

(No Model.)

3 Sheets—Sheet 1.

S. T. & C. H. WELLMAN.
FURNACE CHARGING APPARATUS.

No. 569,075.

Patented Oct. 6, 1896.

FIG. 1.

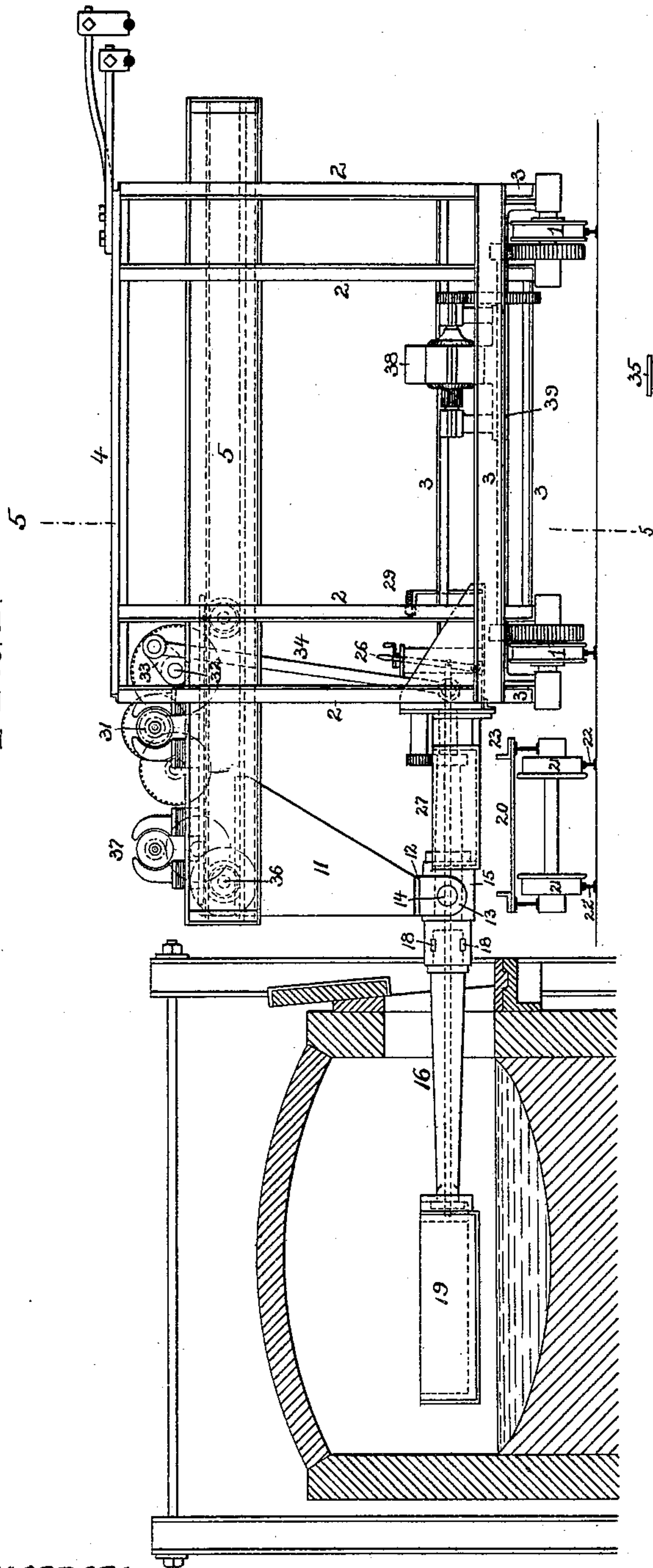
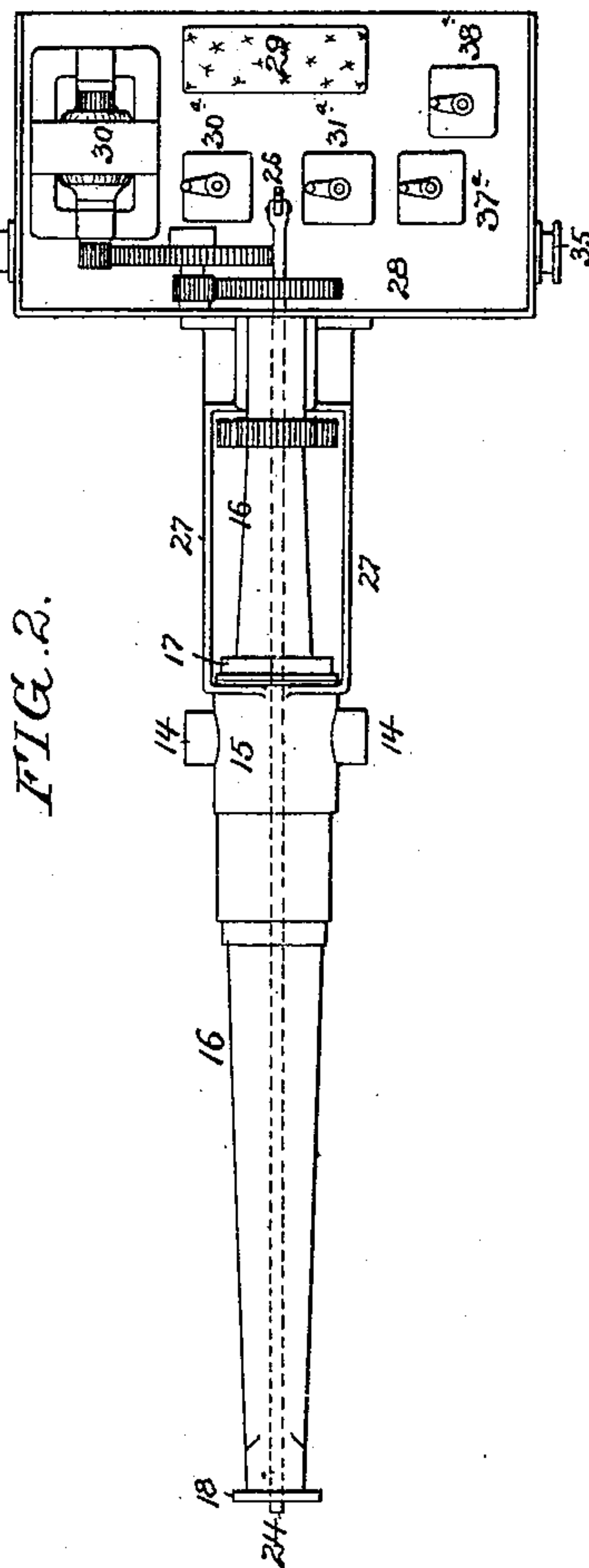


