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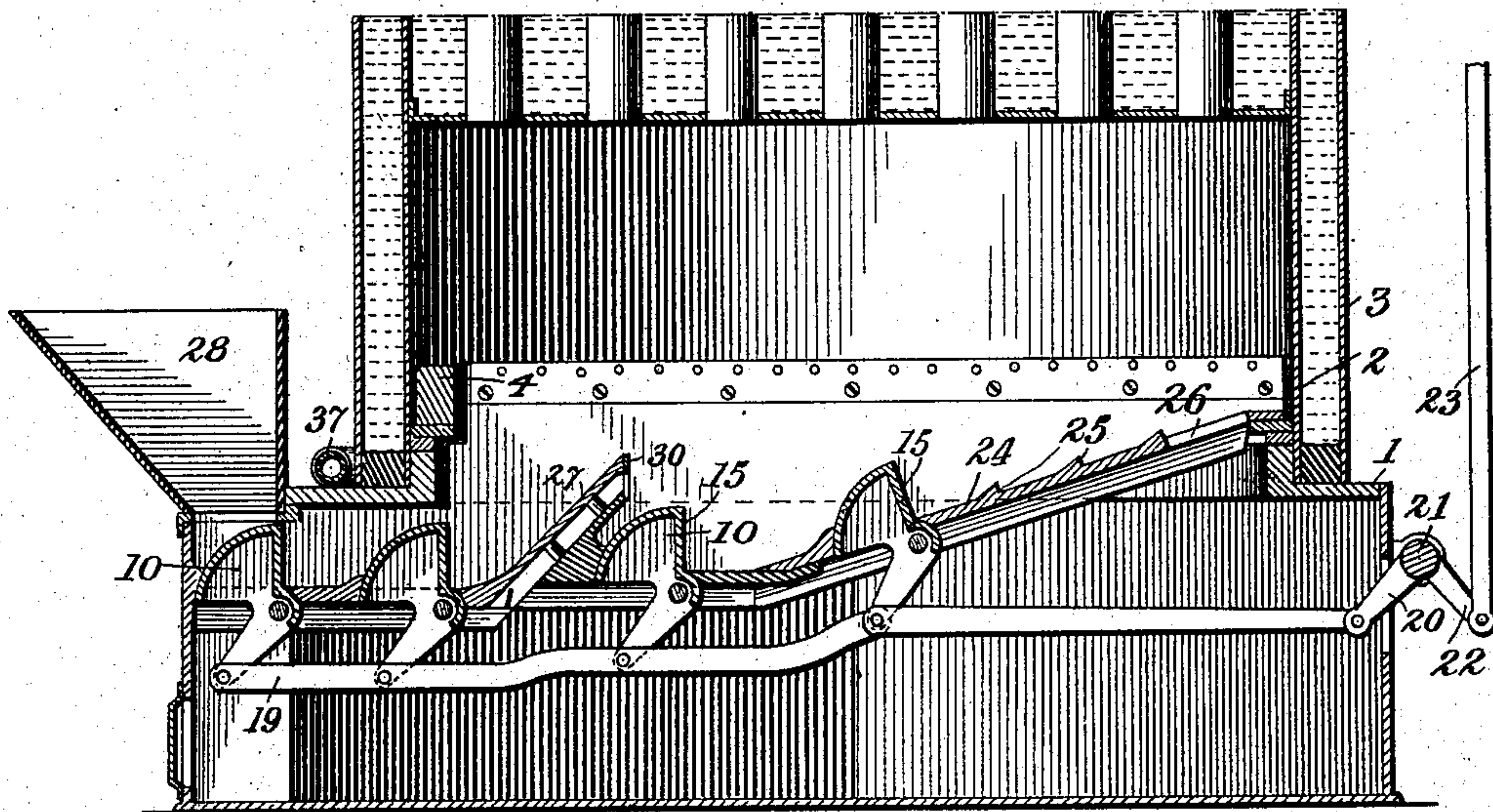
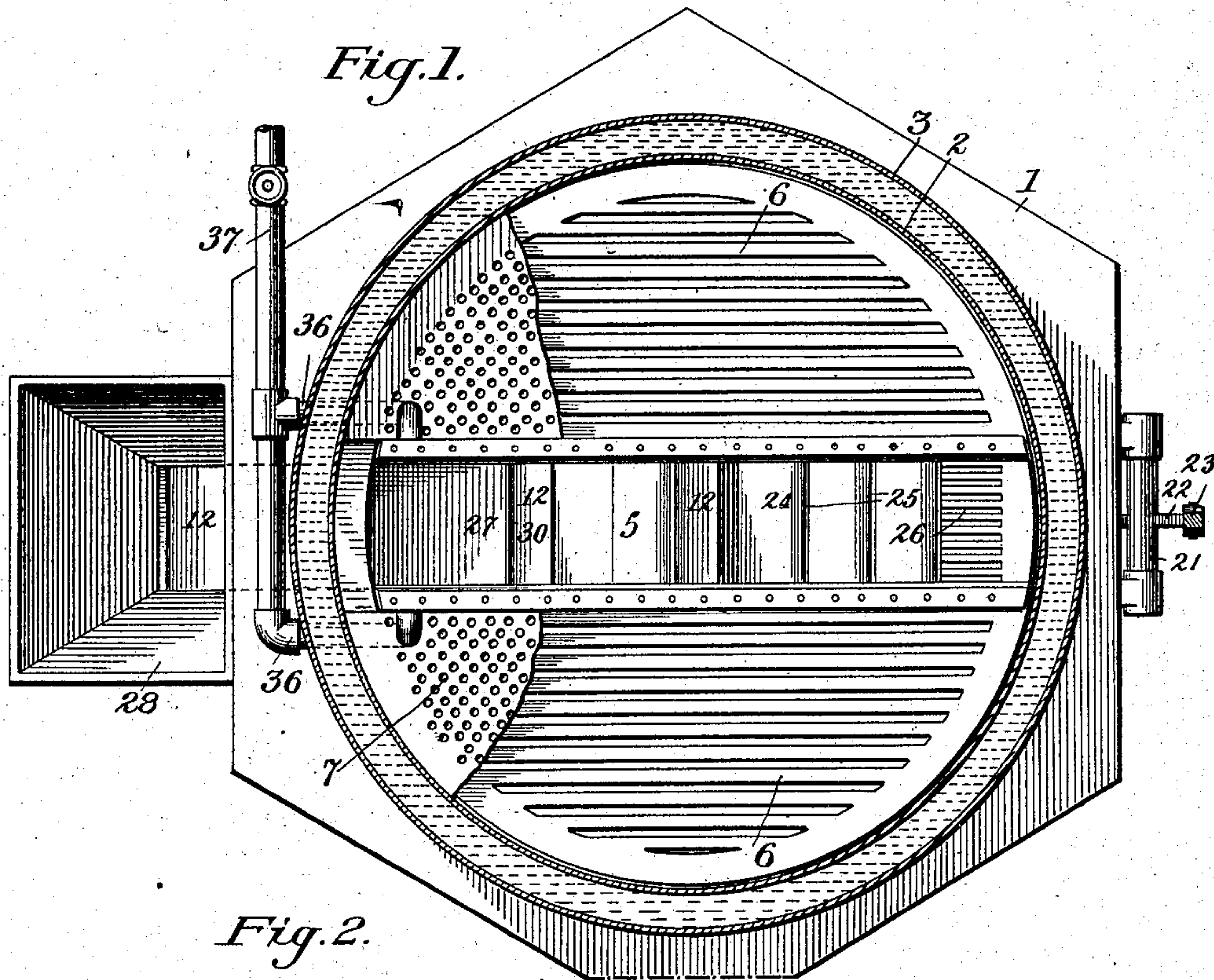
PATENTED FEB. 24, 1903.

