H. M. SMITH.

CARBONATING APPARATUS.

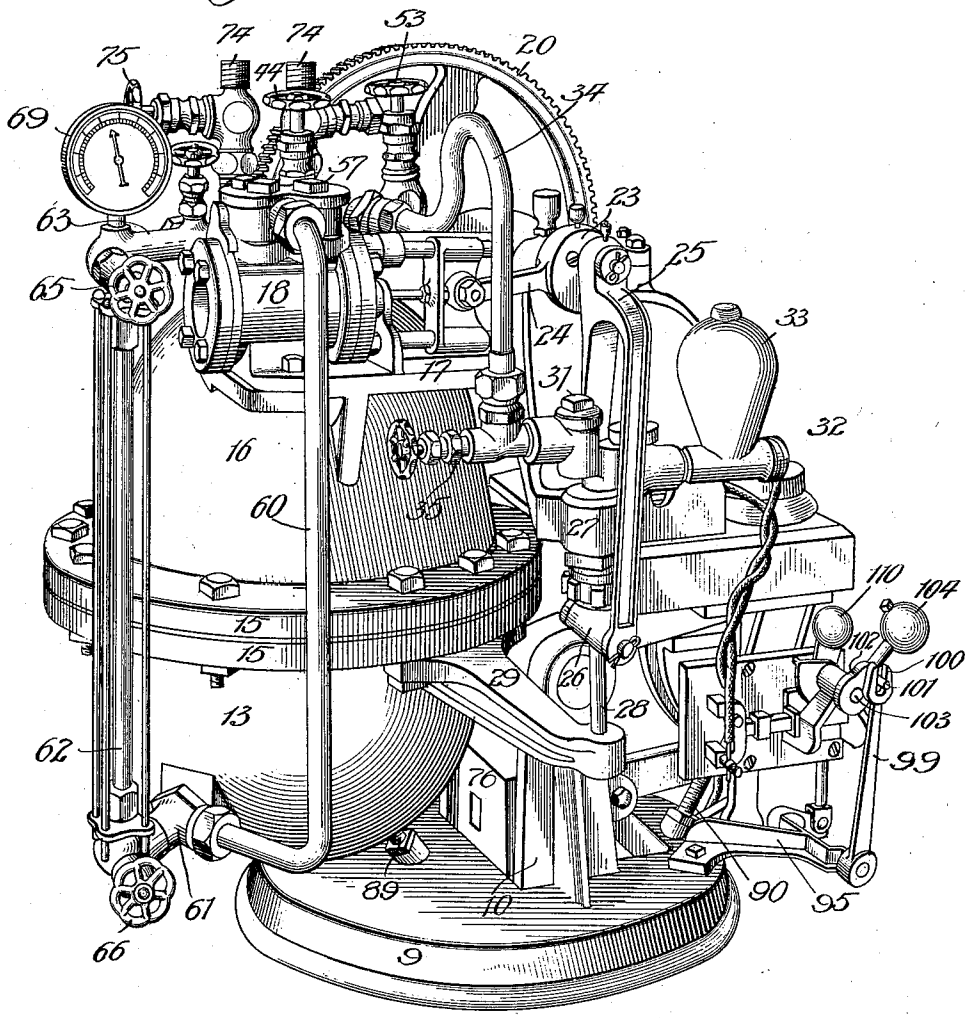
APPLICATION FILED MAR. 14, 1910.

1,026,715.

Patented May 21, 1912.

4 SHEETS—SHEET 1.

Fig. 1



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4 SHEETS—SHEET 2.

