

No. 775,182.

PATENTED NOV. 15, 1904.

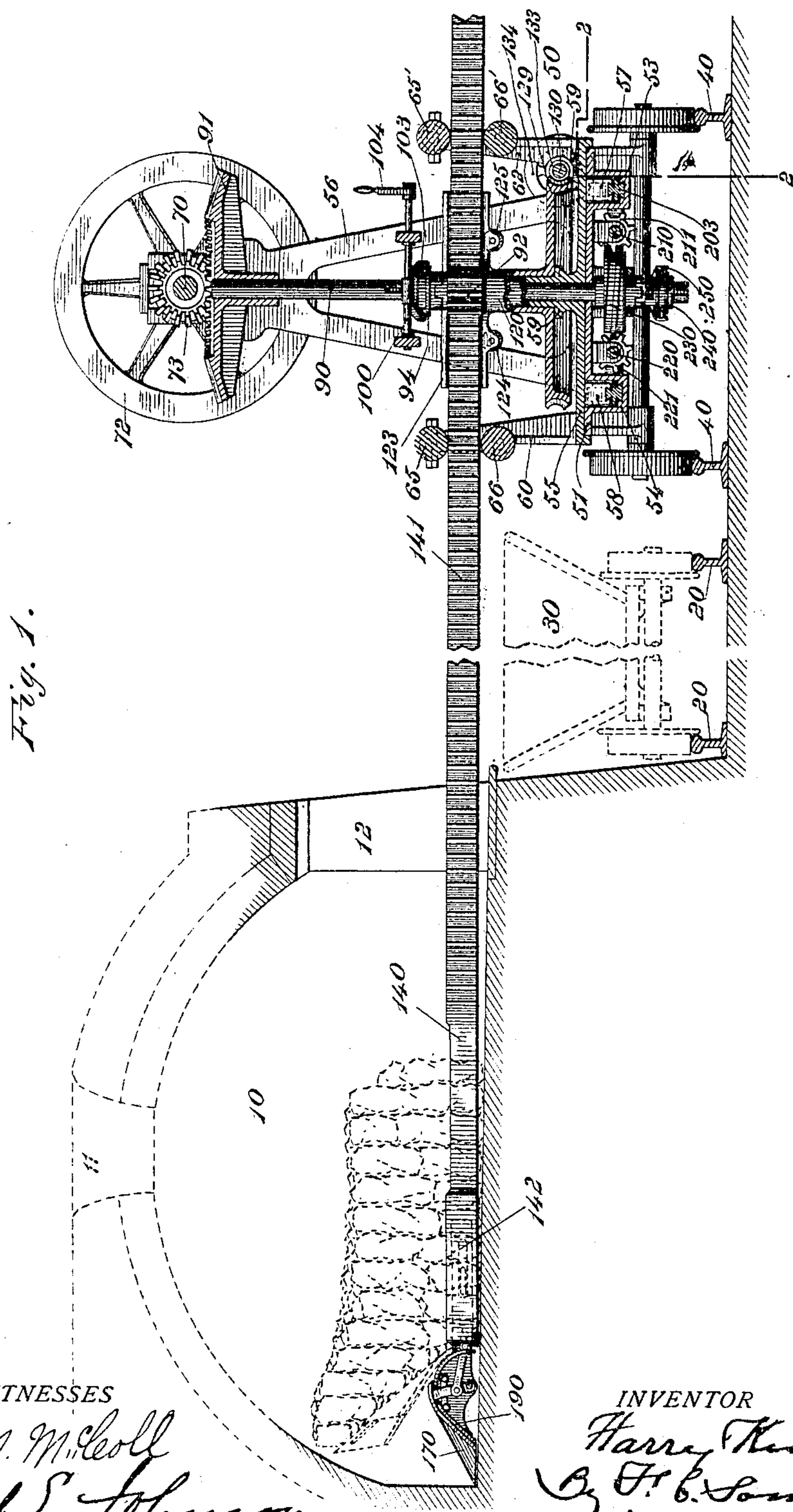
H. KING.

MACHINE FOR DISCHARGING COKE OVENS.

