No. 720,719. PATENTED FEB. 17, 1903.

P. E. MALMSTROM.

# APPARATUS FOR PRODUCING AERATED BEVERAGES.

APPLICATION FILED SEPT. 1, 1899. RENEWED FEB. 24, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

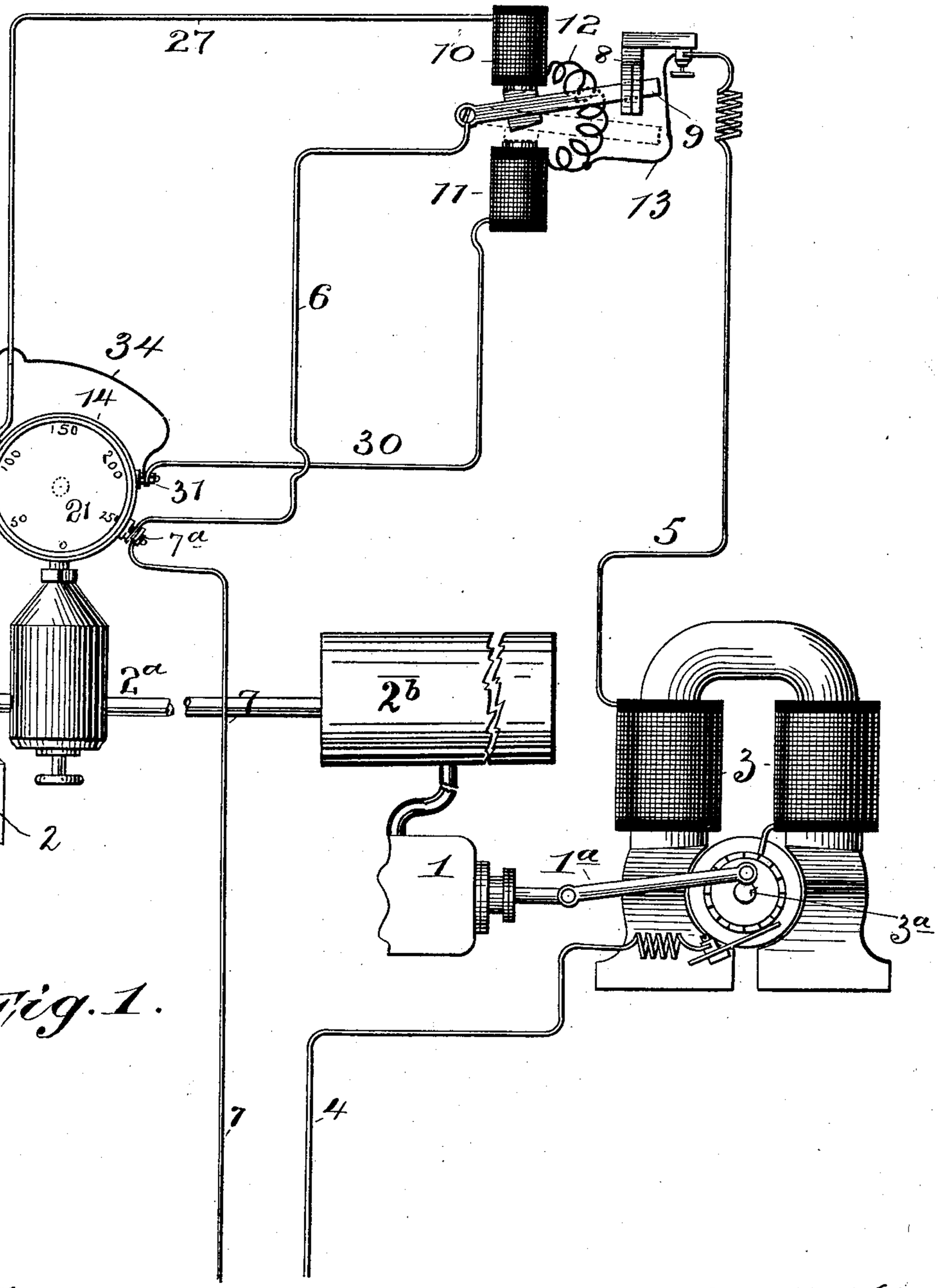


Fig. 1.