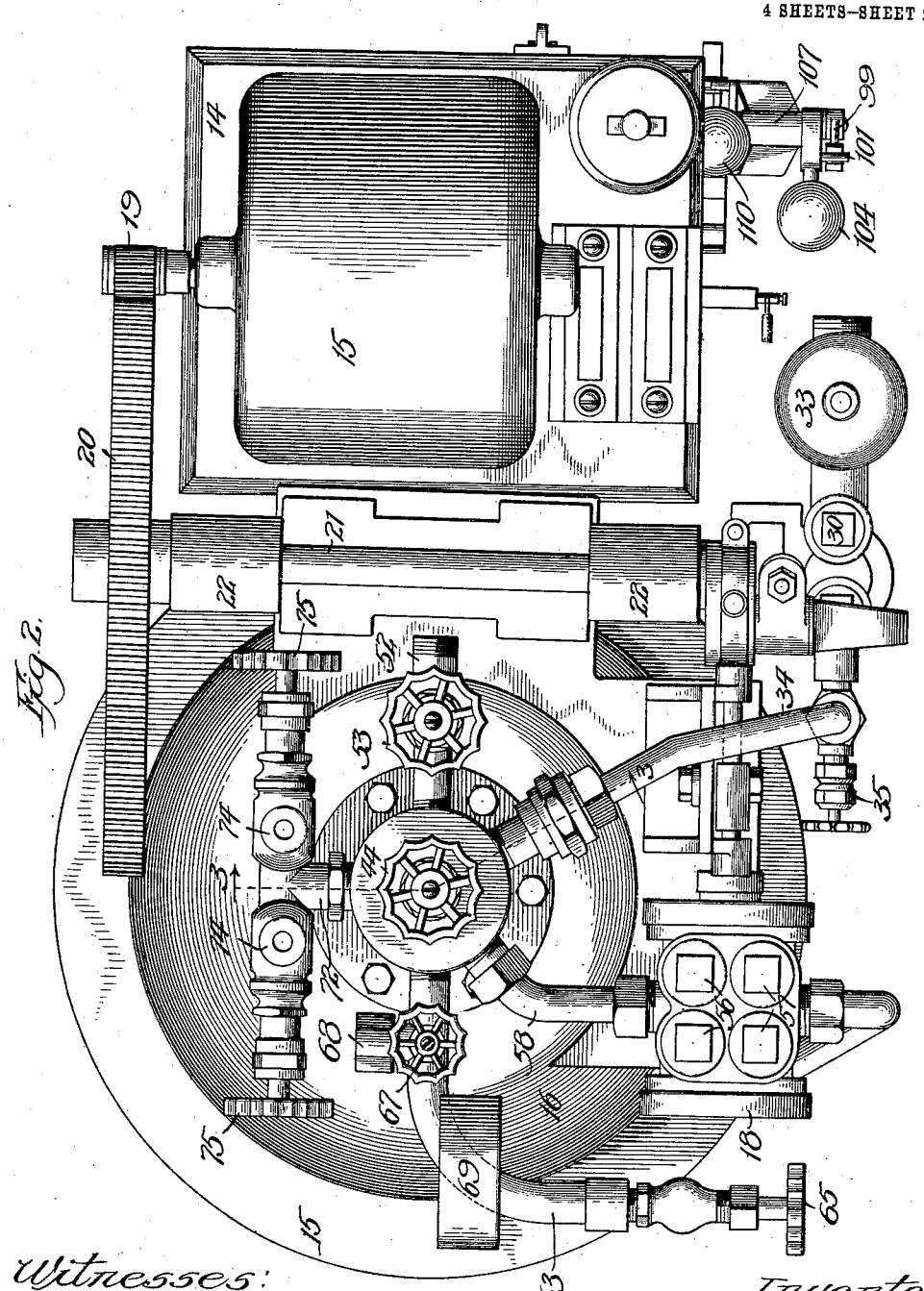

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

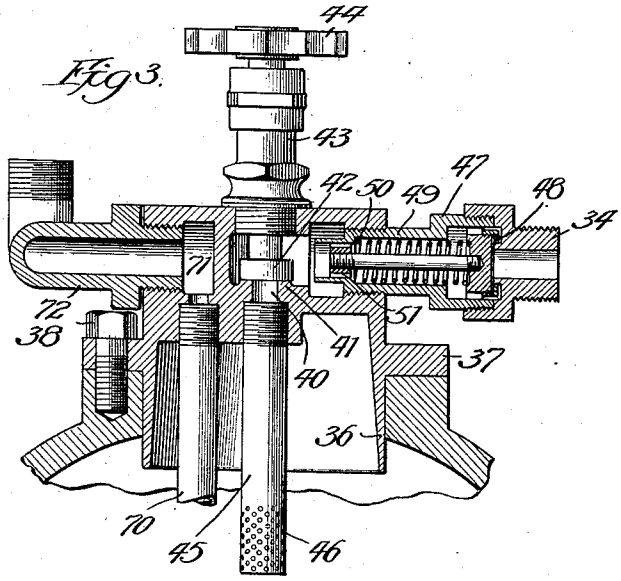
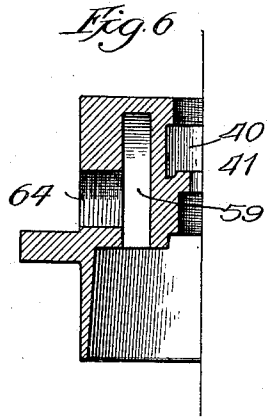


Fig. 6.