APPLICATION FILED APR. 19, 1904.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES

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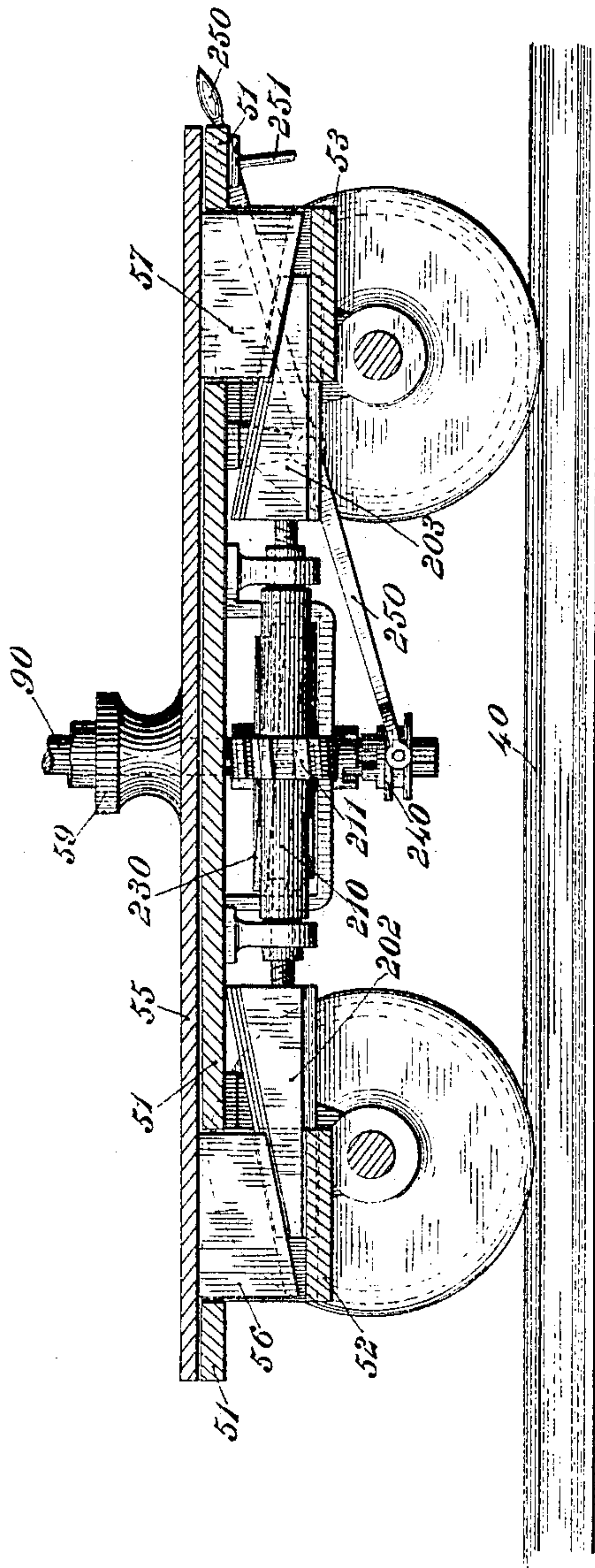
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4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

