No. 832,988. PATENTED OCT. 9, 1906.

C. P. LUDWIG.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

APPLICATION FILED MAR. 16, 1906.

5 SHEETS—SHEET 1.

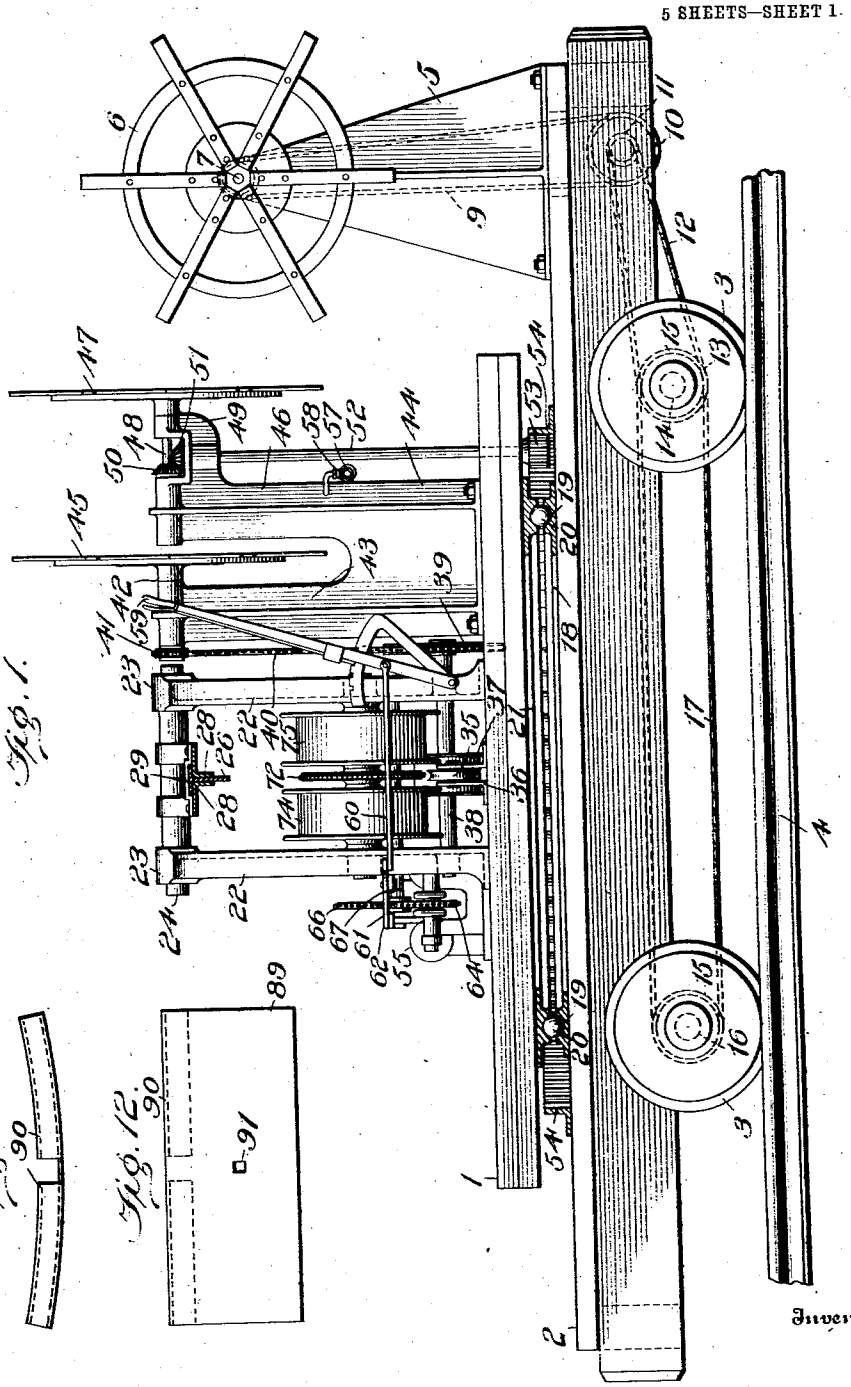


Fig. 1.

Fig. 13.

Fig. 12.

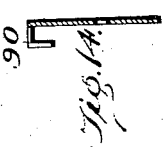


Fig. 14.

Witnesses

Edwin L. Bradford

P. F. Burch

Inventor

Carl Paul Ludwig

By Reid & Johnston Jr.

Attorney

No. 832,988. PATENTED OCT. 9, 1906.

C. P. LUDWIG.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

APPLICATION FILED MAR. 16, 1906.