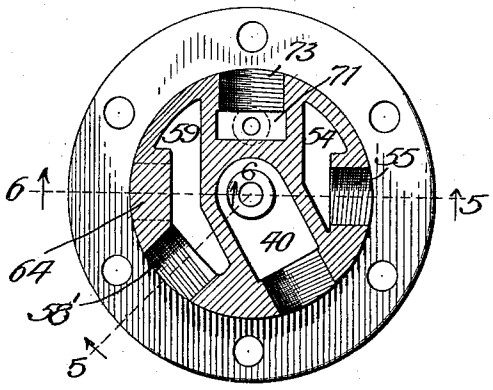


Fig. 4.

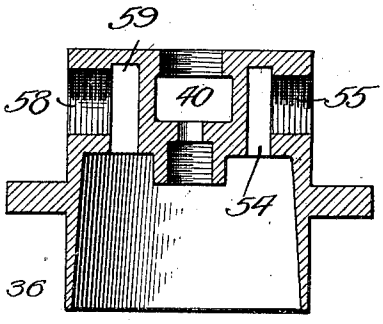


Fig. 5.

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4 SHEETS—SHEET 4.

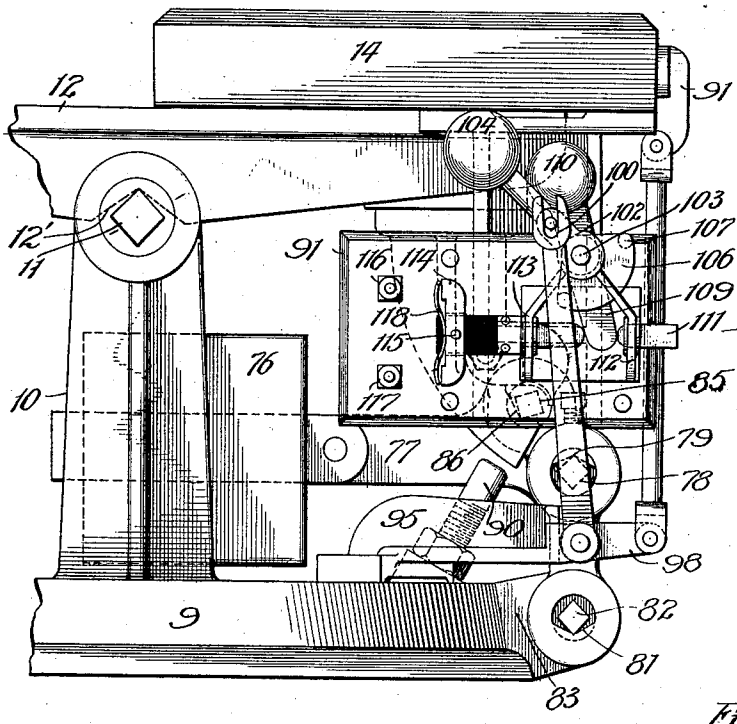

Fig. 7.