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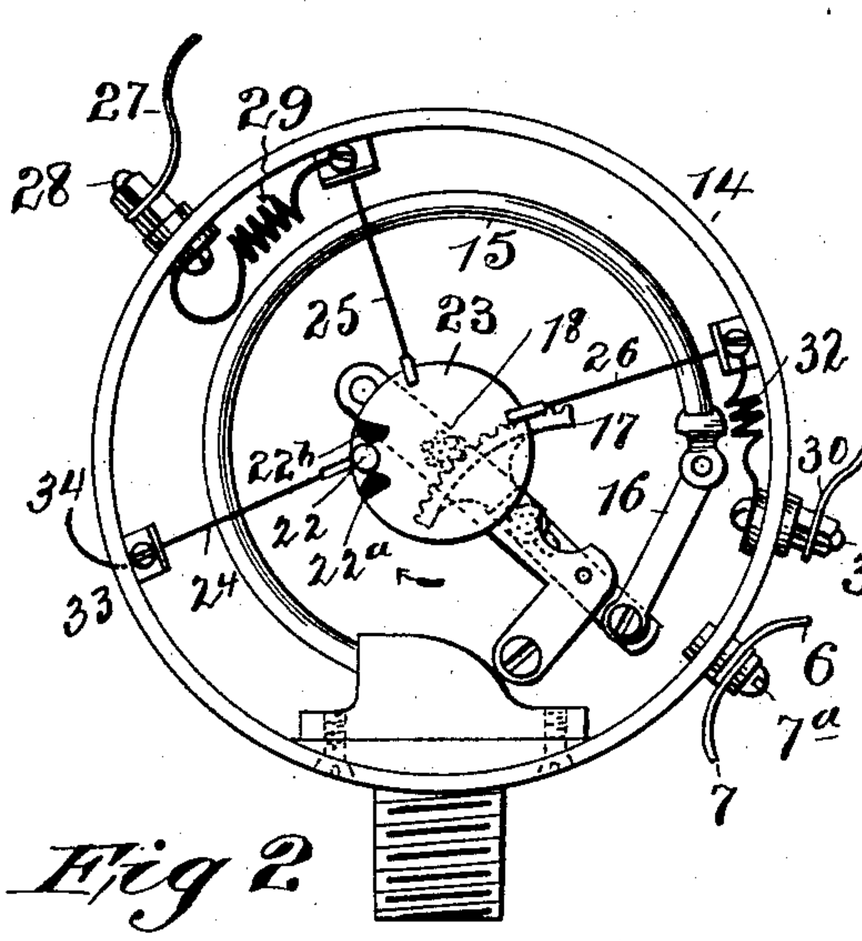


Fig 2.