5 SHEETS—SHEET 2.

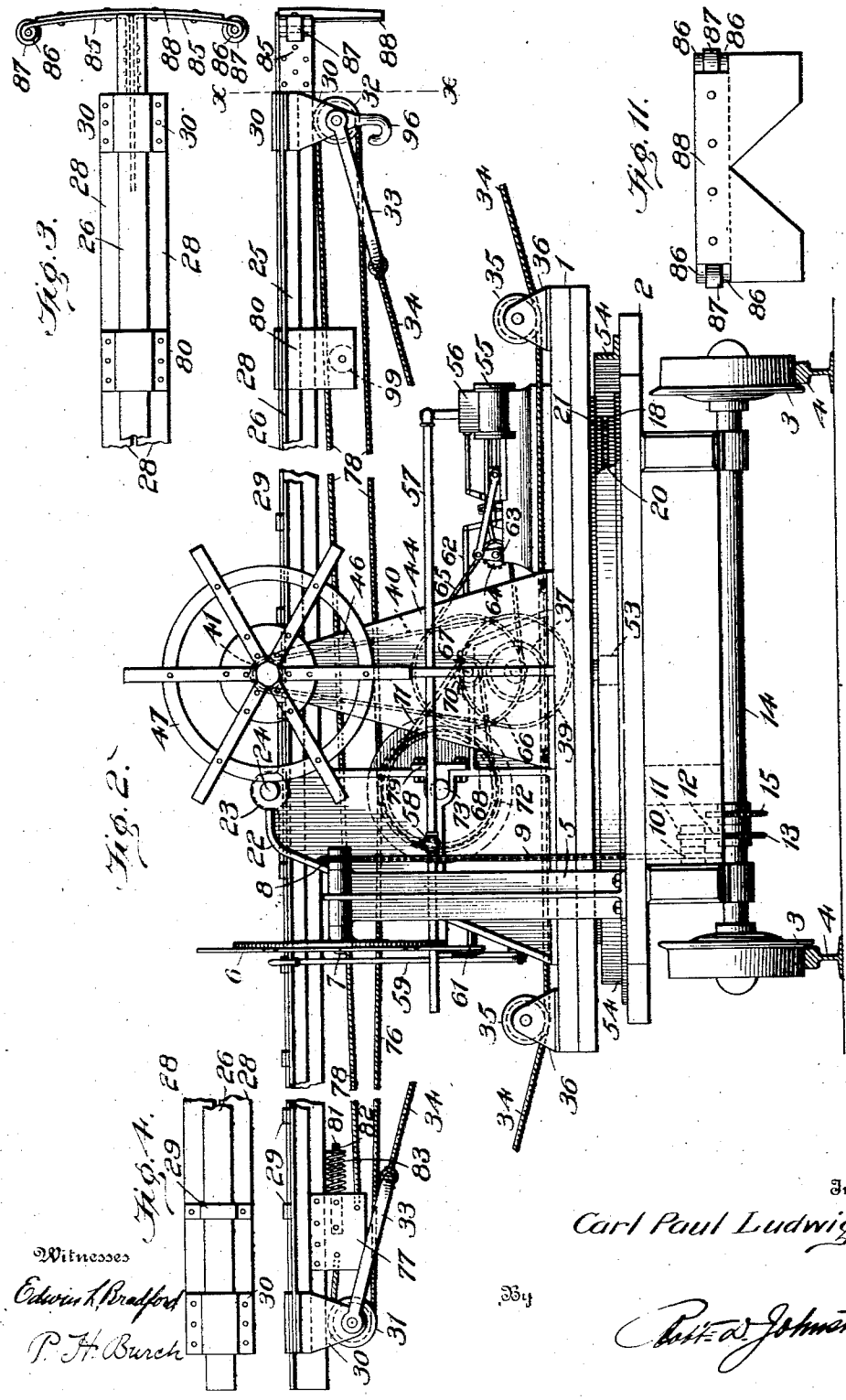


Fig. 3.

Fig. 2.

Fig. 4.

Fig. 11.

Witnesses

Edwin A. Bradford

P. F. Burch

Inventor

Carl Paul Ludwig

By

Pratt & Johnston Jr.

Attorney

No. 832,988. PATENTED OCT. 9, 1906.

C. P. LUDWIG.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

APPLICATION FILED MAR. 16, 1906.

