

No. 662,407.

Patented Nov. 27, 1900.

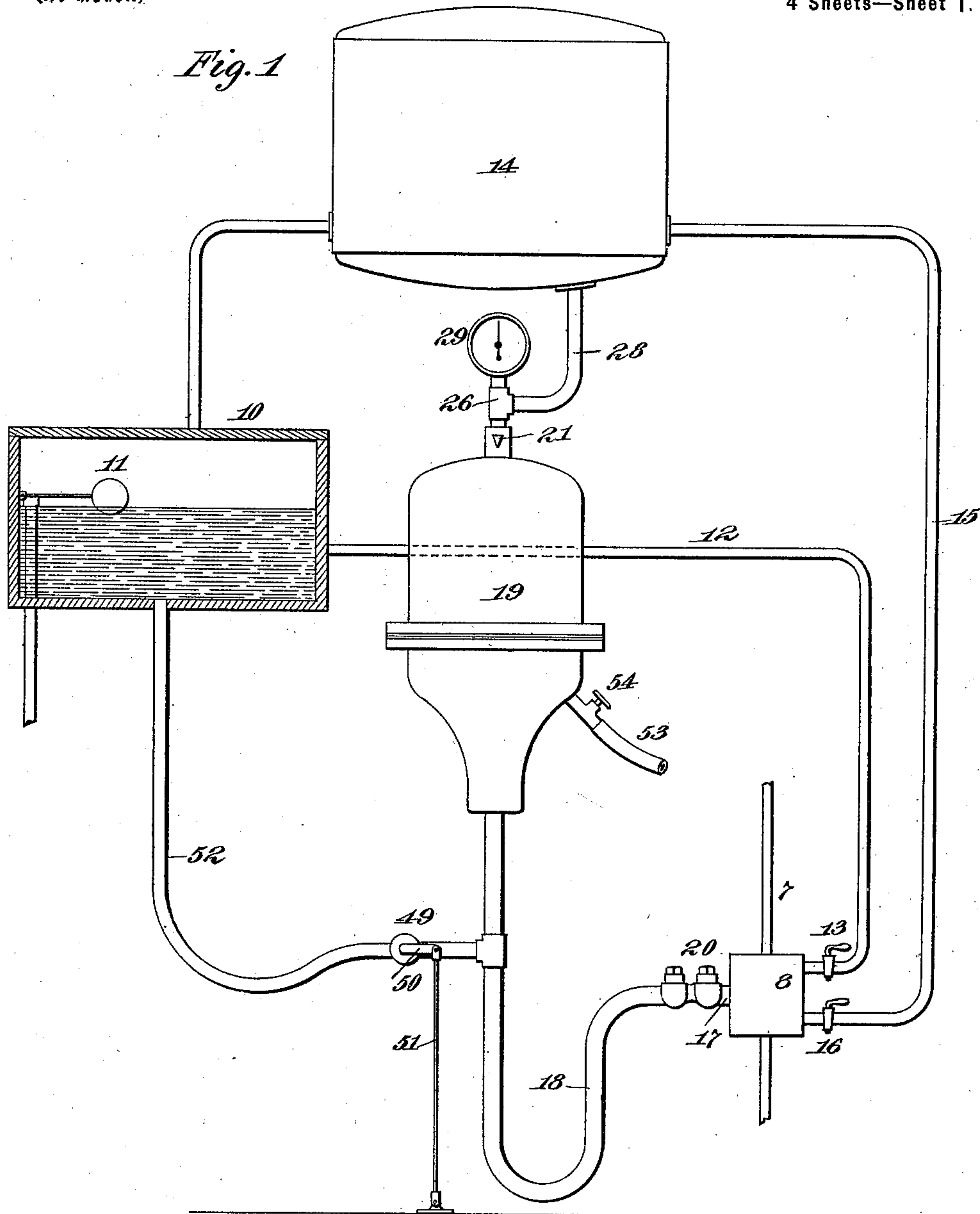
G. A. FLESCHE, H. A. HALL & J. DOHERTY.

CARBONATOR.

(Application filed June 15, 1899.)

(No Model.)

4 Sheets—Sheet 1.



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4 Sheets—Sheet 2.