J. P. LUCKETT.  
AUTOMATIC STOKER.

APPLICATION FILED MAY 31, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

R. A. Baldwin.

Harry L. Amer.

Inventor:  
J. P. Lockett.

by  
Rexford M. Smith.  
Att'y.



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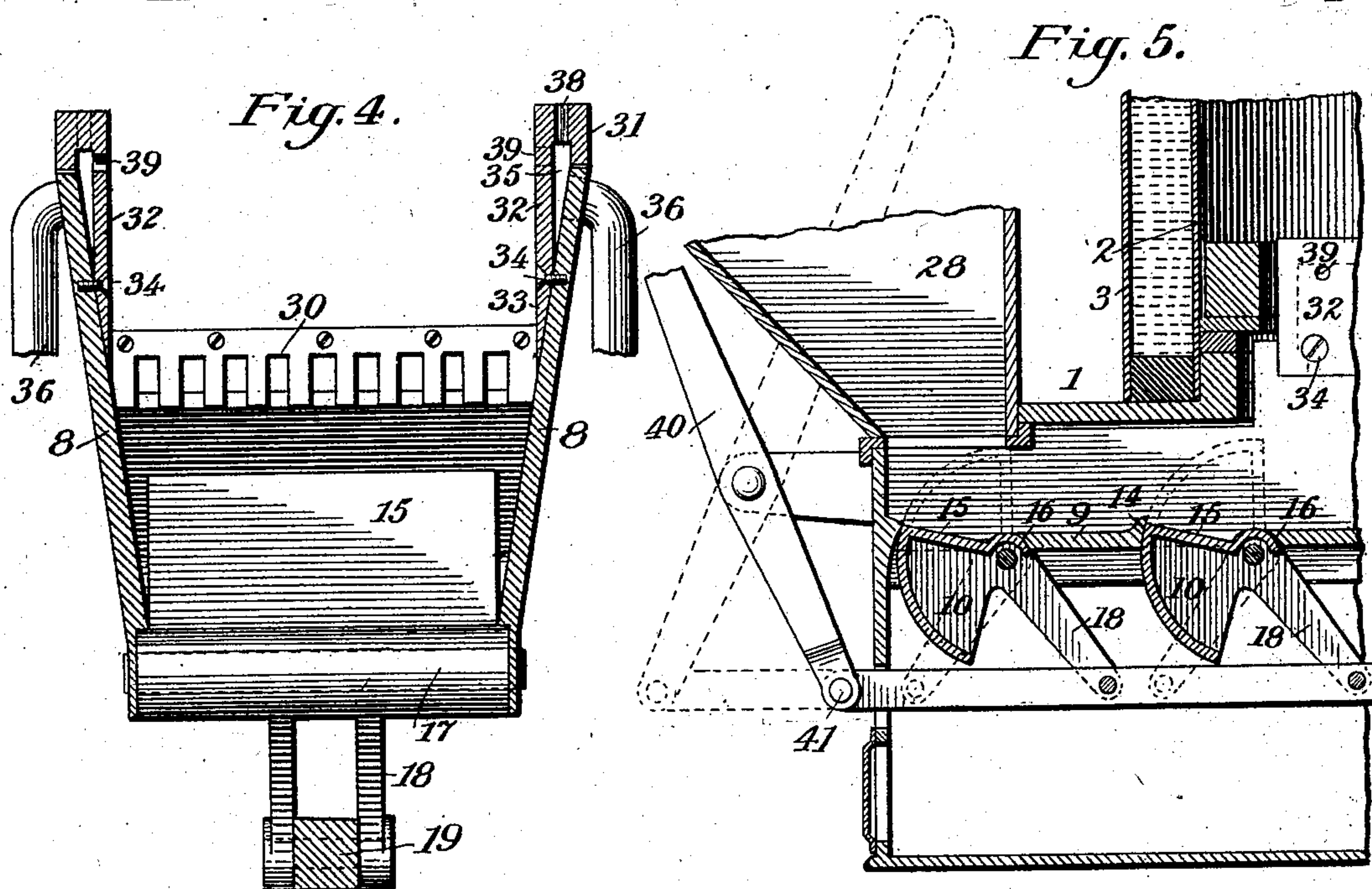
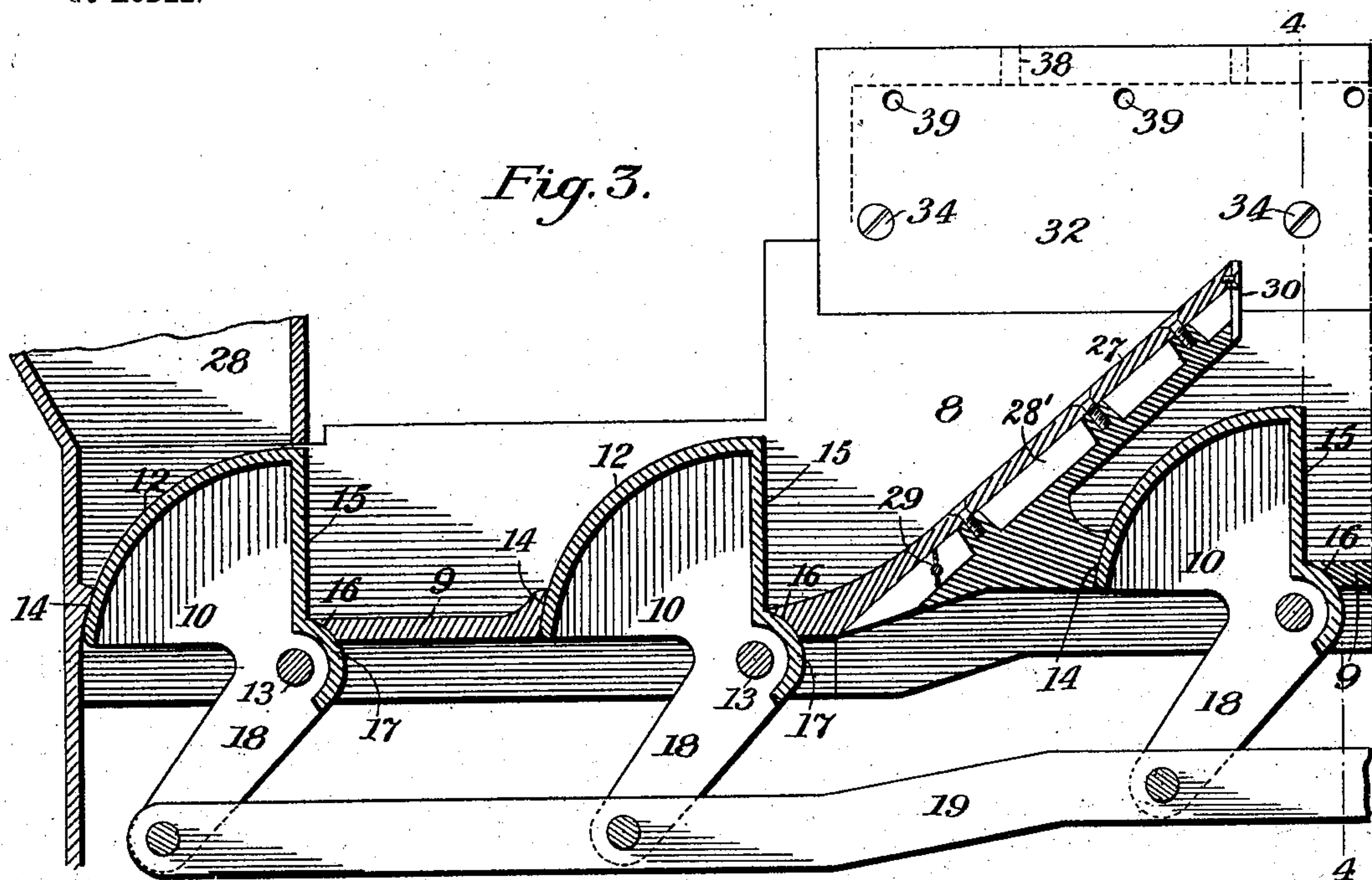
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APPLICATION FILED MAY 31, 1902.

