

No. 731,911.

PATENTED JUNE 23, 1903.

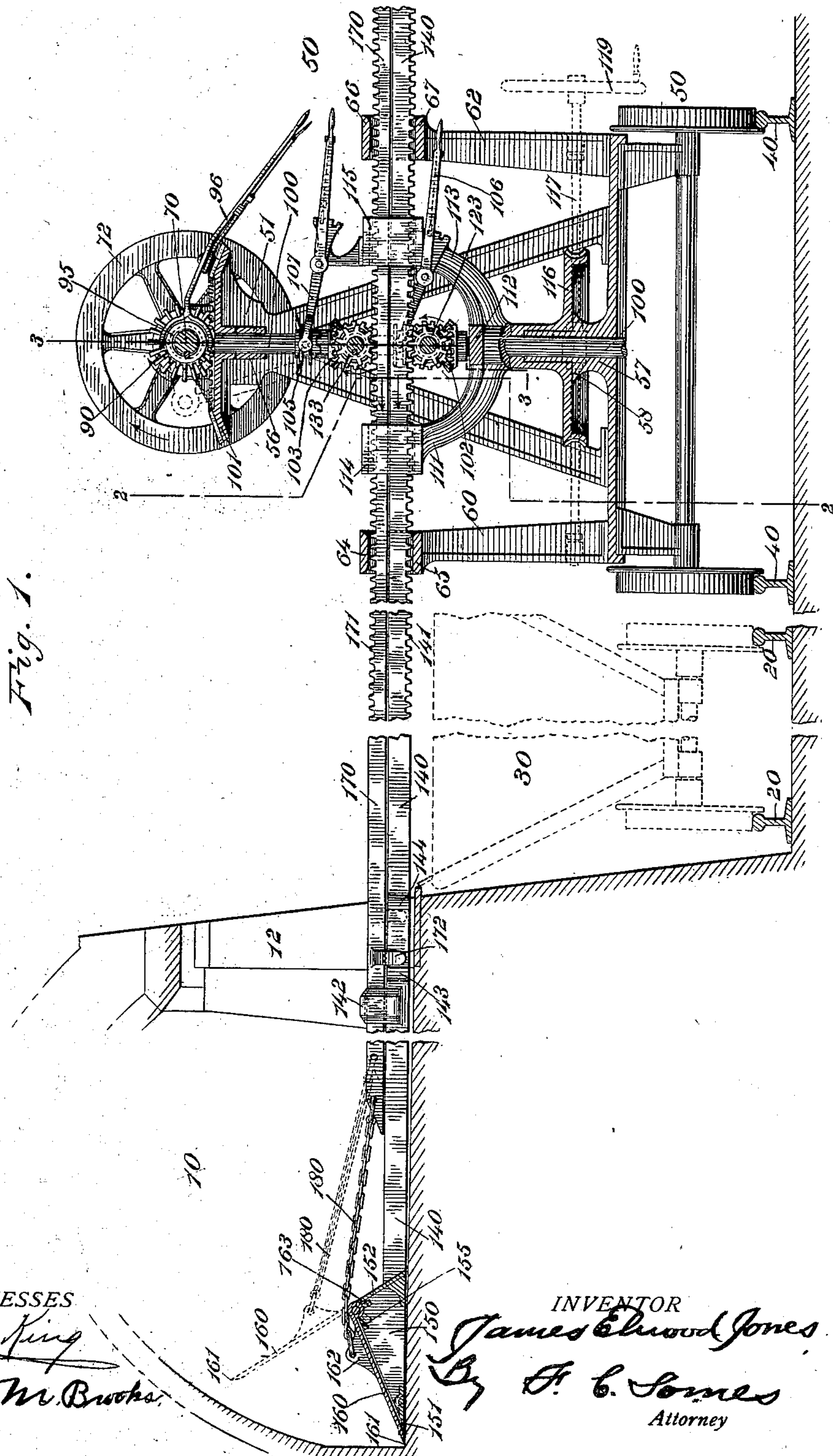
J. E. JONES.

MACHINE FOR DISCHARGING COKE OVENS.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES

Harry King
Wm M. Brooks.

Wm. M. Brooks

INVENTOR

150 INVENTOR
James Elwood Jones

51
J. C. Jones
Attorney

Attorney

No. 731,911.

PATENTED JUNE 23, 1903.