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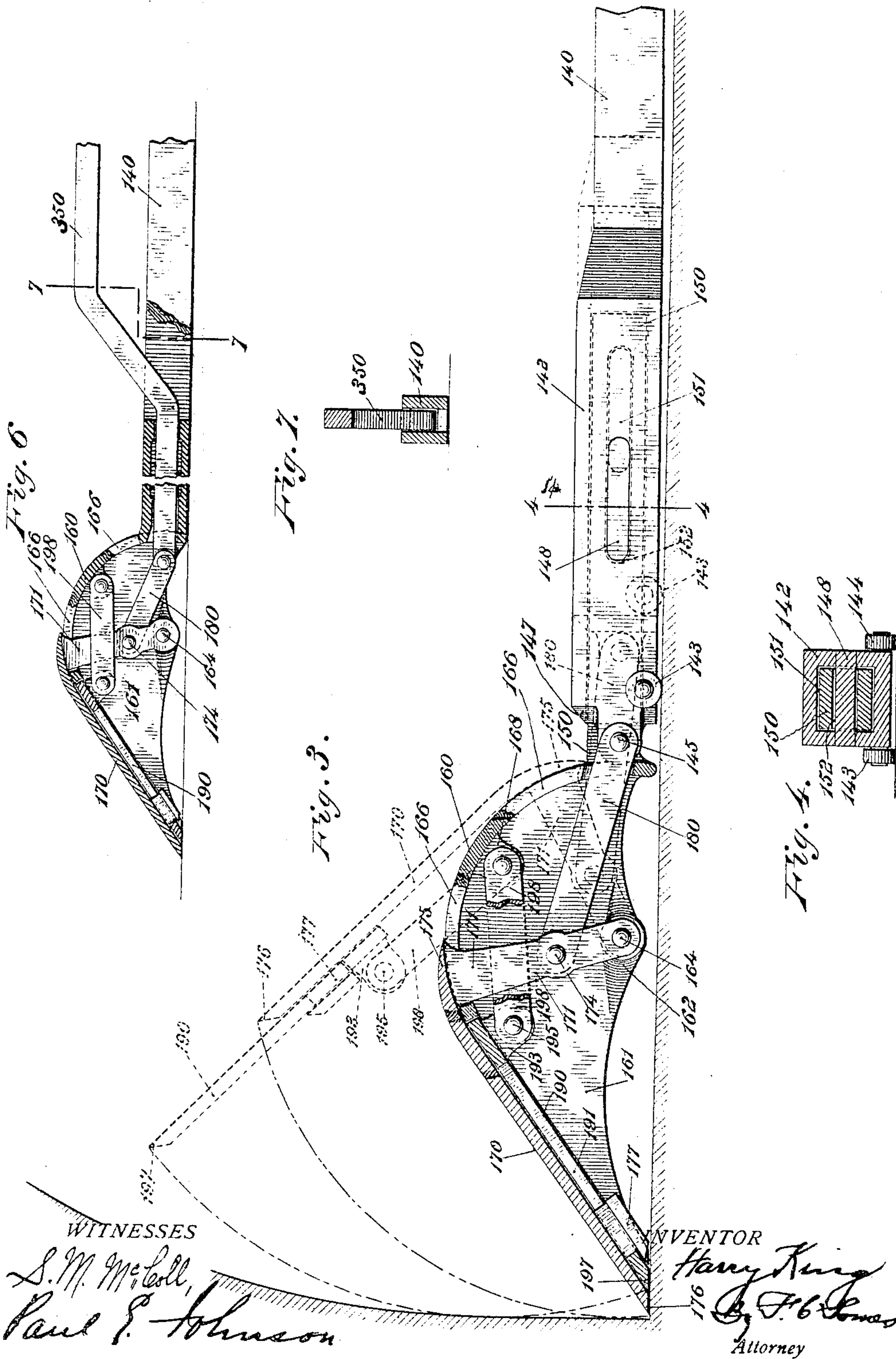
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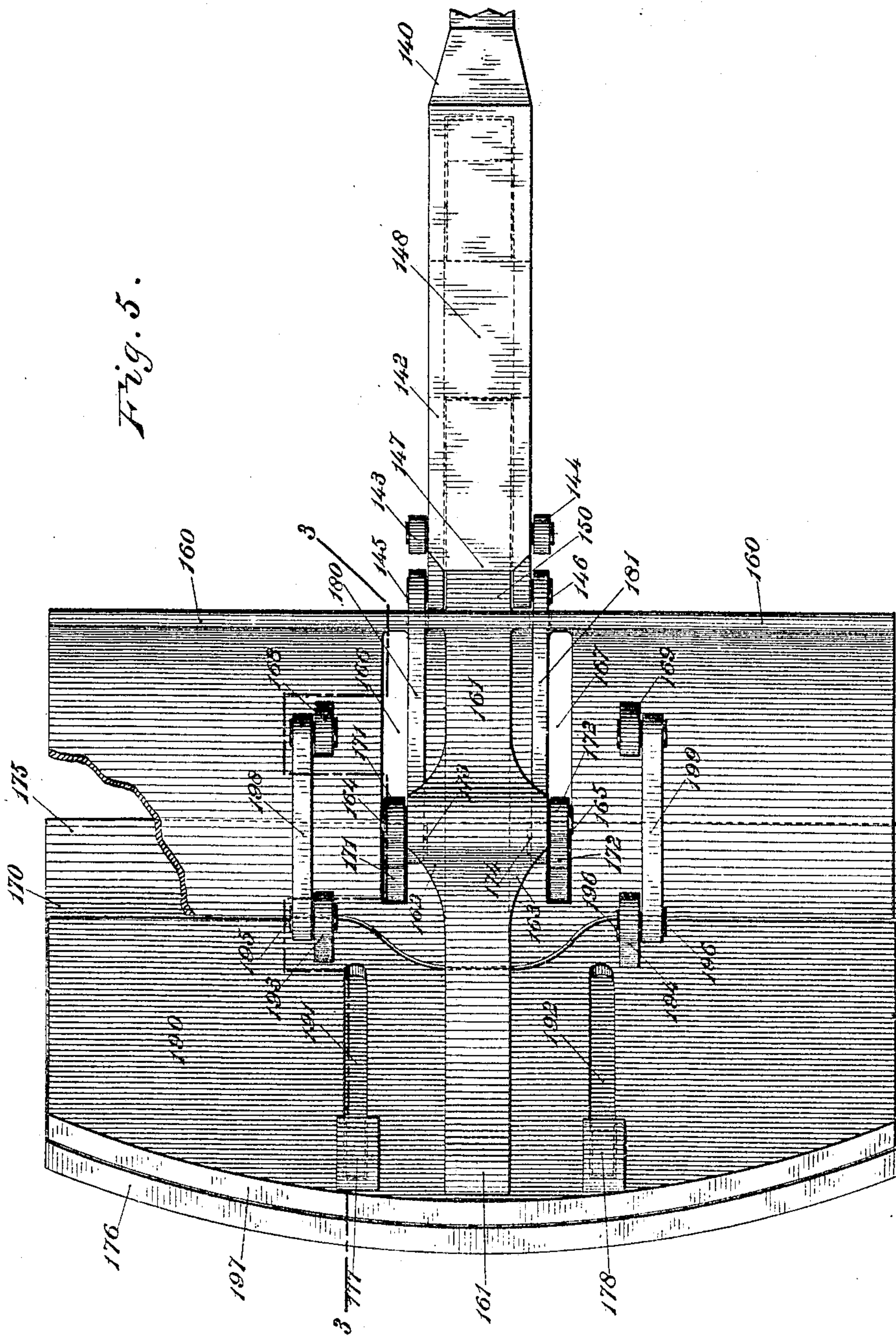
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UNITED STATES PATENT OFFICE.