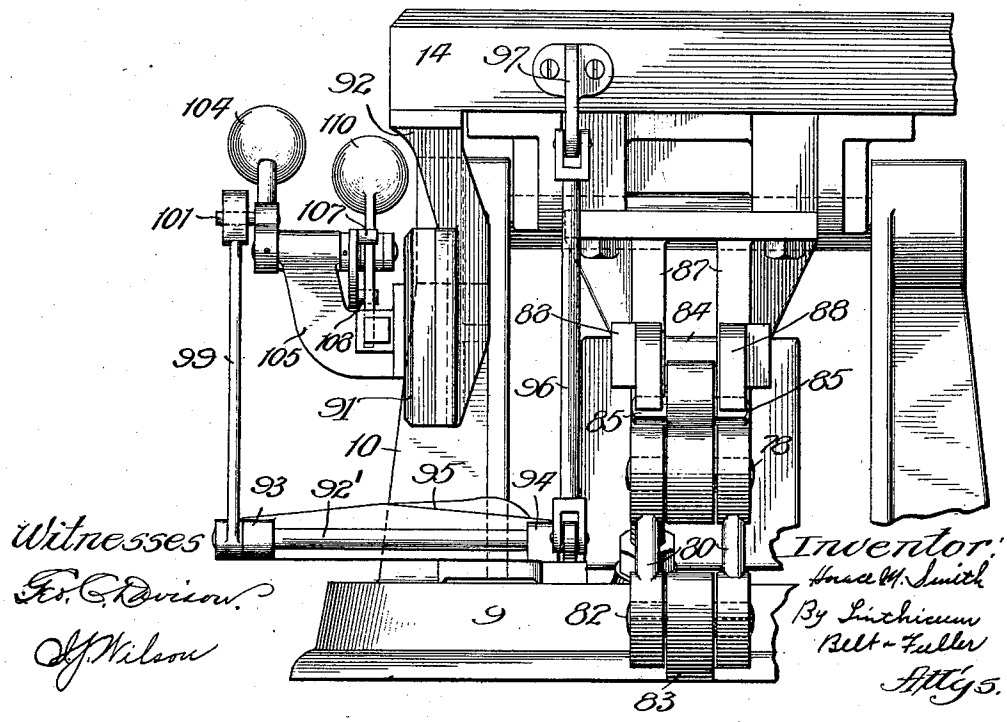

Fig 8.

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UNITED STATES PATENT OFFICE.

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CARBONATING APPARATUS.

1,026,715. Specification of Letters Patent. Patented May 21, 1912.

Application filed March 14, 1910. Serial No. 549,107.

To all whom it may concern

Be it known that I, HORACE M. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbonating Apparatus, of which the following is a specification.

This invention relates to carbonating apparatus adapted to provide carbonated liquids which may be either bottled or dispensed directly from the machine at soda-fountains or other sales places.

It has for its object the provision of a machine which shall be compact so that it will occupy but little room, which shall have all of its valves so positioned that they will be readily accessible to the operator, and which shall be entirely automatic in its operation.

Another object is the provision of a carbonating apparatus in which the quantity of liquid in the tank will be maintained substantially constant, and in which the decrease in the amount of contained liquid will automatically set in operation the liquid supplying pump, and which will automatically shut off the pump when the quantity of liquid has again been raised to the normal required amount.

Another object of my invention is the provision of a connection to the mixing tank through which the liquid supply to the tank, the gas supply, the circulating pump, and the carbonated liquid delivery pipe shall all communicate with the interior of the tank thereby decreasing the number of holes through the walls of the tank which have heretofore been considered necessary.

Further aims, objects, and advantages of my invention will become apparent as it is better understood by reference to the following description when taken in connection with the accompanying drawings illustrating a preferred embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

Referring to the drawings—Figure 1 is a perspective of a carbonating apparatus embodying my invention. Fig. 2 is a plan view thereof. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a horizontal section through the turret connection to the tank intersecting the water inlet, the gas inlet, the outlet to the circulating pump, and the carbonated liquid delivery pipe. Fig. 5 is a section on the line 5—5 of Fig. 4. Fig. 6 is a section on the line 6—6 of Fig. 4. Fig. 7 is an enlarged elevation of the portion of the mechanism shown at the right in Fig. 1, and, Fig. 8 is an elevation looking toward the left in Fig. 7.

In the drawings, 9 designates the base upon which the apparatus is mounted, provided with a plurality of integral upwardly extending standards 10, having laterally projecting knife-edge bearings 11, near their upper ends. Carried upon the bearings 11 is the horizontal arm 12, which is provided with a transversely disposed notch 12′ on its lower edge adapted to seat upon the bearings 11 as shown in Fig. 7. The arm 12 is integral with and projects laterally from the lower half of the body of the mixing chamber 13, and carries at its outer end a base 14 upon which is suitably mounted a motor 15 of any preferred type. The tank 13 is circular in cross-section and substantially elliptical in vertical section and comprises upper and lower sections provided with annular flanges 15 which are connected together by bolts as shown in Fig. 1. The upper section 16 of the tank, has, cast integral therewith, a laterally projecting shelf 17 adapted to support a gas circulating pump 18.

