

No. 710,110.

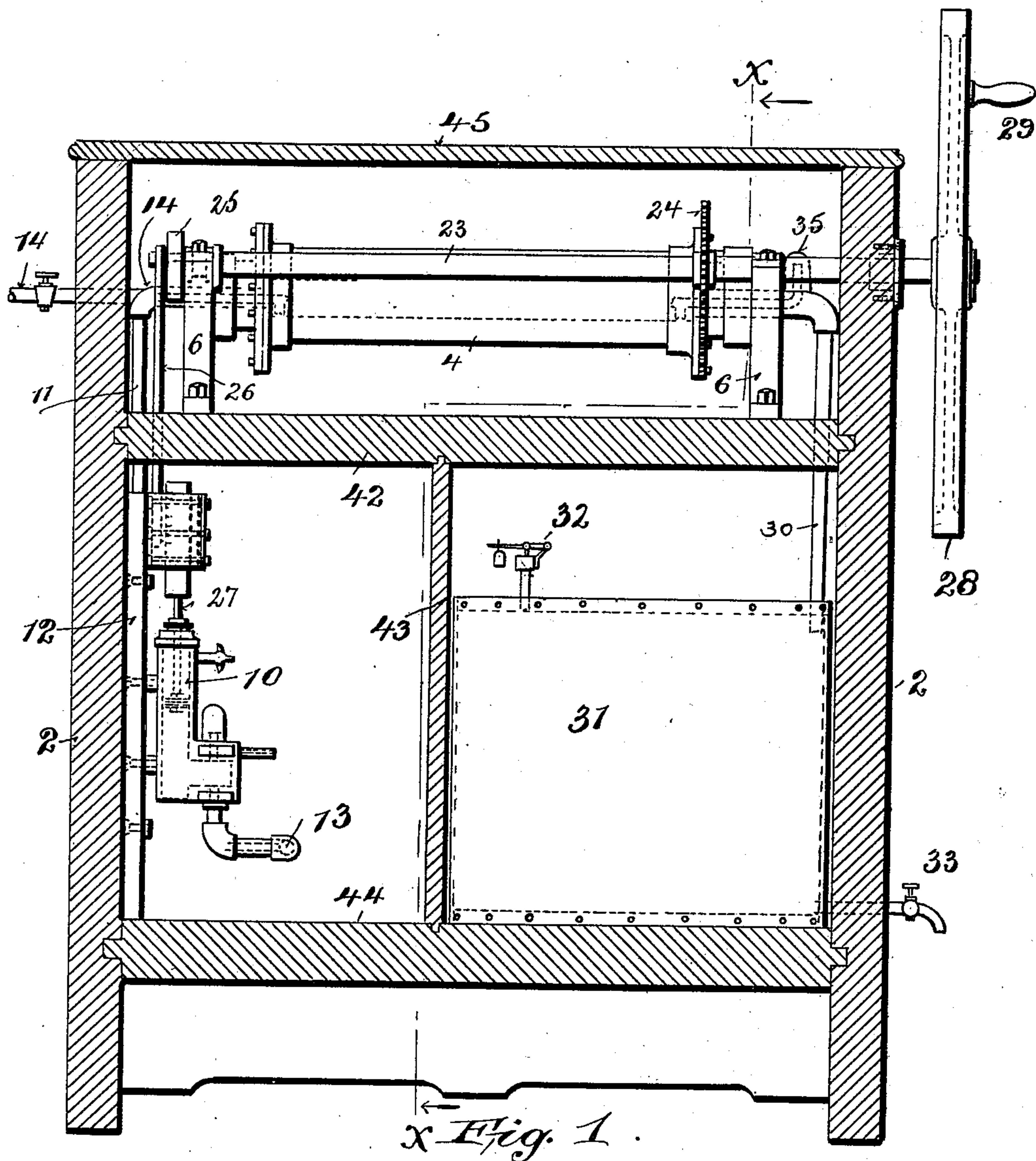
Patented Sept. 30, 1902.

P. E. MALMSTROM.  
CARBONATING LIQUIDS.

(Application filed Jan. 17, 1901. Renewed Feb. 24, 1902.)

(No Model.)

3 Sheets—Sheet 1.



X Fig. 1.

Witnesses;

Chas. G. Hensley

Chas. G. Hensley

Inventor;

Peter E. Malmstrom.

by Joseph R. Levy  
att'y

No. 710,110.

Patented Sept. 30, 1902.

P. E. MALMSTROM.  
CARBONATING LIQUIDS.

(Application filed Jan. 17, 1901. Renewed Feb. 24, 1902.)