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MACHINE FOR DISCHARGING COKE-OVENS.

SPECIFICATION forming part of Letters Patent No. 775,182, dated November 15, 1904.

Application filed April 19, 1904. Serial No. 203,929. (No model.)

To all whom it may concern:

Be it known that I, HARRY KING, a citizen of the United States of America, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Machines for Discharging Coke-Ovens, of which the following is a specification.

The invention relates to a mechanical coke-puller having an underworking or wedge-like scraper operative on the instroke into the oven to loosen coke for withdrawal and on the outstroke to withdraw loosened coke and a swinging plate or coke-grasper having a pivotal connection with said scraper and adjustable after the instroke into position to grasp and hold the loosened coke over and above the scraper on the outstroke.

The objects of the invention are to provide means for elongating or extending the swinging coke-grasper or plate to enable it to obtain a better hold on the coke on the outstroke and for adjusting the coke-puller vertically to suit ovens of different heights.

Figure 1 of the accompanying drawings represents a side elevation, partly in section, of one embodiment of this mechanical coke-puller in connection with a coke-oven, a coke-car in dotted lines for receiving the coke pulled from the oven, and a machine-car on which the puller is mounted, the oven and cars being in section and parts being broken out. Fig. 2 represents a longitudinal vertical section of the base of the machine-car on line 2 2 of Fig. 1, showing the means for raising and lowering the platform. Fig. 3 represents a vertical longitudinal section of one embodiment of this invention on line 3 3 of Fig. 5. Fig. 4 represents a transverse section on line 4 4 of Fig. 3. Fig. 5 represents a plan of the under side of this coke-puller, parts being broken away. Fig. 6 represents, on a smaller scale, a coke-puller embodying this invention, in which the scraper-bar and the bar for actuating the swinging plate are individually operated by mechanical means. Fig. 7 represents a transverse section on line 7 7 of Fig. 6.

The same reference characters indicate corresponding parts in all the figures.

This coke-puller is designed to be mounted on a suitable machine-car traveling on a track located in front of the coke-ovens, and preferably outside the track on which the coke-receiving cars travel. This machine-car will carry suitable mechanism for thrusting the coke-puller into the oven and retracting it therefrom and for swinging it laterally to gather the coke from opposite sides of the oven.