Fig. 2

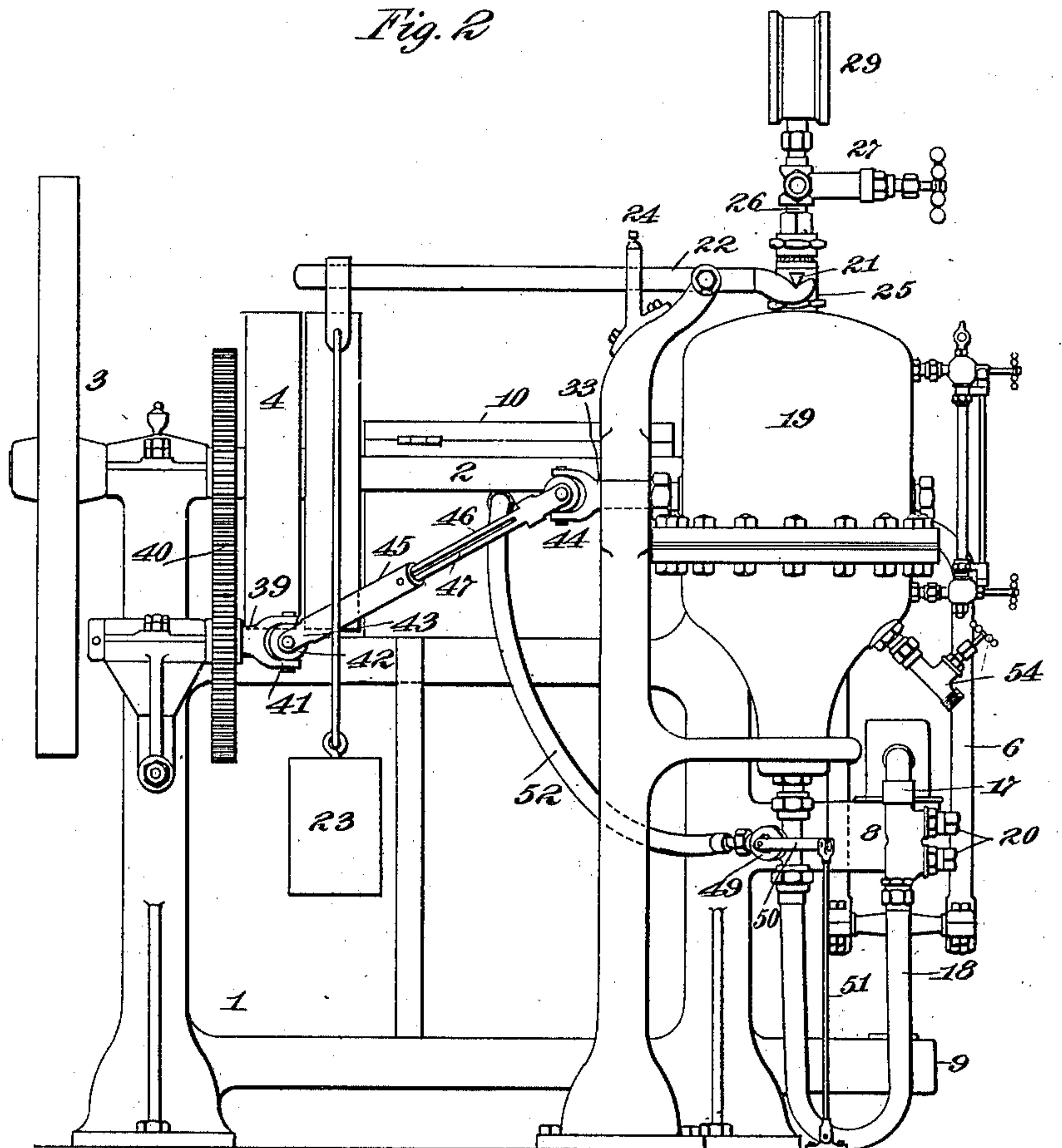
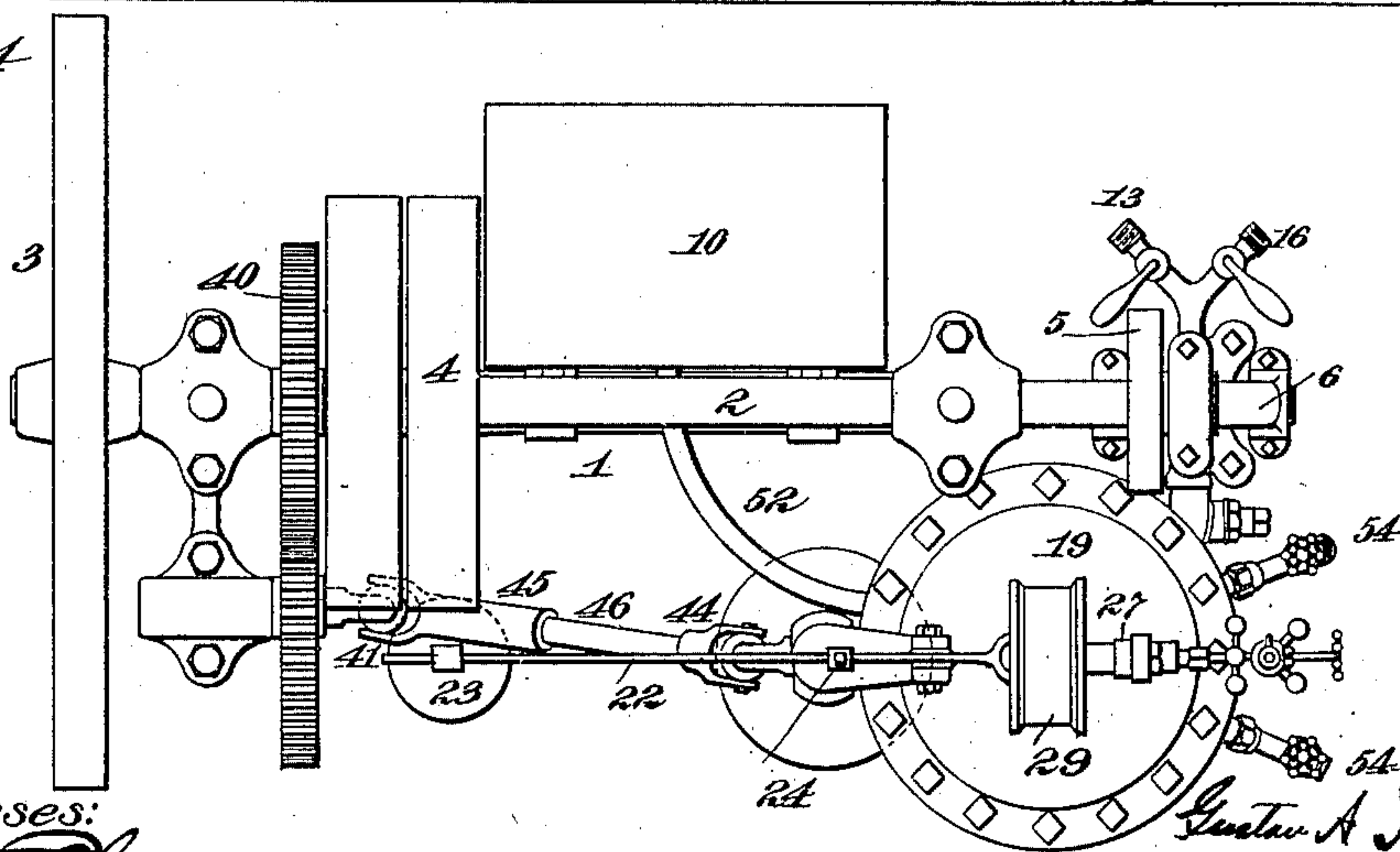