5 SHEETS—SHEET 3.

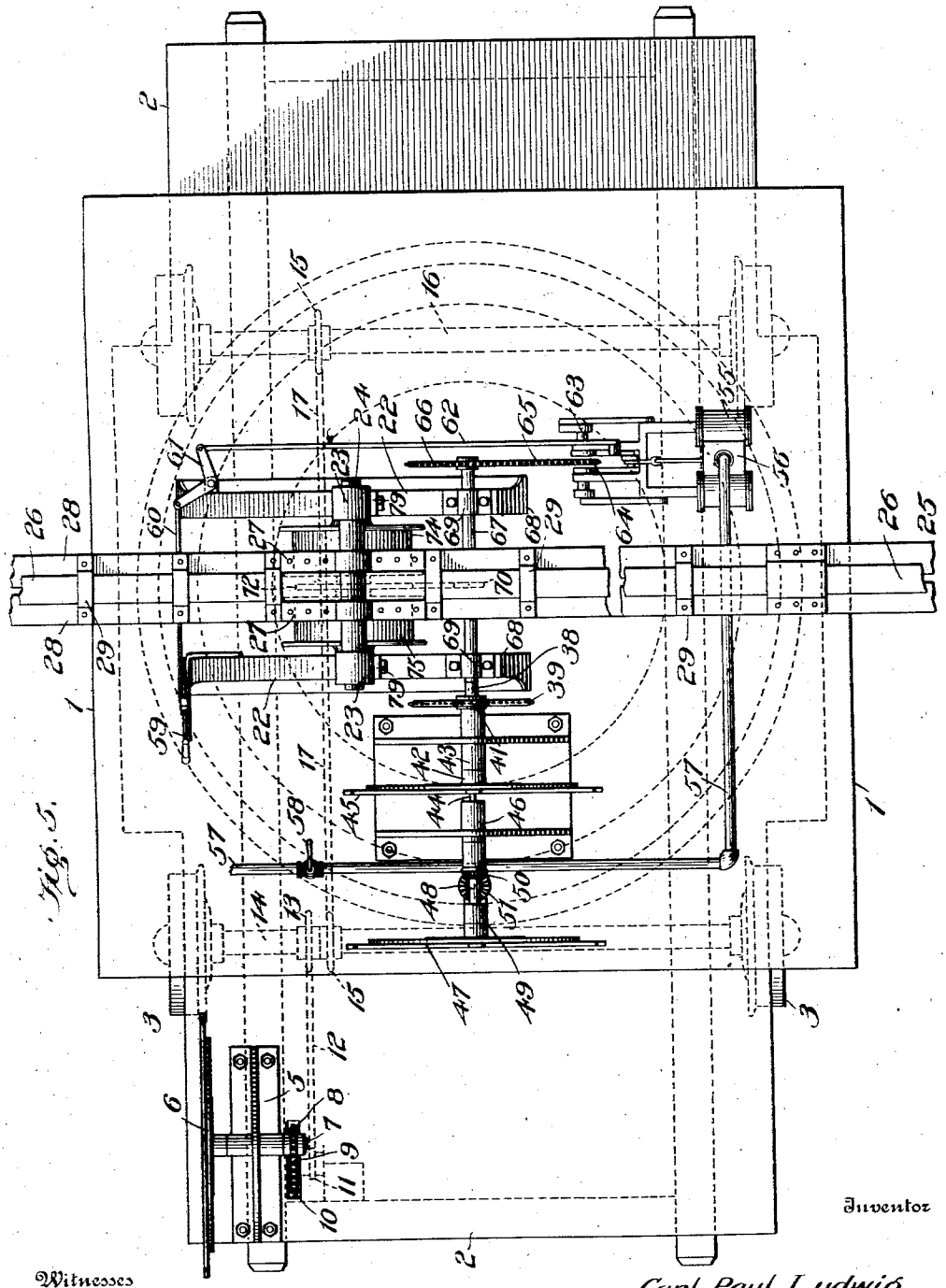


Fig. 5.

Witnesses

Edwin L. Bradford

P. H. Burch

Inventor

Carl Paul Ludwig

By

Attorney

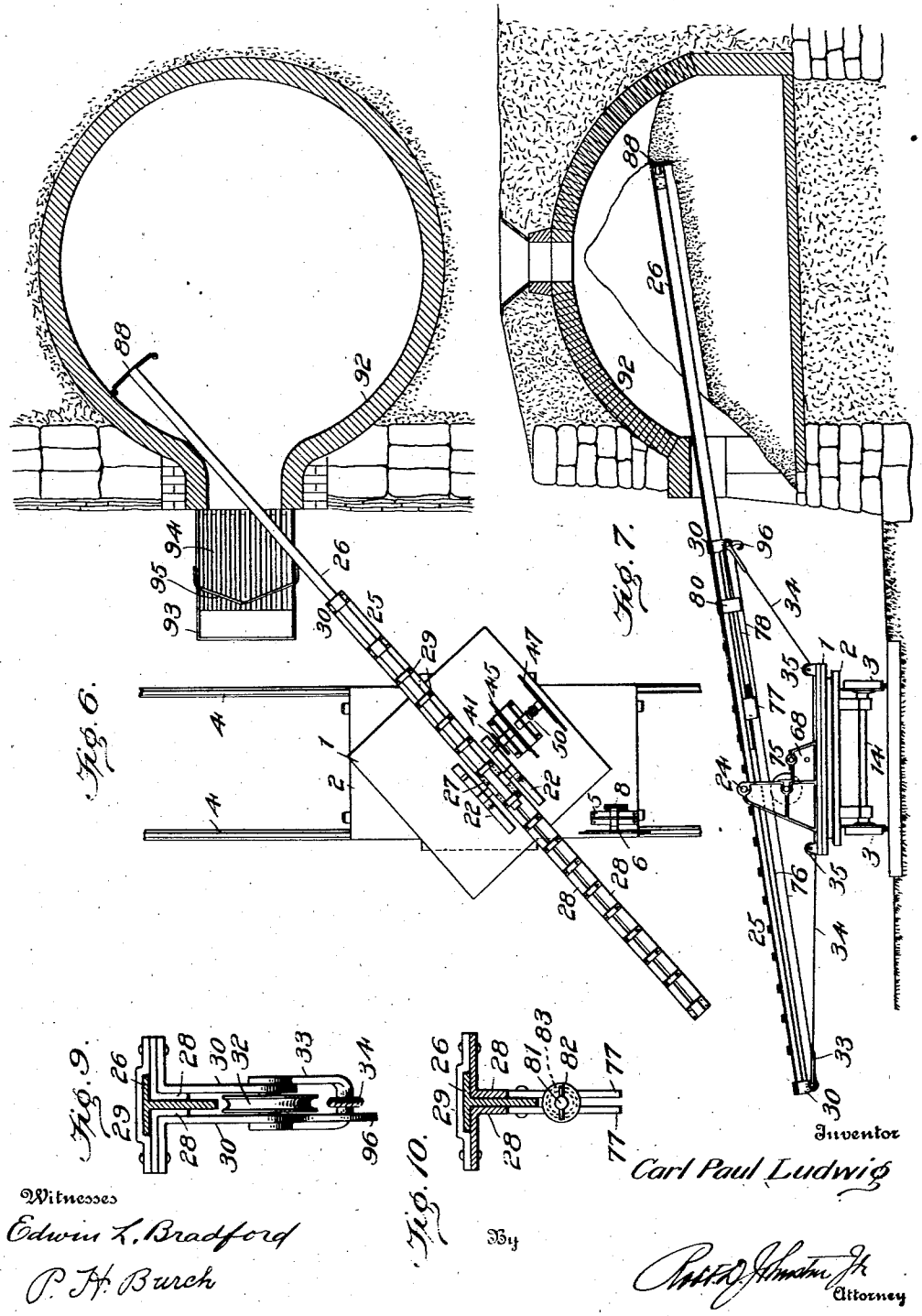
No. 832,988. PATENTED OCT. 9, 1906.