The drawings represent fragments of a beehive coke-oven 10, provided, as usual, with a top opening 11, 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 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 car 50, having a body 51, supported on trucks in the usual manner, is preferably provided with a vertically-movable platform 55, having end standards, as 56. The platform on the machine-car is provided with standards, as 60, on one side, and with standards, as 62, on the other side thereof. The standards, as 60, are connected by elongated horizontal antifric-tion-rollers 65 and 66, disposed parallel with each other in a vertical plane, and these rollers form a guideway for the coke-puller, as hereinafter described. Corresponding rollers 65' and 66' connect the standards, as 62, at the other side of the car and form a guide for said coke-puller. A horizontal driving-shaft 70, supported in bearings on the upper part of the frame, receives motion from any suitable motor (not shown) mounted on the car. This shaft is provided with a fly-wheel 72 and with a beveled pinion 73. A vertical shaft 90 is disposed in bearings in the frame

and provided at its upper end with a beveled gear-wheel 91, which meshes with the beveled pinion 73 on the driving-shaft 70. This vertical shaft is provided with a loose pinion 5 92 and with a sliding clutch 94, splined to the shaft adjacent to said pinion. The means shown for operating this clutch comprise the operating-rod 100, supported in brackets attached to the frame, and a clutch-fork 103, 10 fixed on said rod and engaging the clutch-collar of the loose pinion 92. An actuating-lever 104 is attached to one end of this rod and serves for operating the clutch-fork to slide the clutch 94 on the shaft 90 and connect the 15 pinion 92 therewith or disconnect it therefrom.

A swiveling frame is mounted on the machine-car for carrying the coke-puller, which is thrust into and retracted from the oven in 20 the pulling of coke therefrom. This swiveling frame, which permits the coke-puller to swing laterally to engage the coke at either side of the oven, may be of any suitable construction for this purpose. As herein shown, 25 it comprises a sleeve 120, surrounding the vertical shaft 90 and supported on the step-bearing 59, surrounding said shaft, near the lower end thereof. A flanged guideway 123, horizontal or nearly so, and preferably integral with said sleeve, is disposed at one side 30 of the shaft 90 opposite the loose pinion 92, being open at the side adjacent to said pinion. This guideway is provided with antifriction-rolls 124 and 125. The sleeve 120 is provided 35 at its lower end with a worm-wheel 129. A horizontal actuating-shaft 130 is journaled in bearings and provided with a worm 133, which engages said worm-wheel for turning the swiveling frame. This shaft is provided with 40 a hand-wheel 134 or means for operating it.

The coke-puller performs a twofold function. On the instroke it lifts and separates from the caked mass of coke a strip of coke 45 of a width equal to the width of the puller and of a length corresponding with the length of the stroke thereof, and on its outstroke it operates to withdraw the mass of coke so loosened or the greater part thereof. To enable it to gather the coke at the inner end of its 50 stroke, it is provided with an upwardly-swinging front plate, which is preferably extensible to move adjacent to the arched wall of the oven on the upward swinging of said plate. By this means any coke which might otherwise 55 fall over the end of the coke-puller and be left behind is taken out.

In the forms shown in Figs. 1, 3, 4, 5 the coke-puller comprises a coke-puller bar 140, preferably rigid throughout, and provided at 60 its inner end with a rack-bar or rack-teeth 141 or other means whereby it is engaged by the actuating mechanism of the machine. This bar is provided at its front end with a longitudinal socket 142, which is open at the outer 65 end of the bar. It may also be provided at