Fig. 4



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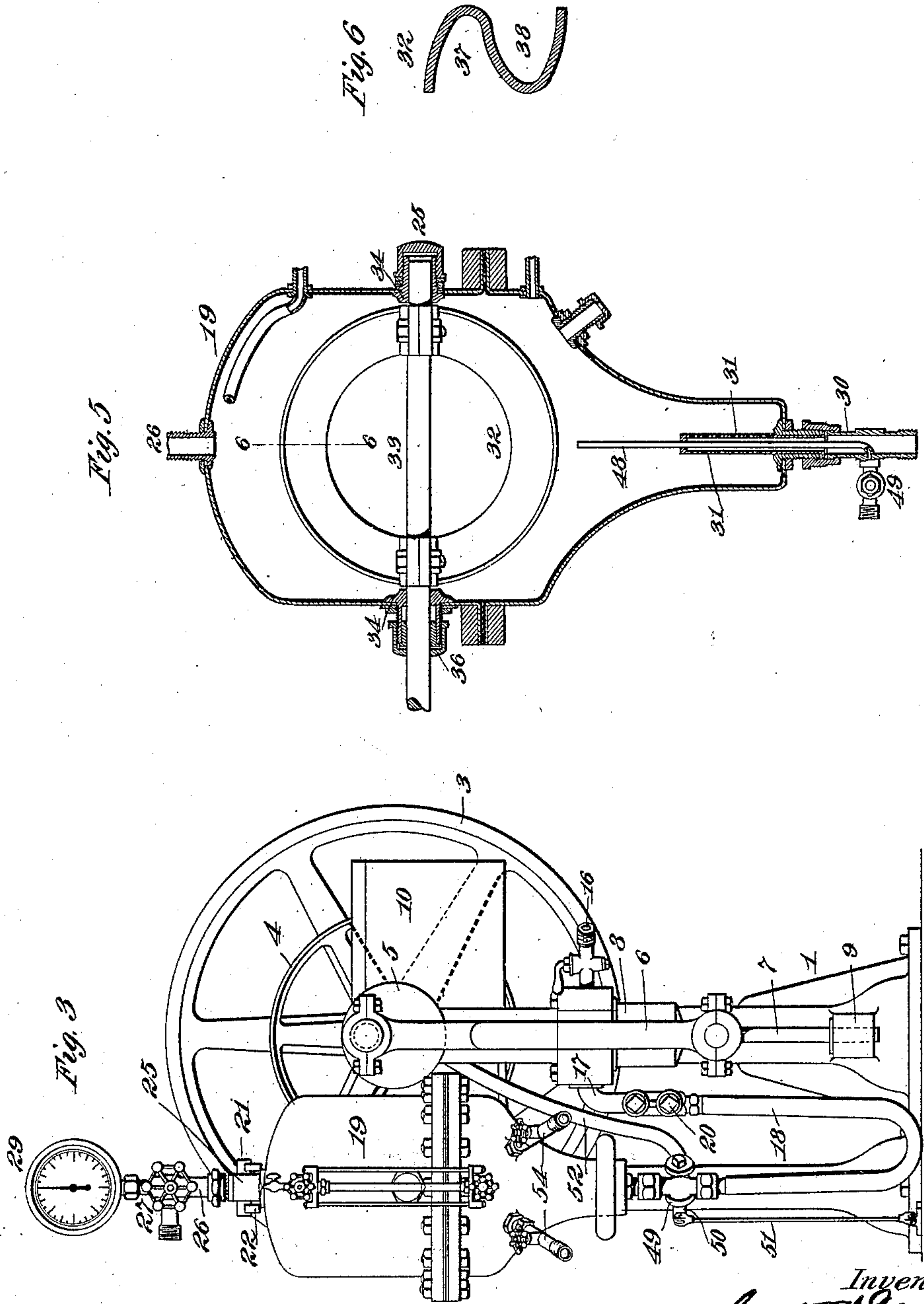
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CARBONATOR.