J. E. JONES.

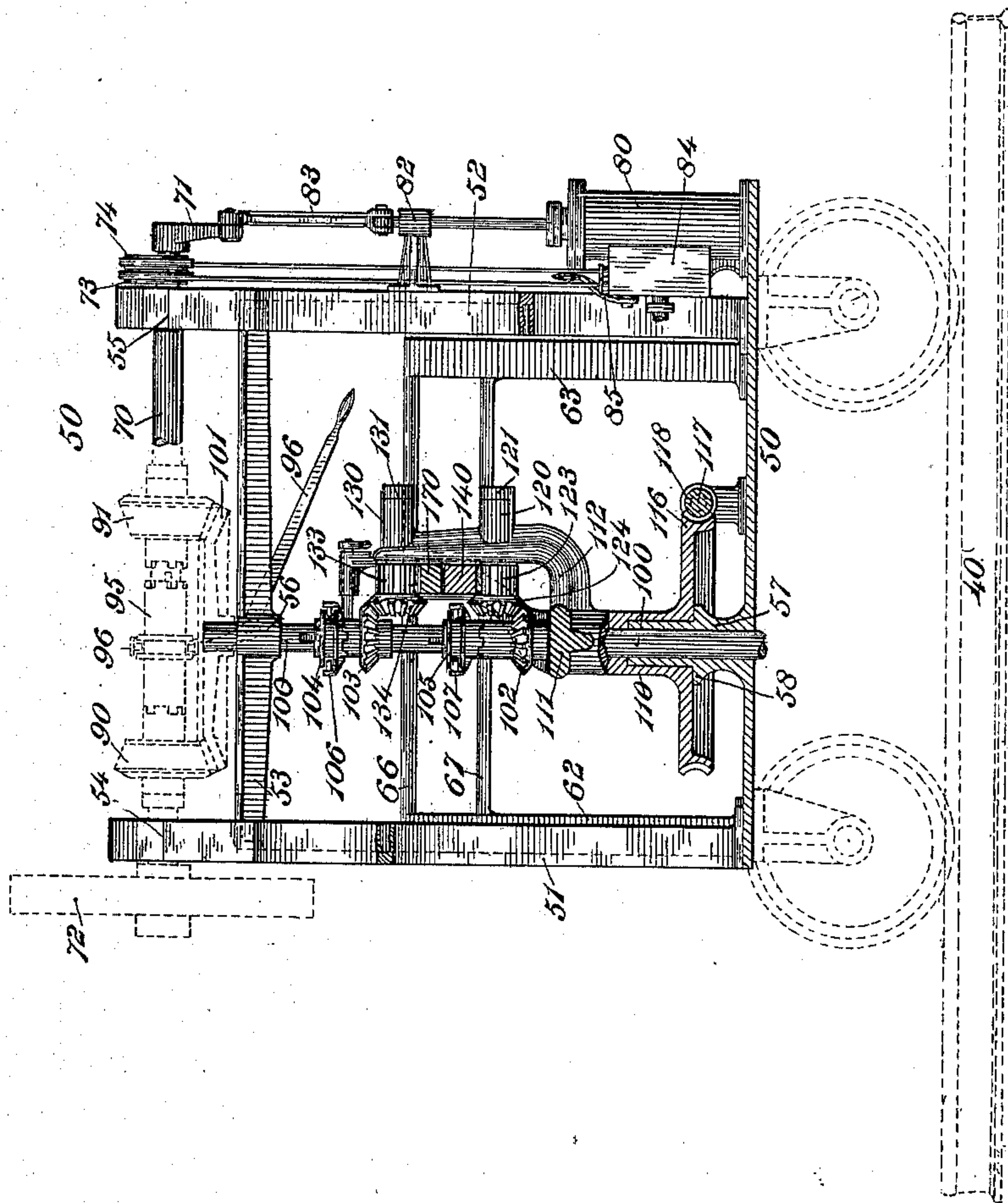
MACHINE FOR DISCHARGING COKE OVENS.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

Harry King
Wm. M. Brooks

INVENTOR

James Elwood Jones
By F. C. Lomes

Attorney

No. 731,911.

PATENTED JUNE 23, 1903.

J. E. JONES.

MACHINE FOR DISCHARGING COKE OVENS.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