(No Model.)

3 Sheets—Sheet 2.

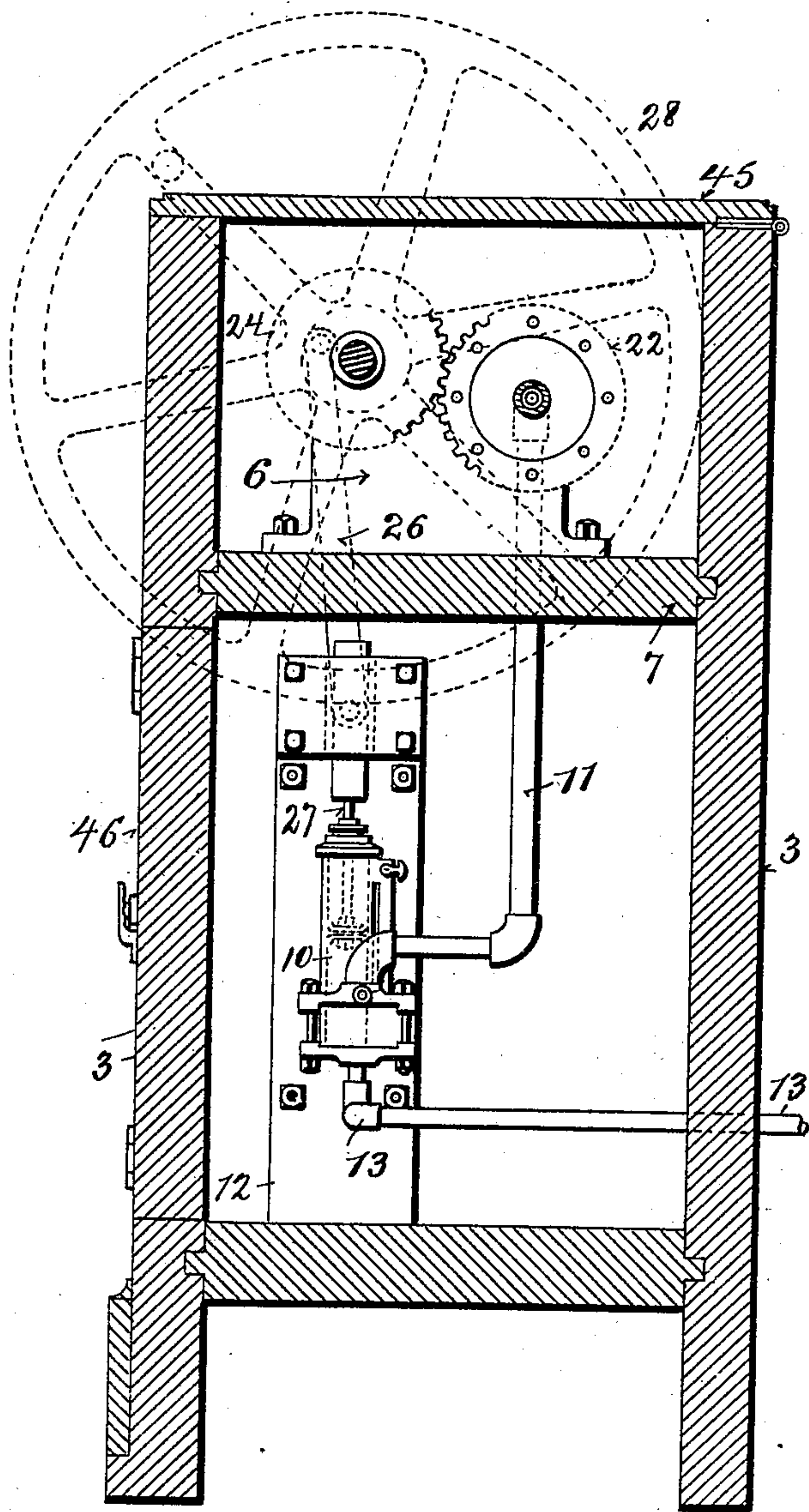


Fig. 2

Witnesses;  
C. W. Benjamin  
Chas. E. Hensley

Inventor  
Peter E. Malmstrom,  
by Joseph R. Levy  
attorney

No. 710,110.

