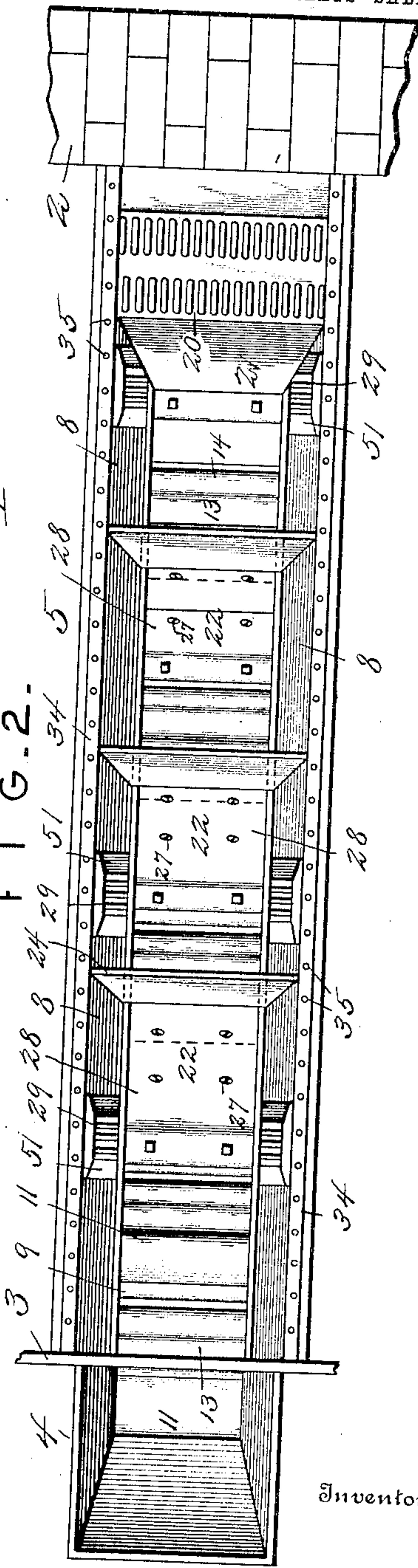
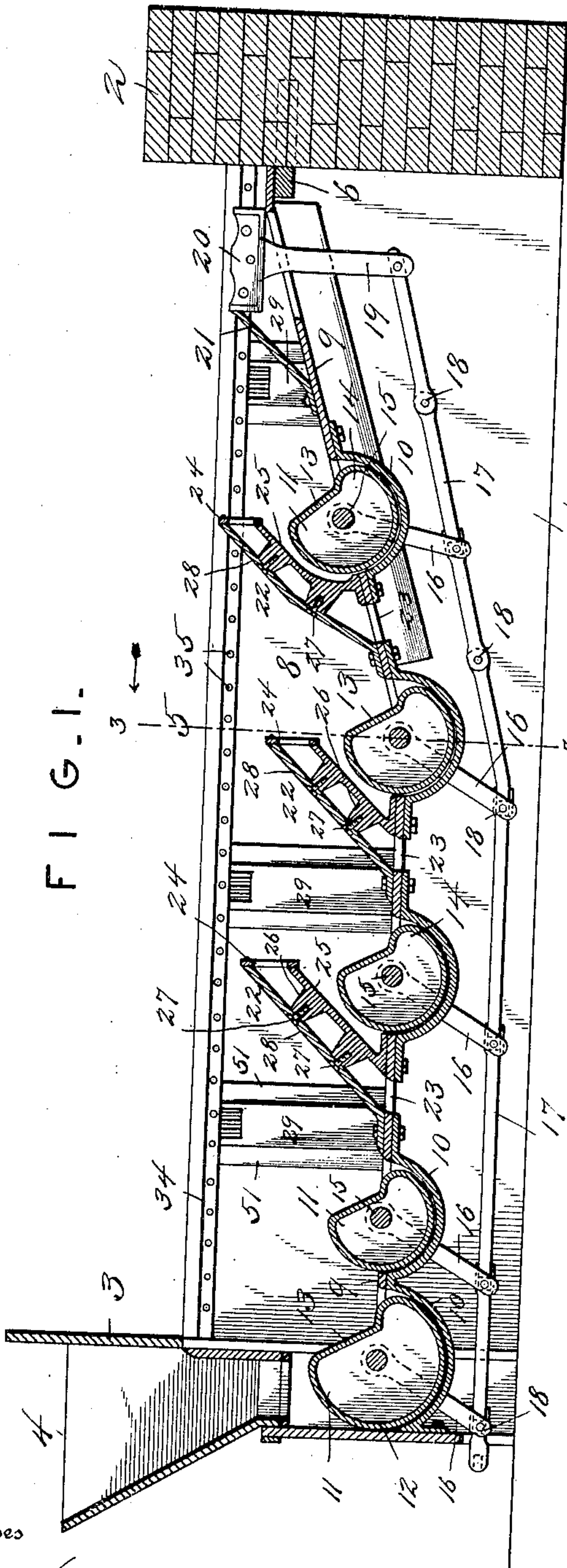


No. 837,858.

PATENTED DEC. 4, 1906.

J. P. LUCKETT.
AUTOMATIC STOKER.
APPLICATION FILED NOV. 15, 1902.

3 SHEETS—SHEET 1.



Witnesses

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3 SHEETS—SHEET 2.

FIG. 3.