4 SHEETS—SHEET 3.

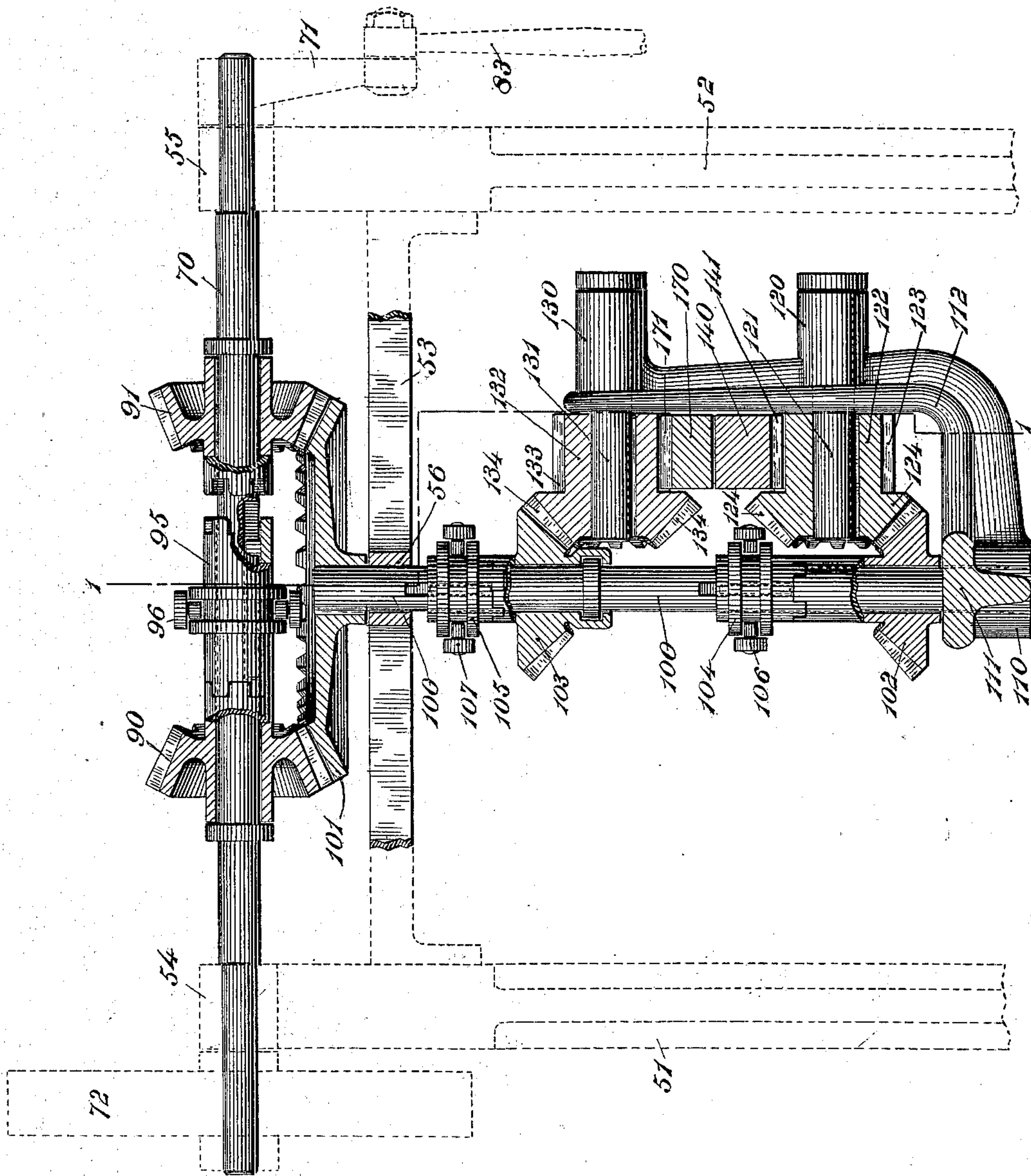


Fig. 3.

WITNESSES
Harry King
Wm. M. Brooks

INVENTOR
James Edward Jones
F. C. Soues
Attorney

No. 731,911.

PATENTED JUNE 23, 1903.