(Application filed June 15, 1899.)

(No Model.)

4 Sheets—Sheet 3.



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(No Model.)

4 Sheets—Sheet 4.

Fig. 7

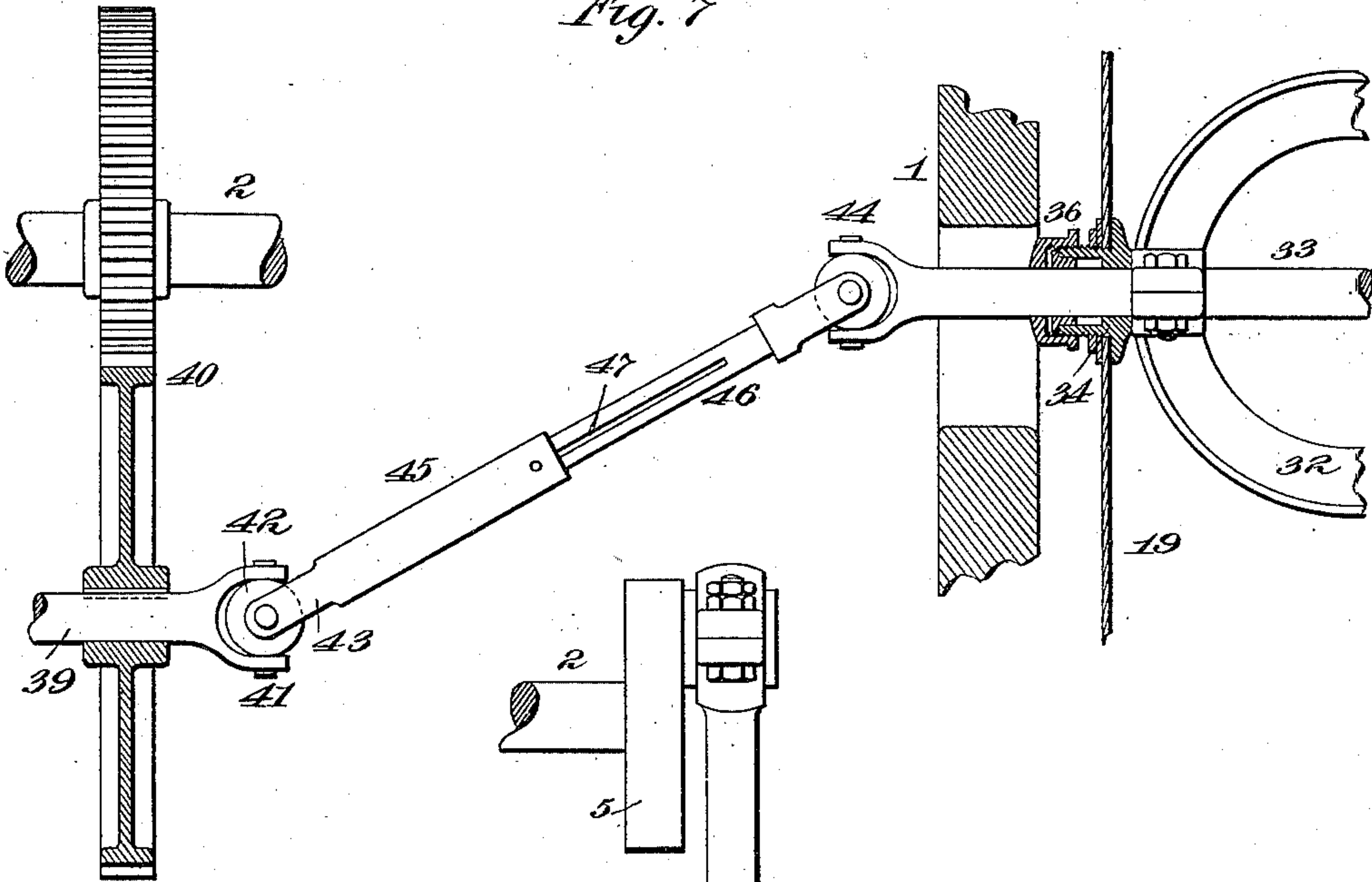
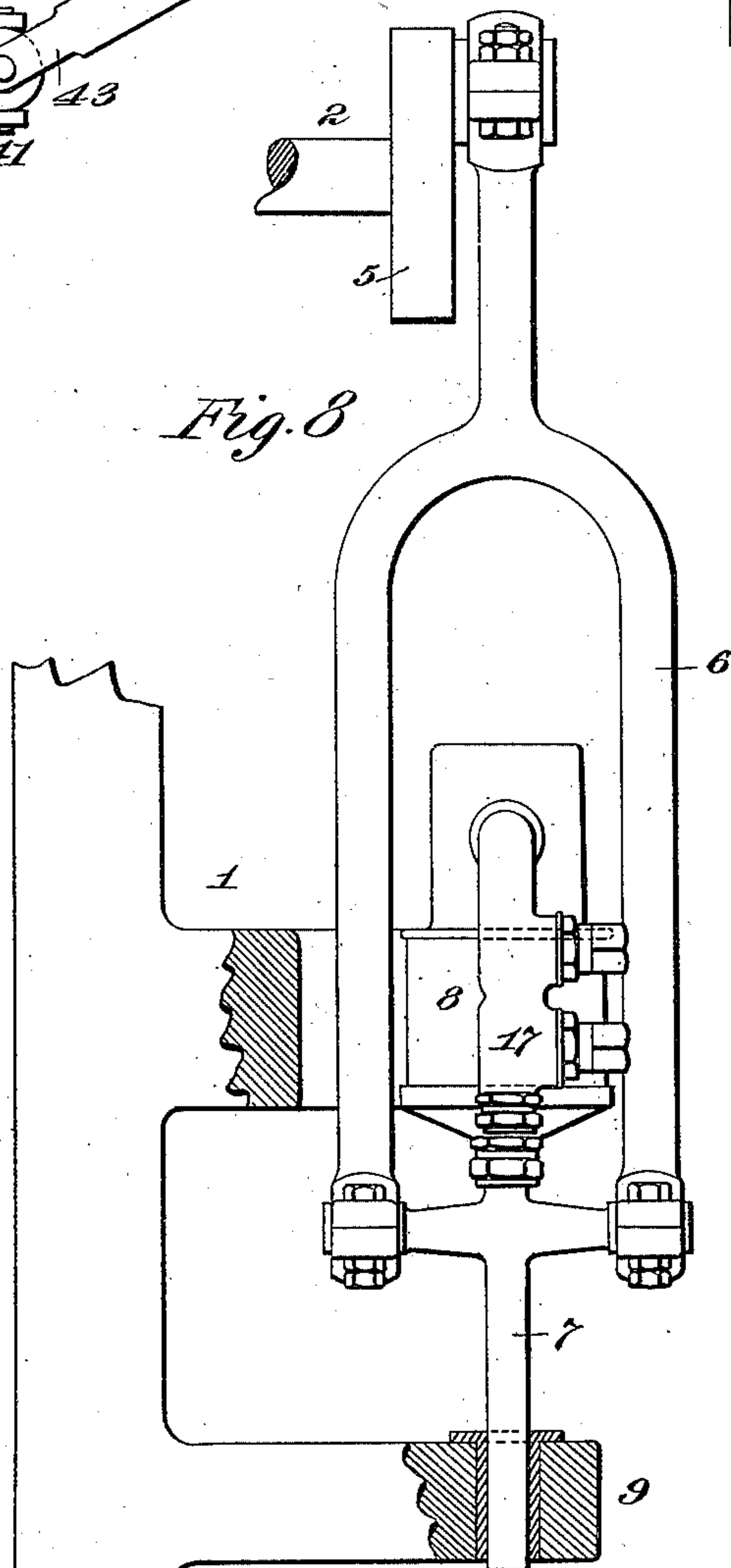