FIG. 2.



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Will. A. Bar.

Chas. De Bow

Inventors:
Samuel T. Wellman
and
Charles H. Wellman
by their Attorneys

Howson & Howson

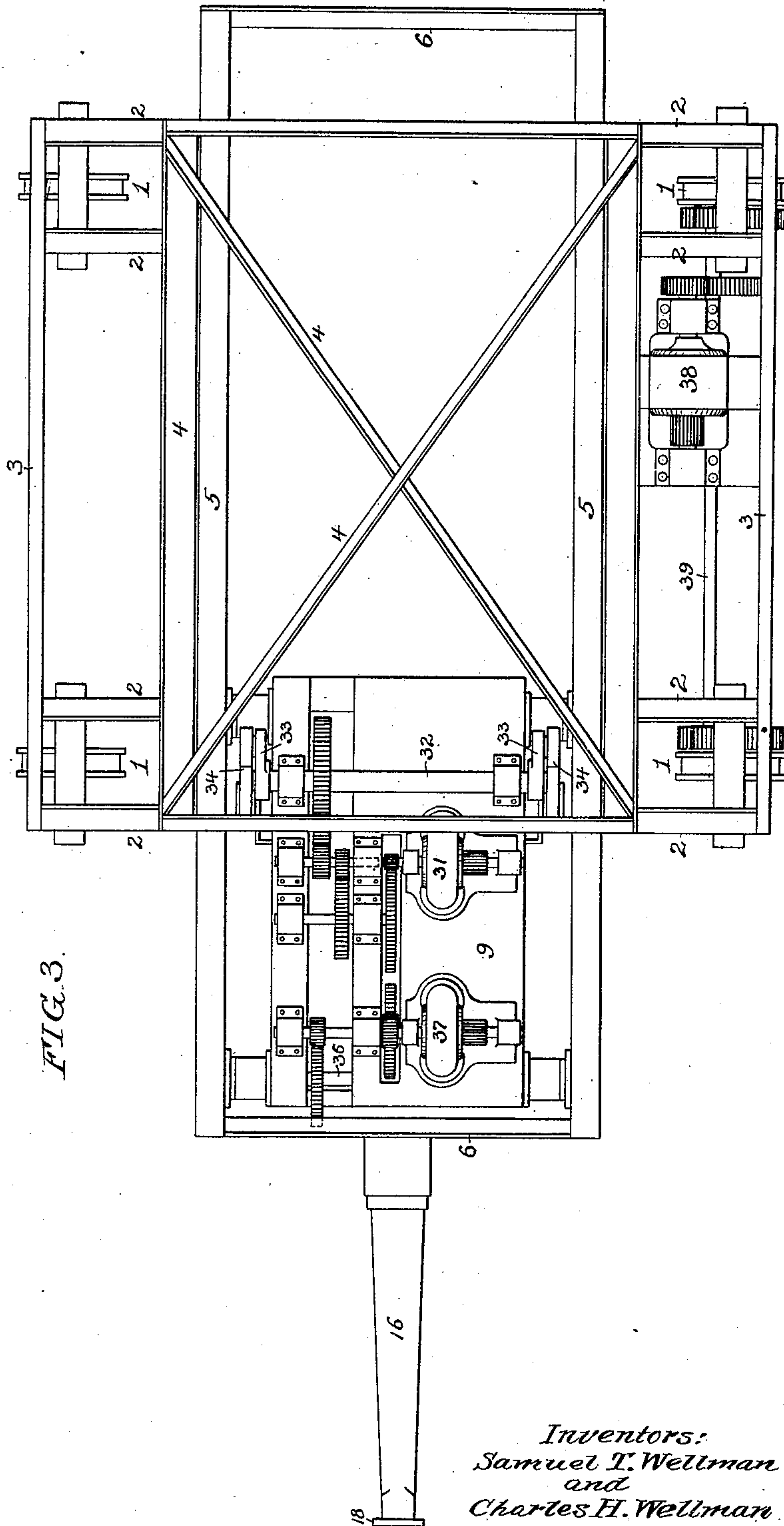
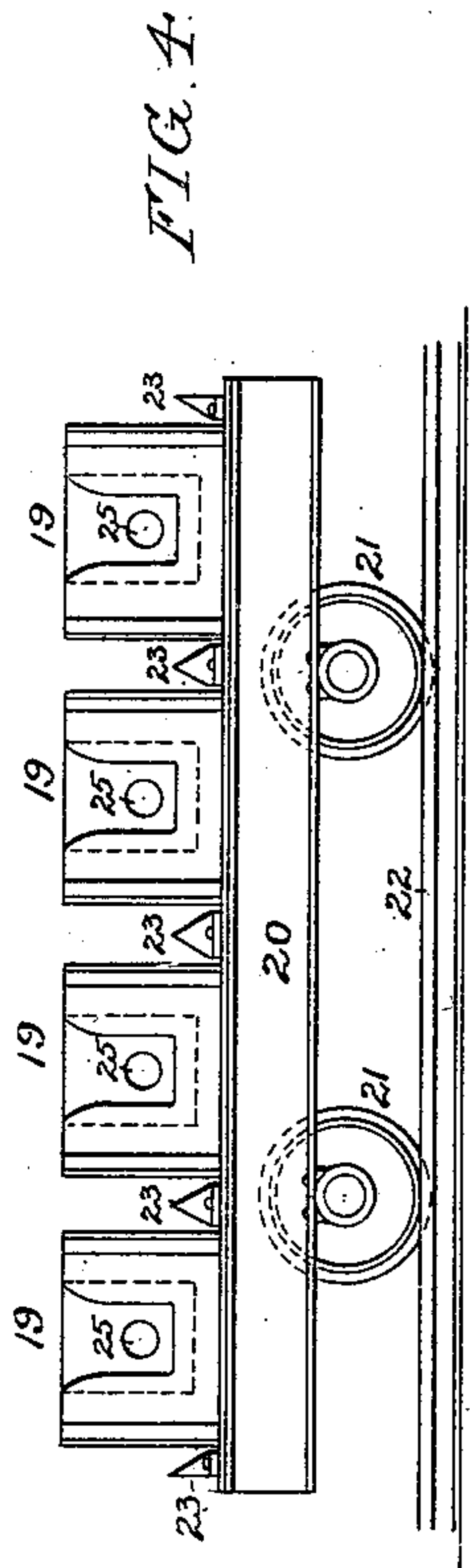
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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FIG. 5.