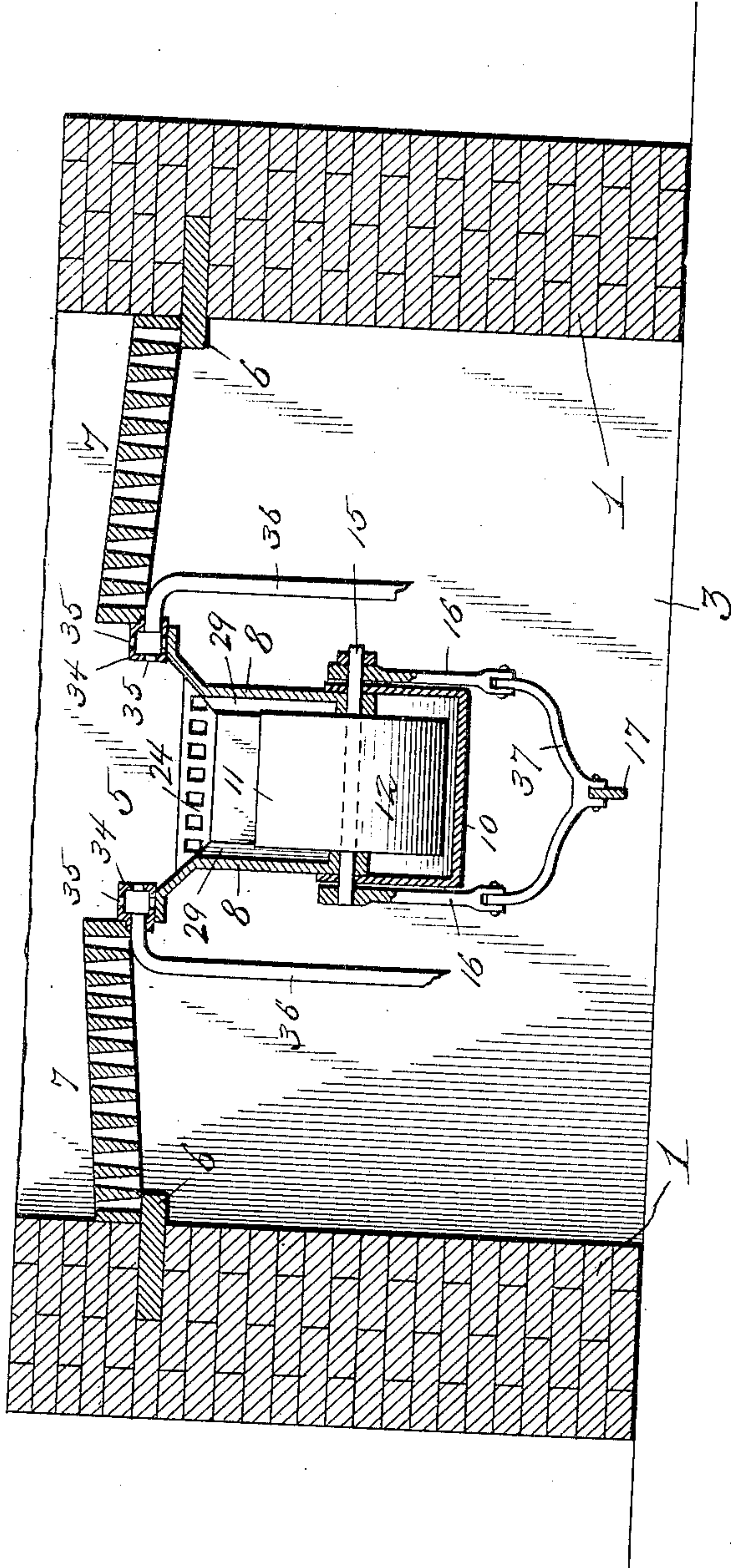


FIG. 5.

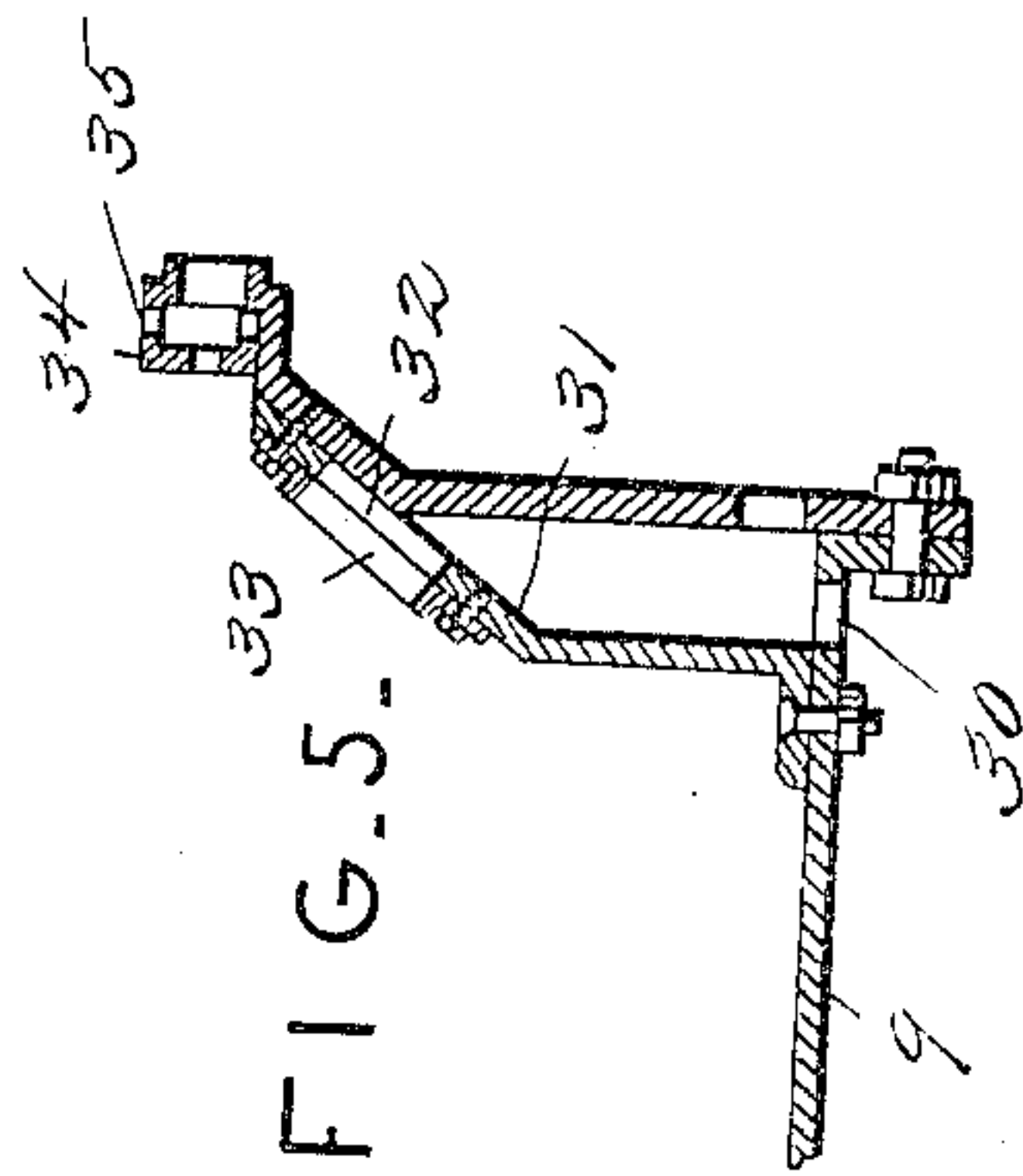


FIG. 10.