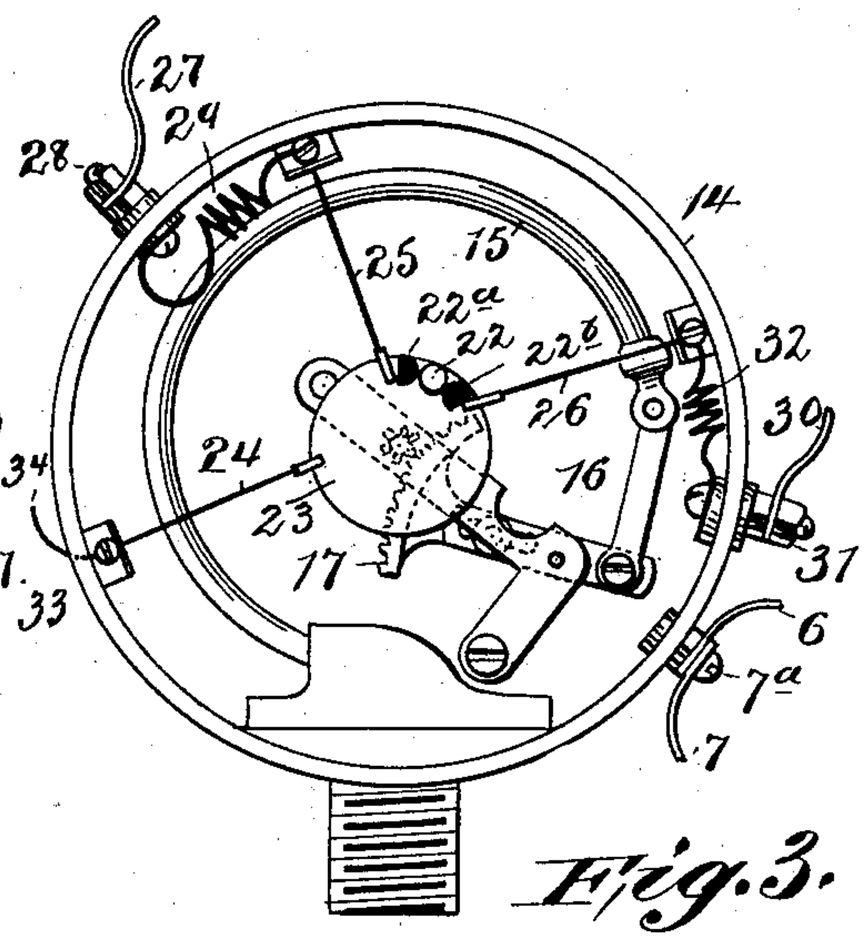


Fig. 3.

