

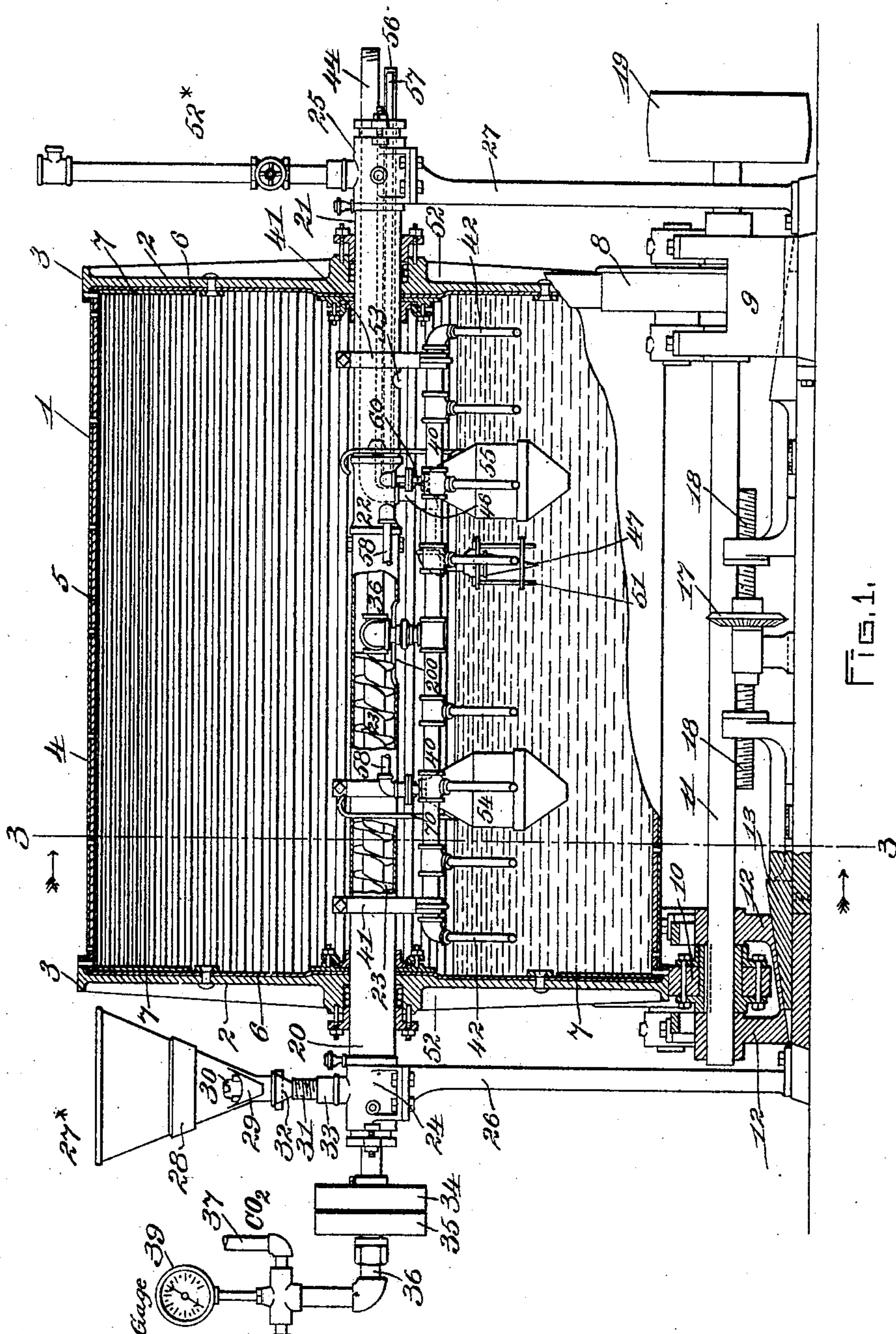
No. 814,430.

PATENTED MAR. 6, 1906.

G. D. COLEMAN.
APPARATUS FOR CORRODING METAL.

APPLICATION FILED APR. 29, 1901.