C. P. LUDWIG.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

APPLICATION FILED MAR. 16, 1906.

5 SHEETS—SHEET 4.



Witnesses

Edwin L. Bradford

P. H. Burch

Inventor

Carl Paul Ludwig

By

Robt. D. Johnston Jr.

Attorney

No. 832,988. PATENTED OCT. 9, 1906.

C. P. LUDWIG.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

APPLICATION FILED MAR. 16, 1906.

5 SHEETS—SHEET 5.

Fig. 8.

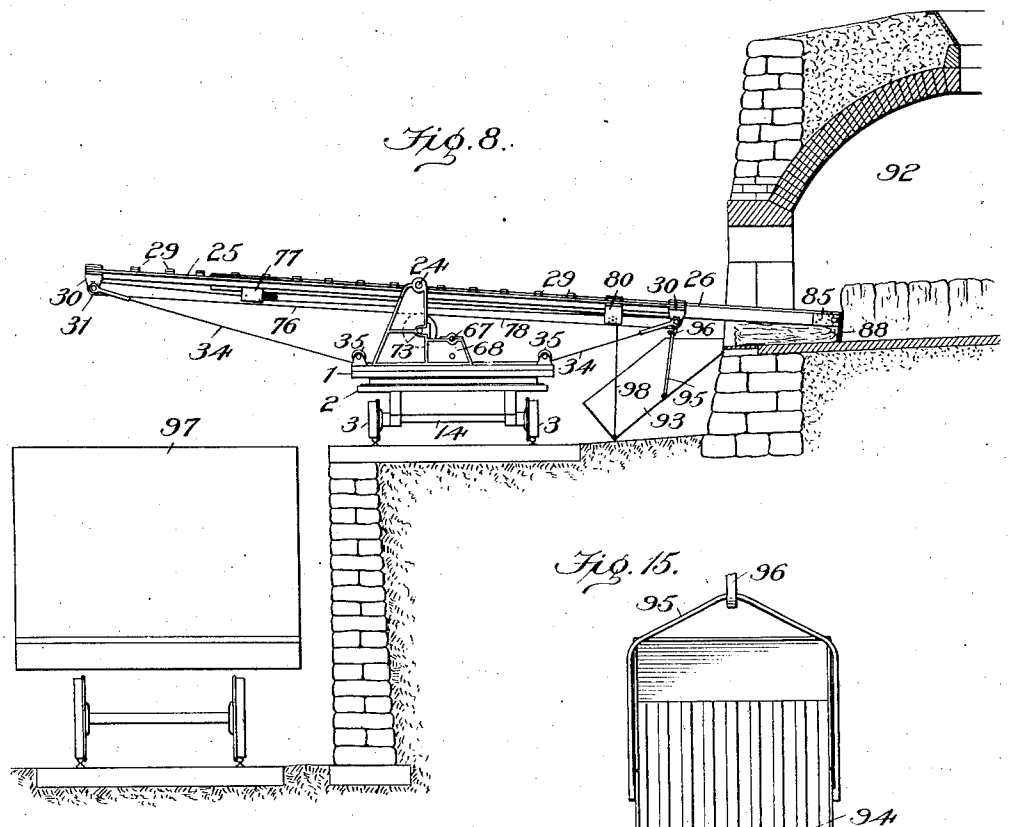
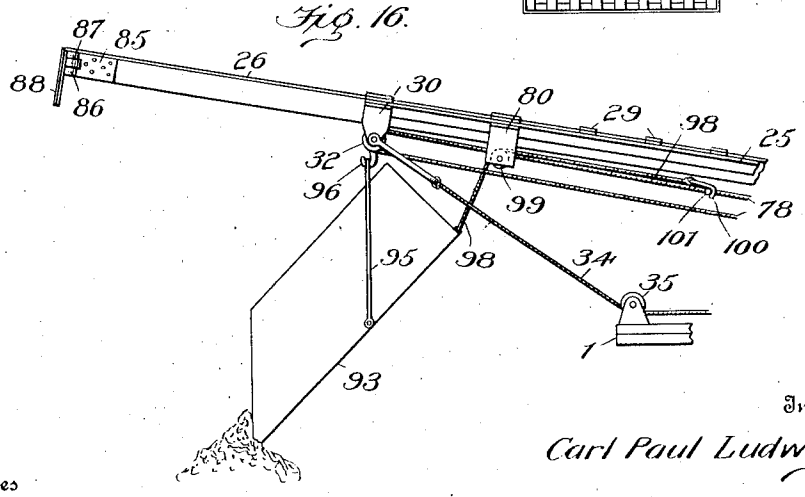


Fig. 15.