Fig. 8



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UNITED STATES PATENT OFFICE.

GUSTAV A. FLESCHÉ AND HENRY A. HALL, OF NEW YORK, N. Y., AND JOHN DOHERTY, OF ASH BROOK, NEW JERSEY, ASSIGNORS TO THE AMERICAN SODA FOUNTAIN COMPANY, OF BOSTON, MASSACHUSETTS.

CARBONATOR.

SPECIFICATION forming part of Letters Patent No. 662,407, dated November 27, 1900.

Application filed June 15, 1899. Serial No. 720,601. (No model.)

To all whom it may concern:

Be it known that we, GUSTAV A. FLESCHÉ, residing at New York, borough of Brooklyn, county of Kings, and HENRY A. HALL, residing at New York, borough of Manhattan, county of New York, State of New York, citizens of the United States, and JOHN DOHERTY, a subject of the Queen of Great Britain, residing at Ash Brook, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Carbonator, of which the following is a specification.

Our invention relates to an improved carbonating apparatus adapted for the charging of a liquid with a suitable gas—as, for instance, the commercial production of soda and mineral waters, beer, wine, and other beverages.

The object of our invention is to provide a carbonator adapted to automatically charge the desired liquid with the desired gas which will be entirely automatic in its operation and wherein great uniformity in the charging operation will be secured.

We are aware that prior to our invention automatic carbonating apparatus has been designed; but owing to the lack of sensitiveness in the regulating devices and to the insufficiency of the mixing devices the prior carbonators have not been equal in the quality of output to the old-fashioned hand machinery and for this reason have not commended themselves to the public.