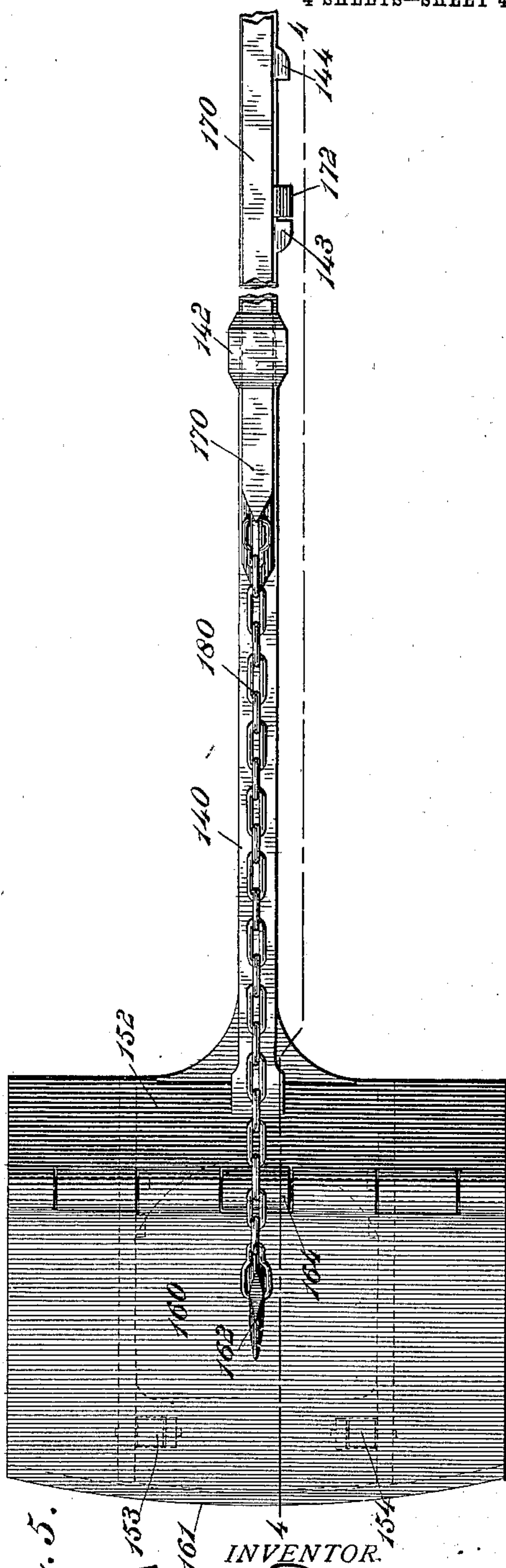
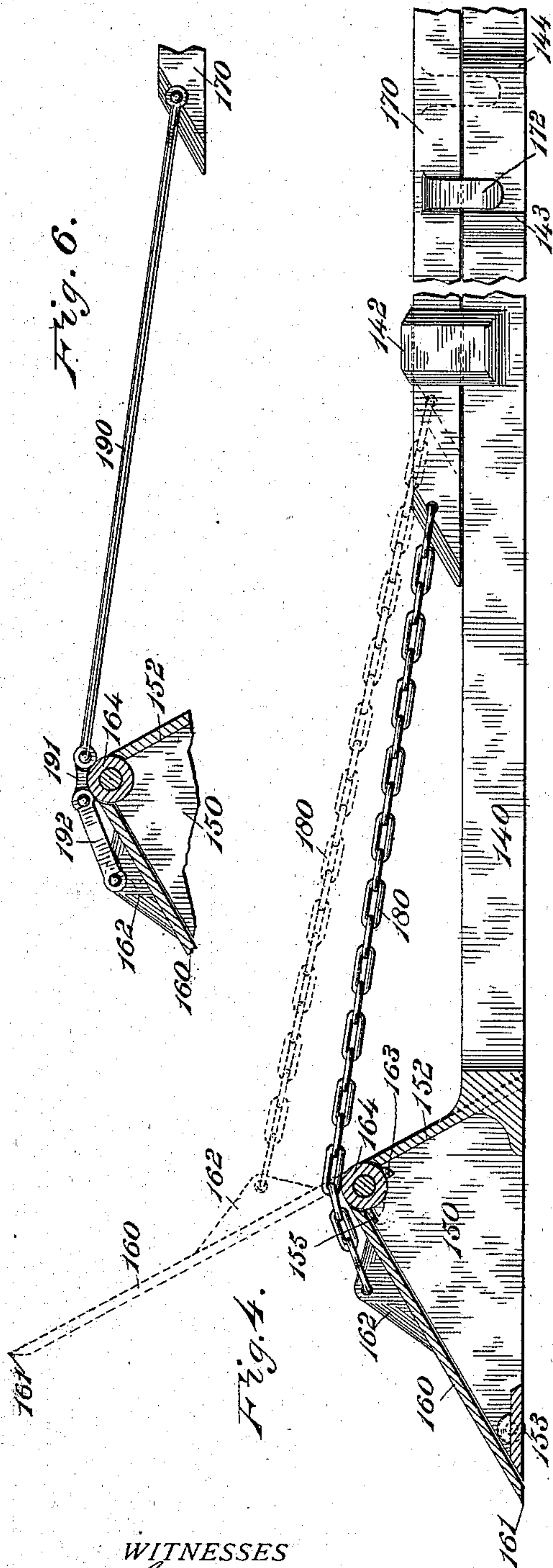
J. E. JONES.

MACHINE FOR DISCHARGING COKE OVENS.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

4 SHEETS—SHEET 4.



WITNESSES

Harry King
Wm M. Brooks

Fig. 5.