4 SHEETS—SHEET 1.



WITNESSES:
Edward J. Day
Horace Van Euren

INVENTOR:
George D. Coleman
by his Attorney
Benjamin Phillips

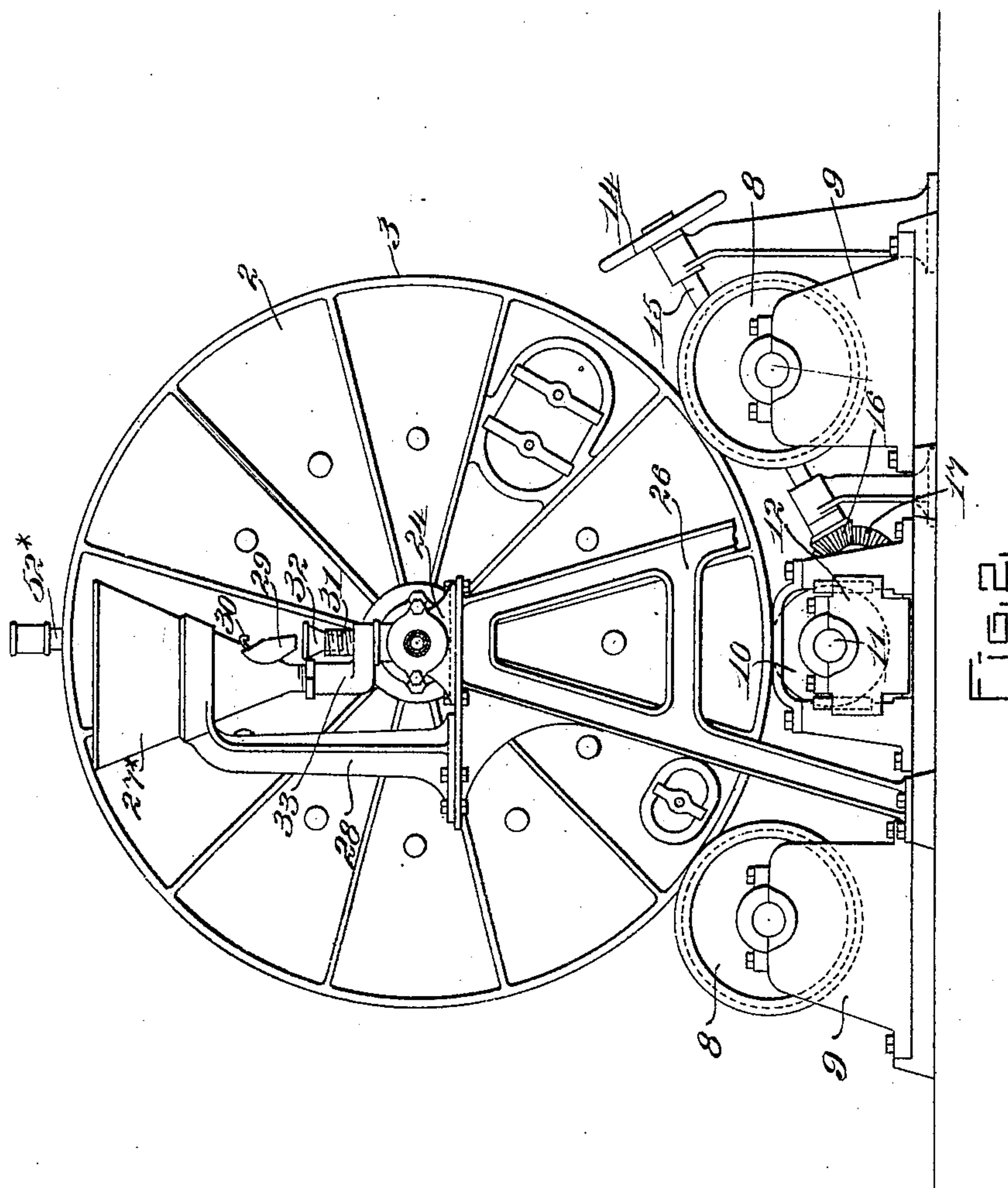