NO MODEL.

3 SHEETS—SHEET 2.



*Witnesses:*

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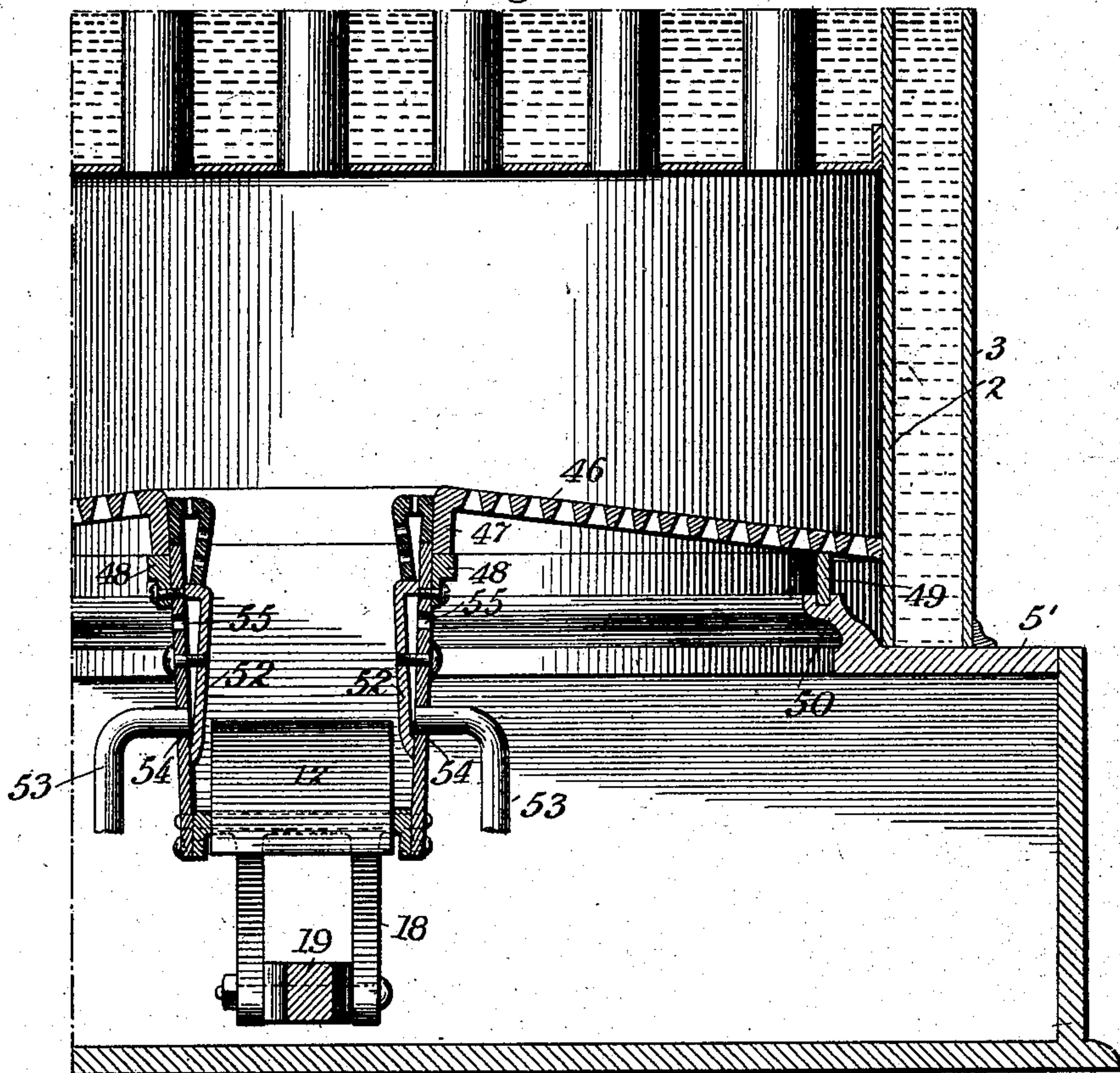
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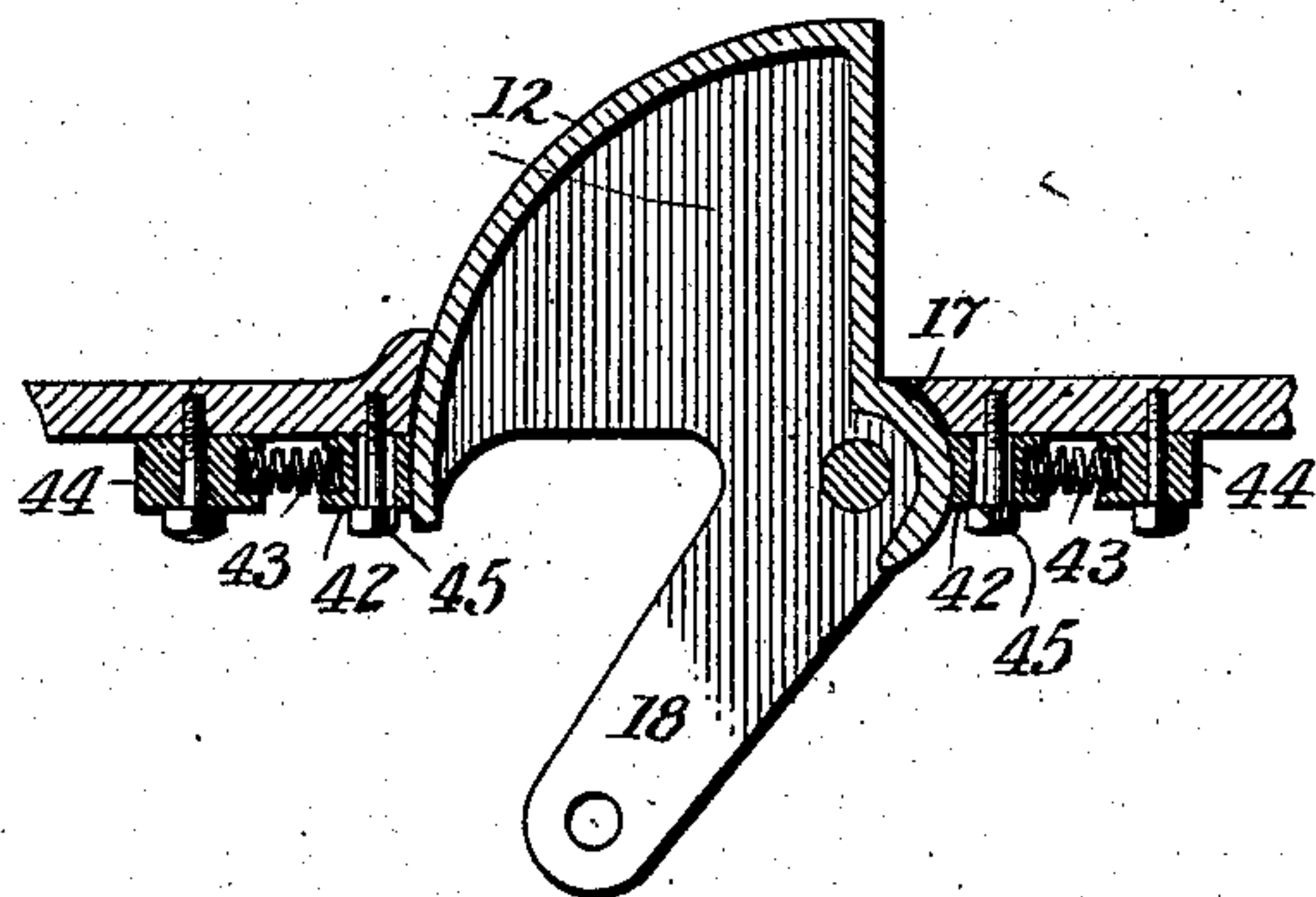
NO MODEL.