Fig. 16.



Inventor

Carl Paul Ludwig

Witnesses

Edwin L. Bradford

P. H. Burch

By Robt. D. Johnston Jr

Attorney

UNITED STATES PATENT OFFICE.

CARL PAUL LUDWIG, OF BIRMINGHAM, ALABAMA.

APPARATUS FOR DRAWING AND HANDLING COKE AND LEVELING COAL.

No. 832,988. Specification of Letters Patent. Patented Oct. 9, 1906.

Application filed March 16, 1906. Serial No. 306,446.

To all whom it may concern:

Be it known that I, CARL PAUL LUDWIG, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Apparatus for Drawing and Handling Coke and Leveling Coal, of which the following is a specification.

My invention relates to improvements in a convertible coke-pulling, coal-leveling, and oven-cleaning machine adapted to be mounted on a car and moved on tracks in front of the coke-ovens.

The chief object of my invention is to provide a machine comparatively simple in construction and operation which is provided with a motor-operated draw-bar or coke-pulling arm adjustable angularly and laterally by hand devices, all of which are disposed within reach of an operator on the car. In other words, I provide a motor-reciprocated draw-bar adapted to be swung on vertical and horizontal axes and to be moved laterally by means independent of each other and said motor which are controllable from one point and capable of contemporaneous operation during the reciprocatory movements of the bar.

It is a further object to provide a novel form of rake-head for the draw-bar and to provide it with antifriction side rollers to protect the side walls of the ovens. To adapt this bar for use as an oven-cleaning device, I provide an attachment for the rake-head which gives it the straight bottom edge required for these purposes.

My invention further comprises improvements in the operating and adjusting mechanism for the draw-bar which comprises a rotatable platform and a swiveling guide for the bar mounted thereon and provided with an adjustable stop to limit the travel of the bar into the oven and prevent it striking the back wall. This guide is light in weight, but of considerable length, being adapted to carry idler-pulleys for the operating cable or cables which connect to the draw-bar and move it back and forth in the guide.

An important object of my invention is to provide a receptacle adapted to receive and preferably to screen the coke as it is drawn from the oven and when loaded to be lifted by laterally-swinging part of the coke-pulling apparatus and moved to a point of discharge, where it is dumped. This provides a simple and effective apparatus to handle and load the coke.

My invention further comprises the novel construction and combination of parts hereinafter more particularly described, and illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of my improved mechanism, showing the draw-bar and guide in cross-section. Fig. 2 is a side elevation, the draw-bar and guide being broken to illustrate both end portions. Fig. 3 is a plan view of the front end of the draw-bar and guide. Fig. 4 is a similar view of the rear end of the draw-bar and guide. Fig. 5 is a plan view of the machine. Fig. 6 is a plan view of the machine in operation, the draw-bar being shown in operating position in an oven. Fig. 7 is a vertical sectional view through an oven, illustrating the mechanism acting to level the coal therein. Fig. 8 is a similar view showing the manner in which the rake-head engages and draws the coke into the receptacle used for carrying the coke away from the oven. Fig. 9 is a vertical sectional view along the lines $x\,x$ of Fig. 2. Fig. 10 is a front view of the spring-stop connected to the rear end of the draw-bar, which is shown in vertical section. Fig. 11 is a front elevation of the rake-head. Fig. 12 is a similar view of the coal-leveling and oven-cleaning attachment for the rake-head. Figs. 13 and 14 are top plan and cross-sectional views of this attachment. Fig. 15 is a front view of the coke-receptacle. Fig. 16 is an enlarged side view of the receptacle as it is being dumped.

Similar reference-numerals refer to similar parts throughout the drawings.

According to the preferred construction of my invention, as illustrated in the drawings, I provide a platform or turn-table 1, rotatably mounted upon a car 2, provided with wheels 3, which move on a track 4. At one end of the car I provide a vertical standard 5, at the top of which a hand-wheel 6 is connected to a shaft 7, suitably journaled in this standard and carrying a sprocket-wheel 8, which drives a chain 9. This chain passes through an opening in the floor of the car and passes around a sprocket-wheel 10, suitably journaled in the side beams of the car. This sprocket-wheel 10 drives a smaller sprocket-

wheel 11, which by means of a chain 12 drives a sprocket-wheel 13, fixed on an axle 14. Sprocket-wheels 15 on the axles 14 and 16 are connected by a chain 17. By turning the hand-wheel 6 the car 2 may be moved along the track at the will of the operator, thus furnishing a lateral adjustment of the coke-pulling mechanism, hereinafter described.

Mounted near the center of the car is an annular plate 18, provided with a circular grooved track 19, adapted to receive a set of antifriction-balls 20, upon which the platform 1 is rotatably supported. This platform carries an annularly-grooved member 21, which, in conjunction with the track 19, completes the raceway for the balls and forms an antifriction ball-bearing for the turn-table.