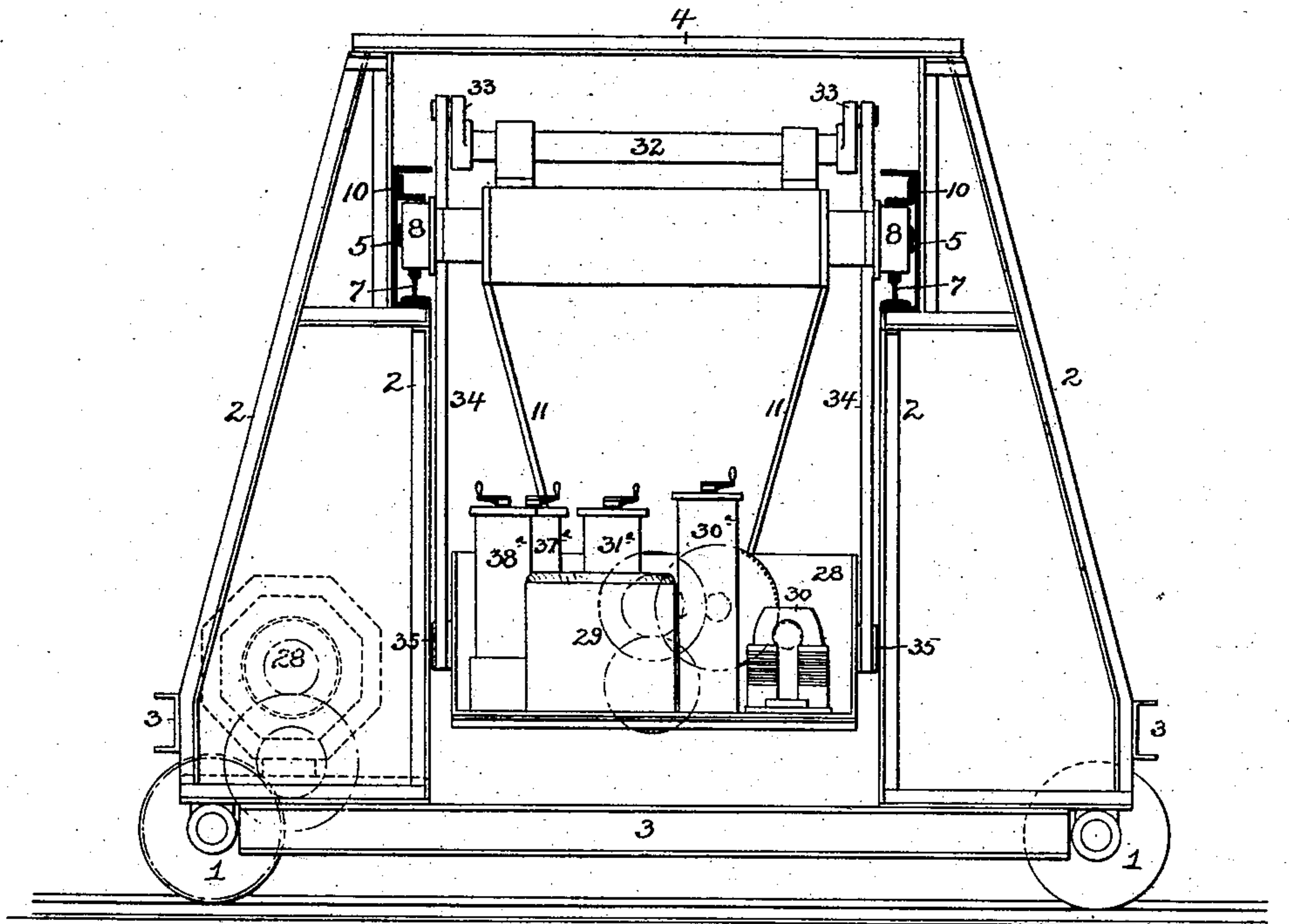


FIG. 7

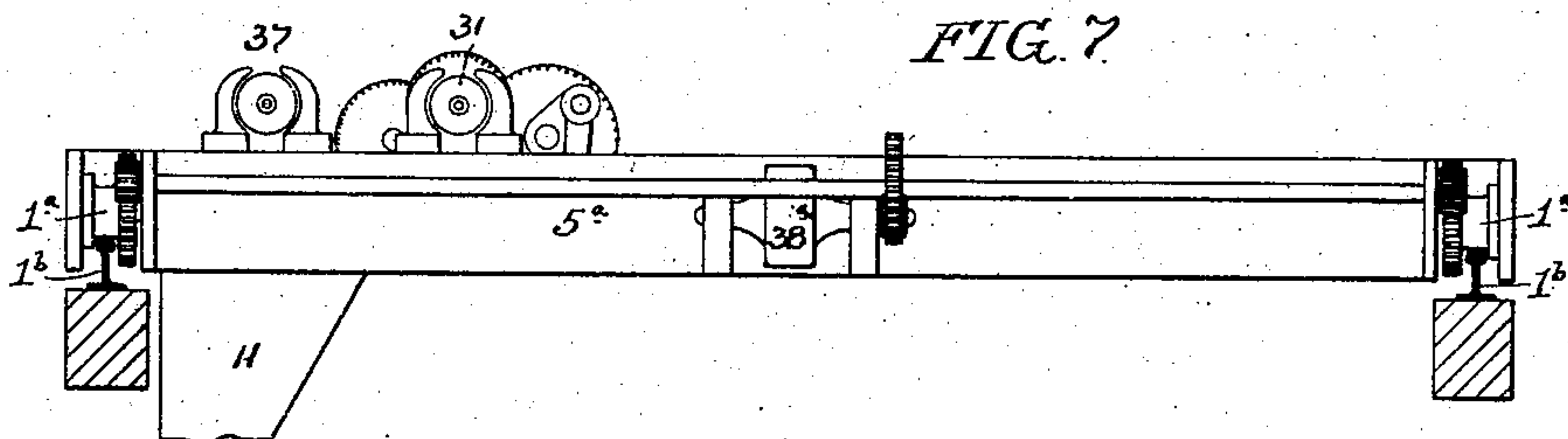
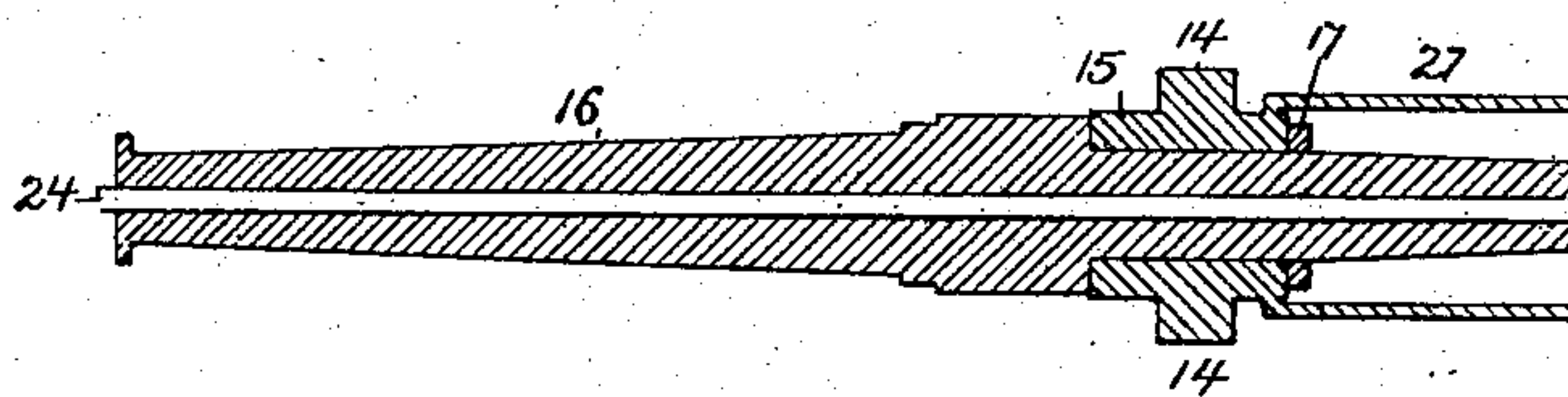


FIG. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF UPLAND, PENNSYLVANIA, AND CHARLES H. WELLMAN, OF SOUTH CHICAGO, ILLINOIS.

FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 569,075, dated October 6, 1896.

Application filed January 28, 1896. Serial No. 577,159. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL T. WELLMAN, of Upland, Delaware county, Pennsylvania, and CHARLES H. WELLMAN, of South Chicago, Illinois, citizens of the United States, have invented certain Improvements in Furnace-Charging Apparatus, of which the following is a specification.