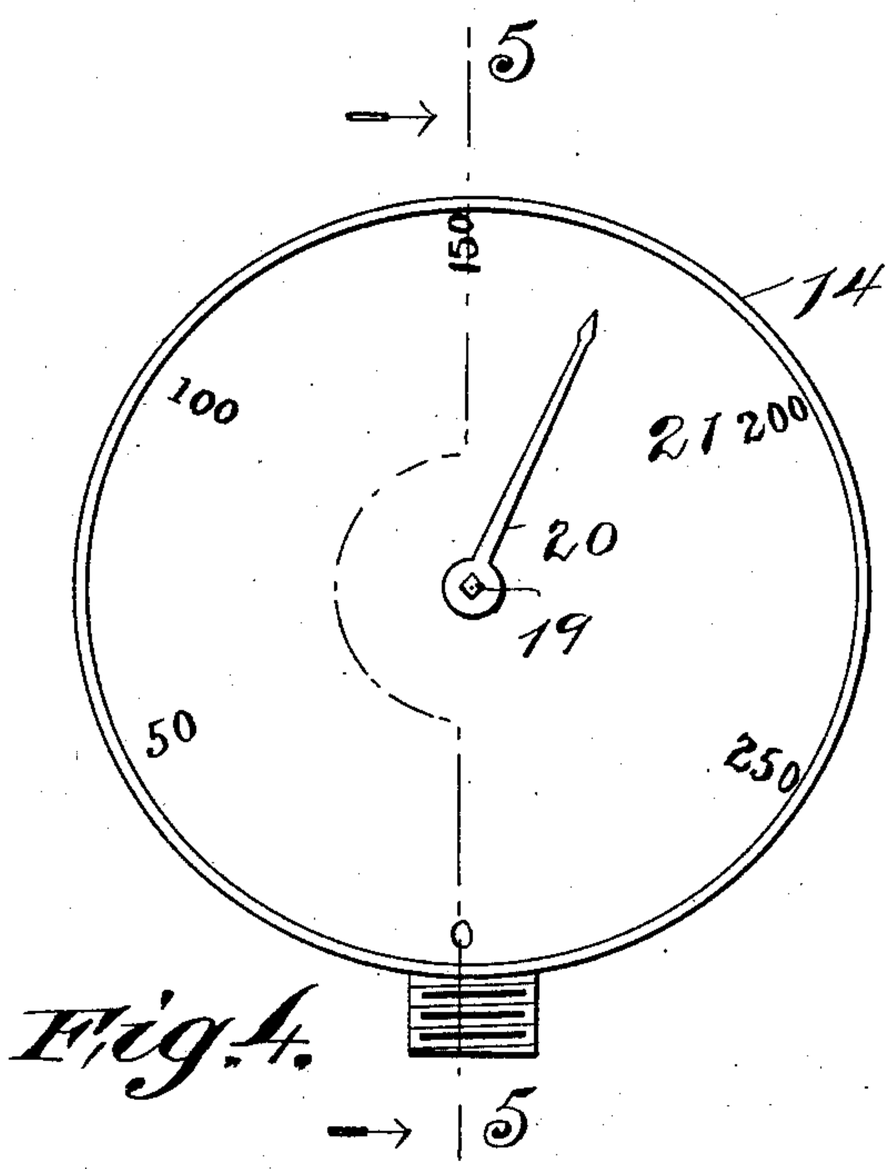


Fig. 4.

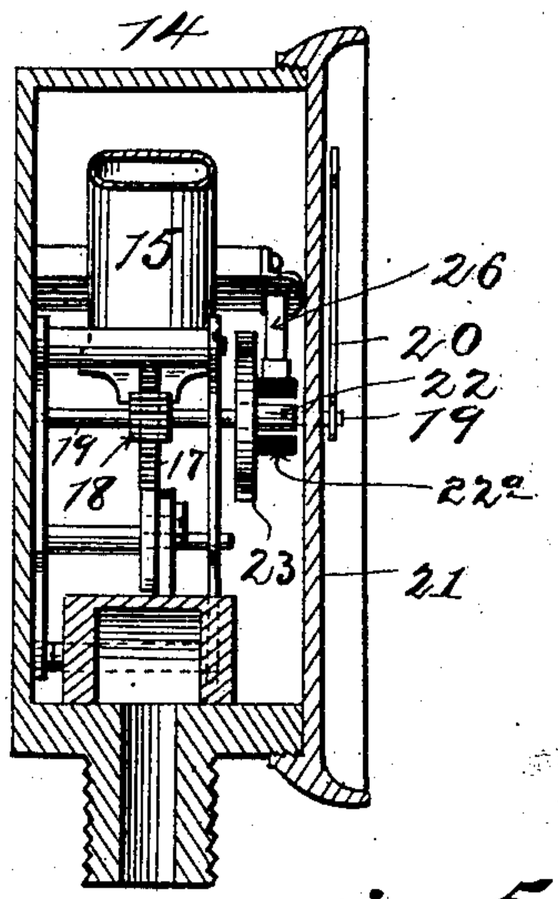


Fig. 5.

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# UNITED STATES PATENT OFFICE.

PETER E. MALMSTROM, OF NEW YORK, N. Y., ASSIGNOR TO JOHN MULHOLLAND, OF NEW YORK, N. Y.

## APPARATUS FOR PRODUCING AERATED BEVERAGES.

SPECIFICATION forming part of Letters Patent No. 720,719, dated February 17, 1903.

Application filed September 1, 1899. Renewed February 24, 1902. Serial No. 95,283. (No model.)

*To all whom it may concern:*

Be it known that I, PETER E. MALMSTROM, a citizen of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Apparatus for Producing Aerated Beverages, of which the following is a specification.

My invention relates to apparatuses for commingling liquid with gas for the production of aerated or carbonated waters or beverages; and the principal object of the invention is to provide improved means to regulate and control the mixing of the gas and liquid through the medium of the pressure of the gas that is being commingled with liquid. To this end I provide a gas-holder and a pump, each of which is to be connected with a receptacle to be charged, and the pump is operated by an electric motor, the current for which is controlled by electrically-operating devices that are caused to act by a circuit-controller that is operated by the pressure of the gas to be commingled with water forced into said receptacle by the pump. In this connection I utilize a switch in the circuit of the motor and provide magnets to actuate the switch, and the circuit for each magnet is controlled by contacts, which are made and broken by devices which are embraced in a gas-pressure-indicating gage, the arrangement being such that when the gas-pressure reaches a predetermined point the circuit-controlling devices will operate the switch to close the circuit of the motor, and when the gas-pressure rises above or falls below definite points the switch will be thrown to break the current from the motor, and thus stop the pumping.