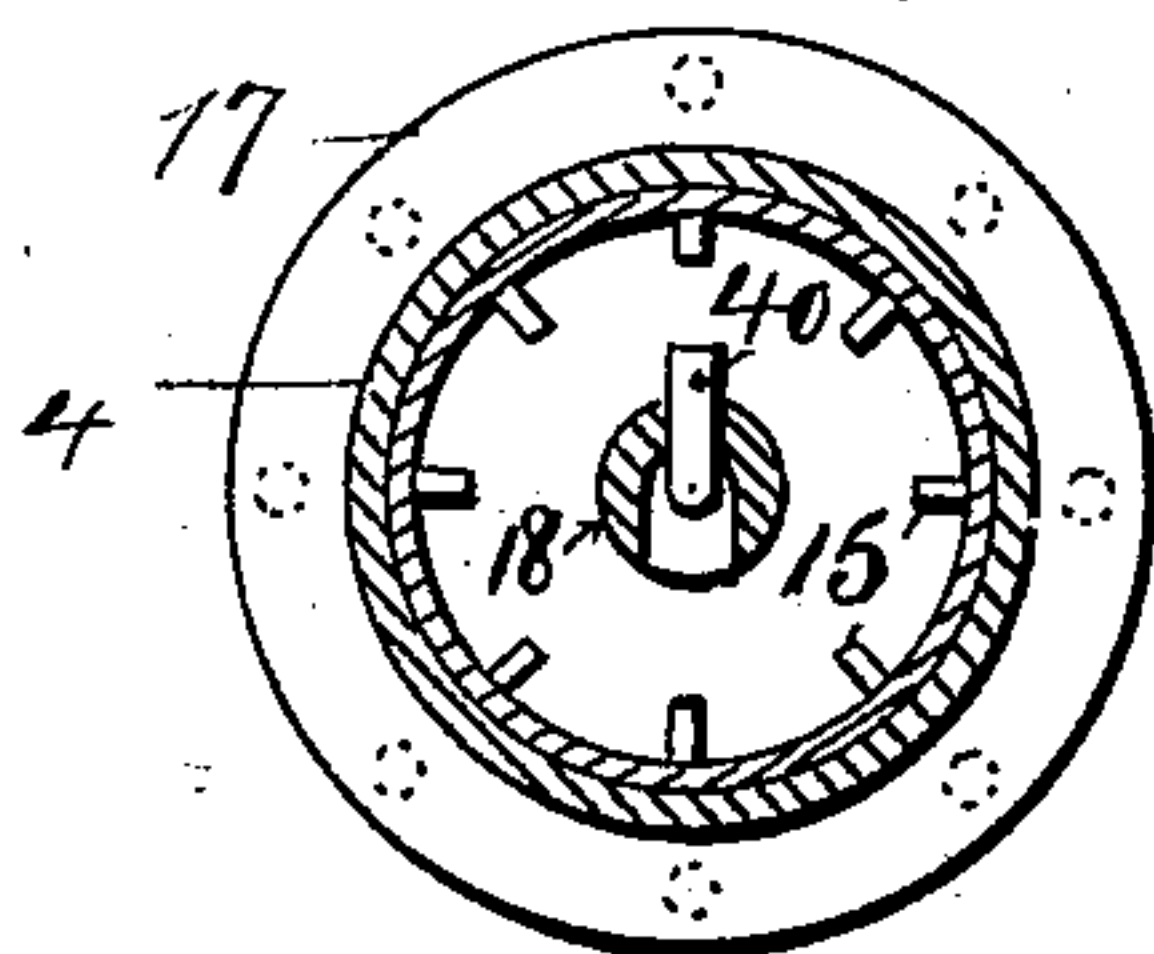
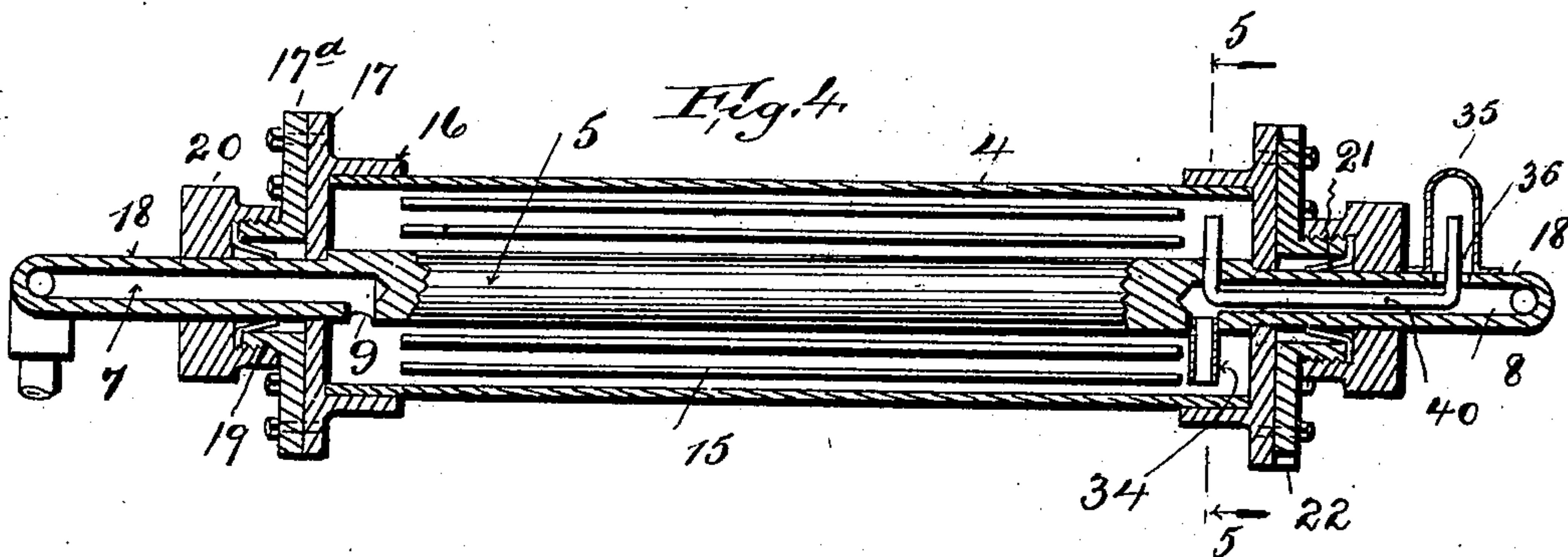