The object of our invention is to construct furnace-charging apparatus capable of being operated by an electric current and adapted to quickly deposit a charge in a furnace, or to charge in succession a row of furnaces, by picking up from a suitable truck a loaded charging-box, thrusting the same into the furnace, dumping the load, withdrawing the box, replacing it upon the truck, and repeating these operations indefinitely.

The invention comprises a pivoted charging-bar mounted so as to be moved into and out of the furnace and capable of swinging on its pivot-trunnions so that its front end can be raised and lowered.

The invention also comprises a charging-bar mounted so as to be moved into and out of the furnace and capable of turning or partially turning around its longitudinal axis.

In the preferable form of our improved charging apparatus the charging-bar is carried by a truck which is mounted so as to be moved to and fro upon an elevated girder, the latter, when the charging device is intended for operation in connection with a row of furnaces, being mounted upon suitable rails extending longitudinally along said row of furnaces or upon a carriage adapted to said rails.

The charging-truck has a depending frame in which is trunnioned the charging-bar, the latter carrying also the operator's cab, the mechanism for tilting and rotating the charging-bar, and the various current-controlling devices.

The charging-bar has at its forward end means whereby it can be caused to engage with and can be locked to the charging-box, and the rear end of the charging-bar structure is connected to a crank, so that by the rotation of the latter the charging-bar can be

swung upon its trunnions and the forward end of the bar thus raised and lowered. 50

Having thus set forth the general features of the apparatus, we will now proceed to describe the same more in detail, referring to the accompanying drawings, in which— 55

Figure 1 represents a side view of furnace-charging apparatus constructed in accordance with our invention, this view showing also a transverse section of a melting-furnace with the charging-bar and its charge-box inserted thereinto. Fig. 2 is a top or plan view of the charging-bar and its appurtenances. Fig. 3 is a top or plan view of the entire charging apparatus. Fig. 4 is a front view of a feed-truck with a series of charge-boxes mounted thereon. Fig. 5 is a transverse section on the line 5 5, Fig. 1, with the motors and gearing of the charger-truck omitted to avoid confusion. Fig. 6 is a view, partly in section and partly in elevation, of the charging-bar and its trunnion-sleeve; and Fig. 7 is a side view illustrating a modified form of support for the girder which carries the charging device. 60 65 70

To suitable rails laid upon the floor in front of the furnace or row of furnaces are adapted flanged wheels 1, having journals which turn in suitable bearings upon the main carriage, the latter comprising suitable vertical trusses 2, properly connected and steadied by means of brace-bars 3 at the bottom and by bars 4 at the top. Upon these vertical trusses is supported a rectangular girder comprising opposite channel-bars 5 and end bars 6, the lower flanges of said channel-bars 5 having rails 7, upon which are adapted to run the wheels 8 of the charger-truck 9, suitable angle-bars 10, secured to the bars 5, serving as guard-rails to prevent the tipping of this truck by the rise of the rear end of the same. 75 80 85 90

Depending from the forward portion of the truck 9 are bars or plates 11, connected at the bottom by a plate 12 with depending flanges 13, and to openings in these flanges are adapted trunnions 14, projecting from the opposite sides of a sleeve 15, through which passes a reduced portion of the charging-bar 16, the latter being longitudinally confined to the 95

sleeve 15 by means of a collar 17, as shown in Fig. 6.

The charging-bar projects both forwardly and rearwardly from the trunnioned sleeve 15, the forward end of the charging-bar being detachable and being secured in position by suitable transverse keys 18', so that it can be readily replaced when it becomes so injured by heat as to be unserviceable.

The forward end of the charging-bar 16 has a flange 18, which is adapted to engage with a socket formed upon one end of each of the charging-boxes 19, as shown in Fig. 4, the upper end or mouth of each socket being flared or widened, so as to facilitate the entrance of the flanged front end of the charging-bar thereinto.

The series of charging-boxes are mounted upon a feed-truck 20, having wheels 21 adapted to run upon rails 22 directly in front of the furnace or row of furnaces, said truck 20 having suitable beveled gages or separators 23, which serve to direct the charging-boxes into proper position as said boxes are lowered onto the truck.