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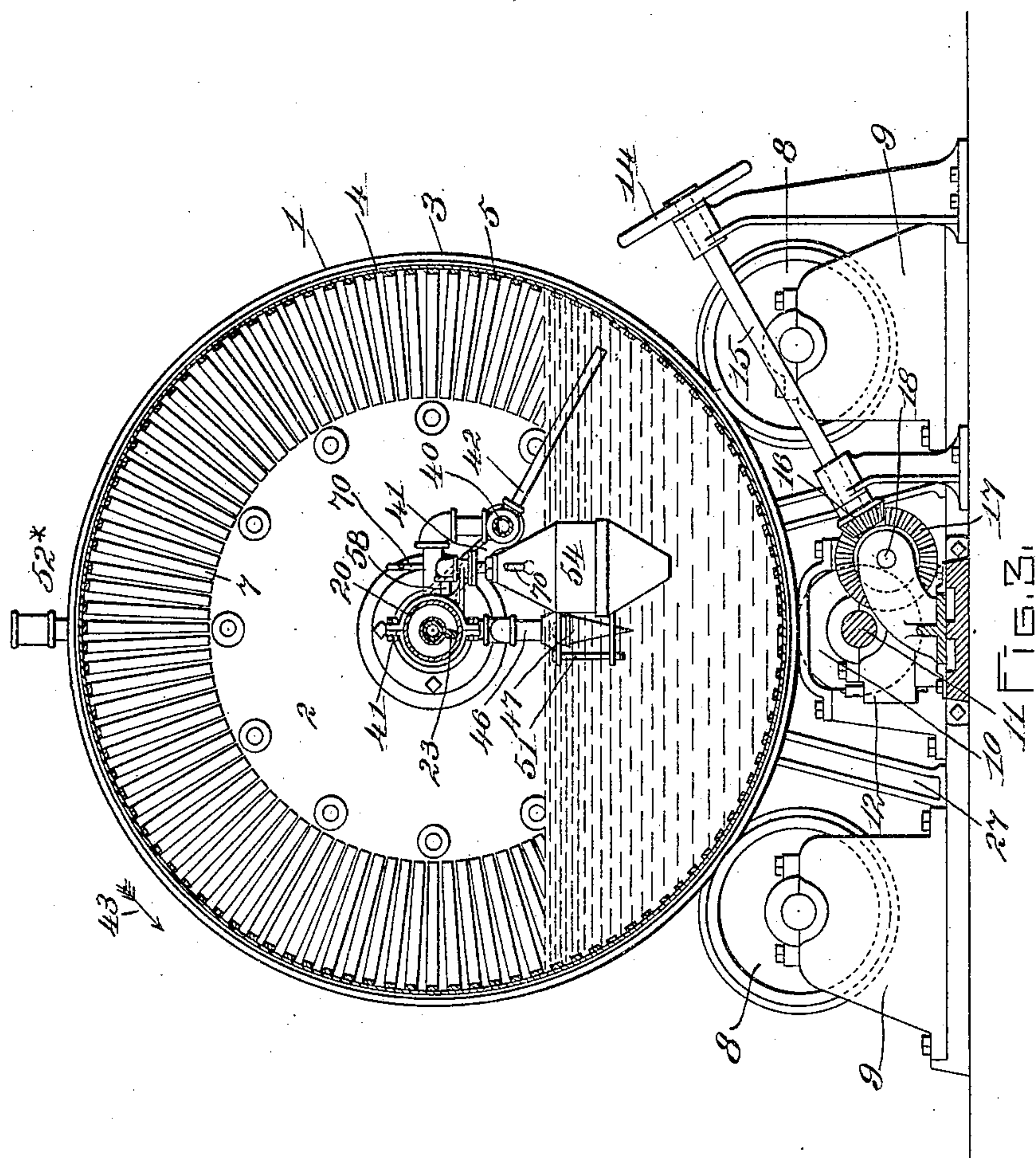
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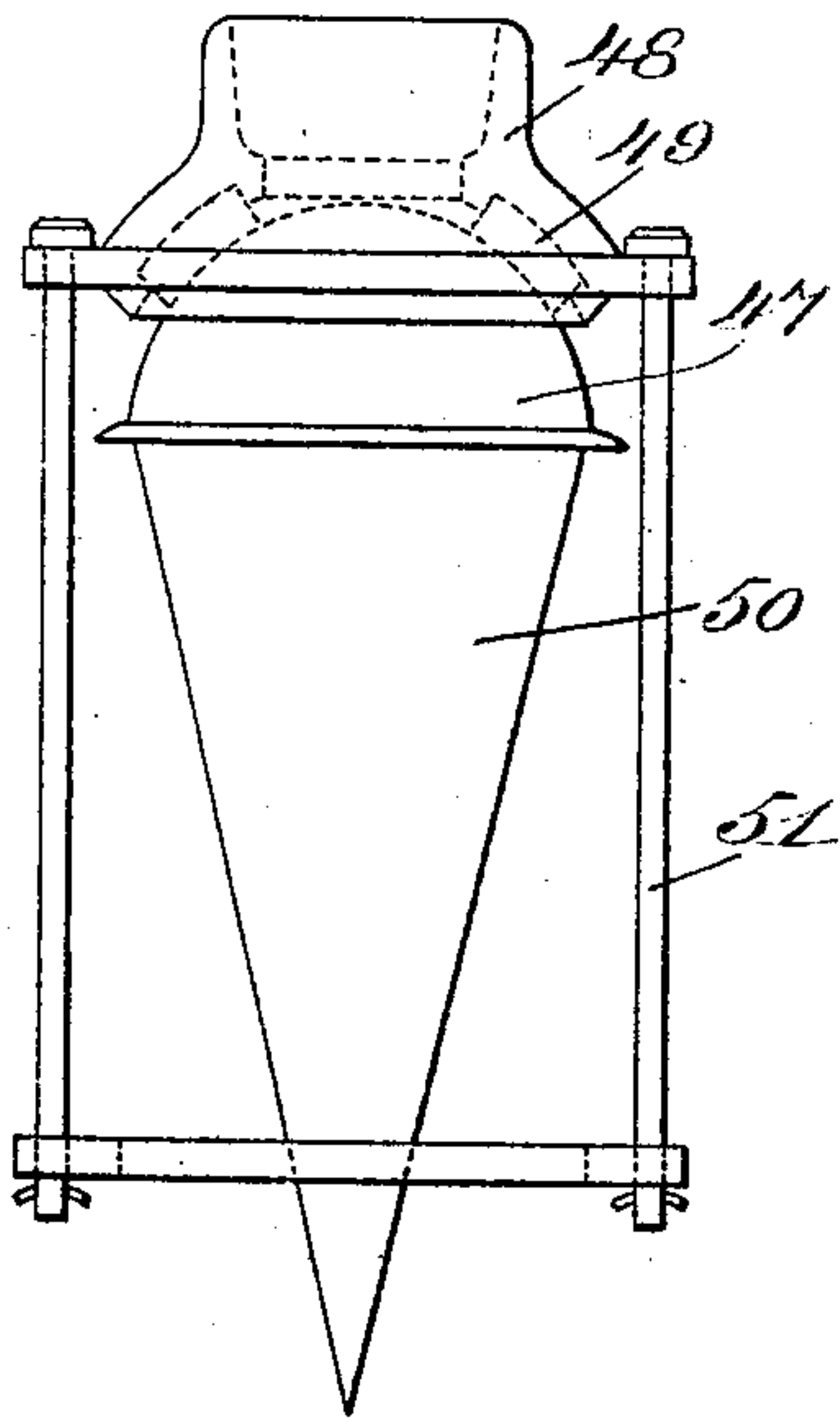