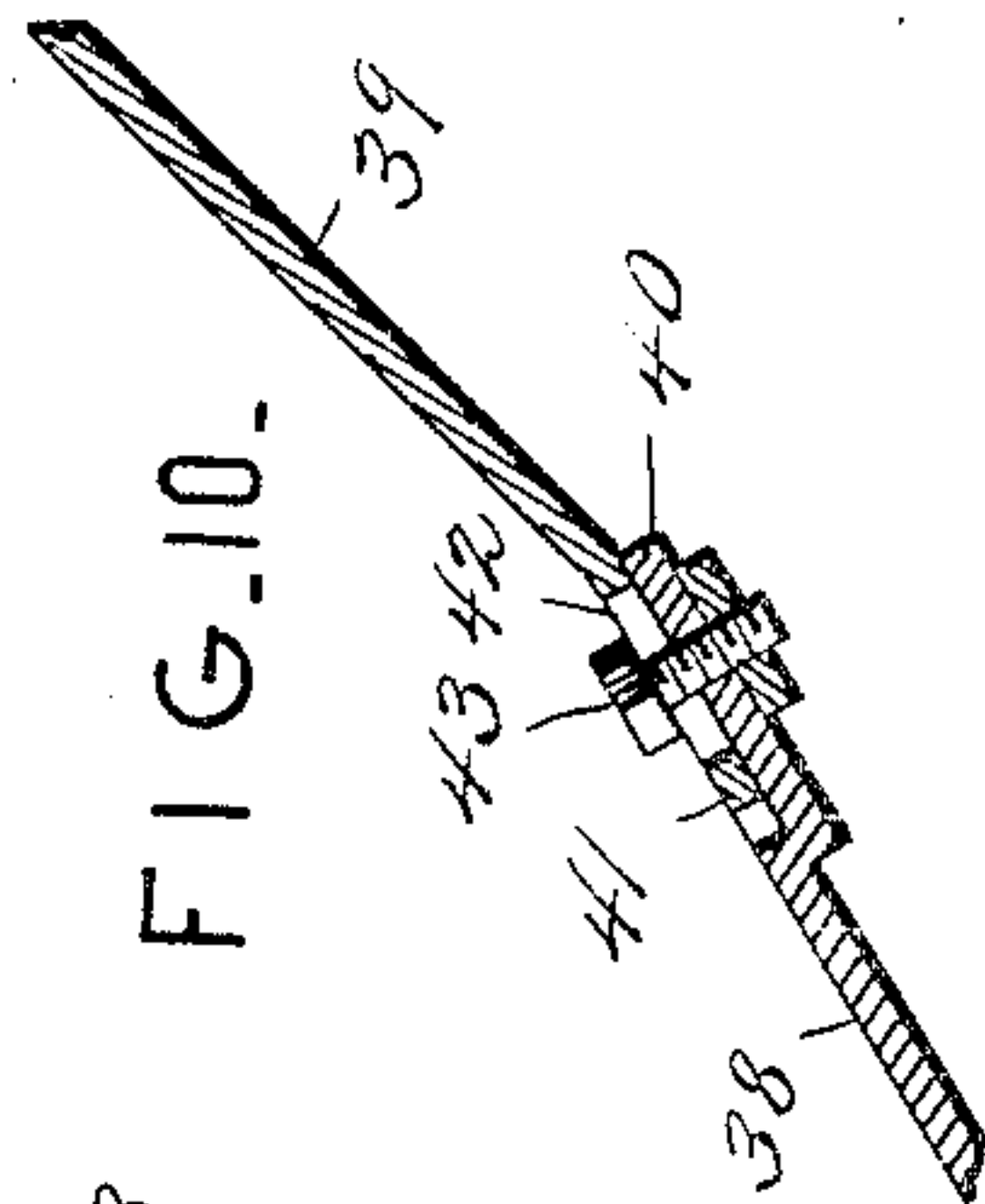
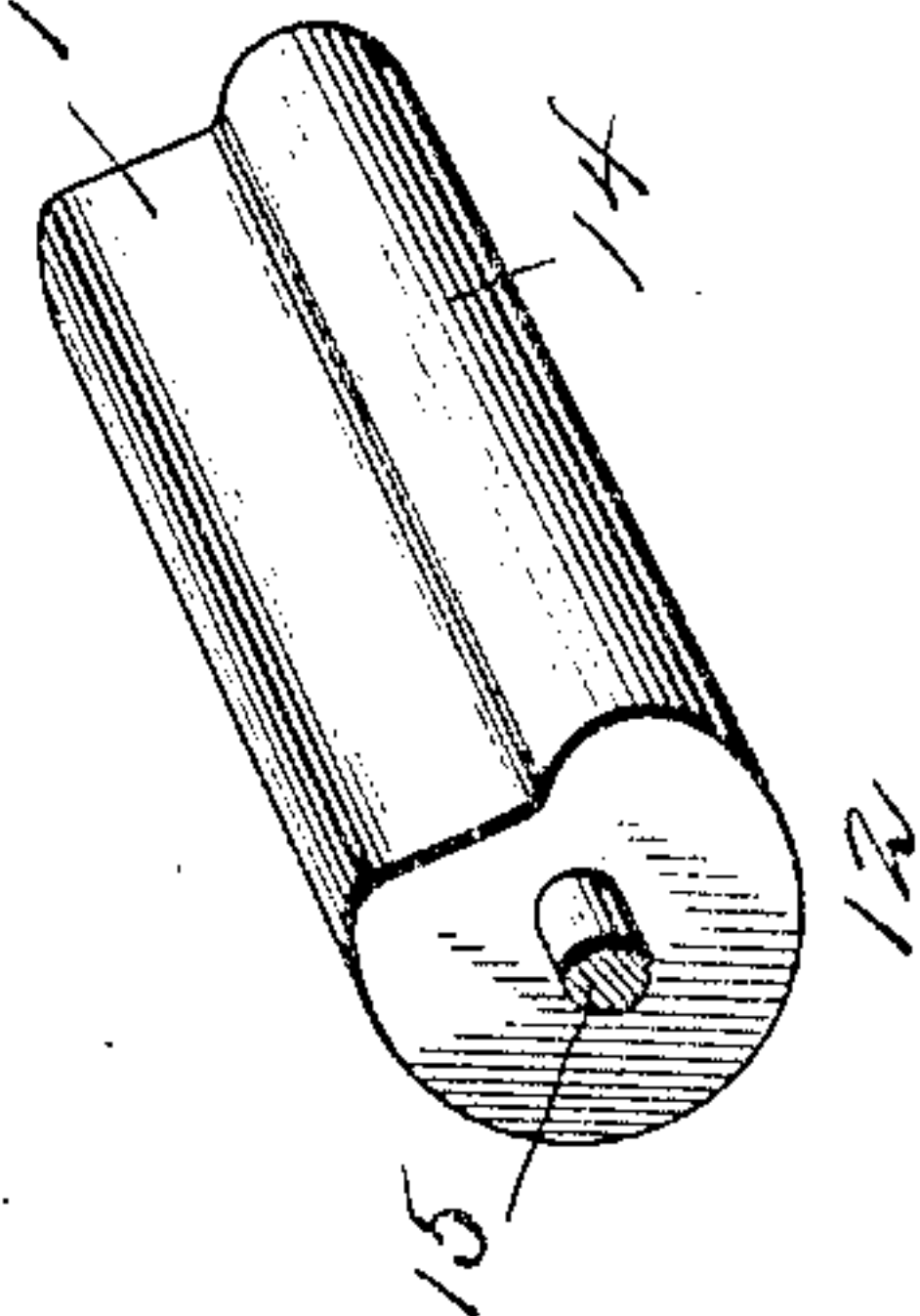


