925,428.

W. R. ELLIOTT.

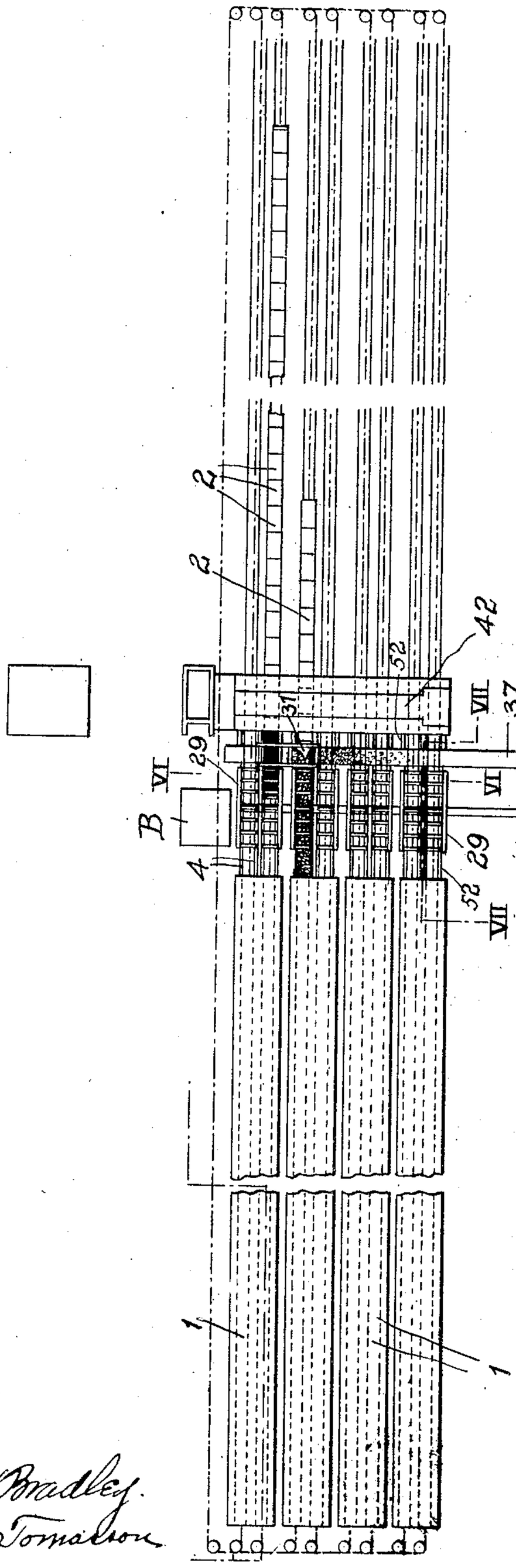
COKING PLANT.

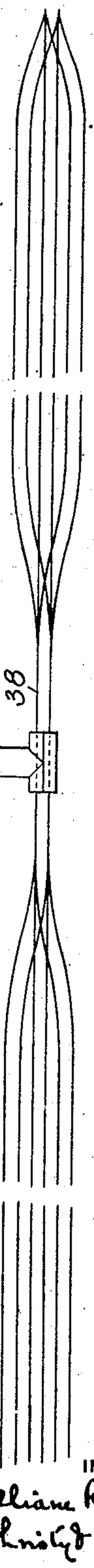
APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 1.

FIG. 1.





WITNESSES:

J. Herbert Bradley.

Francis J. Tomalson

INVENTOR

William R. Elliott

by Christy & Christy

Atty's.

925,428.

W. R. ELLIOTT.

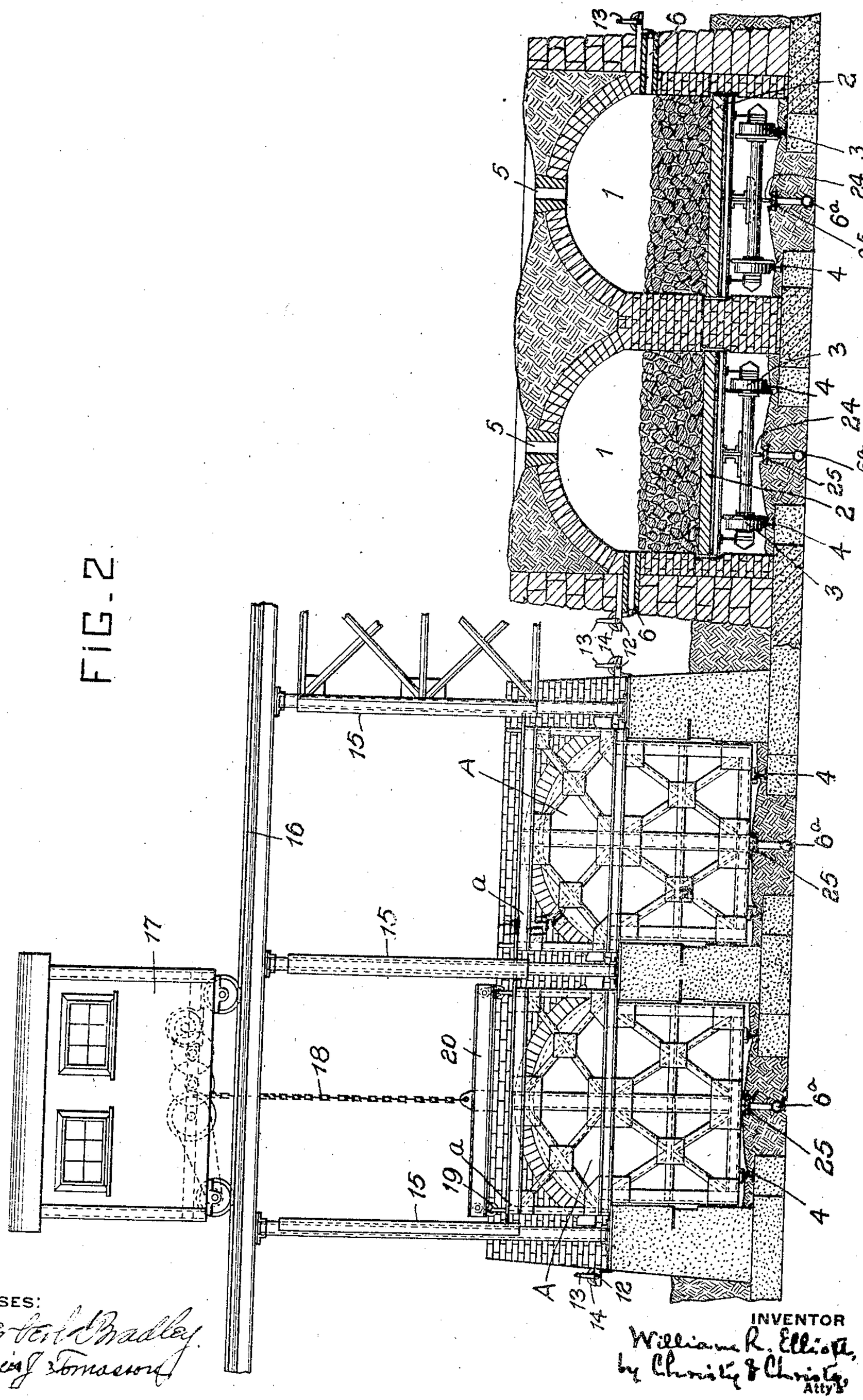
COKING PLANT.

APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 2.

FIG. 2



WITNESSES:

J. Herbert Bradley

Francis J. Tomasone

INVENTOR

William R. Elliott,

by Christy & Christy,

Atty's

W. R. ELLIOTT.

COKING PLANT.

APPLICATION FILED JULY 18, 1908.

925,428.

Patented June 15, 1909.

10 SHEETS—SHEET 3.

FIG. 4.

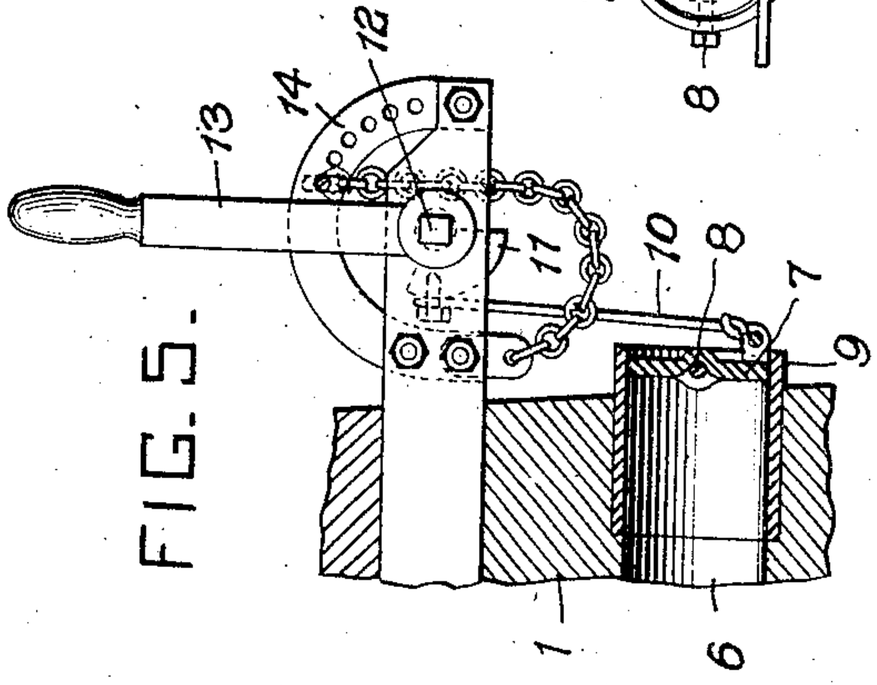
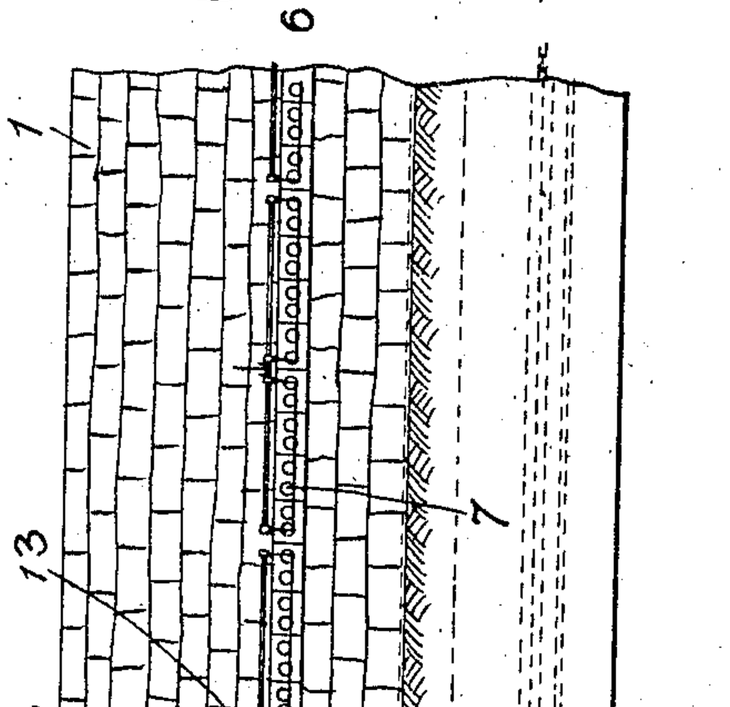


FIG. 5.



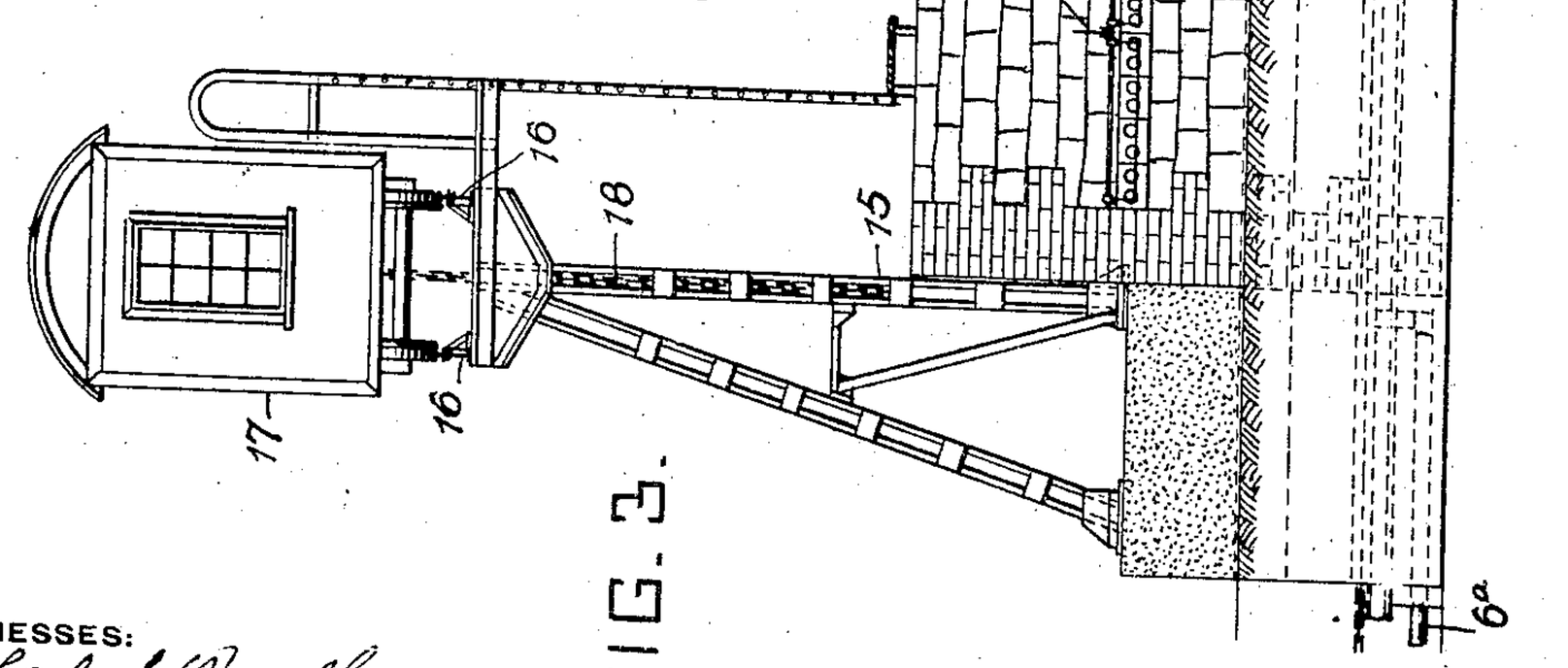


FIG. 3.

