, O represents the oven which is provided with a central opening O_1 in the top and the door D at one side.

S represents one of a pair of rails extending along the top of a row of coke ovens, upon which moves a carriage carrying the leveling device similar to that described and claimed in a certain application filed by William Sangster on the 7th day of July, 1908, in the United States Patent Office, for another form of coke leveling machine.

On the carriage 1 is the truck which carries a rotating table 13, actuated as described in said application, which in turn carries two beams 14, mounted on trunnions so that they may be adjusted angularly at an angle to the plane of the table. In the present form of apparatus, as in that referred to in the aforesaid application, the mechanism for inserting and rotating the leveling arms consists as appears from Figs. 1, 2, 3 and 4, of a vertical tube 18 which forms the main shaft of the machine which is arranged to slide vertically up and down in a sleeve 30 to which it is keyed, the shaft 18 being hung in a yoke 57. At one end of the beams 14 is mounted the tower 17. The tower 17 carries the vertical leveling shaft 18 which is raised or lowered by means of the chain 24 winding or unwinding from the drum 23.

Between the extremity of the two beams 14 under the tower 17 is a head casing, which consists of a cylindrical housing 86 hung between the beams by two hangers 87 as shown in Fig. 7. The housing 86 is hollow at the lower end, and carries the gear wheel 28, which encircles the sleeve 30, and is arranged to provide a bearing for the shaft 29 carrying the worm wheel 27, as shown in Figs. 6 and 7. The mechanism has for its object the revolving of the spreading or leveling bars or arms as the same are lowered for the purpose of leveling the coal in the oven, and the desired rotary motion is given to the shaft 18 by a suitable clutch sprocket on the truck, which through the sprocket 26 on the shaft 29 and the worm 27 and the gear wheel 28, drives the sleeve 30 and in turn the main shaft 18.

As will be seen by reference to Figs. 6 and 7, the tube 18, which forms the main shaft of the machine, carries at the top two collars, 85 and 84, the latter being superimposed upon the former. These collars are attached to, and rotate with the tube 18, upon the yoke 57. The yoke 57 is suspended

in the trunnions 89 in the vertical arms 58, which in turn are attached by the bolts 82 to the crossbar 59, the construction of which is shown in Fig. 7. This is connected with a wire rope 24, which raises and lowers the mechanism. The collar 85 is attached to the cylinder 18, so that when a rotary movement is imparted to the cylinder or sleeve 30, the collars 85, 84 and the tube 18 rotate with the same.

For the purpose of connecting the tubular shaft 18 and the sleeve 30 a form of annular bushing 90 is provided, which fits in the inner and outer sleeves at the top and bottom and as is shown in Fig. 7 does not bear in the center. This slides within the tube 30 and the tube 18 slides within it. As shown in Fig. 9 keyways 91 are cut in the bushing 90 to fit over keys attached to 18 and 30. A small keeper 92 is fastened to the side of the sleeve 30 at the bottom, to prevent the bushing 90 from dropping out.

The tube 18 terminates at its lower end in a species of forked frame or split clamphead 40 which is shown in cross-section at different points in Figs. 9, 10, 11 and 12. The forked frame 40 is composed of two parts bolted together at the top around the tube 18 by the bolts 41 and the two ends are rigidly held at the bottom by the bolts 37, as shown in Figs. 3 and 12. The bolts 37 are supported by the sleeves 36, which allow free play for the arms 31 when the bolts are tightened up, as, if the sleeves were not provided, the bolts would clamp the arms within the pieces 40 and prevent any movement of the same.

Within the tube is a frame 25 composed of four angle irons as shown in Figs. 4, 5, 9 and 10. These angle irons are bolted at the top and bottom, being separated by the crossheads 45 as shown in Figs. 4 and 5. This frame 25 is arranged to travel freely up and down in the interior of the tube 18, and is actuated by means of a chain 48 passing around the sprocket wheel 43, rotating idly on a shaft 46, in the upper end of the forked frame 40. At the top of the tube is placed another sprocket wheel 47, rotating on a shaft 51 in the bearings 80 on the collar 84. A chain 48 runs over the two sprockets 47 and 43, as shown in Figs. 5 and 7. A rotary movement of the sprocket 47 moving the chain 48 in the direction of the arrow shown in Fig. 5, will exert a downward pull on the pin 49 and frame 25. Reversing the motion of the sprocket 47 will exert an upward pull on the pin 49 and frame 25, so that by turning the sprocket 47 the frame 25 is either raised or lowered in the tube 18. The dimensions of the angle iron frame 25 are such as to permit the chain 48 and shaft 46 to pass within the legs of the angles inside of the forked frame.