The invention also consists in the novel details of improvement, that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a diagrammatic view of an apparatus embodying my invention. Figs. 2 and 3 are enlarged detail face views of the combined gage and circuit-controller, the dial being removed. Fig. 4 is a face view of the same, showing the dial and pointer; and Fig. 5 is a vertical cross-section on the plane of the line 5 5 in Fig. 4.

Similar numerals of reference indicate corresponding parts in the several views.

A suitable pump is indicated at 1 and a gas-holder at 2, both of which are connected with a receptacle or carbonator $2^b$, in which liquid is to be aerated or carbonated in the well-known manner of pumping liquid into a vessel containing carbonic-acid gas.

3 is a suitable electric motor to operate pump 1, being shown connected to the pitman $1^a$ of the pump by a crank $3^a$. The conductors 4, 5, 6, and 7 for the circuit of the motor may connect with any suitable source of electrical energy, and in said circuit is a switch having a contact 8, shown connected with conductor 5, and an arm 9, adapted to engage contact 8 and shown connected with conductor 6. The switch 9 may be substantially in the form of a dead armature, adapted to be alternately attracted by magnets 10 and 11 to make and break the circuit of the motor. By preference I utilize the current of the motor-circuit to energize the magnets 10 and 11, and for this purpose I have shown one terminal of each magnet connected with conductor 5, as by wires 12 13.

The circuit of each magnet 10 11 is controlled by contacts connected with a gas-pressure gage 14, that is in communication with the gas-holder 2, preferably through a reducing-valve $2^a$, all arranged in well-known manner. The arrangements I have shown for this purpose are as follows: Within the casing of the gage 14 is an expansible tube 15, adapted to receive gas, and it is connected by a link 16 with a pivotally-supported segmental rack 17, that meshes with a pinion 18, carried by a shaft 19, journaled in the casing and having a pointer or hand 20, adapted to sweep over a dial 21. The parts of the gage above described are of well-known construction; but any other suitable gage can be used. To the shaft 19 is connected a contact or metal pin 22, being shown carried by a metal support or disk 23, secured to shaft 19, so that the contact 22 will oscillate or travel in an arc around shaft 19, corresponding to the movements of pointer 20, through the action of the gas-pressure. The contact

22 is adapted to engage contacts 24 25 26, that are carried by but insulated from the casing of the gage, and by means of these contacts the circuit of magnets 10 and 11 is made and broken at the proper times. The conductors 6 and 7 are in electrical connection with gage 14 through the medium of a binding-post $7^a$, carried by the latter, whereby current from the circuit of the motor is taken to operate magnets 10 and 11. At each side of contact 22, secured on support 23, I preferably place insulation $22^a$ $22^b$ in such position as to cause the contact-springs 24 25 26 to snap into quick engagement with contact 22 to prevent sparking, as the movement of contact 22 under the action of gas-pressure may be quite slow. The contact 25 is electrically connected with a conductor 27, that leads from a terminal of magnet 10 to a binding-post 28, carried by and insulated from the gage, contact 25 being connected with post 28, as by a conductor 29.

From the foregoing it will be understood that when switch 9 is in the position shown in dotted lines in Fig. 1 and contact 22 engages contact 25 (through the action of the gas-pressure in the gage) circuit will be closed through magnet 10 from conductor 7 through post $7^a$ and the gage mechanism to contact 22, thence through 25 29 28 27, magnet 10, conductors 12 13 5, motor 3, and conductor 4 back to conductor 7 through the generator. Magnet 10 will now cause switch 9 to close circuit at 8, whereupon circuit for the motor will be established from 7 through 6, 9, 10, 5, 3, and 4, whereupon pump 1 will be operated.