its front end with rounded feet, preferably in the form of antifriction-rollers 143 and 144, which enable it to travel with facility on the bottom of a coke-oven. Lateral trunnions 145 and 146 project from opposite sides of the 70 socket, near the front end thereof, and the upper end of the socket is recessed and provided with a beveled edge 147, as shown in Figs. 3 and 5. A cross-bar 148, preferably broad and flat, extends across the socket 142, 75 as shown in Figs. 3 and 4. A slide-bar 150 is adapted to slide in the socket 142 of the bar 140 or is otherwise connected therewith. It may constitute an extension of the bar 140 and terminate within the socket 142 thereof. 80 The slide-bar in this form has a longitudinal slot 152, which is engaged by the cross-bar 148. The body of the wedge-like scraper comprises a back plate 160, fixed to the front end of the slide-bar 150, and a longitudinal 85 web 161, united with the plate 160 and practically constituting an extension of the slide-bar 150. This web is provided on opposite sides with lugs 162 and 163, having lateral studs 164 and 165, respectively. The curved 90 plate 160 is provided with slots 166 and 167 on opposite sides of the central web 161 and disposed parallel therewith. A swinging plate 170 is adapted to ride over the fixed plate 160 and is provided with arms 171 and 172, rigidly 95 connected to its under side at its inner edge and extending downwardly approximately at right angles thereto. These arms are pivoted at their lower ends to the studs 164 and 165 on the web 161, and they are 100 provided with lateral studs 173 and 174 some distance above their fulcrums. The swinging plate 170 has a beveled and curved inner edge 175, fitting over the fixed plate 160, and an outer beveled edge 176, adapted to 105 fit the oven bottom or floor, and it is provided on its under side with headed studs 177 and 178. Links 180 and 181 connect the outer end of the bar 140 with the arms 171 and 172 of the swinging plate 170 and serve as 110 a means for operating the latter. The link 180 is pivoted at its inner end on the trunnion 145, passes through the slot 166 in the fixed plate 160, and is pivoted at its outer end to the arm 171. The link 181 is correspondingly 115 pivoted at its inner end to the trunnion 146, passes through the slot 167 in the fixed plate 160, and is pivoted at its outer end to the arm 172. A sliding plate 190 is attached to the swinging plate 170 and serves when thrust 120 outward as an extension thereof, being movably disposed on the under side of said swinging plate. This sliding extension-plate has slots 191 and 192 parallel with the web 161 of the bar extension 150, and these slots are engaged 125 by the headed studs 177 and 178 of the swinging plate 170, and the sliding extension-plate is provided on its under side near its inner edge with lugs 193 and 194, having lateral studs 195 and 196. It is also provided 130

with an arc-shaped outer edge 197, which corresponds approximately in curvature with the curve of the oven, said outer edge being also beveled to fit the oven-bottom. Links 5 198 and 199 connect the fixed plate 160 with the sliding extension-plate 190. These links are pivoted at their inner ends, respectively, to the lugs 168 and 169 of said plate and at their outer ends to the studs 193 and 194 of 10 the sliding plate. Means are provided for raising and lowering the base or platform 55, which supports the coke-pulling mechanism. The body 51 is provided at its opposite ends and on opposite sides with guideways, as 52, 53, 15 and 54, which are preferably provided with longitudinal grooves. The base or platform 55 is provided with dependent wedge-blocks, as 56, 57, and 58, which project downward through said platform over said guideways. 20 A pair of wedge-blocks, as 202 and 203, is disposed in the guideways on one side of the car and corresponding wedge-blocks in the guideways on the opposite side of the car. These wedge-blocks are preferably provided 25 with ribs on their upper and under sides, and they engage on their under sides the grooves of the guideways attached to the body, and on their upper beveled sides they engage the lower edges of the dependent wedges attached 30 to the base 55. The grooves and ribs referred to are preferably of dovetail form. Suitable means are provided for adjusting the wedges to raise and lower the base 55. The means shown for this purpose comprise two longitudinal screw-shafts 210 and 220, one of which 35 is connected at its opposite ends with the wedges at one side of the car and the other at its opposite ends with the wedges at the other side of the car. The wedges may be 40 provided with lateral arms to effect this engagement. The wedges or their arms are screw-threaded, and the shafts which engage said wedges or arms have screw-threads at their opposite ends of opposite pitch. The 45 shaft 210 is provided with a pinion 211 and the shaft 220 with a pinion 221, and a worm-wheel 230, disposed loosely on the vertical shaft 90, engages said pinions at diametrically opposite points. A clutch 240, splined on 50 said shaft, is adapted to engage the sleeve of said worm-wheel and cause the latter to rotate. A lever 250, supported on a dependent bracket 251, attached to the body 51, projects at one end of the car and serves as a means 55 for operating said clutch. When it is desired to raise the coke-puller to a higher plane or to lower it to a lower plane, the shaft 90 is slightly turned in one direction or the other and the clutch 240 is thrown into connection 60 with the lifting and lowering mechanism and allowed to remain in connection until the proper adjustment is obtained.