The shaft 51 on which the sprocket wheel 47 rotates is mounted in the bearings 80 formed upon the collar 84 which surrounds and is keyed to the top of the tube 18. Between the collars 84 and 85 is placed a loosely running sleeve gear 55. The lower end of the frame 25 carries an extension piece 26 which is provided with a slotted elongated opening 67, as shown in Fig. 4. By turning the upper sprocket 47 in one direction the angle frame 25 with its crosshead 26 is lowered, and by revolving the sprocket 47 in the opposite direction the frame 25 and the crosshead 26 are pulled up.

The form of the bars or arms employed in the present structure, for spreading or leveling the coke, is best seen by reference to Fig. 2. These are composed of any number of pantographic arms 31, of what is known in mechanical language as the "pantographic" or the "lazy tongs" type which are pivoted at the points 32 and 33, according as they come together, as shown in Fig. 2. The two inner arms 31 are pivoted at the top to the cross-head 45, at the point 34, and at the bottom to the forked frame 40 at the point 35, as shown in Fig. 2, the pivot 35 being the lower point where the two inmost arms are pivoted and the pivot 34 being the upper point where the two innermost arms are pivoted. The pivot 35, as will be seen from Figs. 3 and 4, also attaches the arms at the bottom to the fork 40, and the pivot 34 is extended on either side so as to engage with the slotted opening 67 on the extension piece 26 on the sliding frame 25. By raising or lowering the frame 25 in the cylinder 18, the pantographic arms 31 will be extended or retracted as may be desired. In order to prevent the arms from dropping below the level horizontally, the bolts 37 are provided, which support the arms and prevent them from dropping below the point of contact with these bolts and also strengthen the lower end of the fork 40.

For the purposes of rotating the sprocket 47, a gear wheel 50 is provided upon the end of the shaft 51 as shown in Figs. 6, 7 and 8. This gear wheel meshes into a worm gear 52 turning on a pivot 53 in bearings formed on the collar 84 as shown in Figs. 6 and 8.

The gear wheel 55 is made of the form shown in Figs. 6 and 7, and is provided with a friction band 56, passing around its lower periphery. The shaft 60 is splined from top to bottom as shown in Fig. 8, and carries a lever 61 which is provided with a keyway on which it slides vertically on the spline on the shaft 60 so that as the yoke 57 is raised and lowered, the friction band 56 and the lever 61 slides with the same, and motion may be given to the lever 61 from the shaft 60 in any portion of its length.

When the friction band is tightened by the action of the lever, the gear wheel 55 will be held from turning, and the tube 18 carrying the upper head 84 and the shaft 53 and the pinion 54 will revolve around the gear wheel 55 with the resultant rotation of the pinion 54, thus giving motion through the worm and wheel to the sprocket 47. If the friction band is not tightened, the large annular gear 55 will travel around with the shaft 18 and there will be no relative motion between them. As a result, when the vertical shaft is revolved in one direction, the arms 31 may be extended, while the rotation in the reverse direction will contract the same.

For the purpose of raising and lowering the entire mechanism, the tower 17 is provided, with the pulleys 19 at the top, over which passes the wire cable 24, attached to the drum 23 on the table 14. By rotating the drum 23 by appropriate mechanism, the wire rope 24 is wound up and the leveling mechanism may be raised or lowered with respect to the arms 14.

The method of operation is as follows: The leveler is propelled along the track and revolved about its center within the carriage until the vertical tube 18 is centrally located over the eye of the coke oven. The chain 24 is then unwound from the drum 23, which allows the vertical shaft 18 and the head 40 to be lowered into the coal. After passing through the eye, a rotary motion is given to the head 40, by means of the gear wheel 28 actuated from the sprocket wheel 26 and driven by a worm 27 which assists it in boring its way down into the coal until a proper level is reached. The drum 23 is then stopped and the head remains at a fixed height. The friction band 56 is tightened and thereupon motion is given to the upper sprocket wheel 47 which through the chain 48 presses down the frame 45, and the angle head 26 acting on the arms 31 forces them out and this motion continues until the arms are pushed out to their maximum length. When necessary the head 40 is raised and lowered according to the directions of the observer, who by looking in through the door of the oven can tell when the coal is properly leveled. The rotation of the device is continued until the desired result is accomplished. When this is done, the head 45 is raised slightly above the bed of coal, the direction of rotation is reversed, and the friction band 56 again thrown on, which as described above closes the arms 31. The rotary motion of the shaft 18 is then stopped, and by means of the drum 23 the apparatus is hoisted clear of the oven and is ready to proceed to the next.

We claim as our invention:

1. In a coke-leveling machine, foldable and extensible arms of pantographic type arranged to fold and be extended in a vertical plane.

2. In a coke-leveling machine, the combination of foldable and extensible arms of a pantograph type arranged to fold and be extended in a vertical plane, and means for operating the same substantially as described.

3. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of a pantograph type arranged to fold and be extended in a vertical plane, and means substantially as described for unfolding and extending the arms after being lowered.