INVENTOR.

James Edward Jones
By J. B. Jones
Attorney

UNITED STATES PATENT OFFICE.

JAMES ELLWOOD JONES, OF SWITCHBACK, WEST VIRGINIA.

MACHINE FOR DISCHARGING COKE-OVENS.

SPECIFICATION forming part of Letters Patent No. 731,911, dated June 23, 1903.

Application filed April 27, 1903. Serial No. 154,532. (No model.)

To all whom it may concern:

Be it known that I, JAMES ELLWOOD JONES, a citizen of the United States of America, residing at Switchback, in the county of McDowell, in the State of West Virginia, have invented certain new and useful Improvements in Machines for Discharging Coke-Ovens, of which the following is a specification.

This invention relates to a coke-puller designed to be operated by machine for pulling coke from coke-ovens, and it is particularly adapted for discharging coke from beehive coke-ovens. In the manufacture of metallurgical coke the oven known as the "beehive-oven," so called because of its dome-shaped form, has been generally adopted, being found to give the best results. In the burning of the coke the coke is produced in a caked mass, having a vertical stratification, and it is desirable to avoid as much as possible breakage of the sticks and lumps extracted from the oven.

The invention consists principally in a coke-puller having an underworking or wedge-shaped scraper operating on the instroke into the oven to loosen the coke for withdrawal and provided with adjustable means operative on the outstroke for grasping or holding loosened coke disposed over and above the scraper, whereby a thorough discharge of the oven may be obtained.

The invention consists, further, in a coke-puller comprising an underworking scraper operative on its instroke to loosen coke for withdrawal and means in the form of an upwardly-swinging plate connected therewith and operative on the outstroke for holding the loosened coke over and above the scraper.

Figure 1 of the accompanying drawings represents a side elevation, partly in section, on line 1 1 of Fig. 3 of one embodiment of this mechanical coke-puller in connection with a coke-oven, a coke-car for receiving the coke pulled from the oven, and a machine-car on which the puller is mounted, parts being broken out for convenience of illustration. Fig. 2 represents a transverse section on line 2 2 of Fig. 1. Fig. 3 represents, on an enlarged scale, a vertical transverse section on line 3 3 of Fig. 1. Fig. 4 represents, on an enlarged scale, a side elevation of the coke-puller proper, partly in section, on line 4 4 of Fig.

5, showing the means for holding the coke on the outstroke in closed position by full lines and in open position by dotted lines. Fig. 5 represents a plan of the coke-puller shown in Fig. 4. Fig. 6 represents a longitudinal section of a fragment of the scraper constituting a part of the coke-puller and the coke-holding means in modified form.

The same reference-numbers indicate the same parts in all the figures.

This coke-pulling apparatus may be used for discharging various forms of coke-ovens. The drawings represent fragments of a beehive coke-oven 10, provided, as usual, with a top opening, which serves for a feed and blast opening, and with a lateral discharge-opening 12. These openings are closed and sealed in the usual manner during the coking operation or a part thereof. A number of such coke-ovens are arranged side by side, and a railway-track 20 is disposed in front thereof, on which travel the coke-cars 30 for receiving and conveying away the coke drawn from the oven. Any other suitable means may be employed for disposing of the coke withdrawn from the ovens. A track 40 is disposed outside the track 20 parallel therewith, and a machine-car 50, on which the discharging apparatus is mounted, travels on said track 40. A suitable frame for operating the mechanism of the coke-puller proper is mounted on the car 50. The frame shown for this purpose comprises two standards 51 and 52, secured to the platform of the car at opposite ends thereof. These standards are connected by a top cross-bar 53 and provided, respectively, with horizontal shaft-bearings 54 and 55. The cross-bar 53 is provided with a vertical shaft-bearing 56, and the car-platform is provided in line with the bearing 56 with a corresponding vertical shaft-bearing 57, having an exterior flange 58, adapted to serve as a step-bearing. The platform of the machine-car is also provided with standards, as 60, on one side and with standards 62 and 63 on the other side thereof. The first two of the standards above referred to are connected by longitudinal rails 64 and 65, disposed parallel with each other in a horizontal plane about midway of the height of the main frame, and these rails form a guideway for the coke-puller, as hereinafter described.

Corresponding rails 66 and 67 connect the standards 62 and 63 and form a guide at the other side for said coke-puller.