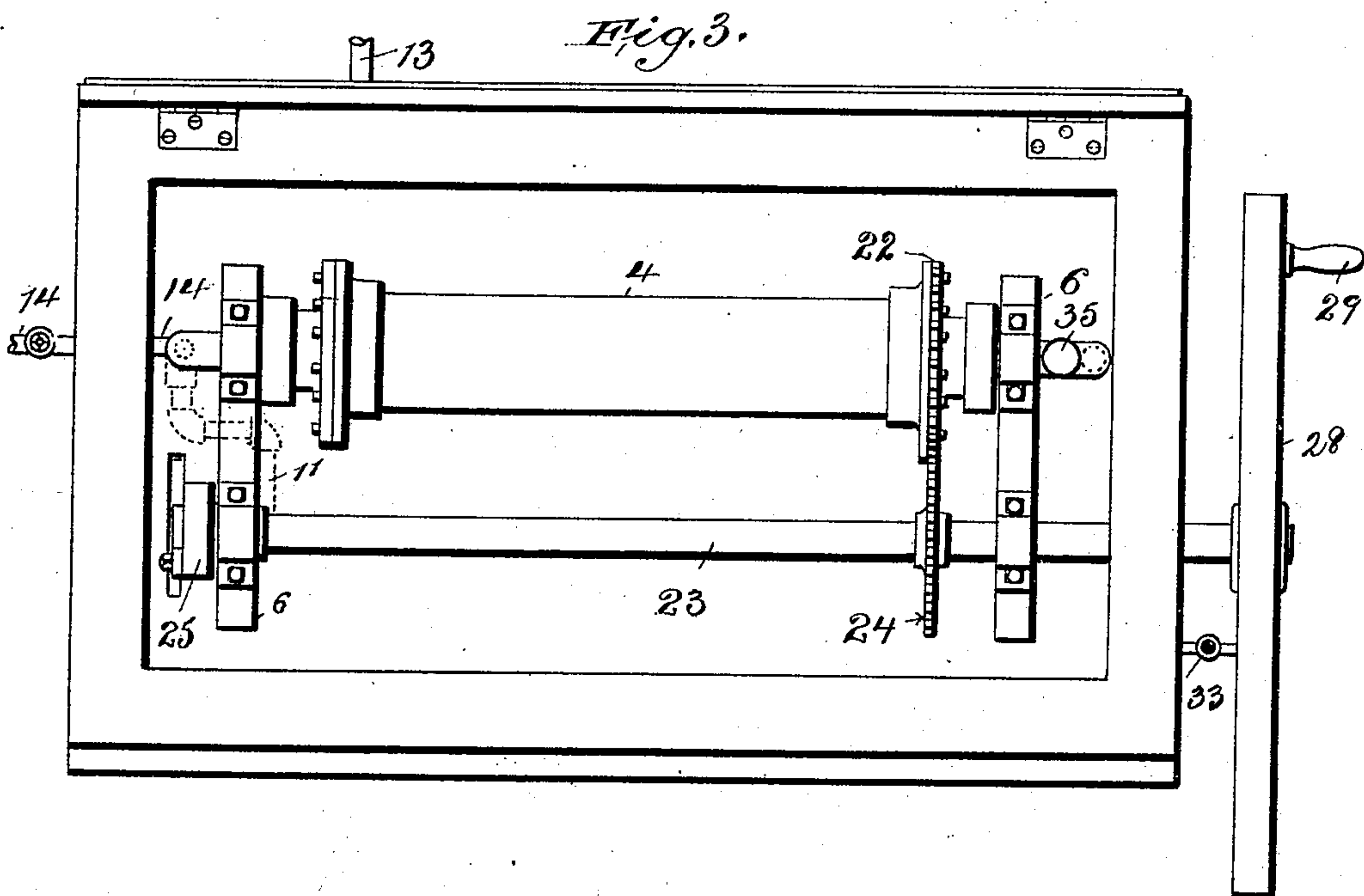
Patented Sept. 30, 1902.