The contacts 24 and 26 are utilized to close a circuit through magnet 11 when the gas-pressure in holder 2 falls below or rises above predetermined points, and for this purpose magnet 11 is electrically connected with contact 26, as by a conductor 30, leading to a binding-post 31, carried by and insulated from gage 14, said post being shown connected by a conductor 32 with contact 26, and the contact 24 is also electrically connected with magnet 11, being shown connected with a binding-post 33, carried by and insulated from gage 14, from which post a conductor 34 leads to post 31 or wire 30, or it could lead direct to magnet 11.

From the foregoing it will be understood that when contact 22 engages contact 26 (owing to high gas-pressure) circuit for magnet 11 to cause switch 9 to break the circuit of the motor will be as follows: from 7 through $7^a$ and the gage to contact 22, thence to 26 through 32 31 30, magnets 11, 12, and 13, to conductor 5, and thence through the bin back to 7, whereupon switch 9 will be operated by magnet 11 to break the motor-circuit. Likewise when the gas-pressure falls to a certain low point contact 22 will engage contact 24, whereupon circuit for magnet 11, for the purpose before stated, will be established as follows: from 7 to $7^a$ and through the gage to contact 22, thence through 24, 33, 34, 31, and 30 to magnet 11, and thence to the bin, as described for contact 26.

The complete operation of aerating or carbonating liquid in connection with my improvements may be described as follows: The gas-holder 2 and pump 1 are connected with the receptacle or carbonator to be charged, circuit is open at 8 9, and the gas is turned on. As soon as the pointer 20 indicates a predetermined pressure—say one hundred pounds—contact 22 will have reached contact 25, (but in passing contact 24 will have made no change in the motor-circuit,) whereupon circuit for magnet 10 will be closed, and thereupon switch 9 will be drawn into engagement with contact 8, thus closing the circuit of the motor, which will actuate the pump 1 to force water into the carbonator. If the pressure in the gage 14 should rise above a predetermined point—say one hundred and fifty pounds—contact 22 will be moved into engagement with contact 26, thus closing the circuit of magnet 11, and switch 9 will move to break the motor-circuit at 8 9 to stop the motor, which will remain stopped until the pressure in gage 14 falls sufficiently to enable contacts 22 and 25 to again engage. Should the pressure in gage 14 after the motor starts fall to a predetermined low point—say fifty pounds—contact 22 will engage contact 24 to close the circuit of magnet 11 to break the circuit of the motor, which will remain stopped until the pressure again rises to the predetermined starting-point. From this it will be apparent that the motor starts only when the gas-pressure in the gage reaches a determined point, that the motor stops when the pressure exceeds or falls below definite points, and that the motor after once starting will continue to operate the pump at all gas-pressures between the determined high and low points.

The location of the contacts 24 and 26 relatively to the path in which contact 22 oscillates determines the pressures required to cause magnet 11 to operate the switch, and the location of contact 25 determines the pressure at which contacts 22 and 25 will close circuit for magnet 10 to cause the motor to start. Thus the pumping of liquid into the presence of gas is automatically controlled at predetermined high and low pressures of said gas, and the pumping operation is not started until a predetermined gas-pressure has been reached; but it is evident that, if desired, switch 9 or any other switch in the motor-circuit can be manually operated to start or stop the motor at any desired gas-pressure.

One of the advantages of my invention is that the carbonating operation can proceed without requiring close attendance by an operator and the resulting product will be that which is desired.

It is evident that if the contact 24 or 26 were dispensed with the motor would continue to operate at any pressure either below or above the predetermined starting pressure respec-

tively, but I prefer to use both of said contacts and their circuits; but I do not limit my invention to the details of construction and the arrangement shown and described, as they may be varied without departing from the spirit thereof, and it will be evident that the described arrangement of contacts and circuit connections can be varied and also that the circuits of magnets 10 and 11 could be provided with means for energizing the magnets instead of utilizing the current from the motor-circuit.

Having now described my invention, what I claim is—

1. In a carbonating apparatus, a gas-holder, a liquid-supply pump, and electrical means for driving said pump, a carbonator connected to said gas-holder and pump, a switch provided with magnetic actuating devices, and means automatically controlled by the pressure in said gas-holder for energizing either of said magnetic devices, thereby controlling the operation of said pump, substantially as described.