At one side, or eccentrically of the platform 1, I bolt or otherwise secure two vertical frames 22, provided at their tops with suitable bearings 23 for a fixed shaft 24. An elongated guide 25 for the draw-bar or coke-pulling arm 26 is swivelly supported near its center by the shaft 24, two metal straps 27 being bolted to the top of the guide and passing over the shaft. This guide is formed by two angle-irons 28, which are connected at frequent intervals by cross-irons 29, the several irons being so shaped and connected as to leave a T-shaped channel-opening between them. The draw-bar 26 is T-shaped in cross-section, its horizontal top portion resting on the tops of the angle-irons 28, being free to slide back and forth thereon under the control of the mechanism hereinafter described.

The guide 25 is provided at each end with pulley-blocks 30, which support pulleys 31 and 32. An arm 33 is swivelly connected to each pulley-block 30 and connected to a cable 34, which passes under the idlers 35, journaled in the blocks 36, connected at opposite points to the table 1 and is wound around a drum 37. This drum is mounted on a shaft 38, journaled in the frames 22 near the platform, and provided at its right-hand end, Fig. 1, with a sprocket-wheel 39, driven by a chain 40 from a sprocket-wheel 41. This latter sprocket-wheel is mounted on a shaft 42, journaled in an arm 43 of the standard 44 and is adapted to be operated by a hand-wheel 45. This standard 44 is rigidly mounted on the platform 1 and is divided at its upper end to form the vertical arms 43 and 46, between which the hand-wheel 45 turns. As the wheel 45 is rotated the drum 37 is turned by means of the mechanism described and acts to wind the cable 34 in one direction and to unwind it in the other; so that by its connection to the swiveled arms 33 it rocks the guide 25 on the shaft 24. This provides for the angular adjustment in a vertical plane of the draw-bar 26, which being supported in the guide 25 will have its operating end raised or lowered as the guide is rocked on its shaft-support.

A second hand-wheel 47 turns a shaft 48, journaled in the arm 46, and an extension-arm 49, integral therewith. This shaft 48 has fixed thereon a beveled gear 50, which meshes with a similar gear 51, connected to the upper end of a shaft 52, which is journaled in the extension 49 and passes through suitable openings in the platform 1, which openings serve as a bearing for the lower end of the shaft. A pinion 53, carried by this shaft, is adapted to mesh with a circular rack 54, connected to the car-flooring. By turning the hand-wheel 47 the platform will be revolved on the roller-bearings, thus providing for the angular adjustment in horizontal or transverse planes for the guide 25 and the draw-bar 26.

It will be noted that the several adjustments—to wit, the movement of the car on its track and the swinging of the draw-bar in vertical and horizontal planes—are severally and independently controlled by manual means preferably, though separate mechanisms capable of independent control may be used to move these parts. The purpose of this is to have these several adjustments independent of the operating mechanism which reciprocates the draw-bar, so that they can be brought into effect in any desired manner during the movement of the bar into and out of the oven, causing it to assume any position or follow any line of movement required.

The operating mechanism for the draw-bar comprises a small two-cylinder motor 55, having the usual valve-chest 56, to which fluid-pressure is supplied by a pipe 57 from any suitable source, such as a steam-boiler on the car. A valve 58 is provided in this pipe at a point within reach of the operator when handling the hand-wheels. To enable the motor to be reversed, I provide a lever 59, connected to one of the frames 22 and adapted, by means of a rod 60, bell-crank 61, and rod 62, to move the reversing-valve in the chest 56. The motor, which may be of any desired construction, drives a crank-shaft 63, suitably journaled on the platform and having fixed thereon a sprocket-wheel 64, connected by a chain 65 with a sprocket-wheel 66, fixed to a shaft 67, journaled in the frames 22. These frames are provided with extensions 68, of less height than the portions which support the shaft 24. These extensions are provided with top bearing-recesses for the shaft 67, which is held therein by the cap bearing-plates 69, bolted to the extensions. A sprocket 70 is mounted on the shaft 67 at a point between the frames 22 and is connected by a chain 71 to a sprocket-wheel 72, fixed on a shaft 73, journaled in the frames 22. Fixed to the sprocket-wheel 72 or otherwise driven thereby are two drums

74 and 75, to the former of which is connected a cable 76, which passes around the pulley 31 and connects to a block 77, bolted to the rear end of the draw-bar. Connected to the drum 75 is a cable 78, which passes around the pulley 32 and back under the guide 25 to the block 77. Though I prefer to use two drums and cables, as described, it will be obvious that a single drum may be substituted and a single cable wound around this drum, with its ends passing around the pulleys 31 and 32 and connected to the block 77. The bearing for the shaft 73 is formed by lateral recesses in the sides of the frames 22 above the extensions 68, the shaft being held in position by bearing-blocks 79, bolted to the frames and closing the lateral openings.