A horizontal driving-shaft 70 is supported 5 in the bearings 54 and 55. This shaft is provided with a crank 71, a fly-wheel 72, and valve-eccentrics 73 and 74. Any suitable means may be employed for imparting motion to the driving-shaft—such, for instance, 10 as a motor-cylinder 80, disposed on the platform 50, the piston-rod thereof playing through a guide-bracket 82, attached to the frame, and being connected by a pitman 83 with the crank 71. This motor-cylinder is 15 provided with a valve-chest 84 for the inlet and exhaust of the steam, air, or other motive fluid. This engine may be provided with any means usually employed for stopping, starting, and reversing, controlled, for in- 20 stance, by a reversing-lever 85. Two bevel-pinions 90 and 91 are disposed loosely on the driving-shaft. The inner ends of the sleeves of said pinions are provided with clutch-faces of any suitable form. A clutch-sleeve 95 is 25 splined on said driving-shaft 70 between said pinions, and the opposite ends thereof are provided with clutch-faces adapted to engage said pinions respectively. An actuating-lever 96, suitably pivoted on the frame, is pro- 30 vided with a forked inner end which engages said clutch-sleeve, whereby the latter may be shifted into and out of engagement with either of said pinions for driving and reversing the mechanism operated by the 35 driving-shaft and out of engagement with both said pinions for stopping said mechanism.

A vertical shaft 100 is supported at its upper end in the shaft-bearing 56 and at its 40 lower end in the shaft-bearing 57. A bevel gear-wheel 101 is fixed on the upper end of the vertical shaft 100 and meshes with both the bevel-pinions 90 and 91, loose on the driving-shaft 70. This vertical shaft is provided 45 with two loose beveled pinions 102 and 103, disposed one above the other in reversed relation to each other, the sleeves or hubs thereof being provided with clutch-faces. Sliding clutches 104 and 105 are splined to the vertical 50 shaft adjacent to said pinions, respectively, and adapted to lock the said pinions to the shaft. A clutch-lever 106 actuates the clutch 104, and clutch-lever 107 actuates the clutch 105.

A swiveling frame is mounted on the machine-car for carrying the coke-puller, which is thrust into and retracted from the oven in pulling the coke therefrom. This swiveling frame may be of any suitable construction. 60 As herein shown, it comprises a sleeve 110, surrounding the vertical shaft 100 and supported on the step-bearing 57. Three curved arms or brackets 111, 112, and 113 extend upward from the upper end of said sleeve, the 65 brackets 111 and 113 being in the same diametrical plane and the intermediate bracket

112 being at right angles to the others. The brackets 111 and 113 are provided at their upper ends with horizontal guideways 114 and 115, respectively, through which the coke- 70 puller bars work, as hereinafter described. The intermediate bracket 112 is provided with two horizontal shaft-bearings 120 and 130, disposed one above the other. Two stub-shafts 121 and 131 are mounted in these bear- 75 ings and project toward the vertical shaft 100. A pinion-sleeve 122 is secured to the shaft 121 and provided with a straight pinion 123 and with a beveled pinion 124, and a pinion-sleeve 132 is secured to the shaft 131 and pro- 80 vided with a straight pinion 133 and a beveled pinion 134. The beveled pinion 124 meshes with the lower beveled pinion 102 of the vertical shaft, and the pinion 134 meshes with the upper beveled pinion 133 on said 85 shaft, and motion is imparted to each of the stub-shafts in either direction by means of this gearing. The swiveling frame is oscillated by any suitable means. For this purpose it is shown as provided at the lower end 90 of its sleeve 110 with a worm-wheel 116, and a horizontal shaft 117, having its bearings in the stationary frame of the machine-car, is provided with a worm 118, engaging said worm-wheel, and with an actuating-crank 119. 95

A coke-puller proper comprising a scraper adapted for loosening a portion of the caked coke on the instroke and having an adjustable coke-holder for grasping or holding the loosened coke over and above the scraper on 100 the outstroke is mounted on and actuated from the swiveling frame. This coke-puller may be constructed in any suitable form which adapts it for performing this double function. In the form of embodiment shown 105 in the drawings it comprises a shank-bar 140, a beveled scraper 150 at the outer end of said shank-bar, and a swinging plate 160; which in this showing constitutes a part of the coke-loosening scraper, a slide-bar 170, and a flexi- 110 ble connection 180 between the slide-bar and the swinging plate. The body of the scraper 150, which may be solid or skeleton construction, is in the form of a wedge attached to the bar 140 and beveled downward from its 115 thick rear face 152 to its thin front edge 151. The front edge is preferably arc-shaped to conform to the curvature of the oven-wall, and the rear face is preferably straight and at an abrupt angle to the inclined upper face. 120 This body is preferably provided on its under side with antifriction-rolls 153 and 154, which travel on the oven-bottom. The shank-bar 140 is supported in the guideways 114 and 115 of the swiveling frame and also in the 125 elongated stationary guideway at opposite sides of the machine-car, which latter permit the bar to swing horizontally to different angles as the supporting-frames swivels. The inner portion of this bar is provided with rack- 130 teeth 141, which engage the pinion 123, whereby said bar is reciprocated to thrust and re-

tract the scraper. This bar is provided in its outer portion at its upper side with a guide 142, and on one side with stops 143 and 144.