3 SHEETS—SHEET 3.

*Fig. 7.*



*Fig. 6.*



Witnesses:  
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Atty.



# UNITED STATES PATENT OFFICE.

JOHN PARKER LUCKETT, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE  
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## AUTOMATIC STOKER.

SPECIFICATION forming part of Letters Patent No. 721,586, dated February 24, 1903.

Application filed May 31, 1902. Serial No. 109,747. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN PARKER LUCKETT, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented a certain new and useful Automatic Stoker, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to automatic stokers for fuel-consuming furnaces and burners of various types—such, for example, as are used in connection with vertical, horizontal, marine, and locomotive boilers, stoves, ovens, kilns, muffles, driers, and the like; and the invention is in the nature of an improvement upon the construction illustrated, described, and claimed in Letters Patent No. 667,027, granted to me January 29, 1901, for fuel-feeding mechanism for furnaces.

The aim of the present invention is to provide a natural-draft automatic stoker which feeds the fuel evenly and uniformly into the magazine, where every particle of the fuel is subjected to an inflowing current of fresh air, the amount of which is capable of regulation to suit existing conditions and to agree with the intensity of heat required and the deflected heat found to exist in the ash-pit. The fresh air is so admitted that all the gases in the coal are extracted and the coal converted into coke, thus producing two distinct strata, one above the other, the one consisting of coke and the other of coal. The result of this is that the life of the grate, magazine, and all parts connected therewith is greatly increased. The coal is acted upon and thoroughly coked before it passes onto the grate or grates, grate-beds, or hearths, and by reason of the arrangement of the means for admitting fresh air or heated air through a special air-chamber or uptake, as also through the grates to the fuel, such air is delivered into the fuel in a heated condition, which further assists in the proper coking of the fuel before it finds its way upon the grate, where combustion takes place. Fresh air may also be admitted in the usual way or admitted at one or more points, so as to thoroughly mingle with the particles of fuel and evenly coke the same.