WITNESSES:

J. Herbert Bradley

Francis J. Tomaetow

INVENTOR

William R. Elliott,

by Christy & Christy,

Atty's

925,428.

W. R. ELLIOTT.

COKING PLANT.

APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 4.

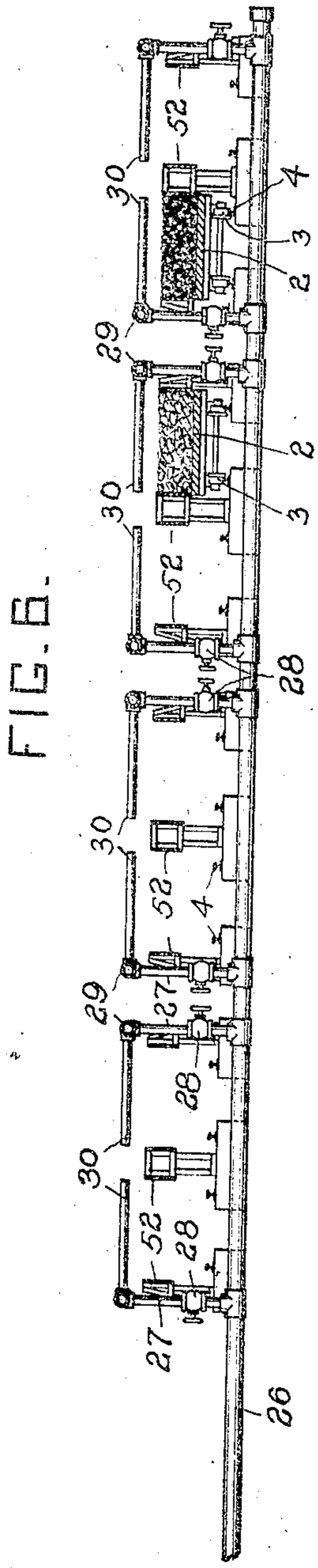


FIG. 6.

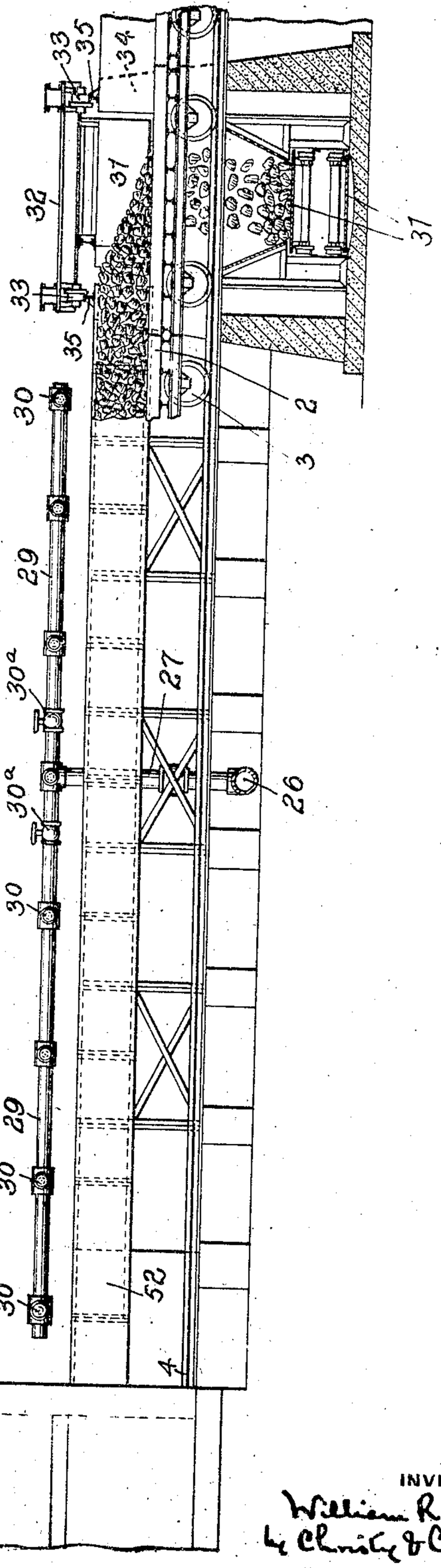


FIG. 7.

WITNESSES:

J. Herbert Bradley

Francis J. Tomaselon

INVENTOR

William R. Elliott

by Christy & Christy

Atty's

925,428.

W. R. ELLIOTT.

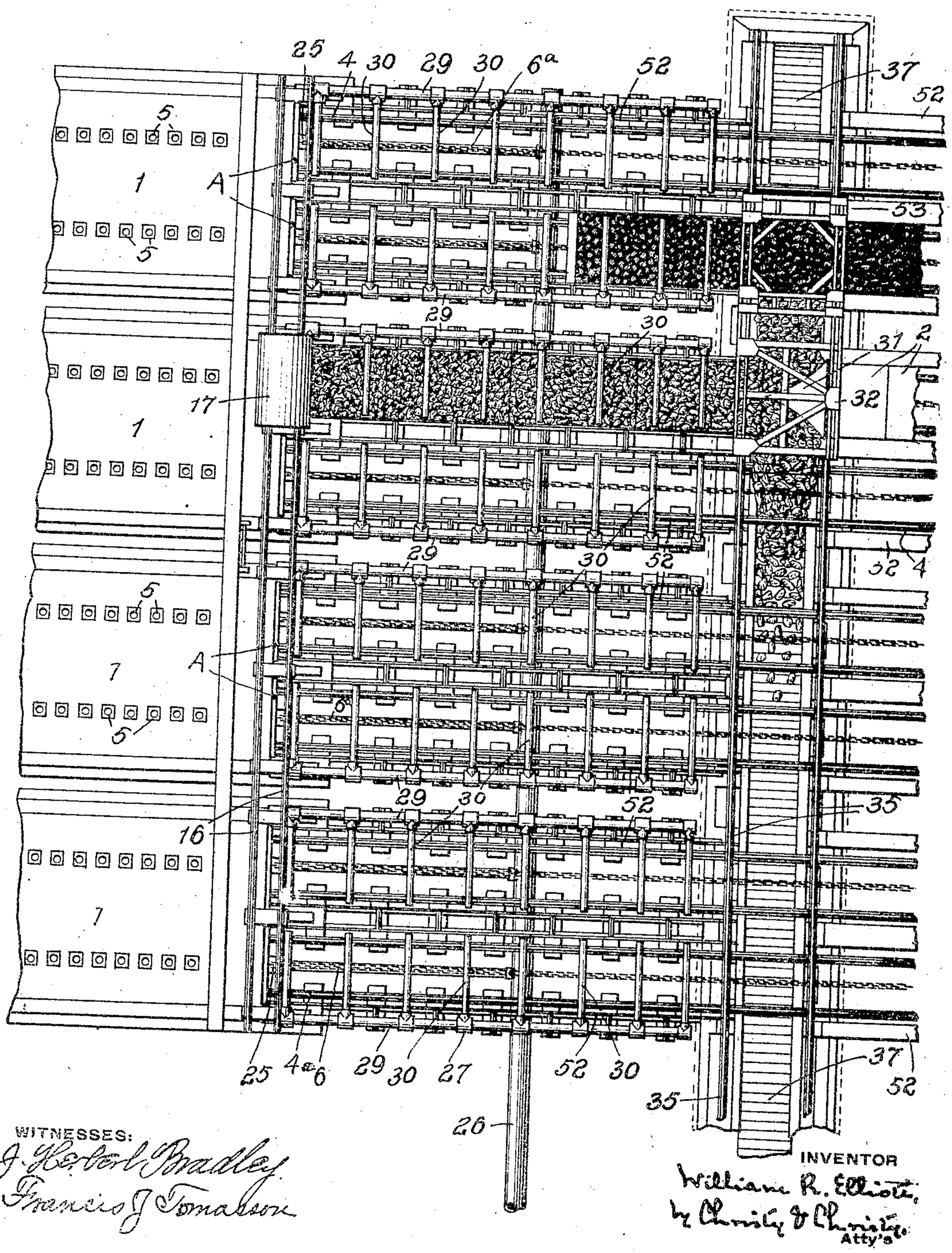
COKING PLANT.

APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 5.

FIG. 8.



WITNESSES:

J. Herbert Bradley

Francis J Tomlinson

INVENTOR

William R. Elliott,

by Christy & Christy

Atty's.

W. R. ELLIOTT.

COKING PLANT.

APPLICATION FILED JULY 18, 1908.

925,428.

Patented June 15, 1909.

10 SHEETS—SHEET 6.

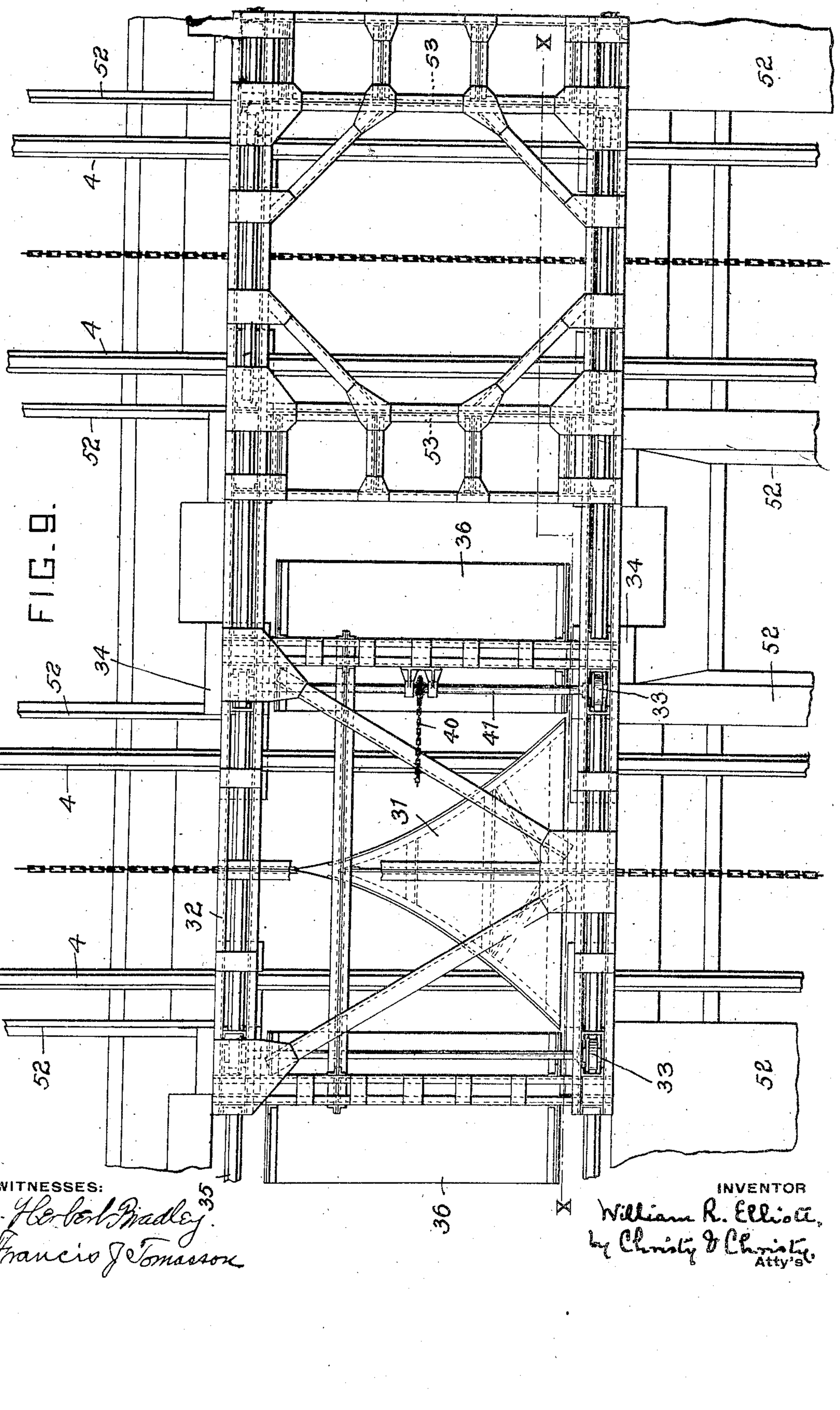


FIG. 9.

WITNESSES:

J. Herbert Bradley.

Francis J. Tomasson

INVENTOR

William R. Elliott,

by Christy & Christy,

Atty's.

W. R. ELLIOTT.

COKING PLANT.

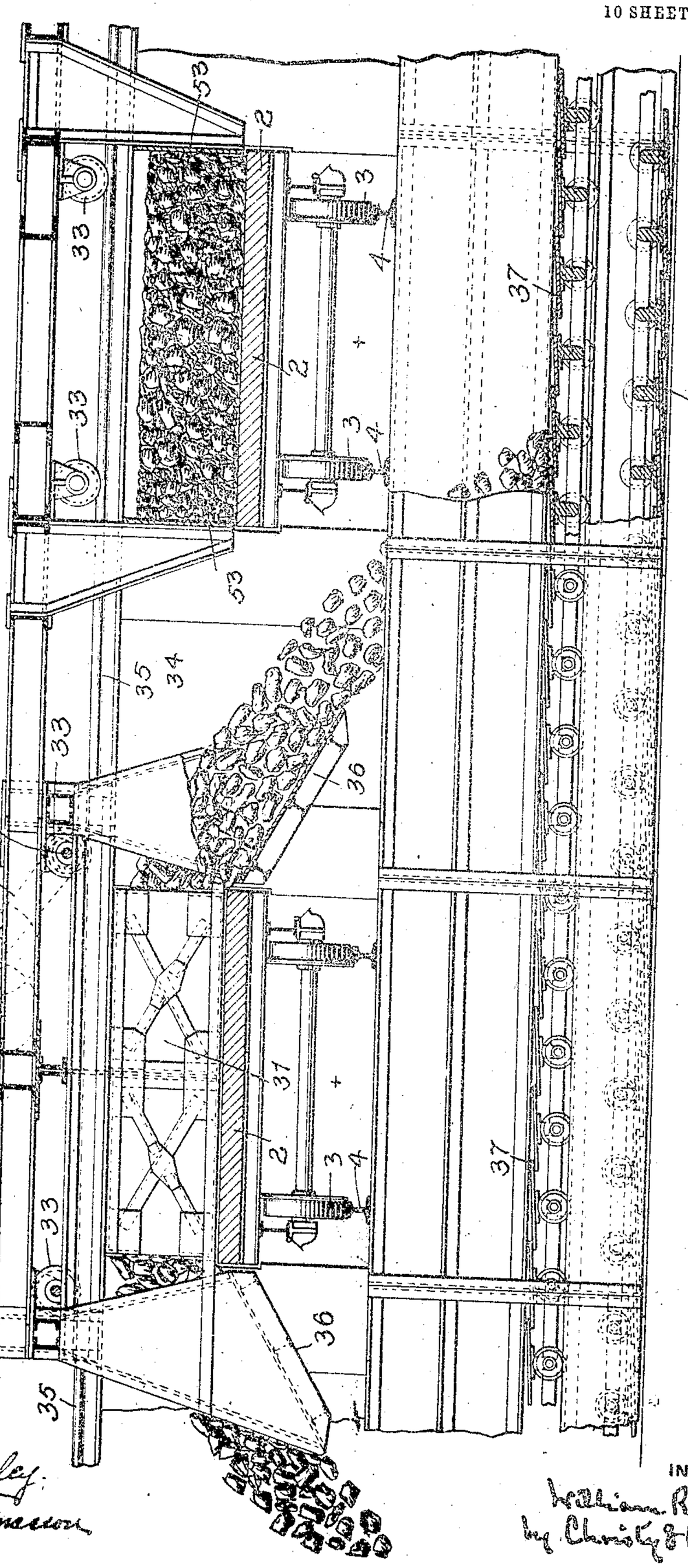
APPLICATION FILED JULY 18, 1908.