The shaft of the motor 15 has secured thereon, at one end, a drive pinion 19 adapted to mesh with a large driven gear 20 secured upon the shaft 21, which is mounted in bearings 22 extending upwardly from a forward projection of the shelf 17. Upon the other end of the shaft 21 there is secured the eccentric 23 which is connected with the pump 18 by means of the connecting rod 24, for the purpose of reciprocating the pump pluriger as will be hereinafter described. Secured to the outer face of the eccentric 23 is the upper end of a yoke 25 which extends downwardly and is connected at its lower end with a cross-head 26 of a water pump 27, the cross-head being guided on a rod 28 projecting upwardly from the outer end of an arm 29 secured to the flange of the lower section 13 of the tank.

The water pump 27 may be of any preferred construction, therefore a detailed description of the same will be unnecessary in this application, it being sufficient to state that the pump is of an ordinary single act-

ing type provided with an inlet check valve 30 and a discharge check valve 31, the intake pipe 32 being provided with the usual air-cushion chamber 33. This pump is adapted to supply water to the mixing tank through the connecting pipe 34 which is provided at its lower end with an ordinary drain-cock 35 and connections at its upper end with the turret connection to the tank.

It is necessary that mixing tanks for carbonators be lined with block-tin or some similar material which will withstand the action of carbonic acid and as will be evident, each hole through the walls of the tank and lining increases the cost of manufacture because of the labor required in calking the tin around the edges of the hole. Furthermore, the liability of the acid coming in contact with the iron is increased by the number of holes around which the tin is calked. In my present construction the water and gas inlet pipes and the liquid delivery pipes communicate with the interior of the tank through a single turret connection located at the top of the tank. This connection can be cast in one piece and secured in place on the tank after the tank has been lined, it being necessary in securing these pipes in place to calk the tin around one opening only, *i. e.*, around the line of connection between the turret and the tank. As best shown in Figs. 3 to 6, inclusive, this turret connection comprises a downwardly extending flange 36 which projects into the top of the tank, and a laterally projecting flange 37 by means of which the turret is connected to the tank through the instrumentality of bolts 38 or other desired fastening means. A passage-way 40 extends vertically through the center of the connection and has a valve-seat 41 against which the valve 42 is adapted to seat, the valve casing 43 being screwed into the top of the turret and projecting upwardly therefrom and provided with a hand-wheel 44. An inlet pipe 45 is threaded into the lower end of the passage-way 40, said pipe terminating near the top of the tank and being provided with minute perforations 46 through which the water is delivered in a spray or in fine streams into the tank. The passage-way 40 extends laterally through the wall of the turret as best shown in Fig. 4, and is internally threaded to receive the nipple 47 of a check-valve 48 which is interposed in the water inlet pipe 34. The valve 48 is normally held in closed position by means of a coil expansion spring 49 bearing at one end against the valve and at its other end against an internal shoulder 50 in the nipple 47, as shown in Fig. 3, the inner end of the valve-stem being guided by a spider 51 which is adapted for longitudinal reciprocatory movement in the reduced inner end of the nipple.

Gas is supplied to the mixing tank from an ordinary pressure supply (not shown) through the supply pipe 52 which is provided with a hand valve 53 and communicates with the passage 54 in the turret through the internally threaded opening 55. The passage-way 54 opens directly downwardly into the mixing chamber where the gas and water are mixed to produce the carbonated liquid. The surplus of carbonic acid gas in the mixing tank accumulates in the top thereof, and for the purpose of circulating this gas through the liquid in the tank so that it may be absorbed by the water, I have provided the circulating pump 18 which is operated from the main shaft 21 as previously described. The pump 18 is of the usual double acting type, the inlets and outlets to the cylinder within which the usual plunger reciprocates being controlled by the check-valves 56 and 57, respectively. The suction pipe 58 is attached at one end to the inlet valve chamber and is threaded at its other end into the opening 58′ in the turret connection which communicates with the tank through the chamber 59, as shown in Fig. 4. A pipe 60 connects the discharge valve chamber of the pump with the bottom of the tank through the fitting 61 threaded through the wall of the tank. When the tank is partially filled and the surplus gas has accumulated in the tank above the water level, the operation of the circulating pump 18 will draw the gas from the top of the tank through the chamber 59 and pipe 58 and discharge it through the pipe 60 and fitting 61 into the bottom of the tank, the discharge from the fitting 61 being preferably in the form of a perforated coil which is submerged in the liquid so that the gas escaping therefrom is thoroughly distributed through the liquid contained in the tank.