It is also an object of the present invention to provide what I term a "hollow cap-rail," which extends along the upper edge of the magazine and is perforated and connected with an air-supply, so that fresh air is discharged into the fuel throughout the entire length of the magazine, thereby insuring the proper coking of the fuel and combustion of gases and arresting the escape of the highly-volatile substances of the coal before delivery upon the grate or grates at the sides of the magazine. The said hollow cap-rail also affords full protection for the top portion of the magazine and receives its oxygen through a pipe leading outward from the magazine, thus preventing destruction of the magazine. Should the hollow cap-rail eventually become burned out, it may be renewed at small expense without the necessity of renewing the magazine.

It is also an object of this invention to so arrange the air-inlets as to keep the magazine as a whole comparatively cool, also to carry off all obnoxious odors and impure air, also to provide means for preventing the finer particles of fuel from finding their way between the grate-bars into the ash-pit, at the same time giving a more even draft.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination, and arrangement of parts, as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a plan view of a vertical boiler with the boiler-tubing omitted to show the magazine, fuel-feeding device, grates, and grate-rest ring, &c. Fig. 2 is a vertical diametrical section through the lower portion of the same, the section being taken longitudinally of the magazine. Fig. 3 is an enlarged detail vertical section through a portion of the magazine and fuel-feeding device, showing the hopper and combined uptake and air-flue. Fig. 4 is a vertical transverse section through the magazine on the line 4 4 of Fig. 3. Fig. 5 is a detail vertical section through the initial portion of the magazine, showing the hand operating-lever for the rocking conveyers or feeders. Fig. 6



is an enlarged detail section showing the spring-pressed followers which coöperate with each rocker or conveyer. Fig. 7 is a vertical diametrical section through a boiler and magazine, showing modifications in the construction of the magazine and grate, &c.

Like reference-numerals designate corresponding parts in all figures of the drawings.

For the purposes of illustration I have shown the present invention as applied to a vertical boiler, which is illustrated in plan view in Fig. 1, 1 designating the bed-plate of the boiler; 2 and 3, the inner and outer boiler-shells, respectively; 4, the grate-rest ring; 5, the magazine, which extends diametrically across the body of the boiler, and 6 the grates, arranged at opposite sides of the magazine and which preferably incline downward from their inner edges adjacent to the magazine toward their outer edges to provide for the proper distribution and gravitation of the coked fuel along the grate. Each grate 6 is shown as composed of a series of grate-bars; but in some cases it may be desirable to have perforated bed-plates 7 to serve as grates to prevent the fine fuel from passing through the grate and also to secure a more even draft.

By reference to Fig. 4 it will be seen that the magazine comprises upwardly sloping and diverging sides 8, which are connected at the bottom by floor-sections 9, extending between the several rockers or oscillating feeders or conveyers 10. These feeders or conveyers all correspond in construction, and each comprises a quadrant-shaped body portion 11, having a concentric surface or fuel-rest 12 struck from the pivotal point 13 of the feeder as a center. Each floor-section 9 is concaved or cut away, as shown at 14, to correspond with the curvature of the surface 12, so as to prevent the fuel from finding its way through the floor of the magazine during the oscillatory movement of the feeder. Each feeder or conveyer is also provided with a radially-disposed shoulder or surface 15, which operates in the inward movement of the feeder to urge the fuel forward into the inner portion of the magazine and along the floor thereof, so as to fill the magazine with fuel and properly distribute the same. Each floor-section 9 is also undercut or concaved, as shown at 16, to form a fuel-tight joint with the hub portion 17 of the adjacent feeder or conveyer. In this way the fuel is prevented from finding its way through the floor of the magazine into the ash-pit. Any desired number of rocking feeders or conveyers 10 may be employed, and they are all provided with downwardly-extending arms 18, to which is pivotally connected a common operating-bar or connecting-rod 19, which is connected at one end to the crank-arm 20 of a horizontally-disposed rock-shaft 21, having another arm 22, which is operated by a link or connecting-rod 23, leading to a driving-shaft provided with a crank or disk with wrist-pin, motion thus be-

ing imparted to all of the feeders or conveyers, causing them to operate simultaneously and equally upon the inflowing fuel and to advance the fuel along the magazine and upwardly along the inclined rear portion 24 thereof. The inclined portion 24 of the magazine-bottom is provided, by preference, with transverse ribs 25 to catch and hold the fuel, and the rear portion of the bottom of the magazine is formed or provided with a grate or additional air-chamber or uptake 26, through which air is admitted from the ash-pit, which air circulates through the upper portion of the fuel and assists in the coking thereof.