925,428.

Patented June 15, 1909.

10 SHEETS—SHEET 7.

FIG. 10



WITNESSES:

J. Herbert Bradley.

Francis J. Tomeson

INVENTOR

William R. Elliott,

by Christy & Christy

Atty's

W. R. ELLIOTT.

COKING PLANT.

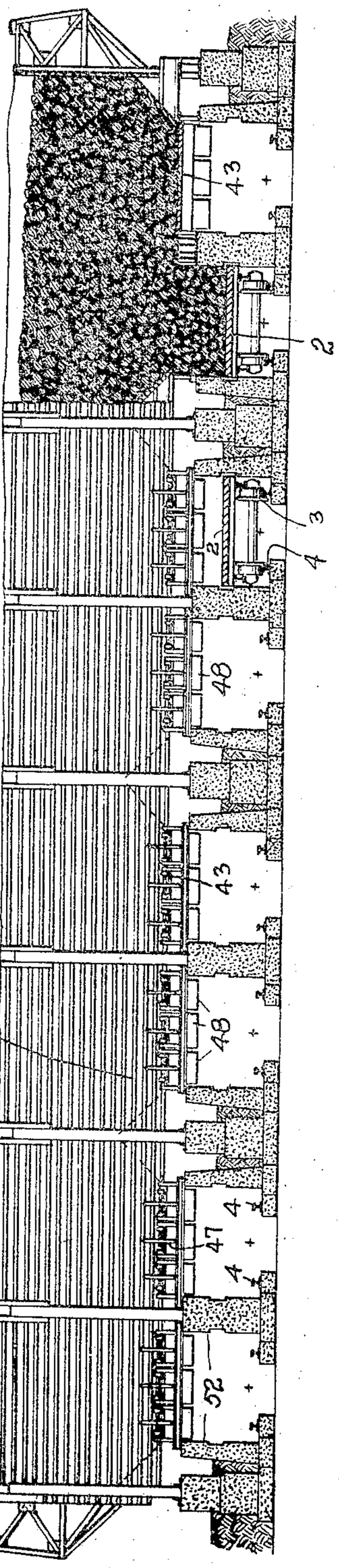
APPLICATION FILED JULY 18, 1908.

925,428.

Patented June 15, 1909

10 SHEETS—SHEET 8.

FIG. 11.



WITNESSES:

J. Herbert Bradley.

Frances J. Tomasson

INVENTOR

William R. Elliott

by Christy & Christy,

Atty's.

925,428.

W. R. ELLIOTT.

COKING PLANT.

APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 9.

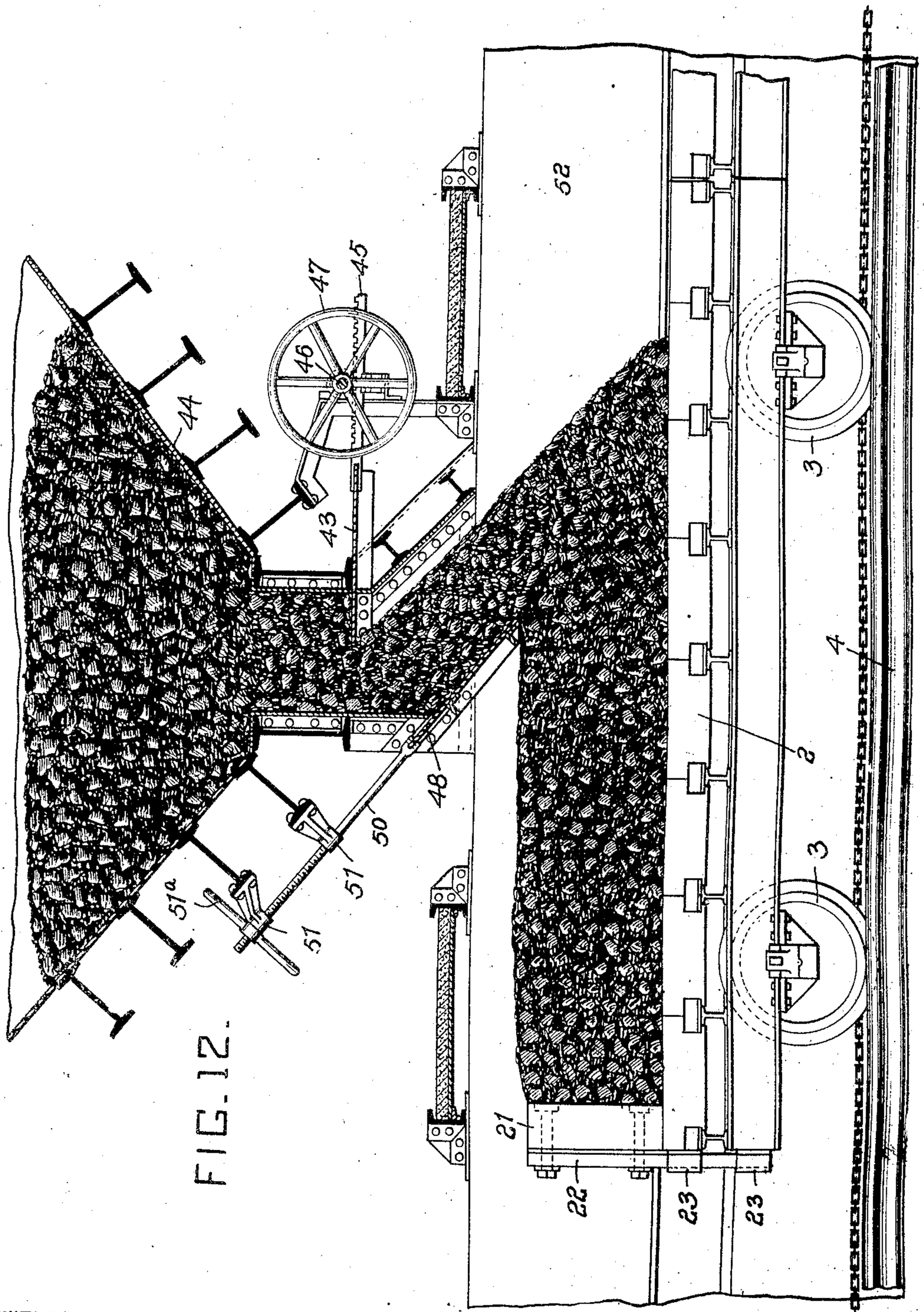


FIG. 12.