In the use of the form of the invention shown in Figs. 1, 3, 4, 5 the coke-puller is

thrust into the oven along the bottom there- 65 of a sufficient distance to make a proper drawing of the coke. On this instroke the swinging plate 170 is in closed position and constitutes the beveled front face of the scraper and operates like a wedge to lift the coke un- 70 der which it passes and to loosen such coke from the caked mass of coke within the oven. As the scraper moves inward in the oven the main portion of the loosened coke falls behind the back plate 160 and at the inner end 75 of the stroke a portion of the loosened coke is disposed directly over the front of the scraper. The outstroke is then made. At the beginning thereof the bar 140 moves outward from the oven and the scraper remains 80 stationary, owing to the resistance of the coke behind the plate 160. During this independent movement of the bar 140 the links 180 and 181, connected to the arms 171 and 172, 85 cause the plate 170 to swing upward and forward into the dotted-line position shown in Fig. 1. This forward swinging of the plate 170 causes, through links 198 and 199, the extension-plate 190 to slide outward into extended position, as also shown in dotted lines in 90 said figure. When the swinging plate 170 is swung into wide-open position, the cross-bar 148 of the bar 140 engages the outer end of the slot 151 of the slide-bar 150 and causes said slide-bar and the scraper to move out- 95 ward in unison with the outward movement of the bar 140 while the swinging plate 170 is in upward position and the plate 190 extended. The upward swinging and extension of the plate 170 enables it to grasp all the 100 coke above said scraper and close to the oven-wall and to hold the mass of coke behind said extended plate on the outstroke. The coke-puller is swung to the right and left in the usual manner for drawing coke from the sides 105 of the oven.

In the embodiment shown in Figs. 6 and 7 the slide-bar 350, which corresponds to the bar 150 of the other figures, is extended backward to the machine and operated independently 110 of the bar 140. The machine shown in United States Patent No. 731,913 may be used for operating this form of the device, the motion of the bar for swinging the hinged plate being reversed. In that patent the actuating- 115 bar is pushed forward to swing the plate into open position, while in this case the bar 350 should be pulled backward for this purpose. In this construction the operator has direct control of the swinging extension-plate. 120

I claim as my invention—

1. In a coke-puller the combination of an underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on its instroke to loosen coke for withdrawal 125 and on its outstroke to withdraw loosened coke, a swinging coke-grasper hinged to said scraper and provided with a sliding extension,

and means for swinging said coke-grasper and shifting said sliding extension into operative position.

2. In a coke-puller the combination of an
5 underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper hinged to said scraper,
10 means for swinging said coke-grasper into open and closed positions, a sliding extension connected with said swinging coke-grasper, and automatic means for projecting and re-
15 tracting said extension on the closing and opening of said coke-grasper.

3. In a coke-puller the combination of an underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on
20 its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper hinged to said scraper, means for swinging said coke-grasper into open or closed positions, a sliding extension
25 connected with said swinging coke-grasper, and a link connecting said sliding extension with said scraper.

4. In a coke-puller the combination of an underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on
30 its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper provided with a rigid arm extending downward therefrom, a slide-
35 bar connected with said rigid arm, and another slide-bar having a link connection with said rigid arm.

5. In a coke-puller the combination of an underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on
40 its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper provided with a rigid arm extending downward therefrom, a sliding extension on said coke-grasper, a slide-bar
45 connected with said rigid arm, another slide-

bar having a link connection with said rigid arm, and means for operating said sliding extension.

6. In a coke-puller the combination of an underworking wedge-like scraper movable
50 over the bottom of a coke-oven and adapted on its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper provided with a rigid arm extending downward therefrom, a slide-
55 bar connected with said rigid arm, another slide-bar having a link connection with said rigid arm, a sliding extension connected with said swinging coke-grasper, and means for automatically projecting and retracting said
60 extension.

7. In a coke-puller the combination of a coke-puller bar provided with a socket at its front end, a slide-bar disposed in said socket,
65 means for limiting the movement of said slide-bar relatively to said coke-puller bar, a scraper for coke-ovens fixed to said slide-bar, a swinging plate provided with a rigid arm pivoted to an extension of said slide-bar, and a link
70 connecting said coke-puller bar with said arm between the pivot thereof and said swinging plate.

8. In a coke-puller the combination of a coke-puller bar provided with a socket at its front end, a slide-bar disposed in said socket,
75 means for limiting the movement of said slide-bar relatively to said coke-puller bar, a scraper for coke-ovens fixed to said slide-bar, a swinging plate provided with a rigid arm pivoted to an extension of said slide-bar, a link con-
80 necting said coke-puller bar with said arm between the pivot thereof and said swinging plate, a sliding extension on said swinging plate, and a link connecting said sliding extension with said scraper.

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Witnesses:

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