FIG. 4.

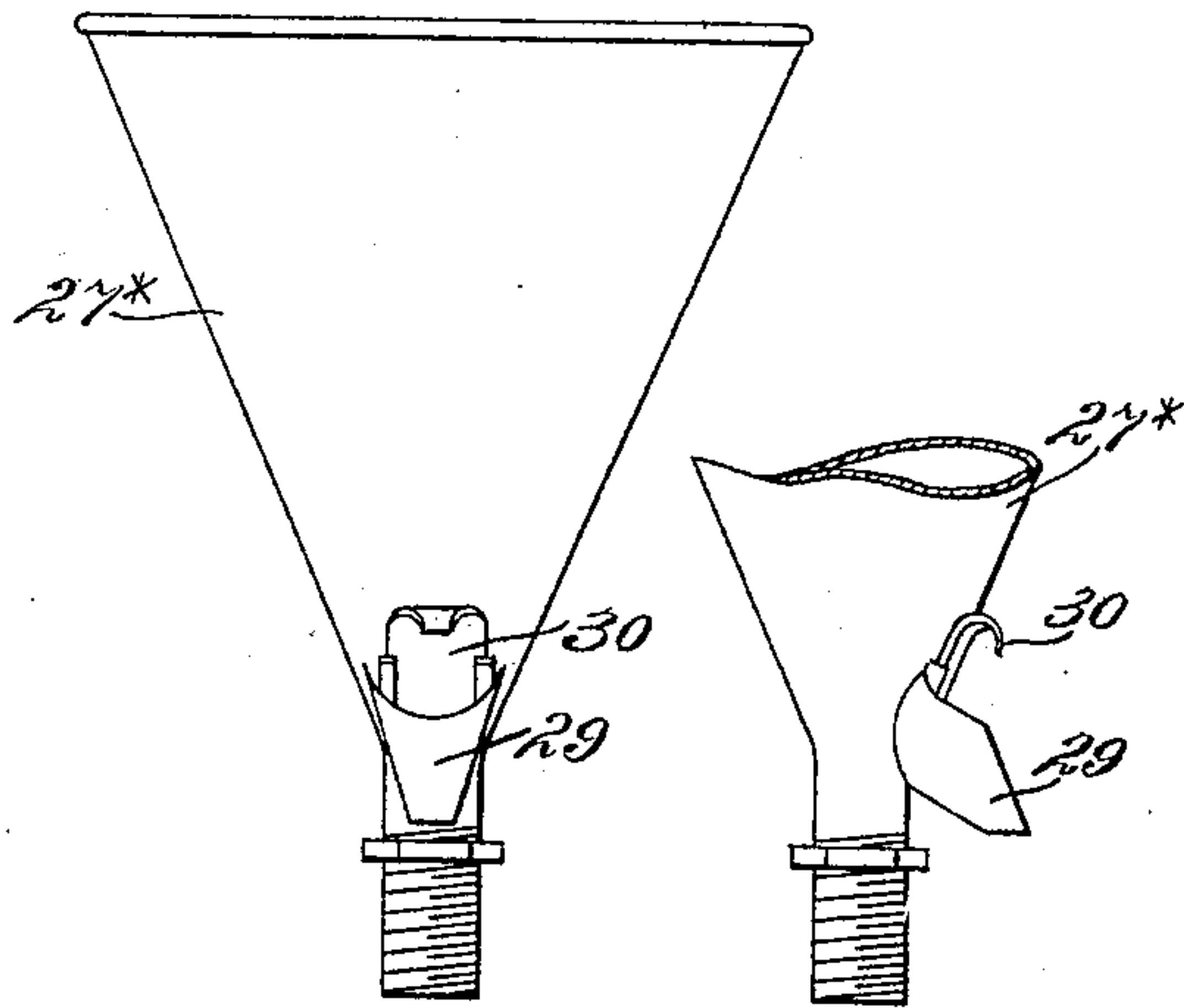


FIG. 5.

FIG. 6.