FIG. 4.



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3 SHEETS—SHEET 3.

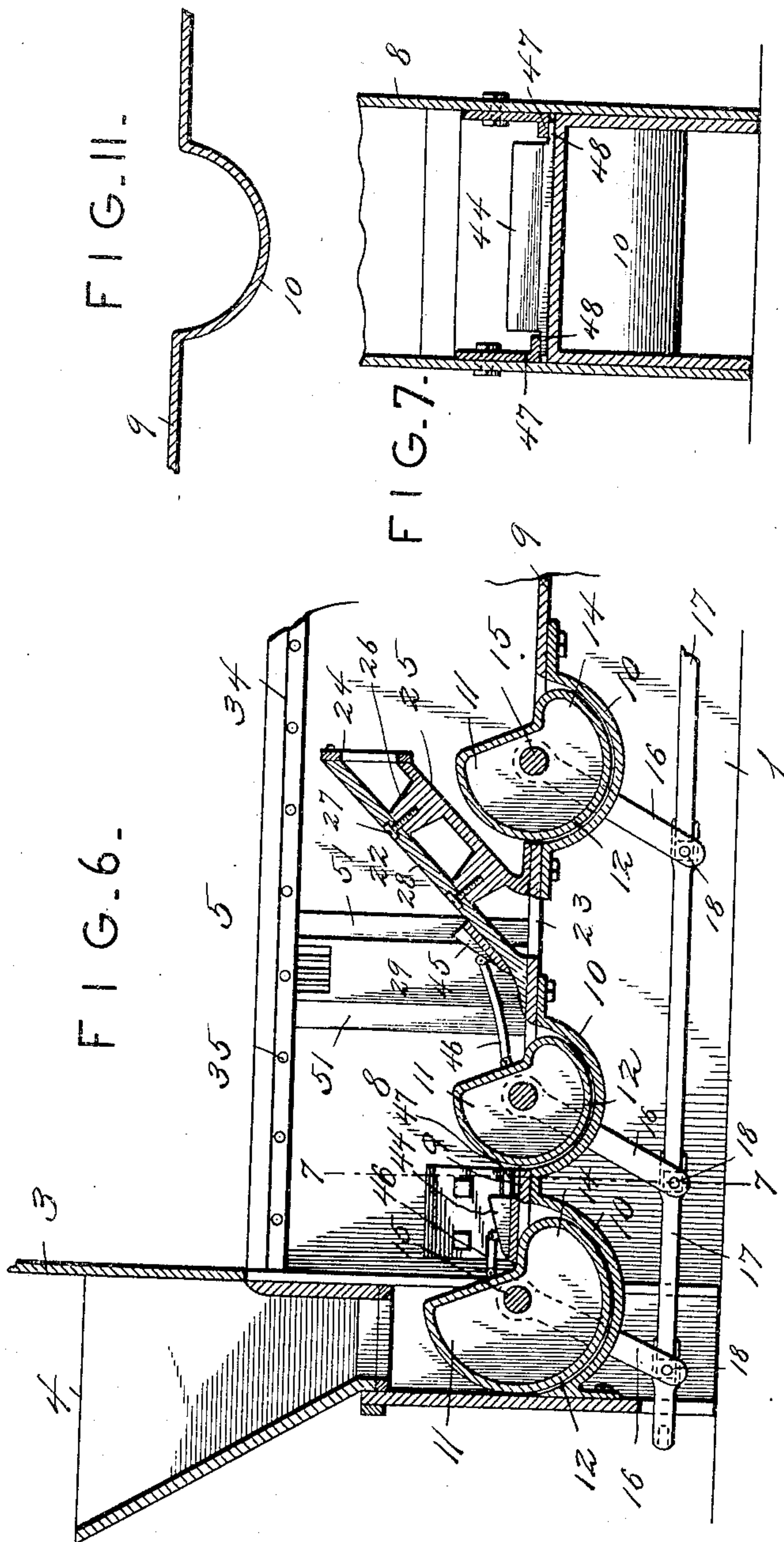


FIG. 6.

FIG. 7.

FIG. 11.