WITNESSES:

J. Herbert Bradley.

Francis J. Tomasek

INVENTOR

William R. Elliott

by Christy & Christy,

Atty's.

925,428.

W. R. ELLIOTT.

COKING PLANT.

APPLICATION FILED JULY 18, 1908.

Patented June 15, 1909.

10 SHEETS—SHEET 10.

FIG. 13

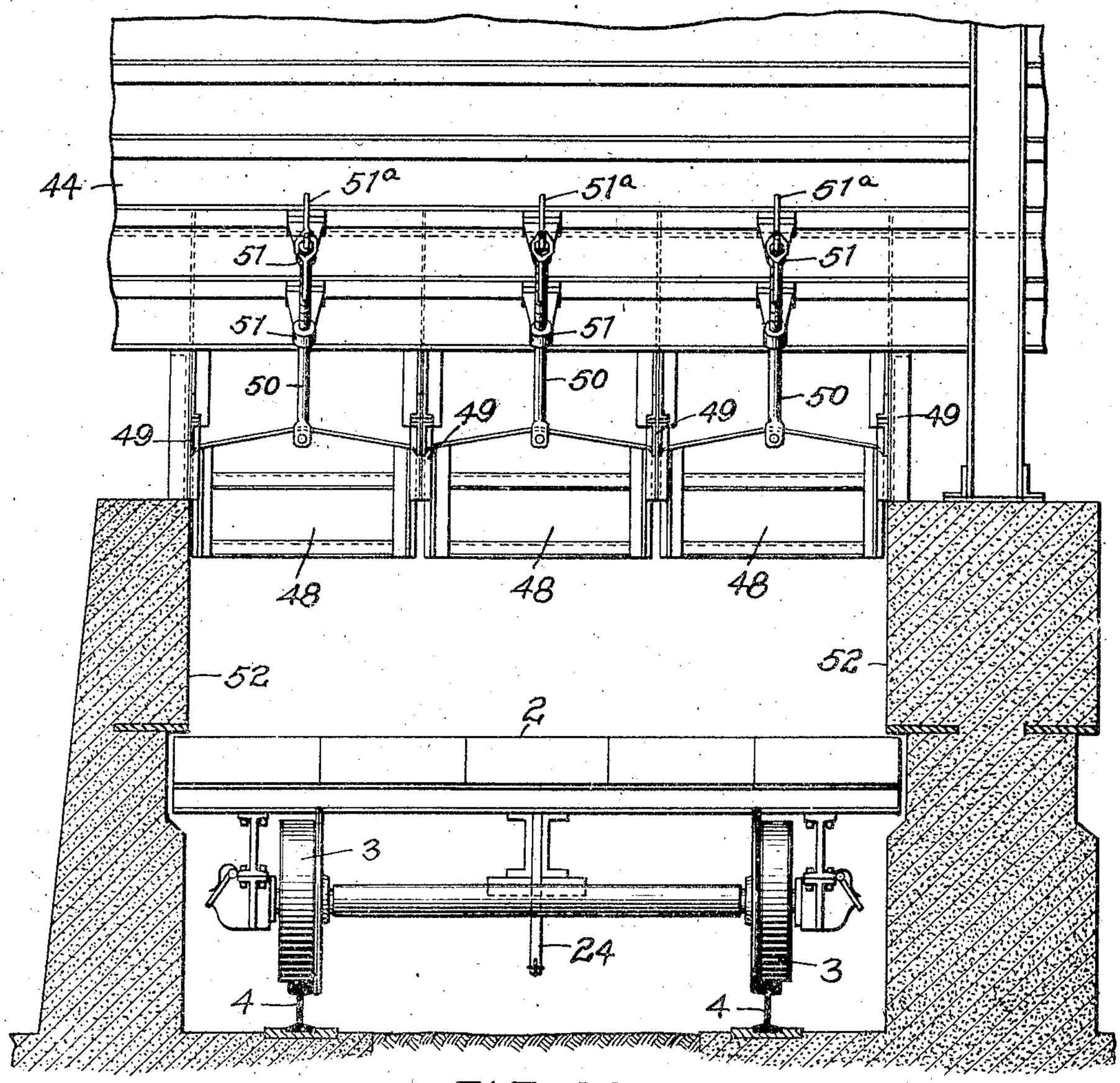
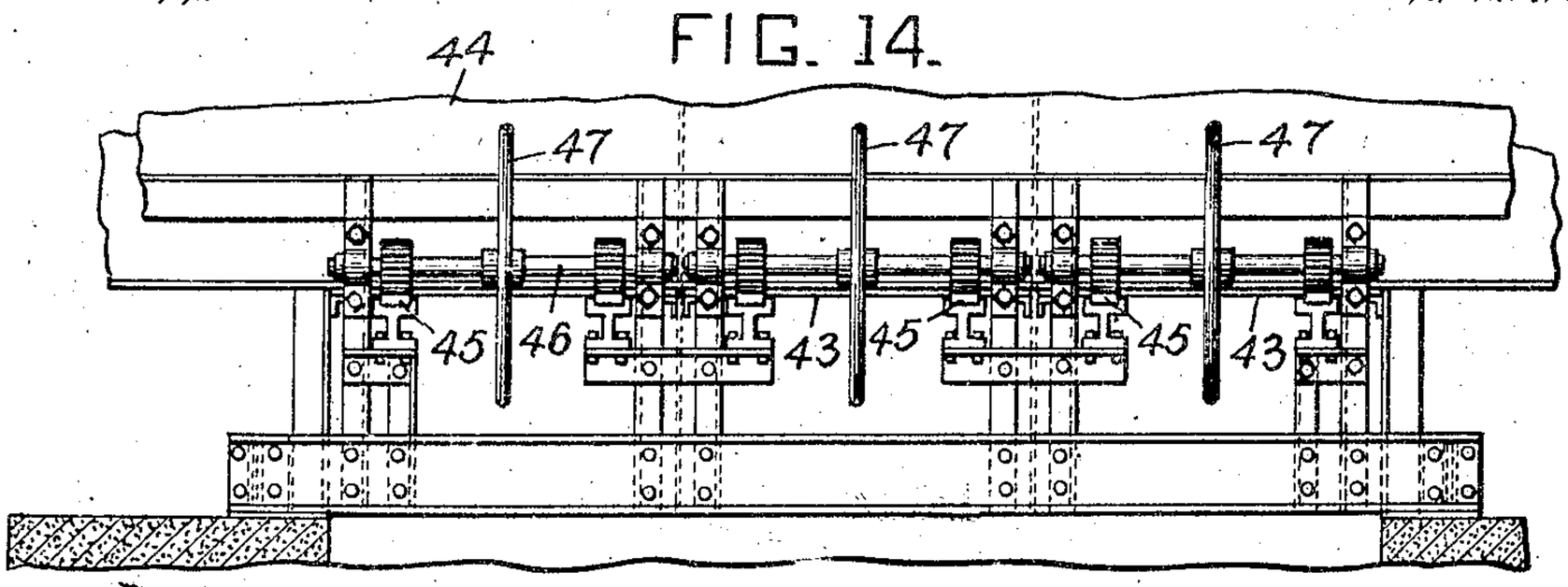


FIG. 14.