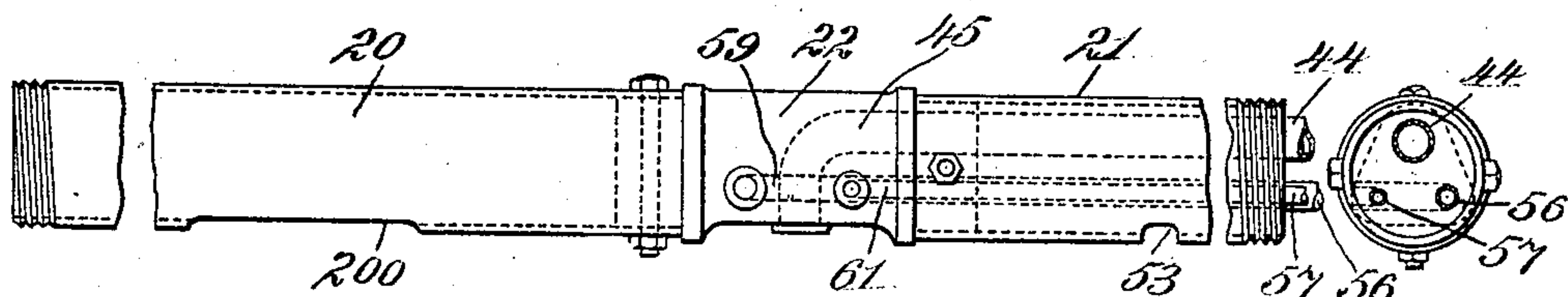


FIG. 7.

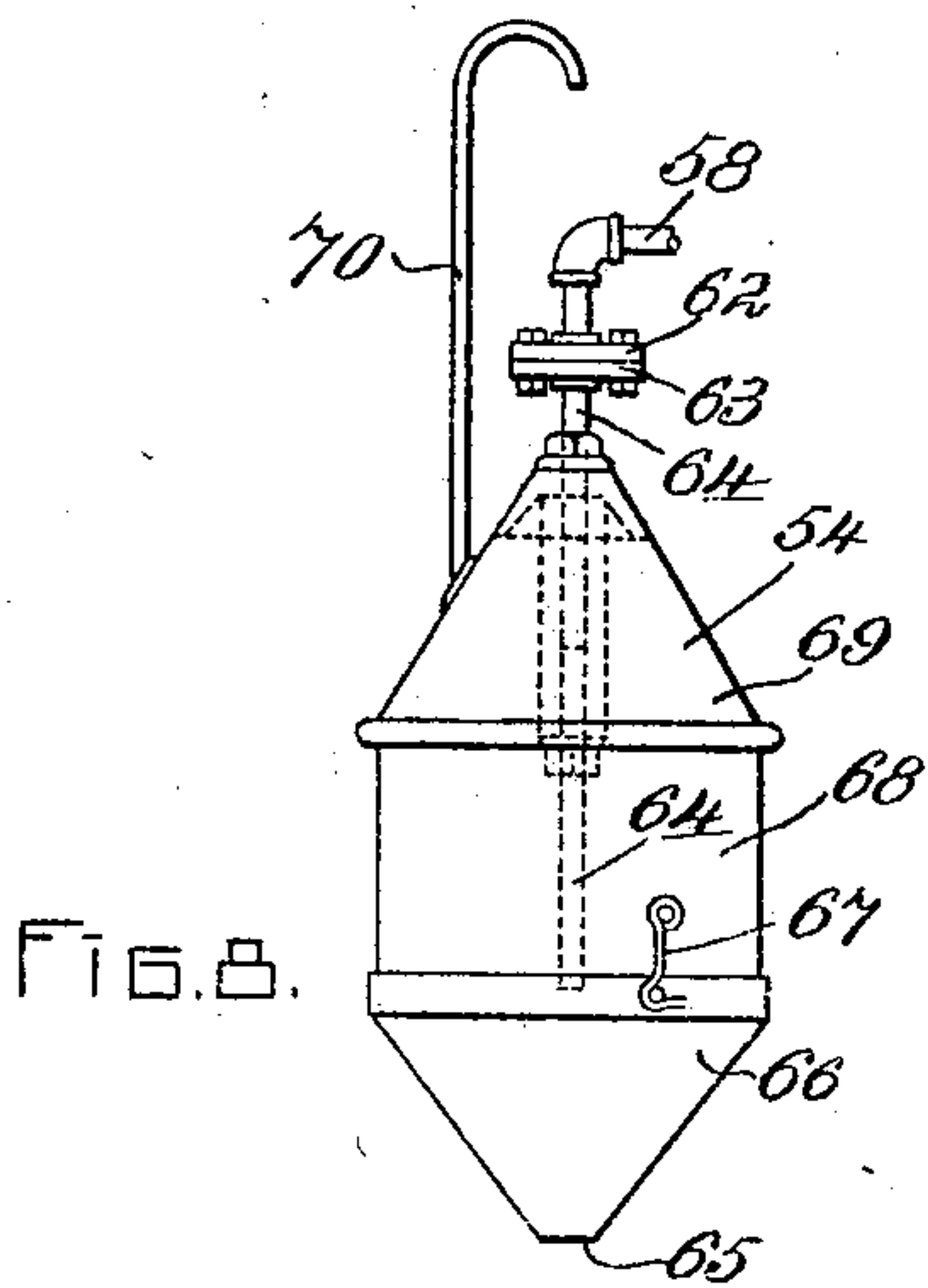


FIG. 8.