A water glass 62 of any preferred type is connected with the tank at its lower end through the fitting 61 and communicates with the chamber 59 at its upper end through the pipe 63 which opens into the chamber through the opening 64 located in a plane below the openings 40, 55, 58, and 73, as will be evident from Fig. 4. The water glass is preferably provided with the usual cocks 65 and 66, while the pipe 63 is supplied with an air-vent controlled by the valve 67 and a safety-cap 68 adapted to relieve the pressure in the tank should it rise above a predetermined safety point. A pressure-gage or indicator 69 of usual construction, is also connected to the pipe 63.

The carbonated liquid is drawn off from the tank through the pipe 70 which extends nearly to the bottom of the tank and connects at its upper end with the chamber 71. The delivery pipe 72 communicates with the chamber 71 through the threaded opening 73 in the wall of the turret connection. The

pressure in the tank will force the liquid up the pipe 70 and into the delivery pipe 72 which may be branched, each branch being provided with discharge openings 74 controlled by the hand-valves 75.

As has been previously explained the tank and all of the operating mechanism, including the motor and the water and circulating pumps, are carried by the arm 12 which is supported upon the standards 10 so as to be capable of oscillatory movement upon the bearings 11. It is desirable that this oscillatory movement of the mechanisms upon the bearings 11 be controlled by the amount of liquid in the mixing tank, and in order that the amount of liquid contained in the tank may be varied, if desired, and in order that the machine may be properly balanced, I have provided a counterweight 76 (Fig. 7) adjustable longitudinally upon an arm 77, which is provided with knife bearings 78 adapted to engage with seats 79 in the links 80 which are pivoted at their lower ends to the base 9 of the machine, and provided with bearing surfaces 81 adapted to engage with the knife-edge bearings 82 upon a laterally projecting stud 83 from the base of the machine. The arm 77 has an upwardly and rearwardly extending portion 84 from which projects laterally the knife-edge bearing lugs 85 which are adapted to seat against the bearings 86 provided on the lower ends of the arms 87 which are secured to the lower side of the arm 12. It will be evident that the weight of the arm 77 and counterweight 76 are supported upon the bearings 85 and that upward movement of the bearings 78 is prevented by the links 80. The bearing lugs 85 are prevented from displacement in the bearings 86 by shoulders 88 bolted to the arms 87 and projecting over and in proximity to the bearing lugs 85, as shown in Fig. 8. When the weight of the water in the tank overbalances the counterweight 76, the parts assume the position shown in Figs. 1 and 7 wherein the mechanism has oscillated in a counter-clockwise direction about the bearings 11 until the tank has assumed its lowermost position, further oscillatory movement in this direction being prevented by the adjustable stop 89. When the carbonated liquid in the tank is drawn off until the weight of liquid in the tank is overbalanced by the counterweight 76, this weight will move downwardly, under the influence of gravity, about its pivotal bearings 78, the bearing lugs 85 acting upon the arms 87 to oscillate the arm 12 in a clockwise direction, looking at Fig. 7, about the bearings 11, until one of the arms 87 engages with the adjustable stop 90. This oscillatory movement of the mechanism in a clockwise direction, when the liquid in the carbonating tank falls below a predetermined level, sets into operation the liquid supplying pump through the gravity switch shown in Figs. 1, 7, and 8. The switch mechanism is mounted upon a block 91 secured to an arm 92 projecting downwardly from the motor base 14 carried upon the arm 12. The switch is operated from a rock-shaft 92′ mounted in bearings 93 and 94 on an arm 95 projecting laterally from the base of the machine. Oscillatory movement of the arm 12 will rock the shaft 93 by means of a link 96 which is connected to the motor base 14 by means of an ear 97, and to the rock-shaft through an arm 98 rigidly secured thereon. The outer end of the shaft 92′ is provided with an upwardly extending arm 99 slotted at its upper end at 100 to receive a laterally projecting pin 101 on the arm 102 secured to the rock-shaft 103. The arm 102 is extended as shown in Fig. 8, and carries at its outer end a weight 104.