When pressure is admitted to the motor 55 to reciprocate its piston and, through the connections described, to rotate the drums 74 and 75, it will be evident as cable 76 is wound on its drum to move the draw-bar forward the cable 76 will be unwound to permit the bar to move, and vice versa when the motor is reversed. By these means the draw-bar may be moved in and out in its guide 25 for the purpose of drawing the coke or leveling the coal, as will be hereinafter described. To limit the forward movement of the draw-bar, I provide a stop 80, adjustably connected to the guide 25, near its forward end. It may be set to any desired position on the guide, so as to engage a spring-pressed buffer-arm 81, provided at its outer end with a cross-pin 82, against which the spring 83 bears. This block 77, as shown in Fig. 10, is preferably formed by two plates bolted to opposite sides of the draw-bar 26, the arm 81 being mounted to have a limited sliding movement between these plates when pin 82 engages the stop-block 80 and compresses the spring to cushion the arm. At the front end of the draw-bar I bolt or otherwise secure two metal bars 85, which are bent outwardly to each side on a slight curve. The outer end of each bar is bifurcated to form two arms 86, which are bent to form bearings for a roller 87. An inverted-**V**-shaped rake-head is bolted to these bars 85 and is of such a width that the rollers 87 project beyond it to prevent it striking the sides of the oven. This rake-head is particularly adapted for breaking down the coke in the oven and drawing it out. It may also be used for leveling the coal in the oven, or, if desired, a detachable plate 89, having a straight bottom edge and a bent flange 90 at its upper edge, may be slipped over the end of the rake-head and secured by a bolt passed through an opening 91 and engaging the rake-head. The flange 90 of this plate is curved to conform with the contour of the rake-head when slipped over the top thereof and forms a device which is adapted both for leveling the coal and for cleaning out the oven after the coke has been drawn.

In practice the operator, by means of the hand-wheel 6, moves the car opposite the oven 92, which is illustrated in the form commonly known as the "beehive" oven. When the draw-bar comes opposite the oven-door, pressure is admitted to the motor 55, so as to cause it to rotate the drums 74 and 75 in a direction to move the bar into the oven-door. While this movement is taking effect the hand-wheels 6, 45, and 47 are grasped and by turning them and by operating them one at a time or simultaneously the rake-head is swung or moved to any desired position in the oven and caused to engage a section of the coke, after which the motor is reversed and the bar drawn outwardly under the independent or joint control of the hand-wheels. By this means while the motor is moving the draw-bar into the oven and drawing it out the operator maintains a control of the bar which enables him to handle it with as much ease and precision as if the coke were being drawn direct by manual means, the motor being called upon solely to furnish the power for reciprocating the draw-bar. It will be noted that the movement of the car on the track enables the draw-bar to reach all portions of the oven and that the antifriction-rollers 87 prevent the sides of the rake-head striking or injuring the walls of the oven. To prevent the end of the draw-bar striking the oven, the stop 80 is provided and so disposed on the guide 25 that it arrests the travel of the bar at the proper point to prevent injury to the back wall of the oven.

To convey coke to any desired point of discharge, I provide a receptacle or coke-box 93, having a screen bottom formed by the bars 94 and a bail 95, adapted to engage a hook 96, depending from the pulley-block 30 at the forward end of the guide 25. This receptacle is leaned against the oven, as seen in Fig. 8, in position to receive the coke as it is drawn out by arm 26 and screen it. By catching the bail over hook 96 the receptacle may be lifted and swung around to any desired point of discharge which may be over a car 97. To dump the contents of the receptacle, I connect a dumping-rope 98 to its bottom and pass it over a pulley 99, journaled between the plates of the stop 80. A hook or catch 100 is provided at the end of the rope and adapted to be snapped over the cable 78, so as to be engaged by a knot or stop 101 thereon. When the guide has swung the receptacle to the dumping-point and catch 100 has been snapped over the cable 78, the motor is started to draw the bar 26 inwardly. This moves cable 78 until the stop 101 engages the catch and draws the rope 98 in-

wardly over pulley 99, so that it lifts the receptacle and dumps its contents, as seen in Fig. 16.

The mechanical devices employed to effect the ends above described may be variously modified within the scope of my invention, and it is to be understood that in construing the appended claims they are not limited to the details of construction which have been described with the preferred embodiment of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the character described, a rotatable platform, a guide swivelly mounted thereon, a draw-bar adapted to slide in said guide, a motor mounted on said platform and adapted to reciprocate said draw-bar, and means independent of said motor to adjust said guide and bar angularly in vertical and horizontal planes, as and for the purposes described.

2. In a machine of the character described, a car, a turn-table mounted thereon, a guide swivelly mounted on said turn-table, an idler journaled at each end of said guide, a draw-bar supported by said guide, flexible driving means which pass around said idlers and connect to said bar, motor-driven operating mechanism for said flexible driving means also mounted on said table, and independent devices for manually adjusting said turn-table, car, and guide, substantially as described.

3. In a machine of the character described, a car mounted on wheels, mechanism mounted thereon for moving said car by hand, a draw-bar, a guide-support therefor mounted on vertical and horizontal axes, power-driven means to reciprocate said bar, and separate mechanisms for manually adjusting said draw-bar and guide on said axes independently of said means for reciprocating said bar, said several mechanisms being controllable from the same point on said car.

4. In a machine of the character described, a turn-table, vertical standards mounted thereon, a guide swivelly mounted between said standards, a drum mounted on said turn-table, a cable wound around said drum and connected to said guide on each side of said standards, means to drive said drum in either direction to adjust said guide angularly, and a draw-bar mounted in said guide and adjustable therewith, substantially as described.

5. In a machine of the character described, a car, a turn-table thereon, a reciprocatory draw-bar, swiveling supports for said bar comprising standards mounted on said table, and an elongated guide in which the bar is supported for the greater portion of its length and which is swiveled in said standards, hand devices, also mounted on said table, which turn said table and rock said guide independently, substantially as described.