The charging-bar is free to turn in the trunnioned sleeve 15, and the flanged front end of the bar is of rectangular or other equivalent shape, so that when the bar is turned on its axis the charging-box, with which the flanged front end of the charging-bar engages, will be caused to turn with it, and in order to lock the charging-box to the front end of the charging-bar the latter is hollow from end to end for the reception of a locking-bolt 24, which is adapted to enter an opening 25 in the charging-box, the rear end of said locking-bolt projecting from the charging-bar and being connected to a lever 26, whereby it can be readily projected or retracted. The rear end of the charging-bar turns in a bearing formed on a box-like structure 27, projecting rearwardly from the sleeve 15, and this structure also carries the cab 28, which is provided with a seat 29 for the attendant of the machine and also with an electric motor 30 and various current-controlling switches, referred to hereinafter.

The motor 30 is geared by a train of reducing-gears to the rear portion of the charging-bar 16, so as to effect the turning of said charging-bar 16 around its axis when desired.

Mounted upon the charger-truck 9 is an electric motor 31, which, by means of a suitable train of reducing-gears, drives a crank-shaft 32, the latter having at each end a crank 33, which is connected by a rod 34 to a projecting pin or stud 35 on the cab structure 28. Hence when the shaft is rotated the charging-bar 16 will be caused to rock upon the trunnions 14, and the forward end of said charging-bar will be raised or lowered. The forward wheels 8 of the truck 9 are secured to a shaft 36, which is driven by an appropriate train of reducing-gears from an electric motor 37 on said truck 9, and a motor 38 on the

main carriage drives, by means of a suitable train of reducing-gears, a shaft 39, which in turn is geared to the shafts of two of the supporting-wheels 1 of said main carriage.

The current-supplying wires are suitably mounted adjacent to the main carriage of the machine and parallel with the line of movement of the same, and the said carriage has suitable contact devices for engagement with said wires, the current being conveyed to the different motors by means of connections of ordinary character, which it has not been deemed necessary to show or describe further than by saying that they are carried through current-controlling switch-boxes on the cab 28, there being one of these switch-boxes for each motor, and the boxes being numbered 30^a, 31^a, 37^a, and 38^a to correspond with the different motors.

Having thus described the detailed construction of our machine, we will now describe the operation of the same.

The charger-truck 9 is first retracted to the rear end of the elevated girder and the forward end of the charging-bar 16 is raised by turning the cranks 33 to their lowermost position. The feed-truck containing a series of charging-boxes is then run in front of the furnace, so that the socket of the first box of the series is directly under the flanged forward end of the charging-bar. The cranks 33 are then turned to their uppermost position so as to cause the flanged front end of the charging-bar to descend into the socket of the first charging-box to which it is locked by projecting the bolt 24. The cranks 33 are then again turned to such an extent as to lift the loaded charging-box from the feed-truck and bring the same into position to be thrust through the feed-door of the furnace. The door being then raised, the truck 9 is moved forward on the elevated girder, so as to carry the loaded charging-box into the furnace, and said bar is then caused to turn around its axis by means of the motor 30, so as to reverse the charging-box and dump its load into the furnace, whereupon the movement of the charging-bar is immediately reversed or continued for a full turn in order to restore the charging-box to its normal condition, whereupon the carriage 9 is moved rearward on the elevated girder until the charging-box is restored to a position above the feed-truck 20, the cranks 33 being then turned so as to lower the front end of the charging-bar until the box again rests on the feed-truck, whereupon the locking-bolt 24 is withdrawn, the cranks 33 are further turned so as to withdraw the flanged front end of the charging-bar from the socket of the charging-box, and the feed-truck is moved forward, so as to bring another charging-box into position beneath the front end of the charging-bar prior to a repetition of the above-described operations.

By mounting the charging-bar upon trun-

nions on a depending portion of the charger-truck not only is facility afforded for readily raising and lowering the forward end of the charging-bar, but the weight of the attendant and of the various appurtenances contained in the cab can be utilized to counterbalance or partially counterbalance the weight of the charging-box and its load, and by the employment of the crank as a means of effecting the raising and lowering of the end of the charging-bar excessive rising or falling movement of said charging-bar is rendered impossible, and accident due to the overrunning of the motor or to failure to stop the movement of the charging-bar at the exact point required is effectually prevented.