The swinging plate 160, constituting the front face of the wedge-shaped scraper, is hinged at its upper edge to the angle of the scraper-body. This plate also extends in a transverse direction to the bar 140 and has a beveled outer edge 161, adapted to the bottom of the oven. This plate is provided on its upper face in line with the shank-bar 140 with a lug 162, to which the outer end of the chain 180 is connected. This lug is preferably thin and tapering to permit it to pass readily through the coke and sufficiently high to afford leverage for the actuating means. The pintle of the hinge of the swinging plate 160 is provided with an antifriction-roll 164, over which the chain passes.

The slide-bar 170 is mounted on the shank-bar 140 and is somewhat shorter than the latter. This slide-bar also moves through the guides of the swiveling and stationary frames heretofore mentioned and also at its outer end through the guide 142, attached to the bar 140. This bar 170 is also provided along its inner portion with rack-teeth 171, which are engaged by the pinion 133, whereby motion may be imparted to said bar independently of the motion of the bar 140. This slide-bar 170 is provided with a dependent lug 172, which plays between the stops 143 and 144 of the bar 140, whereby the movement of the sliding bar 170 is limited. The front end of the sliding bar is preferably beveled, so as to pass readily under the coke on the instroke.

In Fig. 6 the swinging plate and actuating-bar are connected by the rod 190 and the links 191 and 192, the link 191 resting on the antifriction-roller 164 when the swinging plate is closed, or nearly so.

The machine-car may be provided with suitable traction mechanism operated by the same power which operates the coke-puller. This traction mechanism may consist of suitable transmitting-gearing between shaft 100 underneath the platform of the car and one of the axles thereof and will properly include devices for shifting it into and out of gear, so as to move the car as desired.

In the use of this coke-drawing apparatus when the oven is ready to be discharged the machine-car 50 and the receiving-car 30 are moved into position opposite the lateral oven-opening 12, the closure of which is removed. The engine is started, and the driving-shaft moves in the direction of the arrow 72 in Fig. 1. The operator then by the lever 96 shifts the clutch 95 into engagement with the pinion 90 and by the lever 106 shifts the clutch 104 into engagement with the pinion 102 on the vertical shaft 100. The coke-puller is thereby thrust into the oven, and the scraper thereof moves over the bottom of the oven a sufficient distance to make a proper drawing of the coke. On this instroke of the coke-puller the plate 160, constituting the

beveled front face of the scraper, is in lowered or closed position and operates as a wedge to lift the coke above it from the caked mass of coke within the oven. At the end of the instroke the lever 106 is shifted so as to disconnect the pinion 102 from the shaft, and the inward movement of the coke-puller is stopped. Then the lever 96 is moved to shift the clutch 95 out of engagement with the pinion 90 of the driving-shaft and into engagement with the pinion 91 thereof, whereby the motion of the vertical shaft 100 is reversed. Then the lever 107 is shifted into position to lock the clutch 105 into engagement with the pinion 103, and motion is imparted to the pinion 133, which engages the bar 170, whereby said bar is retracted a distance equal to the space between the stops 143 and 144 on the bar 140, and the swinging plate 160 is lifted into raised position, as indicated in dotted lines in Fig. 1. This upward swing of the plate 160 lifts the mass of coke immediately above said plate and thrusts it behind said plate and places the plate in position to engage the depth of loosened coke above the body of the scraper on the outward stroke. The operator then shifts the lever 106 and brings the clutch 104 into engagement with the pinion 102, whereby the actuating-bar 140 is retracted and the coke-puller withdrawn from the oven, with its plate 160 in raised position, whereby substantially the whole mass of coke which was loosened on the instroke is discharged into the coke-car 30. Then the levers 106 and 107 are shifted to throw both the gears 102 and 103 out of connection with the vertical shaft 100, whereby the motion of the coke-puller is stopped. To make another stroke, the vertical shaft 100 is reversed either by reversing the engine or by shifting the clutch of the driving-shaft. Then the upper bar 170 is first brought into operative connection with said vertical shaft and is thrust forward, loosening the chain 180 and permitting the plate 160 to fall into closed position. Then the lever 106 is actuated to connect the bar 140 with the transmitting mechanism, and the new thrust of the coke-puller is effected as before. The first few strokes of the coke-puller are preferably in a direct line at right angles to the tracks, it usually requiring two or more drawings to remove the coke throughout a diameter of the coke-oven. After this is done lateral thrusts of the coke-puller are made, first to one side and then to the other, the swiveling frame being shifted for this purpose by the operator through the manipulation of the crank-wheel 119.