One of the main features of this invention resides in what I term a "combined uptake and air-flue" 27, which is arranged within the shell of the boiler and within the walls of the magazine and by preference adjacent to that wall of the boiler which is next to the hopper 28, through which the coal gravitates upon an initial feeder or conveyer 10. The uptake 27 is arranged at an inclination, as best shown in Figs. 2 and 3, and extends entirely across the magazine from side to side, thus requiring every particle of fuel to pass upward along the uptake and over the discharge end thereof, which discharge end is arranged several inches below the normal level of the fuel in the magazine when the apparatus is in operation. The uptake is by preference composed of a pair of plates of any suitable heat-resisting material, the plates being bolted or otherwise secured together and held at such distance apart as to form an air-flue 28', which leads through the bottom of the magazine and takes the supply of air from the ash-pit, the supply of air being regulated and controlled by means of a damper or shut-off 29, which may be adjusted for the purpose. The upper end of the air-flue is partially closed by means of a grate or perforated plate 30, which extends vertically, or approximately so, as shown in Fig. 3, so that the air may escape readily from the discharge end of the flue, while at the same time preventing particles of fuel from getting into the flue and passing downward into the ash-pit.

While I have shown but a single uptake or air-flue, it is to be understood that one or more of such air-flues may be employed and arranged at suitable intervals or points as may be required along the magazine. Ordinarily, however, one of such combined uptakes and air-flues is sufficient, and it is found expedient to locate the same about one foot from the front wall of the boiler, as indicated in Fig. 2, so that all the fuel must pass over the uptake and be subjected to the current of air passing through the flue in the uptake. In this way oxygen to the necessary amount is continuously supplied to the inflowing fuel, and the upper stratum thereof is thoroughly coked before passing onto the grates, and therefore prior to combustion. Below the coked stratum the fuel remains "green," and



thus the lower portion of the magazine is kept comparatively cool. This effect is further enhanced by reason of the fact that the cool air is drawn into the ash-pit in order to supply the air-flue 28' and circulates below the bottom of the magazine before entering such air-flue. In order to still further insure the proper coking of the upper stratum of the fuel, the sides of the magazine are provided along their upper edges with hollow cap-rails 31. Each rail is made in one piece or section and comprises a short outer side, which rests directly on the top of the magazine, and a longer inner side 32, which extends downward within the magazine and is beveled, as at 33, so as to fit closely against the inner surface of the adjacent side of the magazine to avoid catching any of the fuel as it rises between the magazine-walls. Each hollow cap-rail 31 is secured in place by means of bolts or screws 34, and the air-chamber 35 within each cap-rail is supplied with fresh air by means of a tubular connection or pipe 36, the pipes from the cap-rails communicating with a common supply-pipe 37, leading to any suitable source. Each cap-rail is also provided with a series of perforations or jet-openings 38, leading through the top wall thereof, as shown in Fig. 4, and is provided with other jet-openings 39, which lead through the inner wall of the rail and by preference alternate with the openings 38. As the fuel is crowded over the top edges of the magazine it necessarily passes over the hollow cap-rails 32 and is subjected to the jets of fresh air passing through the openings 38 and 39, and the coking of the fuel is thus rendered doubly sure before passing onto the side grates prior to combustion.

Instead of operating the rocking feeders or conveyers from a motor or any motive power they may be operated by means of a hand-lever 40, arranged at the front of the furnace and connected at 41 with the common operating-bar or connecting-rod 19, as shown in Fig. 5. The hand-lever 40 is especially useful in primarily filling the magazine before coupling up the stoker with the motor, by means of which it is made automatic in action.

In order to still further guard against the sifting or escape of fuel through the bottom of the magazine adjacent to the rockers or conveyers, followers 42 are arranged in front and rear of each rocker, as best shown in Fig. 6, one follower bearing with a yielding pressure against the surface 12 of the rocker and the other bearing against the concentric surface 17. Each follower 42 is backed up by one or more springs 43, which are sustained at their outer ends by means of seats 44, preferably in the form of blocks or strips, secured to the lower side of the bottom of the magazine. The followers 42 are preferably in the form of strips or bars extending the entire length of each rocker and are preferably supported by means of headed pins or studs 45, which pass through slots extending trans-

versely of the followers and connect with the bottom of the magazine. The followers work in close contact with the concentric surfaces of the rocker and effectively prevent the sifting or escape of the fine particles of fuel through the bottom of the magazine.

In lieu of the usual grate or grates (shown in Fig. 1) perforated plates 46 may be employed, as shown in Fig. 7, and the perforations thereof may be downwardly flared to admit of the ready escape of the ashes. In this way ample draft may be provided, so as to affect the entire mass of fuel resting on the grate. The grate 46 is provided along its inner edge with a depending flange 47, which rests on a cleat or angle-iron 48, secured to the outer wall of the magazine, while the outer portion of the grate rests on a grate-ring 49, which is supported by one or more brackets 50, in turn supported by the bed-plate 51 of the furnace.