4. In a coke-leveling machine, the combination of a vertically movable element; foldable and extensible arms of a pantograph type arranged to fold and be extended in a vertical plane, supported in said member; means substantially as described for unfolding and extending the arms after the vertical element has been lowered; and means substantially as described for rotating the vertical element and with it the arms.

5. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of a pantograph type arranged to fold and be extended in a vertical plane, and means for automatically closing the arms so that they will not project beyond the inclosing head.

6. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of pantograph type arranged to fold and be extended in a vertical plane, and means for forcing apart the arms at the beginning of the operation of leveling.

7. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of a pantograph type, and means for preventing them from dropping below a horizontal line after the same have been extended.

8. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of a pantograph type attached thereto; a frame sliding in the vertical element, provided at the bottom with a wedge-shaped cross-head which engages with and unfolds and extends the arm after the vertical element is lowered; and means substantially as described for rotating the vertical element and with it the arms.

9. In a coke-leveling machine, the combination of a vertically movable element, means for raising and lowering said element, foldable and extensible arms of a pantograph type attached thereto; a frame sliding in the vertical element, provided at the bottom with a wedge-shaped cross-head

which engages with and unfolds and extends the arm after the vertical element is lowered; and means substantially as described for rotating the vertical element and with it the arms.

10. In a coke-leveling machine, the combination of a vertically movable element, means for raising and lowering said element, foldable and extensible arms of a pantograph type attached thereto; a frame sliding in the vertical element, provided at the bottom with a wedge-shaped cross-head which engages with and unfolds and extends the arm after the vertical element is lowered; means for raising and lowering said frame in said vertical element, and means substantially as described for rotating the vertical element and with it the arms.

11. In a coke-leveling machine, the combination with a vertically movable element, of foldable and extensible arms of a pantograph type attached thereto; a frame sliding in the vertical element, provided at the bottom with a wedge-shaped cross-head which engages with and unfolds and extends the arm after the vertical element is lowered, and by suitable devices retracts the same after the leveling is complete; and means substantially as described for rotating the vertical element and with it the arms.

12. In a coke-leveling machine, the combination with a vertically movable element, of a pair of vertically foldable and extensible arms of pantograph type, arranged to fold and be extended in a vertical plane, attached to said element and composed of any convenient number of joints.

13. A coke leveling apparatus provided with a laterally adjustable carrying frame, and a vertically adjustable plunger provided with an inner vertically movable bar, an adjustable spreader bar pivoted at its inner end thereto, and a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, substantially as set forth.

14. The combination with a traveling carriage, of a laterally adjustable frame thereon, vertically adjustable plunger mechanism mounted in the frame provided with an inner vertically movable bar, an adjustable spreader bar pivoted at its inner end thereto, and a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, substantially as set forth.

15. The combination with a traveling carriage, of a laterally adjustable frame thereon, vertically adjustable plunger mechanism mounted in the frame provided with an inner vertically movable bar, an adjustable spreader bar pivoted at its inner end thereto, a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, and means for vertically adjusting the plunger and its vertically movable bar, spreader bar and strut with relation to each other, substantially as set forth.

16. The combination with a traveling carriage, of a laterally adjustable frame thereon, vertically adjustable plunger mechanism mounted in the frame provided with an inner vertically movable bar, an adjustable spreader bar pivoted at its inner end thereto, a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, and means for vertically adjusting the plunger and its vertically movable bar, spreader bar and strut, with relation to the desired level of the coal within an oven, substantially as set forth.

17. The combination with a traveling carriage, of a laterally adjustable frame thereon, vertically adjustable plunger mechanism mounted in the frame provided with an inner vertically movable bar, an adjustable spreader bar pivoted at its inner end thereto, a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, means for vertically adjusting the plunger and its vertically movable bar, spreader bar and strut, with relation to each other, and means for rotating said parts, substantially as set forth.

18. In a coal leveling apparatus, the combination with a supporting carriage, of a laterally swinging frame, means for adjusting and locating said frame in position, a vertically adjustable plunger mechanism mounted in said frame having an inner vertically movable bar and an adjustable spreader bar pivoted at its inner end thereto, a bracing strut below the spreader bar pivoted to the lower end of the plunger and to the spreader bar, and means for rotating the plunger mechanism and spreader bar, substantially as set forth.

In testimony, that we claim the foregoing as our invention, we have signed our names in presence of two witnesses, this tenth day of August, 1908.

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ENOCH H. ABRAHAM.
JOHN S. HAM.

Witnesses as to John H. Huhn:
M. S. NOFFSINGER,
S. GARNER.
Witnesses as to Enoch H. Abraham:
E. C. RICKS,
RAY WHEELER.
Witnesses as to John S. Ham:
JENNIE MCDONALD,
H. GRAU.

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