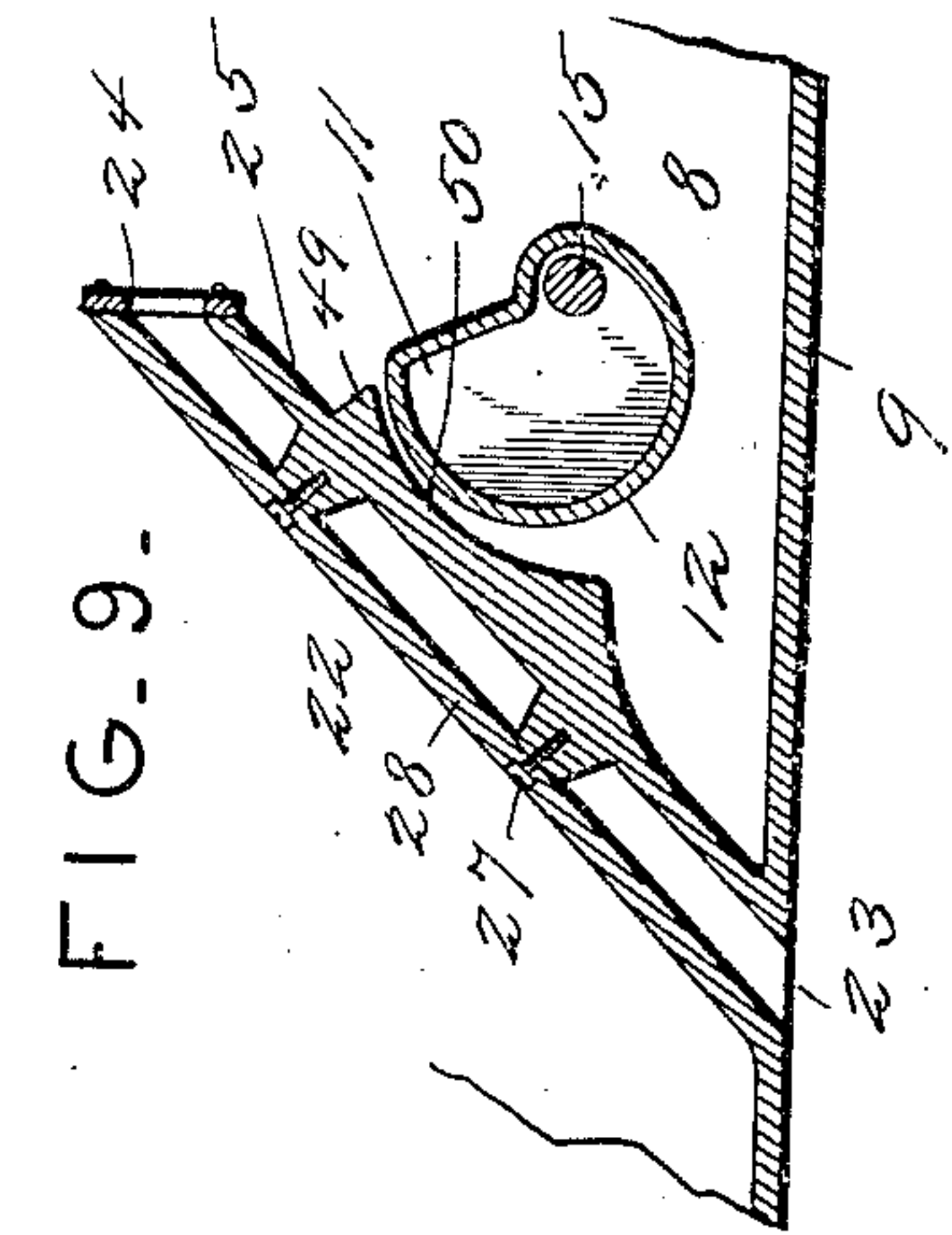


FIG. 9.