As an additional protection to the sides of the magazine I employ a protecting-plate 52, as illustrated in Fig. 7. It will be understood that one of these plates is provided at each side of the magazine and that the fuel comes in direct contact therewith instead of coming in contact with the sides of the magazine. The upper and lower edges of each plate 52 are offset and extended downwardly to bear against the sides of the magazine, as shown in Fig. 7, and air is admitted behind each protecting-plate 52 by means of the air-pipe 53, which communicates with an opening 54 near the bottom edge of the plate 52, the air after absorbing the heat escaping through one or more openings 55 near the top of the plate 52 and passing from thence in its heated condition through the grate 46. When the hollow cap-rail 31 is not used, the protecting-plate 52 may be extended to the top of the magazine or so as to terminate substantially in line with the horizontal plane of the inner edge of the grate, the protecting-plate 52 thus taking the place of the hollow cap-rail and performing the functions hereinabove ascribed to said cap-rail.

From the foregoing description it will be understood that the inflowing air not only furnishes the necessary oxygen to promote combustion and effectively consume the products or gases, but such air also serves to keep the magazine and the several parts thereof cool, thus adding greatly to the life of the apparatus as a whole. The device also acts as an air-purifier, carrying off all obnoxious odors, as every particle of fuel must pass along and over the uptake and be subjected to the current of air passing through the flue 28', and thus the upper stratum of fuel is coked to the proper depth before passing onto the grates at each side of the magazine. This coking action is added to by the arrangement of grate 26 at the rear portion of the magazine and the hollow cap-rails 32, extending along the upper edges of the sides of the



magazine. Actual test has demonstrated the fact that the stoker operates under a perfectly-natural draft, thus doing away with the necessity for fans and other blast devices for producing a forced draft.

I do not desire to be limited to the details of construction and arrangement hereinabove described, and accordingly reserve the right to make such changes in the form, proportion, and minor details of construction as properly fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, an air-flue located between the front and rear of the magazine and arranged to discharge into the fuel beneath the surface thereof.

2. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, an air-flue located between the front and rear ends of the magazine and receiving its supply through the floor of the magazine, said air-flue being arranged to discharge into the mass of fuel beneath the surface thereof.

3. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, a combined uptake and air-flue inclining upward from the bottom of the magazine and terminating beneath the plane of the normal level of fuel in the magazine.

4. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, an inclined uptake located between the front and rear ends of the furnace and provided with an air-flue leading through the floor of the magazine and upward to the extremity of the uptake, said uptake terminating at its upper end beneath the normal fuel-level.

5. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, an inclined uptake located between the front and rear ends of the magazine and inclosing an air-flue which is supplied from beneath the floor of the furnace and which discharges at the rear side of the uptake adjacent to the upper end thereof, the uptake being so arranged that the entire supply of fuel must pass therefrom and be subject to the current of air supplied by the fuel.

6. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, a combined uptake and air-flue inclining from the bottom of the magazine upward and inclosing an air-flue which discharges near the top and at the rear of the uptake, and a grate covering the discharge end of the flue.

7. In automatic stokers, the combination

with a magazine, and fuel-feeding mechanism, of an inclined uptake leading upward from the bottom of the magazine and terminating below the top of the magazine, said uptake being made hollow to form an air-flue leading to the upper edge of the uptake, and a substantially vertical grate covering the discharge end of the flue.

8. In an underfed mechanical stoker in which the fuel is supplied to a magazine extending longitudinally across the furnace, a combined uptake and air-flue inclining from the bottom of the magazine upward and terminating beneath the normal level of fuel, and a regulating-damper controlling the air-flue.

9. In automatic stokers, the combination with a magazine, and fuel-feeding mechanism, of a hollow cap-rail extending along the top edge of the magazine and having its inner wall extended downward into the magazine and convergently related to the side wall of the magazine to which it is secured, and means for conducting air to and discharging the same from the cap-rail.

10. In automatic stokers, the combination with a magazine, and fuel-feeding mechanism, of a perforated hollow cap-rail extending along the top edge of the magazine and having the inner side wall thereof beveled and held against the inner surface of the side of the magazine, and means for supplying air to the interior of the cap-rail.

11. In automatic stokers, the combination with a magazine, of an oscillatory conveyer operating through an opening in the bottom of the magazine and provided with a concentric surface, and a follower bearing with a yielding pressure against the concentric surface of the conveyer, substantially as described.

12. In an automatic stoker, the combination with a magazine and an oscillatory rocker or conveyer operating through an opening in the bottom of the magazine and provided with a concentric surface, of a spring-pressed follower arranged beneath the magazine and bearing against the concentric surface of the conveyer, substantially as described.

13. In an automatic stoker, the combination with a magazine, and an oscillatory rocker or conveyer operating through an opening in the bottom of the magazine and provided with concentric surfaces, of followers bearing with a yielding pressure against the concentric surfaces of the conveyer, substantially as described.

14. In an automatic stoker, the combination with a magazine, and fuel-feeding mechanism mounted therein, of one or more imperforate protecting-plates secured to the inner surfaces of the side walls of the magazine and offset from the side walls to leave an intervening air space or spaces, substantially as described.

15. In an automatic stoker, the combina-



tion with a magazine and fuel-feeding mechanism therein, of one or more protecting-plates arranged at the sides of the magazine and offset inwardly therefrom to leave an air  
5 space or spaces, the side walls of the magazine being provided with air inlet and escape openings, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN PARKER LUCKETT.

Witnesses:

R. R. WARE,  
E. L. WOODSIDE.