It will be observed that the forward end of the elevated girder of the apparatus overhangs the feed-truck 20, thereby reducing the lateral dimensions of the supporting structure to that extent and permitting the trunnions of the charging-bar to approach closely to the charging-doorway of the furnace, so that the extent of swinging movement of the bar in said doorway is comparatively slight and the use of large doorways rendered unnecessary. The whole apparatus, moreover, is of an extremely compact character, and all of the various motors are within easy and direct control of the attendant in the cab, so that the desired end, namely, the quick and accurate handling of the successive charges, is perfectly attained.

Where the character of the furnace admits of it, the main supporting-carriage which we have illustrated and described may be dispensed with and the elevated girder may be mounted directly upon rails suitably supported upon elevated longitudinal beams or girders in the mill, such construction being shown, for instance, in Fig. 7, where the girder is represented as mounted upon wheels 1^a, running upon the elevated tracks 1^b, these wheels being driven by a suitable train of reducing-gears from a motor 38^b, mounted directly upon the elevated girder.

We have set forth an organized apparatus embodying our invention in one of its preferred forms, but modifications in the various details of the apparatus will suggest themselves to those skilled in the art, and such modifications may be made without departing from the essential features of our invention.

That which we claim, and desire to secure by Letters Patent, is—

1. Furnace-charging apparatus in which are combined a frame mounted so as to be movable toward and from the front of the furnace, a charging-bar trunnioned on said frame, a cranked shaft mounted on the upper portion of the frame and connected by side rods to the charging-bar, and means for imparting movement to said shaft so as to cause the rocking of the charging-bar on its trunnions.

2. Furnace-charging apparatus in which

are combined a truck mounted so as to be movable toward and from the front of the furnace, a frame carried by said truck, a charging-bar trunnioned on said frame, a cranked shaft connected to the charging-bar, an electric motor connected by means of reducing-gears to the truck-wheels, and an electric motor connected by a train of reducing-gears to the crank-shaft which rocks the charging-bar.

3. Furnace-charging apparatus in which are combined a charging-bar mounted so as to be movable into and out of the furnace, and having horizontal trunnions, said bar being free to turn axially in the trunnioned portion, and an electric motor carried by the trunnioned portion of the charging-bar and connected by a train of reducing-gears to the axially-rotative part of the same.

4. Furnace-charging apparatus in which are combined a girder mounted so as to be movable across the front of the furnace, an electric motor and reducing-gears whereby such movement is effected, a truck movable to and fro on the girder in a direction at right angles to the girder movement, an electric motor and reducing-gears whereby the movement of said truck is effected, a frame carried by said truck, a charging-bar horizontally trunnioned on said frame but free to turn axially in the trunnioned portion, an electric motor and devices operated thereby whereby the rocking of the charging-bar on its trunnions is effected, and an electric motor mounted on the charging-bar and connected by a train of reducing-gears to the axially-rotative portion of the same.

5. Furnace-charging apparatus in which are combined a frame mounted so as to be movable toward and from the front of the furnace, a charging-bar trunnioned on said frame, and extending rearwardly therefrom, and a controlling-cab and its appurtenances mounted upon the rear end of the bar.

6. Furnace-charging apparatus in which are combined a carriage mounted on rails in front of the furnace, feed-truck rails interposed between said main rails and the front of the furnace, an elevated girder supported on the main carriage and overhanging the feed-truck rails, a frame mounted on said elevated girder and free to move to and fro thereon, and a charging-bar carried by said frame.

7. Furnace-charging apparatus in which are combined a girder mounted so as to be movable across the front of the furnace or furnaces, a truck mounted on said girder so as to be movable to and fro thereon in a direction at right angles to the girder movement, a frame carried by said truck, a charging-bar horizontally trunnioned on said frame and free to turn in the trunnioned portion, a cab mounted upon said charging-bar, electric motors for effecting the movement of the girder and its truck and for causing the swing-

ing and turning of the charging-bar, and motor-controlling switches carried by the cab.

8. In a furnace-charging apparatus, the combination with a charging-box having a
5 socket thereon, of a charging-bar having a flanged forward end for engaging with the socket on the box, and a longitudinal bolt passing through the charging-bar and adapted to engage with the charging-box so as to pre-
10 vent the withdrawal of the flanged head of the bar from the socket, substantially as described.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

SAMUEL T. WELLMAN.

CHARLES H. WELLMAN.

Witnesses to the signature of Samuel T. Wellman:

FRANK E. BECHTOLD,

WILL. A. BARR.

Witnesses to the signature of Charles H. Wellman:

JOHN L. WHITEHEAD,

CHRISTIAN HINRICHS.