2. In a carbonating apparatus, a gas-holder, a liquid-supply pump, and an electric motor for driving said pump, a carbonator connected to said gas-holder and pump, a switch connected in the circuit of said motor, switch-operating magnets, a pressure-gage connected to said gas-tank and means carried by said pressure-gage for automatically causing either of said magnets to be energized, whereby said motor-circuit is completed or broken, substantially as described.

3. The combination of a pump and a gas-holder, both adapted to be connected with a carbonator, with an electric motor to operate the pump, a gas-pressure gage connected with the gas-holder, a switch in the circuit of the motor, a magnet to operate the switch, one terminal of the magnet being connected with the motor-circuit, the other terminal of the magnet being connected with a contact carried by the gage, and means to be operated by gas-pressure in the gage to close the circuit of the magnet through another part of the motor-circuit, substantially as described.

4. The combination of a pump and a gas-holder, both adapted to be connected with a carbonator, with an electric motor to operate the pump, a gas-pressure gage connected with the gas-holder, a switch in the circuit of the motor, a magnet to operate the switch, one terminal of the magnet being connected with the motor-circuit and the other terminal being connected with a contact carried by the gage, a part of the motor-circuit being connected with the gage, a contact in circuit with the gage, and means for operating said contact to cause it to close the circuit of the magnet, substantially as described.

5. The combination of a pump and a gas-holder, both adapted to be connected with a carbonator, with an electric motor to operate the pump, a gas-pressure gage connected with the gas-holder, a switch in the circuit of the motor, a pair of magnets to operate the switch, contacts carried by the gage in the circuits of the magnets, and means to be operated by gas-pressure in the gage to close the circuit of either magnet according to the gas-pressure, substantially as described.

6. The combination of a pump and a gas-holder, both adapted to be connected with a carbonator, with an electric motor to operate the pump, a gas-pressure gage connected with the gas-holder, a switch in the circuit of the motor, the circuit of the motor leading to the gage, a pair of magnets to operate the switch, the circuits of the magnets leading from the motor-circuit to separate contacts in the gage, and a contact to be operated by gas-pressure in the gage to close the circuit of either magnet through its contact by different gas-pressures in the gage, substantially as described.

7. The combination of a pump and a gas-holder, both adapted to be connected with a carbonator, with an electric motor to operate the pump, a gas-pressure gage connected with the gas-holder, a switch in the circuit of the motor, a pair of magnets to operate the switch, a contact in the circuit of one magnet, a pair of contacts in the circuit of the other magnet and located on opposite sides of the first-mentioned contact, and means operated by gas-pressure in the gage for closing the magnet-circuit through either contact according to the gas-pressure, substantially as described.

8. The combination of a pump, a gas-holder, a carbonator and a motor, with a pressure-gage having a contact carried within the casing behind the dial adapted to be operated by gas-pressure, and a pair of contacts within the casing extending into the path of the first-mentioned contacts, said contacts serving to control the circuit of the motor, substantially as described.

9. The combination of a pump, a gas-holder, a carbonator and a motor with a pressure-gage having a contact to be operated by gas-pressure and insulation in proximity to said contact on opposite sides thereof, and a pair of contacts extending into the path of the first-mentioned contact and the insulation, whereby the second-mentioned contacts will be caused to snap into engagement with the first-mentioned contacts in either direction of movement of the latter, said contacts serving to control the circuit of the motor, substantially as described.

10. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a carbonator connected to said gas-holder and said pump, an electric motor operating said pump, a switch in the motor-circuit, a pressure-gage connected to said gas-holder, a rotating shaft within said pressure-gage, an electrical contact upon said shaft, and stationary contacts within said gage adapted to register with said moving contact, whereby said motor is automatically started, stopped or regulated by the pressure of the gas in said holder, substantially as described.

11. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a carbonator connected to said gas-holder and said pump, an electric motor operating said pump, a switch in the motor-circuit, electrically-operated means for operating said switch, a pressure-gage connected to said gas-holder, and means carried by said pressure-gage for operating said switch, substantially as described.

12. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a carbonator connected to said gas-holder and said pump, an electric motor operating said pump, a switch in the motor-circuit, electrically-operated means for operating said switch, a pressure-gage connected to said gas-holder, a rotatable shaft within said pressure-gage, an electrical contact upon said shaft, and stationary contacts within said gage adapted to register with said moving contact for completing the circuit through said electrically-operated means for said switch, substantially as described.

13. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a carbonator connected to said gas-holder and said pump, an electric motor driving said pump, a switch in the motor-circuit, magnets for automatically opening and closing said switch, a pressure-gage connected to said gas-holder, and means carried by said pressure-gage for energizing said magnets for opening or closing said switch, substantially as described.

14. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a carbonator connected to said gas-holder and said pump, an electric motor for driving said pump, a switch in the motor-circuit, magnets for automatically opening and closing said switch, a pressure-gage connected to said gas-holder, a rotatable shaft within said pressure-gage, an electrical contact upon said shaft, and stationary contacts within said gage adapted to register with said moving contact for completing circuits through said magnets for opening or closing said switch, substantially as described.

15. In a carbonating apparatus, a gas-holder, a liquid-supply pump, and electrical means for driving said pump, and a carbonator connected to said gas-holder and pump; of a pump-controller consisting of a pressure-tube connected to said gas-holder, a contact-arm mechanically connected therewith, a high-pressure contact located on one side of the said arm, a low-pressure contact located on the other side of said arm, and means electrically connected with said contacts for automatically opening and closing the circuit through said pump-driving mechanism.

16. In a carbonating apparatus, a gas-holder, a liquid-supply pump, electrical means for driving said pump, and a carbonator connected to said gas-holder and pump; of a circuit-controller consisting of a pressure-tube, an insulating-link connected to the closed end of said tube, a segment connected to the other end of said link, a contact-arm operated by said segment, an adjustable contact located upon each side of said contact-arm, and electrically-operated means connected to said electrical contacts adapted to open and close the circuit through said pump-operating mechanism.

17. In a carbonating apparatus, a gas-holder, a liquid-supply pump, electrical means for driving said pump, and a carbonator connected to said gas-holder and pump; of a circuit-controller for said pump mechanism consisting of a pressure-actuated means, an insulating member connected therewith, an electrical contact mechanically connected to the said insulating member, an adjustable contact located upon each side of said first-named contacts, and an electrically-actuated switch connected in circuit with said contacts adapted to open and close the circuit through the pump-operating mechanism upon the rise and fall of the pressure in said gas-holder within predetermined limits.

18. In a carbonating apparatus, a gas-holder, a liquid-supply pump, an electric motor for driving said pump, a carbonator connected to said gas-holder and pump, and a magnetically-actuated switch in circuit with said pump; of a pressure-tube connected to said gas-holder, a swinging arm connected to said tube, electrical contacts located upon each side of said arm, and electrical connections between said magnetic switch and said electrical contacts whereby the operation of said pump is controlled.

19. In a carbonating apparatus, a gas-holder, a liquid-supply pump, a motor for driving said pump, a carbonator connected to said gas-holder and pump, and a magnetically-operated switch in said motor-circuit; of a circular pressure-tube connected to said gas-holder, a link connected thereto, a pivoted arm adjustably connected to the said link, a contact moved by said pivoted arm, a carbon contact-piece located upon each side of said movable contact, and electrical connections between said carbon contacts and said magnetically-operated switch.

20. In an aerating apparatus, the combination of a pump-controller consisting of a pressure-actuated means, a circuit-controller mechanically connected therewith, an adjustable high-pressure-limiting device located on one side of the said circuit-controller, an adjustable low-pressure-limiting device located on the other side of the said circuit-controller, and springs for supporting the said limiting devices.

Signed in the city, county, and State of New York this 31st day of August, 1899.

PETER E. MALMSTROM.

Witnesses:

JOSEPH L. LEVY,

SERENA B. KUHN.