6. In a coke-pulling machine, a draw-bar, an adjustable guide therefor, pulleys supported by said guide, cables which pass around said pulleys and are connected to the bar and disposed beneath it, operating mechanism for the cables also disposed beneath the bar and adapted to reciprocate it in said guide, and a rake-head connected to said bar.

7. In a coke-pulling machine, a turn-table, a housing thereon, a sliding and rocking bar mounted in said housing adapted to swing in vertical and horizontal planes, a pair of drums disposed beneath said bar and mounted in said housing, means on said table to turn said drums, a guide for said bar carrying a pulley at each end and cables wound around said drums and pulleys and connected to said bar in such manner that as one cable is wound on, the other is wound off its drum and the said bar is moved into and out of a coke-oven, for the purposes described.

8. In a machine of the character described, a draw-bar, a guide therefor, means to adjust said guide, means to reciprocate said bar in said guide, an adjustable stop carried by said guide, and a spring-stop on said bar adapted to engage said adjustable stop and limit the outward travel of said bar, for the purposes described.

9. In a machine of the character described, a guide adjustably mounted intermediate its ends so as to swing to any desired angle, pulley-blocks connected to the ends of said guides, pulleys journaled in said blocks, a draw-bar slidably mounted in said guide, cables which pass around said pulleys and connect to said bar, means to operate said cables to slide said bar in or out, and swivel-arms connected to said pulley-blocks and to a cable means for effecting the angular vertical adjustment of said bar.

10. In a machine of the character described, a guide composed of two elongated angle-irons connected at intervals overhead by bent metal straps so disposed as to leave a T-shaped channel, a draw-bar, T-shaped in cross-section, which is supported in said guide, a stop connected to said bar and depending below said guide, a stop depending from the front end of said guide, and a spring-buffer to lessen the jar of engagement between said stops.

11. In a machine of the character described, a car mounted on wheels and adapted to move along a track, a standard mounted on said car, a hand-wheel journaled in said standard, driving connections from said wheel to a wheel or wheels of the car for the purpose of moving it on its track, a turn-table mounted on said car, a rocking guide eccentrically mounted on said turn-table, a reciprocatory bar adjustable in said guide lengthwise thereof, separate mechanisms for

turning said table and adjusting said bar which are carried by said table and are normally disposed adjacent to said hand-wheel, means to reciprocate said bar, and a coke-pulling head connected to said bar.

12. In a machine of the character described, a car mounted on wheels and adapted to move along a track, a standard on said car, a hand-wheel journaled in said standard, driving connections from said wheel to the wheels of said car, a turn-table mounted on said car, two independent hand-wheels mounted on said turn-table, means operated by one of said wheels to revolve the table, a draw-bar swivelly mounted on said table, means driven by the other hand-wheel to adjust said bar angularly on its swivel-support, and a motor operatively connected to said bar and adapted to reciprocate it in the manner and for the purposes described.

13. In a machine of the character described, a car mounted on wheels and adapted to move along a track, hand-operated mechanism carried by said car for adjusting it on said track, a turn-table mounted on said car, housing mounted on said table, a pair of drums journaled in said housing, a guide swivelly mounted in said housing, a draw-bar supported in said guide, cables to reciprocate said bar in its guide which are connected to said drums, a motor mounted on said table, driving connections from said motor to said drums, and means to control said motor disposed adjacent to the adjusting mechanism for the car.

14. In a machine of the character described, a turn-table, a housing thereon, a shaft at the top of said housing, a guide swivelly suspended from said shaft, a draw-bar supported in said guide, a pair of drums journaled in said housing beneath said guide, a sprocket-wheel connected to said drums, a motor mounted on said table, a chain driven by said motor and connected to said sprocket-wheel, and cable connections from said drums to said bar for the purpose of reciprocating it, substantially as described.

15. In a machine of the character described, a turn-table, an eccentically-disposed housing thereon, a reciprocating and rocking bar mounted in said housing, motor-driven means to reciprocate said bar, a hand-wheel mounted on said turn-table, driving connections from said hand-wheel to a drum disposed beneath said bar, and means operated by said drum to rock said bar, a second wheel mounted on said turn-table, and mechanism controlled thereby for turning said table, substantially as described.

16. In a coke-pulling machine, a reciprocatory and rocking bar, laterally-projecting angle-irons connected to one end thereof, rollers journaled at the outer ends of said irons, a rake or coke-pulling head connected to said irons, said rollers projecting beyond the sides of said beaver, for the purposes described.

17. In a coke-pulling machine, a reciprocatory draw-bar, means to swing said bar laterally, a head connected to one end of said bar, antifriction-rollers disposed at the sides of said head, and a plate or rake connected to said head and so disposed as to be prevented by said rollers from striking the coke-oven walls.

18. In a coke-pulling machine comprising a laterally-swinging member and a reciprocatory member, in combination with a receptacle adapted to receive the coke as it is drawn from the oven and screen it, a bail on said receptacle, means to suspend said receptacle by said bail from said laterally-swinging member, a dumping-rope connected to one end of said receptacle, and means movable with said reciprocatory member which engages said rope and operates it to dump the receptacle.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CARL PAUL LUDWIG.

Witnesses:
THOS. J. WINGFIELD,
R. D. JOHNSTON.