In our improved carbonating apparatus we employ a mixing-chamber in which the ultimate mixing of the gas and liquid is effected arranged to hold a normally approximate quantity thereof and when so partially filled to be counterbalanced by a fixed weight. We employ a force-pump which simultaneously draws water or other liquid from a supply-box maintained at an approximate level by a ball float-valve and gas from a gasometer, the liquid and gas thus imperfectly mixed in the pump being forced through a spray opening into the bottom of the mixing-chamber. We also preferably employ one or more check-valves in the discharge-pipe from the pump but more particularly to effect the breaking

up and assist the intimate association of the water and gas. The imperfectly-associated mixture of water and gas entering the mixing-chamber through the spray at the lower end will be forced upward through the charged liquid already in the chamber, and a very perfect mix will be thus secured. In order, however, to facilitate the mixing of the water and gas, we preferably make use of a mechanical agitator mounted in the mixing-chamber and serving to force portions of the gas above the liquid below the surface thereof and to elevate portions of the liquid through the gas. In order that the mechanical agitator when used may be driven, while at the same time allowing the mixing-chamber to be counterbalanced, as explained, we employ universal driving mechanism of novel construction for the purpose. The mixing-chamber is provided with a relief-valve set at the proper pressure and by means of which the gas-pressure within the same will be kept uniform, any escape through the relief-valve being conveyed back to the gasometer. The carbonated or other gas-charged liquid is drawn off from the mixing-chamber for use, the pump being of sufficient capacity to accommodate the maximum quantity withdrawn per minute. In order that the mixture may be absolutely uniform, the level of the liquid in the mixing-chamber requires to be kept substantially fixed, and we therefore employ an overflow-pipe connecting with the interior of the mixing-chamber and leading to the liquid-supply box, said overflow-pipe having an automatic regulating-valve therein adapted to be opened when the mixing-chamber descends by an overload, thus allowing the surplus charged liquid from the mixing-chamber to be forced back into the supply-box, reestablishing the balance, causing the mixing-chamber to ascend, and again closing the regulating-valve. The liquid which is thus caused to overflow into the supply-box will be charged with the gas and will become distributed throughout the larger bulk of liquid, so that but very little of the gas contained therein will escape. In this way we allow for the overflow from the mixing-chamber without substantial loss in power. Any relatively

slight quantities of gas that may ebulliate from the liquid in the supply-box will be conveyed back to the gasometer.

It will thus be observed that with our device in its complete form we subject the liquid and gas to five separate mixing operations, the first being performed in the pump, the second in the passage through the check valve or valves, the third in the spray, the fourth by the action of the mechanical agitator, and the last by the admixture of any charged liquid passing through the overflow into the supply-box. Thus an absolutely intimate mixture of gas and liquid will be secured, which will become less perfect if one or more of the mixing operations are dispensed with—as, for example, the doing away with the check valve or valves or the mechanical agitator. The principal mixing operations take place in the mixing-chamber, and it is upon this device that we lay especial stress. We are aware that prior to our invention mixing-chambers have been employed having a spray leading into the top thereof; but with such devices the mixture was necessarily imperfect. With our improved mixing-chamber the spray is introduced at the bottom, so that the gas is brought into contact not only with the liquid entering with it, but with all the liquid in the chamber.

Another feature on which we lay stress is a counterbalanced mixing-chamber provided with a mechanical agitator in addition to the spray, a device which, so far as we know, is entirely new and by which a very perfect and intimate mix will be secured.

We also believe that we are the first to employ a mixing-chamber having a mechanical agitator, the mixing-chamber being counterbalanced so as to maintain an approximately equal quantity of charged liquid therein and the mechanical agitator being operated by devices such as a universal gearing, which permit the delicate balancing of the mixing-chamber necessary to secure proper results.

We also consider important and claim especially the returning to the supply-box of surplus charged liquid from the mixing-chamber, as in this way we effect the balancing operations without remixture of liquid and gas at the pump.

All of these features of novelty, together with the specific details, will be more fully hereinafter described and claimed.

In order that our invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a diagrammatic view of the apparatus, showing the mixing-chamber, pump, water-supply box, and gasometer and illustrating the several conduits connecting the several elements; Fig. 2, a side view of the apparatus with the gasometer removed; Fig. 3, a front view thereof; Fig. 4, a plan; Fig. 5, an enlarged section through the mixing-

chamber and spray; Fig. 6, a section on the lines 6 6 of Fig. 5; Fig. 7, an enlarged detail view of the driving mechanism for the mechanical agitator; and Fig. 8, a section through the main driving-shaft, illustrating the preferred connection for operating the pump, showing the latter in elevation.

In all of the above views corresponding parts are represented by the same numerals of reference.

In a suitable frame 1 is mounted a main driving-shaft 2, carrying ordinarily a balance-wheel 3 and having fast and loose pulleys 4 thereon, to which the driving-belt is connected. At one end the shaft 2 carries a crank 5, driving a fork 6, connected to the piston-rod 7 of a liquid and gas pump 8 of any suitable type, the rod 7 being guided in a sleeve 9, as shown.