A bracket 105 projecting outwardly and upwardly from the switch-block 91, provides a bearing in which the rock-shaft 103 is adapted to oscillate. The inner end of the shaft 103 has rigidly secured thereto a plate or sector 106 provided with inwardly projecting pins 107 and 108, which are adapted to alternately engage with the arm 109 loosely mounted on the shaft 103 and carrying at its upper end the weight 110. The lower end of the arm 109 engages in a slot in the bar 111 which is adapted to slide longitudinally in the bearings 112 and 113 on the base of the bracket 105, the inner end of the bar being made of fibrous or other insulating material and carrying a contact member 114 pivoted at 115, which is adapted to be engaged with the terminals 116 and 117 to close the circuit to the motor 15, thus setting in operation the liquid supply pump.

It will be evident that downward movement of the motor base 14 will rock the shaft 92′ in a clockwise direction looking at Fig. 7, thus swinging the arm 99 to the right. The engagement of the slotted upper end of the arm 99 with the pin 101 will rock the shaft 103 until the weight 104 passes a vertical line drawn through the axis of the shaft, whereupon further movement of the shaft will be caused by the action of the weight under the influence of gravity. The shaft 103 carries with it in its movement the plate or sector 106, the arm 109 in the meantime remaining in the position shown in Fig. 7, under the influence of the weight 110. When the pin 107 is brought into engagement with the lower portion of the arm 109, the arm will be turned in a clockwise direction until the weight 110 passes a vertical line drawn through its axis of rotation, whereupon the weight acting under the influence of gravity, will swing quickly to the right, its

lower end moving to the left to impart longitudinal movement to the bar 111 which brings the contact member 114 into engagement with the terminals 116 and 117 to close the motor driving circuit. For the purpose of insuring a close contact between the terminals and the contact member 114 and to avoid poor contact which might be caused by an accumulation of dust or dirt upon the terminals, I have pivoted the contact member upon the bar 111 so that it is capable of a slight oscillatory movement, and I have also provided a light curved spring 118 which is secured to the contact member midway its ends. When the contact member is forced against the terminals, the spring tends to straighten out, thus moving slightly across the terminals to displace any accumulation of dust or dirt thereon, and insuring a proper contact. The operation of the motor 15 upon the closure of the motor driving circuit, in the manner just described, sets into operation the gas circulating pump 18 which draws the accumulated gas from the top of the tank and discharges it in a finely divided condition into the liquid in the bottom of the tank, and also actuates the water supply pump 27 which pumps water into the tank. These pumps operate continuously until the quantity of water in the tank overbalances the counterweight 76 whereupon the entire mechanism oscillates in a counter-clockwise direction, viewing Fig. 7, upon its pivotal bearings 11. Upward movement of the outer end of the arm 12 will reverse the operation of the switch mechanism previously described.

From the foregoing, it will be evident that I have provided an automatic machine, the operation of which is controlled by the quantity of liquid in the carbonating tank, which quantity of liquid is automatically maintained at practically a constant level. The mechanism is simple in construction, its parts are readily accessible, and with very little attention it is adapted to automatically produce carbonated liquid as fast as it is consumed.

While I have shown and described a preferred embodiment of my invention, it will be obvious that various changes in minor mechanical details may be resorted to without departing from the spirit of the invention or sacrificing any of the material advantages thereof.

What I claim is:

1. In a carbonating apparatus, the combination of a tank, means for supplying gas thereto, mechanism for supplying liquid thereto, mechanism for circulating the surplus gas through the tank, means for operating said liquid supplying and circulating mechanisms, a support upon which all of the aforesaid are pivotally mounted, and a device adapted to be controlled by the movement of the mechanisms about the support for controlling the means for operating said mechanisms.

2. In a carbonating apparatus, the combination of a mixing tank, means for supplying gas thereto, a pump for supplying liquid thereto, a circulating pump adapted to draw the surplus gas from the top of the tank and deliver it to the bottom of the tank and a motor for operating said liquid and circulating pumps, all mounted to oscillate together about a pivotal support, and a device adapted to be actuated upon said oscillatory movement to control the operation of said motor.

3. In a carbonating apparatus, the combination of a mixing tank, a turret attached to the top of the tank, said turret being provided with radially disposed passageways adapted for the connection of pipes to supply water to the tank, to supply gas to the tank, to withdraw gas from the tank and to discharge the carbonated liquid from the tank, said passageways being arranged in a horizontal plane and a separate passageway for the attachment of a water gage disposed in a plane below the other passageways, the pipe through which gas is withdrawn from the tank being connected with the bottom of the tank whereby a circulation of gas through the tank may be maintained.

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