WITNESSES:

J. Herbert Bradley

Francis J. Tomaszek

INVENTOR

William R. Elliott,

by Christy & Christy,

Atty's.

UNITED STATES PATENT OFFICE.

WILLIAM R. ELLIOTT, OF DENVER, COLORADO.

COKING PLANT.

No. 925,428. Specification of Letters Patent. Patented June 15, 1909.

Application filed July 18, 1908. Serial No. 444,260.

To all whom it may concern:

Be it known that I, WILLIAM R. ELLIOTT, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented or discovered certain new and useful Improvements in Coking Plants, of which improvement the following is a specification.

The invention described herein relates to certain improvements in plants for the manufacture of coke, and has for its object a construction and combination of parts or elements whereby the coal to be coked, preferably in large quantities is supported within the coking furnace on a movable platform or car and after the coking operation is finished, the coke is removed while on the car, quenched as it passes from the oven and removed from the car or platform without interrupting the movement of the latter. During the return movement of the car to the oven, a fresh supply of coal is charged thereon and carried into the oven.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification Figure 1 is a diagrammatic plan view illustrating the relative arrangement of the several parts of the coking plant; Fig. 2 is a view partly in section and partly in elevation of two pairs or series of ovens showing the car with the coal or coke in position in the furnace; Fig. 3 is a view partly in section and partly in side elevation of one of the coking ovens; Figs. 4 and 5 are detail views on an enlarged scale illustrating a form of valve mechanism controlling the admission of air to the ovens; Fig. 6 is a view partly in section and partly in elevation of the quenching yard showing the arrangement of pipes, the section being indicated by the line VI—VI Fig. 1; Fig. 7 is a sectional elevation on a plane indicated by the line VII—VII Fig. 1; Fig. 8 is a top plan view of the quenching yard, also showing the plow for removing the coke from the cars; Fig. 9 is a top plan view on an enlarged scale showing the truck carrying the plow for the removal of the coke and also carrying therewith retaining walls for preventing the coal from dropping from the car; Fig. 10 is a sectional elevation on a plane indicated by the line X—X Fig. 9; Fig. 11 is a view partly in section and partly in elevation showing the coal bins and the means for discharging the coal on to the cars; Fig. 12 is a sectional view on an enlarged scale, showing the discharge chute for the coal bin and the means for leveling the coal on the cars; Figs. 13 and 14 are elevations of opposite sides of the discharge chute with controlling valves or slides and leveling device shown in Fig. 12.

In the practice of my invention the ovens 1 are made of considerable length preferably over one hundred feet and even up to five hundred feet if such length is desirable for the particular places where the plant is erected. As shown in Fig. 2 the upper part of the oven is arched forming a reverberating chamber above the bed of coal which is supported upon a platform or series of platforms 2 of the car or cars, the wheels 3 of which move along the rails 4 on the bottom of the oven. The platform of the car and the oven are made of such relative widths that the side walls of the latter will operate as retaining walls to hold the coke or coal in position upon the car. It is preferred that the portion of the side wall of the oven immediately above the platform should extend inwardly over the same so as to prevent the flow of heat to the under portion of the car, as any excessive heat in that portion of the oven would injuriously affect the running gear of the cars. The tops of the ovens are provided with flues 5 for the escape of the gases as is customary, and tubes 6 are embedded in the outer side walls of the ovens preferably immediately above the normal level of coal on the platform for the admission of air. These openings are provided with suitable valves for controlling the admission of air. It is preferred that these valves 7 should be in the form of disks mounted on pins 8 passing through metal sleeves 9 embedded in the fire-clay tube 6 forming the air inlets. These valves are connected by wires 10 to one end of segments 11 on the shaft 12, extending longitudinally of the furnace and the shaft is provided with an operating handle 13 moving along an arch 14 provided with openings for the reception of pins to hold the lever and the valves connected thereto in any desired position. It is preferred that the valves be divided up into several series so that the flow of air to different parts of the furnace may be more readily controlled. Each series of valves are connected to a single shaft 12 operated by handle 13 as heretofore described.

It is preferred that the doors A closing the ovens should be made of an open-work of structural iron, the spaces between them be-

ing filled with fire-clay or other suitable material, which should cover the inner surfaces of the frame to protect them from the heat. These doors are adapted to move vertically and are guided by lateral extensions of the top beam *a* into grooves in the posts 15, as will be seen by reference to Fig. 2, said posts serving to support the rails 16 along which the car 17 can move, said car being provided with a suitable motor and winding mechanism connected to the chain 18 for raising and lowering the doors. These doors are connected in any suitable manner to the chains, but preferably by means of hooks 19 engaging eyes on the doors and being secured to a spreader 20 connected to the hoisting chain.

It will be readily understood by those skilled in the art that a continuous integral platform might be provided for supporting the coal, the platform being the length of the oven, but it is preferred to provide a series of platforms of about the usual length of a railroad car, each platform being supported by separate sets of trucks as is customary. These separate cars are coupled together in any suitable manner, so that the spaces between adjacent platforms will be sufficiently small to prevent the dropping through of any material amount of coal. In order to retain the coal or coke on the car or train of cars, the ends of the cars at each end of the train are provided with removable doors 21 as shown in Fig. 12. Any suitable construction of tail door 21 may be employed, such for example as that shown consisting of a frame work filled with fire-clay and provided with stakes 22 filling in sockets 23 on the ends of car bodies. The car or train of cars may be moved into and out of the oven by any suitable means but it is preferred to employ endless chains indicated in Fig. 1, said chains passing from a power winding mechanism B around guide pulleys through the ovens out to the extreme ends of the tracks for the reception of empty cars and back to the winding mechanism. One or more of the cars of each train are provided with hangers 24 to which the chains may be connected for moving the cars. It will be observed that these portion chains are continually within the ovens, but as long as the cars are in position therein, the platforms 2, the upper portions of which are formed of fire-clay or other heat resisting material will protect the chains as well as under portions of the cars from injury from heat. In order to protect the chains when the car or train of cars is moving out or is entirely withdrawn from the ovens, a gutter 25 is formed in the bottom of the furnace, as shown in Figs. 2 and 3, in which the chains will lie, and this gutter is supplied with flowing water by a pipe 6^a connected to the quenching system or other suitable source to prevent excessive heating of the chains.

As soon as the coal or coke on a car or train of cars within the oven, has been sufficiently coked, the door of such oven is raised and the car is moved out to the quenching yard, where the incandescent charge is thoroughly drenched with water. This quenching yard is provided with a supply pipe 26 having at suitable intervals, stand pipes 27, as shown in Figs. 6, and 7, the stand pipes being provided with regulating valves 28. These stand pipes support horizontal pipes 29, one extending alongside of each track in the quenching yard. The horizontal pipes 29 are provided with branch pipes 30 which extend horizontally a distance equal at least to the width of a car, as will be clearly seen in Fig. 6. By reference to Fig. 7 it will be seen that these horizontal drenching pipes extended nearly to the ovens, and that the horizontal feed pipe 29 is provided with a series of valves 30^a to regulate the flow of water into the branch pipes. As soon as a car begins to emerge from the furnace suitable valves are opened so that the quenching operation will begin immediately and as the car progresses, the other valves are opened so that by the time the front end of the car reaches the point where the coke should be discharged the latter is thoroughly quenched.