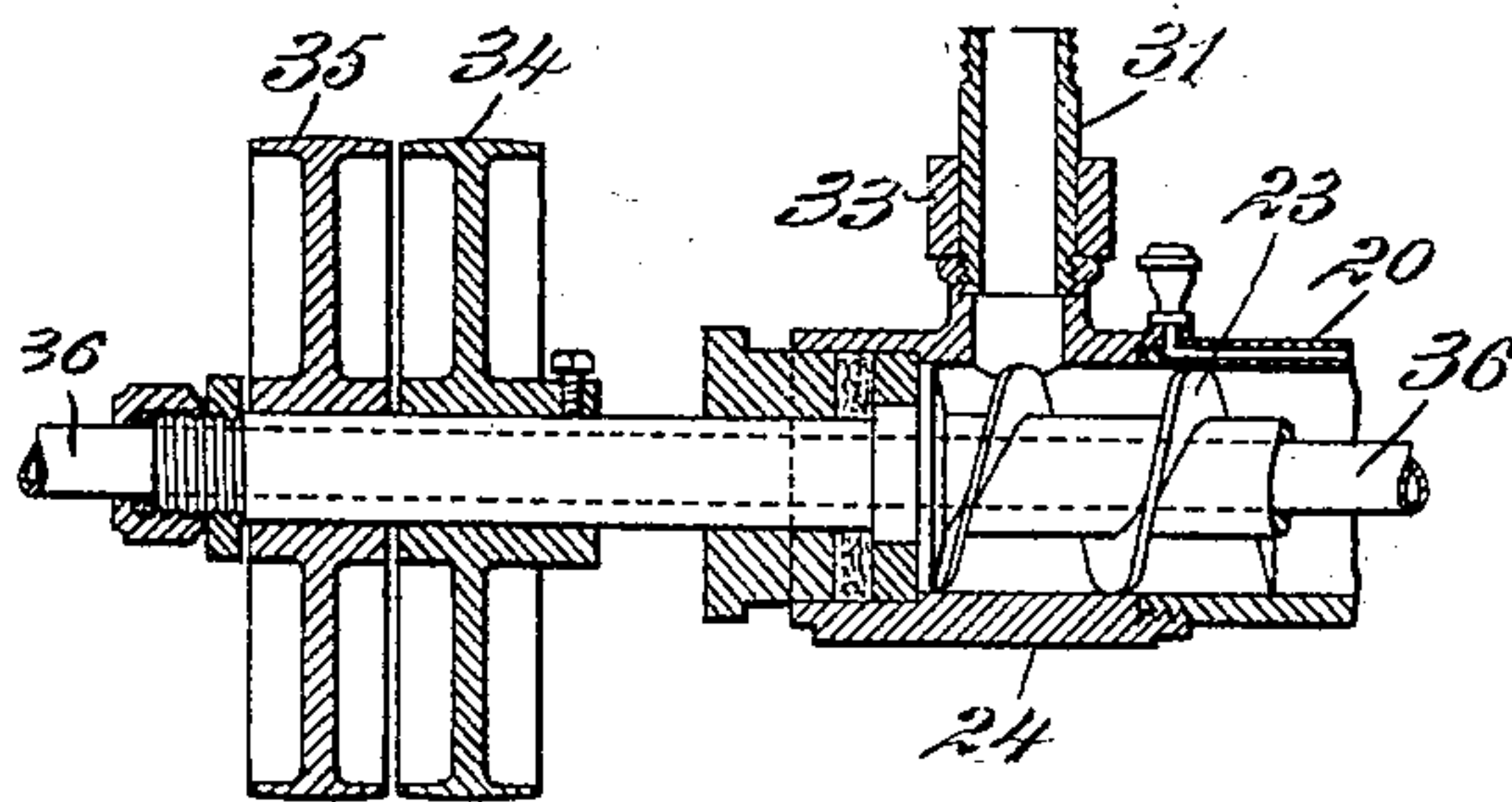


FIG. 9.

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UNITED STATES PATENT OFFICE.

GEORGE D. COLEMAN, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR CORRODING METAL.

No. 814,430.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed April 29, 1901. Serial No. 57,993.

To all whom it may concern:

Be it known that I, GEORGE D. COLEMAN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Corroding Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in apparatus for corroding metals, and it is particularly applicable to apparatus for corroding lead, such as is described in Letters Patent No. 481,004, granted August 16, 1892, to me.

The object of this invention is to reorganize and improve apparatus of the kind named, particularly in the ways to be presently indicated.