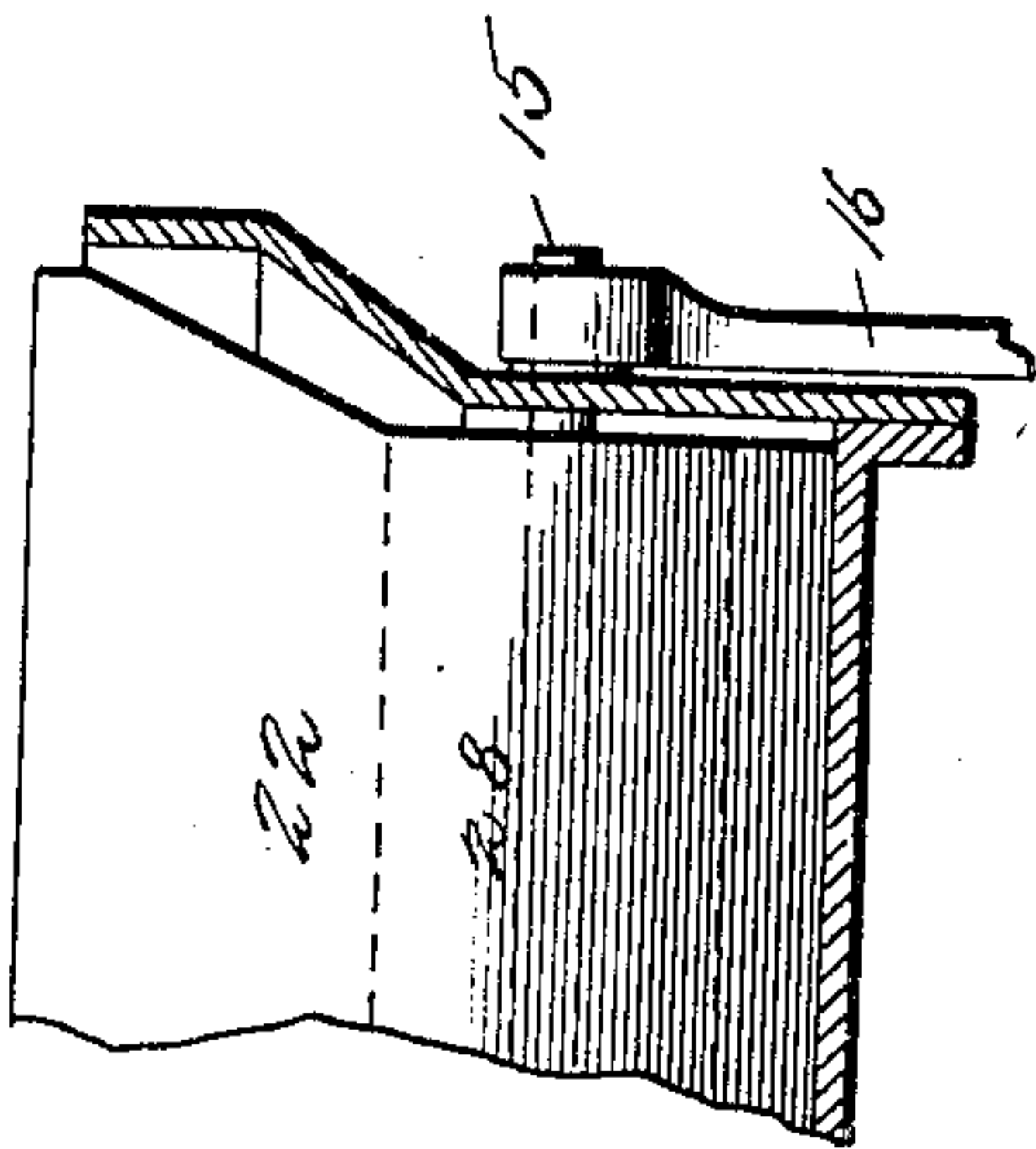


FIG. 8.

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UNITED STATES PATENT OFFICE.

JOHN PARKER LUCKETT, OF BALTIMORE, MARYLAND.

AUTOMATIC STOKER.

No. 837,858.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed November 15, 1902. Serial No. 131,507.

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.

This invention relates to automatic stokers, the object being to provide mechanical means whereby fuel is fed from a hopper through the magazine and distributed along the surface of the grate or grates located contiguous to the magazine.

One of the principal objects of the present invention is to provide an automatic or mechanical stoker which will operate successfully without resorting to forced draft, the space occupied by the magazine and fuel-feeding mechanism being abundantly compensated for, so that the natural draft of the furnace is not in any way impaired by the presence of such magazine and fuel-feeding devices. While the stoker hereinafter described is especially designed with reference to obtaining natural draft, it is to be understood that, should the exigencies of the case require, any suitable forced-draft appliances may be associated with the stoker without departing from the principle or sacrificing any of the advantages of the present invention.

A further object of the present invention is to improve the construction of the fuel-feeding mechanism, and particularly the magazine, whereby the oscillatory rockers or conveyers are housed entirely within the magazine and all leakage of fuel through the bottom or floor of the magazine entirely overcome, the invention in this respect forming a modification of and improvement upon the construction illustrated, described, and claimed in my Patent No. 721,586, dated February 24, 1903, for an automatic stoker.

In addition to the combined uptakes and air-conduits described in my said other application the present invention contemplates the use of series of side air-conduits which extend upward along the sides of the magazine and within the same and conduct the air in any desired quantity from the ash-pit or space beneath the magazine and grate upward to points adjacent to the upper level of the magazine, where such air is discharged

into the fuel just before it overflows upon the grate.

This invention also contemplates the use, in connection with oscillatory rockers or conveyers, of pushers or rams adapted to operate adjacent to the floor of the magazine and the uptakes to further assist in advancing the fuel along the magazine and in discharging the fuel upon the grate.

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 central vertical longitudinal section through a magazine, illustrating the construction and arrangement of the fuel-feeding mechanism. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged vertical cross-section through the magazine and furnace on the line 3 3 of Fig. 1, showing a modified arrangement of operating mechanism. Fig. 4 is a detail perspective view of one of the oscillatory rockers or conveyers. Fig. 5 is a detail section showing the construction and arrangement of one of the vertical air-conduits. Fig. 6 is a central vertical longitudinal section similar to Fig. 1, showing a slight modification in the fuel-feeding mechanism. Fig. 7 is a vertical cross-sectional view of the same on the line 7 7 of Fig. 6. Figs. 8 and 9 are respectively detail cross and longitudinal sections illustrating a modified arrangement of rocker or conveyer and magazine. Fig. 10 is a detail section illustrating the manner of lengthening and shortening the combined uptake and air-conduits. Fig. 11 is a detail vertical longitudinal section showing the manner of forming one of the semicylindrical cups or pockets integrally with the floor of the magazine.

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

In the accompanying drawings the automatic stoker contemplated in this invention is shown applied to a fire-box of an ordinary horizontal boiler, the fire-box being comprised between the side walls 1, the rear end wall 2, and the front wall 3, the walls 1 and 2 being shown as composed of masonry, while the front wall 3 is shown as consisting of a

metal plate, outside of which and in front of the furnace is arranged a hopper 4 to receive the supply of fuel. The magazine 5 is supported upon suitable ledges 6, preferably set in the masonry or walls of the fire-box, said ledges also forming supports for the grate-sections 7, which preferably incline downward from their inner adjacent edges toward their outer edges, as shown in Fig. 3, so as to secure a proper distribution of the fuel as it overflows thereon from the magazine.

The magazine comprises the side walls 8 and a floor or bottom 9, the forward portion of which is substantially horizontal, as shown in Fig. 1, and the rear portion of which is inclined upward toward the dead-grate, as shown. The floor 9 of the magazine is provided at suitable intervals with semicylindrical cups or pockets 10, which project below the normal level of the floor and which may be either formed separately from the floor and bolted, riveted, or otherwise secured thereto, as shown in Fig. 1, or formed integrally therewith, as illustrated in Fig. 11. The floor or bottom 9 is cut away in line with and above each of the cups or pockets 10, so as to receive and admit of the rocking movement of a series of oscillatory conveyers or rockers 11. Each rocker or conveyer 11 comprises a cylindrical surface 12 coaxial with its shaft, a fuel-pushing surface or shoulder 13, disposed somewhat tangentially with respect to the axis of movement of the rocker, and a comparatively small rounded surface or shoulder 14 eccentric with respect to the shaft, which is offset from the bottom of the fuel-pushing surface or shoulder 13. For the sake of cheapness and lightness each of the rockers or conveyers 11 is made hollow, as shown in Fig. 11, and is mounted upon a shaft 15, which extends beyond the ends of the rocker and is journaled in the side walls 8 of the magazine, as shown in Fig. 3. If desired, the axle 15 may be composed simply of trunnions projecting from the ends of the rocker instead of passing the shaft entirely through the rocker.