10 is a liquid-supply box conveniently carried on the framework 1, but which may be located at any other desired point. The liquid is maintained in the box 10 at an approximately constant level in any suitable way, as by means of a common float-valve 11. A pipe 12 connects the supply-box 10 with the liquid-inlet of the pump 8, said inlet being provided with a regulating-valve 13.

14 is a gasometer or gas-generator of any suitable type, connecting with the gas-inlet pipe 15 of the pump, said inlet-pipe being provided with a regulating-valve 16. By adjusting the positions of the valves 13 and 16 the proportions of liquid and gas entering the pump will be regulated. The discharge 17 from the pump connects with a flexible pipe 18 and leads into the mixing-chamber 19, which will be described in detail hereinafter. Preferably the discharge-pipe 17 of the pump is provided with one or more check-valves 20, two being shown, which are of any suitable type and which not only prevent backrush into the pump, but also by being lifted from their seats at each pulsation of the liquid from the pump serving to facilitate the association of the liquid and gas. These check-valves may be dispensed with, if desired.

The mixing-chamber 19, which is a vessel of a generally cylindrical shape having a tapered bottom, as shown, is supported by knife-edges 21 on a beam 22, connected to the other end of which is a counterbalance-weight 23, a limiting-guide 24 being used to prevent excessive movements of the beam 22. Preferably the knife-edges 21 are carried by a collar 25, surrounding the blow-off pipe 26, from the mixing-chamber, antifriction-balls being inserted above the said collar, whereby the mixing-chamber 19 will be free to turn on its vertical axis relatively to the scale-beam 22, if desired. The blow-off pipe 26 is provided with a relief-valve 27, which can be adjusted to maintain the pressure of gas within the mixing-chamber 19 at any desired point, overflow from the relief-valve being conveyed by a pipe 28 back to the gasometer. Usually a gage 29 is employed in order that

the workmen may be advised when the pressure within the mixing-chamber has reached the desired point.

The mixing-chamber 19 is made, preferably, of copper or steel spun or stamped into shape, having an inner lining of block-tin or other appropriate material, as is common. The flexible tube 18 for conveying the liquid and gas from the pump connects with a pipe 30, leading up into the interior of the mixing-chamber, closed at its upper end, and provided with numerous small perforations 31 therein, the whole constituting the spray for facilitating the mixing operation. Preferably also a mechanical agitator is employed within the mixing-chamber, which in the preferred construction comprises a ring 32, mounted on a shaft 33, carried in bearings 34 in the side walls of the mixing-chamber, one of said bearings having a closed cap 35 and the other a stuffing-box 36. The agitating-ring 32 is preferably of the cross-sectional shape shown in Fig. 6, comprising, essentially, two trough-like portions 37 38, inverted with respect to each other, one serving to force gas from above the level of the liquid down below the surface thereof and the other to elevate a portion of the liquid and to carry it into engagement with the superjacent gas at each rotation. The normal level of the liquid is preferably substantially in line with the shaft 33. The mechanical agitator 32 when used is operated from a shaft 39, driven from gears 40 from the main shaft 2. The shaft 39 carries a gimbal 41, the pivots of which engage a ball 42, with which at right angles the pivots of a gimbal 43 engage. A similar universal joint 44 drives the shaft 33. Interposed between the two universal joints is a divided shaft comprising a sleeve 45 and a rod 46, loosely adjustable longitudinally therein, rotary movement between the two being communicated by a pin and spline 47. By means of a driving device, such as shown, rotary motion from the shaft 39 will be communicated to the shaft 33, while at the same time the shaft 33 will be free to change its plane under the counterbalancing effects, the lengthening and shortening of the shaft connecting the universal joints being provided for by the telescopic character. By mounting the mixing-chamber on an antifriction-bearing from the scale-beam 22 it may be turned slightly on its vertical axis as it rises and falls when the friction between the sections 45 and 46 of the driving-shaft is greater than in the antifriction-joint above the collar 25.

Leading down from the interior of the mixing-chamber and within the spray-pipe 30 is an overflow-pipe 48, having an automatic regulating-valve 49 therein. This regulating-valve is preferably an ordinary plug-valve, the stem of which is connected to a lever 50, connected by a link 51 to a stationary element, such as the floor. The overflow-pipe 48 connects by a flexible section 52 with the

supply-box 10. The regulating-valve 49 will be so adjusted that when the mixing-chamber 19 occupies its proper plane—i. e., when the amount of charged liquid therein exactly counterbalances the weight 23—the regulating-valve 49 will be exactly on the point of opening, so that if an excess quantity of charged liquid enters the mixing-chamber to overbalance the weight 23 the downward movement of the mixing-chamber will cause the regulating-valve 49 to open.