The metal-feeding means used in the machine of the above-named patent for supplying comminuted metal to the cylinder were incomplete in that no provision was made whereby accidental stoppage of the feed might be seen.

The present invention contemplates, therefore, means for feeding a constant supply of metal so arranged as to permit the metal to be constantly in view at some point in its passage.

The pipes for introducing air or gaseous mixtures as used in former apparatus having rotary cylinders were arranged to discharge at the axis of the cylinder; but the present invention contemplates the use of downward extensions from such pipes, whereby the outlets may be brought below the surface of the water contained in the cylinder, which usually does not rise to the axis thereof, in order that the gases may be the better absorbed by the water and brought into contact with the metal. Moreover, the gas is discharged through a plurality of pipes, which extend in such a direction as to discharge near the rising side of the rotating cylinder, where the contents thereof are raised and massed by the rotation.

The water-feeding means have been improved in the present invention by the provision of automatic means for preventing the rise of the water in the cylinder beyond a certain level. This feature prevents the flooding of the apparatus in case the water-valve is negligently left open when the operation of

the apparatus is stopped, and it is particularly valuable, as such an omission is not apparent to the eye.

The means for withdrawing water carrying in suspension the products of corrosion have been improved by a device for preventing the entrainment of metallic particles in the water.

Other features of the invention will be shown in the description of the particular form illustrated.

To the above ends the present invention consists in the devices and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front elevation, partly in section. Fig. 2 is an end elevation at the left of Fig. 1. Fig. 3 is a vertical transverse section on line 3 3 of Fig. 1. Fig. 4 is an enlarged detail of the automatic float-valve. Figs. 5 and 6 are details of the hopper. Fig. 7 is a detail of the inlet-pipes. Fig. 8 is a detail of the water-outlets, and Fig. 9 is a sectional detail of part of the rotary conveyer.

The illustrated embodiment of the invention is particularly designed for use in making lead salts by the agitation of lead or its compounds in the presence of water and gas or other reagents. It is used in the manufacture of lead oxides, lead hydrate, and hydrocarbonate. It may, however, be used in the corrosion of other metals or for the trituration of various substances.

The apparatus comprises in general a rotating tumbler or cylinder with means for introducing reagents therein and for withdrawing the products of the process. The corroding-cylinder 1 has cast-iron heads 2 and a copper cylinder-wall 4, riveted thereto. The cylinder is supported by flanged rollers 8, mounted on bearings 9, bearing against the peripheries 3 of the heads, which are rotated by means of driving-wheels 10, driven by a pulley 19, fixed to the driving-shaft 11. These driving-wheels are mounted in cradles 12, supported upon inclined faces bearing against wedges 13. A double-ended worm 18 engages extensions from the wedges 13 and is adapted to be rotated through beveled gears 16 and 17 by a hand-wheel 14, mounted on a shaft 15. By these means the driving-wheels may be raised or lowered, so as to adjust their pressure against the cylinder. The heads of the cylinder are supplied with suitable manholes and hand-holes, as shown in Fig. 2, for admission thereto for the purpose of cleaning or repairing the interior.

The materials used in the process are introduced and withdrawn through pipes 20 and 21, located axially with respect to the cylinder and passing through glands therein. These pipes are secured to a block 22, which closes the inner ends thereof. The pipe 20, supported in a head 24 on a standard 26, contains a rotary conveyer having a spiral web 23 fitting closely therein. The shaft of this conveyer is hollow and extends through the head 24, and upon it are mounted fast and loose pulleys 34 and 35 for rotating the conveyer by suitable belt connections. Comminuted metal is placed in the hopper 27*, supported upon brackets 28 and 33. The metal is discharged through a spout 29, controlled by a gate 30, and issues in a visible stream into a funnel 32, connected by a union 31 with the head 24. By these means a constant visible stream of comminuted metal may be supplied to the conveyer, whereby it is carried through the pipe 20 into the interior of the cylinder and discharged therein through an opening 200. By means of the gate 30 the supply of comminuted metal may be adjusted. The air and gas are introduced through a pipe 36, concentric with the pipe 20 and passing through the hollow shaft of the conveyer. Pipes 37 and 38 are connected with pipe 36 and are used for the introduction of different gases, being connected in the illustrated apparatus with sources of supply of carbon dioxide and oxygen or atmospheric air. The pressure-gage 39 indicates the pressure of the gas in the pipe 36. Pipe 36 is connected by suitable unions with a horizontal pipe 40, having a number of inclined discharge-pipes 42. These pipes are so directed as to discharge the gaseous mixture at the point where the contents of the cylinder are raised and accumulated by the rotation thereof, so that the gas is brought into intimate contact with the metal and is discharged below the surface of the water, which facilitates the absorption of the gases by the water.