The shaft 15 of each rocker is provided at one or each end with a lever-arm 16, and all of the lever-arms of the several rockers or conveyers are pivotally connected with a common connecting-rod 17, as shown in Fig. 1, whereby all of the rockers may be simultaneously oscillated for the purpose of feeding the fuel at various points along the bottom of the magazine. Wherever necessary, the connecting-rod 17 is jointed, as shown at 18, to enable the same to operate easily and without binding. The connecting-rod 17 is also operatively connected with the pendent lever-arm 19 of the dead-grate 20, which is mounted to oscillate at the rear end of the magazine, as shown in Figs. 1 and 2. An uptake consisting of an inclined plate 21 ex-

tends from the floor of the magazine upward to a point adjacent to the dead-grate 20, so as to direct the fuel thereon, as shown in Fig. 1.

Arranged at suitable intervals along the magazine and preferably between the several rockers or conveyers 11 are what I term "combined uptakes and air-conduits" 22, similar to those described in my said Patent No. 721,586. These uptakes are inclined in a rearward direction and communicate with openings 23 in the bottom or floor of the magazine, getting their supply of air from the space beneath the magazine. Vertical grates 24 cover the upper discharge ends of said uptakes and are located immediately above the rockers or conveyers arranged in advance thereof. By reference to Figs. 1 and 6 it will be seen that the rear wall of each uptake and air-conduit is arranged at a short distance from the concentric surface 12 of the adjacent rocker or conveyer, the object being to prevent the fuel from being pinched or jammed between the conveyer and the uptake, which would result in throwing considerable labor on the machine, causing it to work hard and requiring additional power to drive the machine. By leaving said space the fuel can easily free itself and the rockers or conveyers are permitted to oscillate with freedom. Each of the uptakes extends, preferably, entirely across the magazine and consists of a rear plate 25, having bosses or projections 26 to receive screws or other suitable fasteners 27, which pass through the forward plate 28.

Extending vertically within the magazine are side air-conduits 29, which communicate with openings 30 in the floor of the magazine, said conduits extending upward to points near the top of the magazine, where they are beveled or inclined, as shown at 31, and each provided with an opening 32, which is covered by a grate 33, having vertically-extending grate bars and openings, as shown. The side air-conduits 29 are arranged at suitable intervals and provided in suitable numbers and serve to discharge air into the fuel prior to the overflow of the fuel upon the grate-sections. An additional supply of air is also discharged into the fuel by means of a perforated cap-rail 34, extending along the top edge of each of the side walls of the furnace and provided with perforations or air-ports 35 in the top and inner side thereof, air being supplied to each of the cap-rails 34 by means of air-supply pipes 36, which conduct the air to the cap-rails under natural draft, the construction last described being best illustrated in Fig. 3.

Instead of coupling the lever-arms 16 directly to the connecting-rod 17 said arms may be pivotally connected to yokes 37, as shown in Fig. 3, the said yokes in turn being attached rigidly to the connecting-rod 17.

The arrangement just described enables the lever-arms 16 to be applied to both ends of the rocker-shafts 15, thus obviating any tendency to twist and break said shafts.

5 The combined uptakes and air-conduits 22 terminate below the normal level of fuel in the magazine and on the grate-sections; but in some instances it is desirable to lengthen or shorten said uptakes, and for that purpose
10 each uptake may be made in sections, as illustrated in the detail view, Fig. 10, in which 38 designates a portion of the lower section, and 39 a portion of the upper section. The sections are provided at their meeting
15 ends with overlapping portions 40 and 41, one of which is slotted, as shown at 42, to receive a clamping bolt or screw 43. One or more of such clamping bolts or screws may be employed to fasten the meeting ends of
20 the sections, and in this way the upper end of the combined uptake and air-conduit may be raised or lowered and properly adjusted, as may be found necessary.

In Fig. 6 I have shown auxiliary feeding
25 devices in the form of rams or pushers 44 and 45, the pusher 44 operating in contact with and along the floor of the magazine, while the pusher 45 operates in contact with and along the inclined upper surface of the up-
30 take 22. Each of the pushers is operated by means of a link 46 or other suitable connection extending between the pusher and the rocker or conveyer in advance thereof, so that as the rockers or conveyers oscillate to
35 feed the fuel forward the rams or pushers 44 and 45 are simultaneously reciprocated, thereby assisting in the fuel-feeding operation. The rams or pushers are held to recip-
40 rocate in right lines by means of guides or brackets 47, secured to the side walls of the magazine and projecting over flanges 48, extending laterally from the pushers, as shown in Fig. 7.

Figs. 8 and 9 illustrate a construction in
45 which the cups or pockets 10 may be dispensed with and the floor or bottom 9 of the magazine made perfectly straight. In order to accomplish this, the shaft 15 of each rocker is located a sufficient distance above
50 the floor 9 to admit of the oscillatory movements of the rocker entirely above and clear of the floor. The rear side of the adjacent uptake 22 is provided with an extension 49, which is concaved, as shown at 50, to form a
55 seat against or adjacent to which the concentric surface 12 of the rocker operates. The concaved extension 49 serves as a cut-off to prevent the fuel from getting behind the rocker in too great a quantity and also obvi-
60 ates the pinching or grinding of the fuel between the conveyer and the uptake. However, the construction illustrated in Figs. 1 and 6 is preferred, as space is economized by such arrangement.