It will be understood that the separate driving-gearing for the bar 140 may be omitted, if desired, and said bar operated through the driving mechanism for bar 170 and its connection with the bar 140. Other details of construction may be varied without departing from the scope of this invention.

I claim as my invention—

1. A coke-puller comprising an underworking wedge-like scraper, movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, and means adjustable after the instroke to engage and hold loosened coke.

2. A coke-puller comprising an underworking wedge-like scraper, movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, a swinging holder operative to engage and hold loosened coke above the scraper on the outstroke, and means for operating said holder.

3. A coke-puller comprising an underworking wedge-like scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, an upwardly - swinging plate attached to said scraper and operative to engage and hold loosened coke above the scraper on the outstroke, and means for operating said plate.

4. In a coke-puller the combination of an underworking wedge-like scraper adapted to slide over the bottom of a coke-oven to lift and loosen coke on its instroke, a swinging plate constituting the front of said scraper, and means for swinging said plate upwardly for holding the coke on the outstroke.

5. In a coke-puller the combination of an underworking scraper operative on its instroke to loosen coke for withdrawal, means for reciprocating said scraper, an upwardly - swinging plate hinged to said scraper, an actuating-bar therefor, and a flexible connection between said bar and plate.

6. In a coke-puller the combination of an underworking scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, means adjustable after the instroke to engage and hold loosened coke above the scraper on the outstroke, actuating-bars slidable on each other and connected respectively with said means and scraper, and mechanism for reciprocating said bars.

7. In a coke-puller the combination of an underworking scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, means adjustable after the instroke to engage and hold loosened coke above the scraper on the outstroke, actuating-bars connected respectively with said means and scraper, and mechanism for reciprocating said bars independently of each other, and stop devices which limit the independent movement of one of said bars in relation to the other.

8. In a coke-puller the combination of an underworking scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, means adjustable after the instroke to engage and hold loosened coke above the scraper on the outstroke, actuating-bars slidable on each other and connected respectively with said means and scraper, mechanism for reciprocating said bars, and stop devices on said bars which limit the independent movement of one of said bars in relation to the other.

9. In a coke-puller, the combination of an underworking scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, means adjustable after the instroke to engage and hold loosened coke above the scraper on the outstroke, actuating-bars slidable on each other, one of said bars being connected with said adjustable means and the other with said scraper, mechanism for reciprocating one of said bars, and means for imparting motion from the said reciprocating bar to the other.

10. A coke-puller comprising a scraper-frame, a plate hinged thereto and adapted to act as a coke-lifter in closed position on the instroke and as a coke-drawer in open position on the outstroke and means for adjusting said plate.

11. In a mechanical coke-puller the combination of an underworking scraper movable over the bottom of a coke-oven and operative on its instroke to loosen coke for withdrawal, a shank-bar to which said scraper is connected, means adjustable after the instroke to engage and hold loosened coke above the scraper on the outstroke, an actuating-bar, a flexible connection between said actuating-bar and said hinged plate and means for reciprocating said bars independently of each other.

12. In an apparatus for discharging coke-ovens, the combination of a wheeled vehicle, a swiveling frame mounted thereon and provided with bar-guides and pinions, rack-bars supported on said guides and engaging said pinions respectively, a coke-loosening scraper connected with one of said bars, a coke-holder mounted on said scraper and connected to the other rack-bar, and reversible driving-gear engaging said pinions.

13. In an apparatus for discharging coke-ovens, the combination of a wheeled vehicle, a swiveling frame mounted thereon, rack-bars supported on said frame, a coke-scraper connected with one of said rack-bars, a coke-grasper mounted on said scraper and connected with the other rack-bar and cooperating with said scraper, and means for reciprocating said rack-bars.

14. In an apparatus for discharging coke-ovens, the combination of a wheeled vehicle, a swiveling frame mounted thereon, rack-bars supported on said frame, a coke-scraper connected with one of said rack-bars, a coke-grasper mounted on said scraper and connected with the other rack-bar and cooperative with said scraper, and independent reversible gearing for reciprocating said rack-bars.

JAS. ELLWOOD JONES.

Witnesses:

A. J. DOSS,
L. A. HOOPER,
EDWIN MANN.