Water is introduced and withdrawn through the pipe 21. The inlet-pipe 44 passes through the pipe 21 and the block 22 and is connected with the automatic float-valve 47. (Particularly shown in Fig. 4.) This valve is spherical and coöperates with a soft-rubber gasket 49, fixed to the valve-seat member 48. The valve is provided with a conical float 50, so that the water-supply will be gradually reduced as the level rises. A cage 51 keeps the valve in place. The products of the corrosion are suspended in the water and are withdrawn, together with the water, through pipes 58 and 60, which are connected with pipes 56 and 57, passing through pipe 21. As the pipe 58 is longer than the pipe 60, the pipe 56, to which it is connected, is made somewhat larger than the pipe 57 in order that the amount withdrawn

through the said pipes may be substantially equal. The means for preventing the entrainment of metallic particles in the water so withdrawn consist of arresters 54 and 55, one of which is shown in Fig. 8. This comprises a vessel having conical top and bottom 69 and 66 and a cylindrical central portion 68, the bottom 66 being removably secured, as by hooks 67. The outlet-pipe 64 projects downwardly into the vessel and has an adjustable lower portion. An air-pipe 70 connects the arrester with the atmosphere in the cylinder to maintain equal levels in the liquid within and without the arrester. The arrester is removably secured to the outlet-pipes by flanged couplers 62 and 63. The operation of this device is as follows: Suction being applied to the pipes 56 and 57 by a suitable pump or otherwise, the water in the cylinder holding suspended the products of the corrosion enters the arrester through opening 65 in the bottom thereof and passes outward through the pipe 64. The water after entering the arrester is brought sufficiently to rest so that any particles of metal suspended therein will fall to the bottom of the arrester and pass out through the opening 65, which is large enough to permit this at the same time that water is passing in. The bottom 66 of the arrester may be removed when necessary to clean the interior of the same. The precise form of the vessel used is immaterial, the invention contemplating, broadly, any means for reducing the agitation of the water before its entry into the outlet-pipe to permit the precipitation of suspended particles of unaltered material. To provide for the removal of exhausted gases from the cylinder, the pipe 21 is pierced at 53, and it may be connected at 52* with suitable exhausting means, such as a pump.

To prevent corrosion and wear of the cylinder, the heads are lined with copper and brass ribs are brazed to both the body and the margins of the heads. These ribs hold a portion of the comminuted material in the spaces between them, and thereby restrict the wear to the tops of the ribs and increase the useful attrition.

Except where specifically limited in the claims, the present invention is not limited to the precise construction of the illustrated embodiment thereof, but may assume many other forms embraced in the claims.

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

1. An apparatus for corroding metal, having, in combination, a rotating corroding-cylinder, having provision for the introduction of comminuted metal and water and for drawing off the product, and a pipe for introducing a gas or gases into said cylinder having a plurality of jets extending below the level of the water and discharging the gas or

gases near the rising side of the cylinder, substantially as described.

2. An apparatus for corroding metal, having, in combination, a corroding-cylinder 5 having provision for the introduction of comminuted metal, gas and water, and means for drawing off the product consisting of a vessel having an opening therein below the level of the water and a pipe leading from inside the 10 vessel and below the level of the water out of the corroding-cylinder, substantially as described.

3. An apparatus for corroding metal, having, in combination, a corroding-cylinder, 15 having provision for the introduction of comminuted metal, gas and water, and means for drawing off the product consisting of a vessel having an opening therein below the level of the water, a pipe leading from inside the vessel 20 and below the level of the water out of the corroding-cylinder, and means for maintaining an equilibrium of pressure on the inside and outside of the vessel, substantially as described.

4. An apparatus for corroding metal, having, in combination, a corroding-cylinder, 25 having provision for the introduction of comminuted metal, gas and water, and means for drawing off the product consisting of a vessel having an unlevel bottom provided with an 30 opening therein at its lowest part and below the level of the water and a pipe leading from inside the vessel and below the level of the water out of the corroding-cylinder, substantially as described. 35

5. An apparatus for corroding metal, having, in combination, a corroding-cylinder, having provision for the introduction of com-

minuted metal, gas and water, and means for drawing off the product consisting of a vessel 40 having an unlevel bottom provided with an opening therein at its lowest part and below the level of the water, a pipe leading from inside the vessel and below the level of the water out of the corroding-cylinder, and means 45 for maintaining an equilibrium of pressures on the inside and outside of the vessel, substantially as described.

6. An apparatus for corroding metal, having, in combination, a corroding-cylinder, 50 having provision for the introduction of comminuted metal, gas and water, and means for drawing off the product consisting of an arrester having an inverted conical bottom provided with an opening at its apex below the 55 level of the water, a pipe leading from inside the arrester and below the level of the water out of the corroding-cylinder and an opening in the arrester above the level of the water, communicating with the outside of the 60 arrester above the level of the water, substantially as described.

7. An apparatus for corroding metal, having, in combination, a corroding-cylinder, 65 having provision for the introduction of comminuted metal, gas and water, a pipe for drawing off water and the products suspended therein, and means for separating metallic particles from the water before its admission 70 into the said pipe, substantially as described.

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

GEORGE D. COLEMAN.

Witnesses:

HORACE VAN EVEREN,
ALFRED H. HILDRETH.