It will be understood from the foregoing 65 description that the fuel passing downward through the hopper 4 falls upon the primary rocker or conveyer 11, which by preference is made somewhat larger than the succeeding
70 rockers or conveyers. As the primary rocker is oscillated the fuel is received thereon and fed inward thereby toward the second rocker, and so on, the auxiliary feeding devices, consisting
75 of the rams or pushers 44 and 45, assisting in the operation. The fuel is thus forced along the magazine and upward over the uptakes and is thus subjected to the currents of air
80 under natural draft passing outward from the discharge ends of the combined uptakes and air-conduits 22. As the fuel banks up in the magazine and overflows upon the grate-
85 sections said fuel is further subjected to air-currents under natural draft discharged from the vertical side air-conduits and the perforated cap-rails 34. In this way the fuel is
90 thoroughly coked and prepared for burning. The location of the magazine centrally of the grate does not impair the natural draft of the furnace, for the reason that the loss of grate-
95 space occupied by the magazine is fully compensated for by the draft appliances hereinabove particularly described. In fact, the effect of the draft is enhanced by reason of
100 the fact that the air is introduced into the fuel at various points during the movement of the fuel along the magazine and while it is under agitation. It will also be seen that the
105 currents of air are introduced directly into the body or mass of the fuel and at points preferably just beneath the top level of the fuel as it overflows from the magazine upon the
110 grate-sections. It will further be seen that the floor or bottom of the magazine is practically imperforate except for the openings which lead to the air-conduits 22 and 29. Said openings are, however, covered and pro-
115 tected by the conduits arranged thereover, so that there is no possibility of a leakage of fuel through the bottom or floor of the magazine, the semicylindrical cups or pockets serving
120 to catch any fuel and prevent the same from leaking downward into the ash-pit. Thus while the air is freely admitted through the bottom or floor of the magazine leakage of fuel therethrough is entirely prevented. In order to facilitate the forward movement of
125 the fuel and prevent the jamming of the same against the side air-conduits 29, the latter are beveled or chamfered at their front and rear edges, as shown at 51.

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

1. An automatic underfed stoker comprising a magazine having a floor with im-
125 perforate portions, oscillatory conveyers working over the imperforate portions of the magazine-floor, and means for admitting air

under natural draft directly into the fuel contained in said magazine.

2. An automatic underfed stoker comprising a magazine extending along the grate and having a floor with an imperforate portion, and an oscillatory arcuate-faced feeder operating within the magazine entirely above the imperforate portion of said floor and adjacent to the grate.
3. An automatic stoker comprising a magazine having a floor with imperforate portions, air-conduits leading upward through the magazine-floor which is otherwise imperforate, and fuel-feeding conveyers operating within the magazine and above the imperforate floor thereof, substantially as described.
4. An automatic stoker comprising a magazine, cups or pockets formed in the floor of the magazine, and fuel-feeding conveyers operating within said cups or pockets.
5. An automatic stoker comprising a magazine, segment-shaped cups or pockets formed in the floor of the magazine, and oscillatory conveyers working within the said cups and the magazine, substantially as described.
6. An automatic stoker comprising a magazine, semicylindrical cups or pockets connected with and extending below the main level of the magazine-floor, and oscillatory rockers or conveyers within the magazine and working in said cups or pockets.
7. An automatic stoker comprising a magazine having a floor with imperforate portions, a series of combined uptakes and air-conduits leading upward from the floor of the magazine, and fuel-feeding conveyers interposed between the uptakes and operating above the imperforate portions of the magazine-floor.
8. An automatic stoker comprising a magazine having a floor with an imperforate portion, fuel-feeding conveyers operating within the magazine above the imperforate portion of the magazine-floor, and combined uptakes and air-conduits leading upward from the magazine-floor and terminating above the conveyers.
9. An automatic stoker comprising a magazine having a floor embodying an imperforate section, and an oscillatory conveyer mounted within the magazine and above the imperforate section of the magazine-floor and having a fuel-pushing shoulder which operates above the level of the conveyer-shaft, the shaft of said conveyer being extended laterally through the side of the magazine to receive the operating device, substantially as described.
10. An automatic stoker comprising a magazine having a floor embodying an imperforate section, an oscillatory conveyer mounted within the magazine and working above the imperforate section of the magazine-floor, and having a fuel-pushing shoulder which operates above the level of the conveyer-shaft, the shaft of said conveyer extending through the side of the magazine, and a lever-arm connected with the extended shaft of the conveyer and arranged entirely outside of the magazine.
11. An automatic underfed stoker comprising a magazine having a floor with an imperforate portion, and an oscillatory conveyer working within the magazine over the imperforate portion of the magazine-floor, said conveyer having a fuel-pushing face which operates above the level of the conveyer-shaft and also having a cylindrical surface coaxial with its shaft.
12. An automatic stoker comprising a magazine, an uptake therein, an oscillatory conveyer working therein, and a reciprocatory ram or pusher operatively connected with said conveyer and working along the uptake.
13. An automatic stoker comprising a magazine, an oscillatory conveyer working therein, and a reciprocatory ram or pusher movable along the floor of the magazine and actuated by said conveyer.
14. An automatic stoker comprising a magazine, an oscillatory conveyer working therein, an inclined uptake, and a reciprocatory ram or pusher operating in contact with the uptake and actuated by said conveyer.
15. An automatic stoker comprising a magazine in which the fuel is fed lengthwise of said magazine, fuel-feeding mechanism and a series of upstanding side air-conduits at intervals along the side walls of the magazine and extending from the floor of the magazine upward to points adjacent to the level of the top of the magazine, the fore and aft portions of said conduits being beveled off substantially as and for the purpose set forth.
16. An automatic stoker comprising a magazine, in which the fuel is fed lengthwise of the magazine, fuel-feeding mechanism therein, side air-conduits at intervals leading upward along the magazine sides from the floor of the magazine and terminating near the top of the magazine, and grates arranged over the upper discharge ends of said air-conduits.
17. An automatic stoker comprising a magazine, fuel-feeding mechanism therein, combined uptakes and air-conduits leading from the floor of the magazine upward and terminating within the body of the fuel passing through the magazine, and side air-conduits leading from the floor of the magazine upward to points near the top of the magazine, the discharge ends of the side conduits being arranged between or alternately with the discharge ends of the combined uptakes and air-conduits, substantially as described.
18. An automatic stoker comprising a

magazine, fuel-feeding mechanism therein,
hollow cap-rails extending along the top of
the magazine and provided with air-ports,
side air-conduits leading upward from the
5 bottom of the magazine to points near the
top thereof, and inclined grates covering the
upper ends of the side air-conduits.

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

JOHN PARKER LUCKETT.

Witnesses:

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EDWARD S. ADAMS.