The coke may be removed from the car by any suitable means, but it is preferred to employ a V-shaped plow 31 having a width on its rear end approximately equal to that of the car platform as shown in Figs. 8, 9 and 10. This plow is secured to the frame work of the truck 32 which is provided with wheels 33 arranged to move along rails 35 supported by abutment 34 a suitable height above the rails 3. The rails 35 supporting this truck 32 are arranged transversely of the rails 4 on the line of movement of the cars and extend entirely across the series of tracks leading from the ovens so that the plow 31 may be brought into operative position relative to each train of cars as required. As the cars move under this plow, the coke is forced off both sides of the car on to guide aprons 36 which are secured to the truck carrying the plow and hang down on each side of the car platform. These guide aprons direct the coal down on to an endless apron 37 moving in suitable subway at right angles to and below the tracks or rails 4. By this endless apron the coke is carried away to a point of storage or to cars suitably arranged upon receiving tracks 38, as shown in Fig. 1. As will be seen by reference to Fig. 9, the plow 31 is firmly braced both as against the direct thrust of the coke and also as against any lateral movement which the coke may tend to impart to the plow during the operation of removing the coke from the cars by transversely arranged braced members shown in Figs. 9 and 10. The truck or frame carrying the car may be shifted along

the rails 35 by any suitable means but preferably by means of a motor 39 mounted on the frame of the truck and having a sprocket chain connection 40 to the shaft 41 of one of the wheels carrying the truck or frame. By the operation of the plow, the coke is entirely removed from the moving platform of the car or cars, which will then pass on out on to the tracks 4 until the left hand end of the train in Fig. 1 is in position under the line of bins 42 arranged transversely of the system of tracks as shown in Fig. 1. The end gates 21 are then placed in position, although the gate at the right hand end of the train in Fig. 1 need not necessarily be placed in position at this time. The motion of the train or car is then reversed so as to move them toward the ovens where the coking is effected. On this reversal of movement the valve 43 in the chute 44 above the track along which the car or train is moving, is moved outwardly so as to permit coal to flow down on to the car. This valve may be of any suitable construction but preferably such as shown, consisting of the plate 43 having secured thereto a rack 45 with which a pinion on the shaft 46 will intermesh, said shaft being rotated to open and close the valve by any suitable means either manually or by power, as for example by the hand wheel 47. It is preferred that a spout should form the discharge of the chute, such spout being constructed so as to cause the coal to flow at an angle less than a right angle to the platform of the car, and in a direction against the movement of the car so that the coal in its movement will tend to distribute itself along the platform.

As is well known in the art, it is necessary in order that all the coal treated at one time should be uniformly coked, that the depth of coal should be approximately uniform at all points and in order to attain this uniformity of depth of coal on the cars, means are provided for leveling the coal as the car moves along. Any convenient construction may be employed for this purpose, but it is preferred to employ one wall of the delivery spout of the chute for this purpose. To this end one of the walls of the spout, as 48, is made movable so as to regulate the depth of coal above the surface of the platform of the car. While not necessary, it is preferred that this slide or wall of the spout 48 should be made in sections, as such construction permits more easy bracing of this leveling device, as will be readily seen by reference to Fig. 13, where the leveling plate or wall is divided into three sections, each section being mounted in independent ways 49. These walls can be shifted up and down to vary the depth of coal by any suitable means either manually or power operated. In the construction shown the leveling plates are connected to threaded rods 50 passing through supporting sleeves 51 secured to the chute in any suitable manner, and a hand operated nut 51[a] screwing on the end of the rod and bearing against one of the sleeves.

As will be seen by reference to several figures of the drawing the cars are not provided with any sides for retaining the coal laterally on the platforms. Hence provision is made to retain the coal on the platform from the time it is loaded until it is again removed from the car. To this end retaining walls 52 are formed along the sides of each track the distance between the walls inclosing each track being only a little greater than the width of the platform of the car. The portion of these retaining walls from the point where the coke is discharged to a point some short distance beyond where the coal is charged into the car, is preferably formed of concrete. But from the point where the coke is discharged back to the furnace, these walls are preferably made of metal so as to be capable of withstanding the heat to which they are subjected on the movement of the coked charge out from the oven and until it is entirely quenched. It will be observed by reference to Figs. 8, 9 and 10 that these retaining walls are interrupted along the path of movement of the plow transverse of the tracks, so as to permit not only the lateral discharge of the coke from the cars, but also the movement of the plow from track to track. In order to prevent the coal flowing off of the car laterally at this point, the truck or frame 32 carrying the plow is extended laterally and to this lateral extension are secured movable retaining walls 53 as clearly shown in Figs. 8, 9 and 10. It is preferred that these movable walls and the plow should be spaced such a distance apart that when the plow is operating upon the car moving along one track, the retaining walls 53 will be in position to prevent a lateral movement of the coal from the car moving inwardly on such adjacent track. This relative arrangement and retaining walls 53, however, is not essential as the plant may be so operated that an inward movement of the coal loaded car will not occur during the outward or discharging movement of the coke loaded car and further these retaining walls may be if desired mounted on a truck independent of that carrying the plow.

I claim herein as my invention:

1. In a coking plant, the combination of an oven, a platform forming the support for the charge during the coking operation, means for applying water to the incandescent material arranged adjacent to the oven and means for imparting a substantially continuous movement to the platform from the oven and along and in operative relation to the water-applying means.

2. In a coking plant, the combination of an oven, a platform forming the support for the charge during the coking operation, means

for moving the platform into and out of the oven and means outside of the oven for forcing the coke from the platform.

3. In a coking plant, the combination of an oven, a platform forming the support for the charge during the coking operation, means for moving the platform from the oven and means outside of the oven and stationary as regards the direction of movement of the platform for removing the coke from the platform.

4. In a coking plant, the combination of an oven, a platform forming the support for the charge during the coking operation, means for moving the platform from the oven, a receptacle arranged in receiving relation to the line of movement of the platform and means for moving the coke from the platform to the receptacle.

5. In a coking plant, the combination of an oven, a platform for the charge, a coal receptacle, and means for moving the platform from the receptacle into the oven.

6. In a coking plant, the combination of an oven, a platform for the charge, a coal receptacle, means for moving the platform from the receptacle into the oven and means for leveling the coal on the platform.

7. In a coking plant the combination of an oven, a platform for the charge having a width approximately equal to the distance between the side walls of the oven, a coal receptacle, means for moving the platform from the receptacle into the oven, means for leveling the coal on the platform and means for holding the coal on the platform during the leveling operation and the movement of the car into the oven.

8. In a coking plant, the combination of an oven, a platform for the charge, a coal receptacle, means for moving the platform from the receptacle into the oven and retaining walls arranged on each side of the line of movement of the platform and extending from the coal receptacle to the oven.

9. In a coking plant, the combination of an oven, a platform for the charge, means for moving the platform from and into the oven, a plow for removing the coke laterally from the platform, means for shifting the plow transversely of the line of movement of the platform, a coal receptacle, retaining walls extending from the receptacle to the point of discharge of the coke and from such point to the oven and movable retaining walls for filling the gaps of the main walls at the point of coke discharge.

In testimony whereof, I have hereunto set my hand.

WILLIAM R. ELLIOTT.

Witnesses:
MARY E. DULEY,
HOWARD C. FRANK.