The operation of our improved device will be as follows: The shaft 2 being rotated to operate the pump, liquid will be drawn from the supply-box 10 and gas from the gasometer 14 in the proper proportions dependent upon the position of the valves 13 and 16 and forced by the pump through the check-valves 20, if used, and thence through the flexible pipe 18 into the mixing-chamber. In being thus forced through the small openings 31 in the spray an intimate admixture of the gas and liquid will be secured, which will be increased when the liquid reaches its normal level, since the gas not only is required to come into intimate contact with the liquid entering with it, but is also caused to pass through all of the liquid within the chamber. The shaft 2, through the gears 40 and the universal shaft, drives the agitator-shaft 33, causing the mechanical agitator to agitate the charged liquid and to facilitate the mixing operation. When an agitator of the cross-sectional shape shown is employed, gas will be carried down below the level of the liquid and liquid will be carried into the superjacent layer of gas to increase the intimate association of the two. The pressure of the gas in the mixing-chamber will be maintained by the relief-valve 27, any escape going over to the gasometer. The charged liquid is drawn out of the mixing-chamber through flexible draw-off pipes 53, connected to valve-nipples 54. If the liquid in the mixing-chamber increases above the normal amount to overbalance the weight 23, the mixing-chamber will descend, opening the valve 49 and allowing the gas-pressure to force a portion of the charged liquid through the overflow-pipe 48 into the supply-box 10, reducing the weight of the liquid and allowing the mixing-chamber to once more ascend, closing the regulating-valve 49. Liquid which is thus caused by overflow to enter the supply-box 10 will be immediately mixed with a very much greater quantity of uncharged liquid therein and there will be little or no tendency of the gas to escape, so that we thus overcome unnecessary mixing of gas and liquid at the pump. Any small quantity of gas which may ebulliate from the liquid in the supply-box 10 will be conducted by a pipe 55 back to the gasometer.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is as follows:

1. In a carbonator, the combination with a counterbalanced mixing-chamber, of a pump

supplying a liquid to said chamber, an overflow-pipe from the chamber, and a regulating-valve in said overflow-pipe, allowing for a discharge of liquid from the mixing-chamber when the latter becomes overbalanced, substantially as set forth.

2. In a carbonator, the combination with a counterbalanced mixing-chamber, of a source of liquid-supply, a pump for forcing liquid therefrom into the mixing-chamber, an overflow-pipe connecting the mixing-chamber with the liquid-supply, and a regulating-valve in the overflow-pipe, permitting a discharge of liquid from the mixing-chamber when the latter becomes overbalanced, substantially as set forth.

3. In a carbonator, the combination with a counterbalanced mixing-chamber, of means for supplying a liquid and a gas thereto, an overflow-pipe from the mixing-chamber, and a regulating-valve adapted to be automatically opened when the mixing-chamber becomes overbalanced, to permit the gas-pressure to force out therefrom a quantity of the liquid, substantially as set forth.

4. In a carbonator, the combination with a counterbalanced mixing-chamber, of a source of liquid-supply, means for forcing liquid therefrom into the mixing-chamber and for forcing a gas into said chamber, an overflow-pipe leading from the chamber to the source of liquid-supply, and a regulating-valve arranged to be automatically opened when the mixing-chamber becomes overbalanced, to allow the gas-pressure to force a portion of the liquid back to the source of supply thereof, substantially as set forth.

5. In a carbonator, the combination with a mixing-chamber, of sources of liquid and of gas supply, means for simultaneously forcing liquid and gas therefrom into the chamber, an overflow-pipe connecting the chamber with the source of liquid-supply, and means for maintaining an approximately uniform quantity of liquid in said chamber by allowing for the return of excess gaseous liquid back to the source of supply, whereby the charged liquid entering the greater bulk thereof in such source of supply will be distributed throughout the same, substantially as and for the purpose set forth.

6. In a carbonator, the combination with a

mixing-chamber, of a liquid-supply box, a gasometer, a pump for forcing liquid and gas into the mixing-chamber, an overflow-pipe leading from the mixing-chamber to the liquid-supply box, an automatic regulating-valve in said pipe, and a gas-pipe connecting the supply-box with the gasometer, substantially as set forth.

7. In a carbonator, the combination with a counterbalanced mixing-chamber, of means for supplying a liquid and gas to the same, a mechanical agitator mounted in said chamber, and connections for positively driving said agitator without affecting the balance of the mixing-chamber, substantially as set forth.

8. In a carbonator, the combination with a counterbalanced mixing-chamber, of means for supplying a liquid and gas to the same, a mechanical agitator mounted in said chamber, and a shaft having universal joints for driving said agitator without affecting the balance of the mixing-chamber, substantially as set forth.

9. In a carbonator, the combination with a counterbalanced mixing-chamber, of means for supplying a liquid and gas to the same, a mechanical agitator mounted in said chamber, and a telescoping shaft having universal joints for driving said agitator without affecting the balance of the mixing-chamber, substantially as set forth.

10. In a carbonator, the combination with a counterbalanced mixing-chamber, means for supplying a liquid and gas to the same, a mechanical agitator mounted in said chamber, comprising two inverted annular troughs, for the purpose mentioned, and means for operating said agitator, substantially as set forth.

This specification signed and witnessed this 25th day of April, 1899.

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