P. E. MALMSTROM.  
CARBONATING LIQUIDS.

(Application filed Jan. 17, 1901. Renewed Feb. 24, 1902.)

(No Model.)

3 Sheets—Sheet 3.



*Fig. 5.*

WITNESSES,  
C. W. Benjamin  
Chas. H. Hensley

INVENTOR,  
Peter E. Malmstrom.  
by Joseph L. Levy  
att



# UNITED STATES PATENT OFFICE.

PETER E. MALMSTROM, OF NEW YORK, N. Y.

## CARBONATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 710,110, dated September 30, 1902.

Application filed January 17, 1901. Renewed February 24, 1902. Serial No. 95,229. (No model.)

*To all whom it may concern:*

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

My invention relates primarily to improved means for mixing gas with liquid, and has special reference to apparatus for mixing carbonic-acid gas with water or other liquid, or, in other words, for carbonating liquids.

The invention also relates to improvements in an apparatus whereby the liquid and gas can be properly commingled and immediately used or a supply kept on hand to be used as desired.

My invention has for its object the thorough commingling or mixing of the liquid and the gas, whereby a less amount of gas is required to charge the liquid than is ordinarily employed or with the same amount of gas the liquid is charged therewith to a greater extent, and to provide a simple and compact apparatus for carrying out my process of carbonating, which may or may not be an adjunct of the usual dispensing-fountain and with which the water or other liquid can be carbonated at will and as wanted and in which also provision may be made for keeping all parts at a lowered temperature, a desideration in this class of work.

A further object is to provide means whereby the depth of water in the commingling-chamber can be ascertained at any time.

To the accomplishment of these and such other objects as may hereinafter appear, the invention comprises a movable or rotatable commingling-chamber into which the liquid and gas are forced and where they are violently agitated, and thereby mixed, and a storage or carbonating cylinder or tank which receives the carbonated liquid from the commingling-chamber and from which it is drawn off as desired, the whole being so compactly arranged and organized as to be conveniently placed in a refrigerating case or box in which ice or other cooling medium is used to reduce the temperature. There is also means, as a water-glass, to indicate the height or depth of water in the mixing-chamber. Other ad-

junctive devices—such as stop-cocks, check-valves, safety-valves, &c.—are provided where necessary or desirable.

The invention further consists in the novel construction and combinations of parts hereinafter particularly described, and set forth in the claims, reference being had to the accompanying drawings, in which the same reference characters designate like parts throughout the several views, and in which—

Figure 1 is a longitudinal sectional elevation through the box or case of the device and showing the various devices therein. Fig. 2 is a cross-sectional elevational view on the line *xx* of Fig. 1. Fig. 3 is a plan view with the lid of the box raised. Fig. 4 is a vertical longitudinal section through the commingling-chamber; and Fig. 5 is a cross-section of the same on the line *5 5*, Fig. 4.

In the figures, 2 and 3 comprise the ends and sides of a box, case, or chest like structure containing the various parts of my apparatus. In the upper compartment thereof is located the movable commingling chamber or receptacle, which may be of any suitable form, but preferably consists of a hollow cylinder 4, extending longitudinally of the box and which is mounted to revolve upon an axle or shaft 5, supported in the vertical brackets 6, secured to the floor 7 of the compartment. In order to introduce the gas and liquid into this commingling or mixing chamber, I have adopted the following-described means as being the most nearly perfect now known to me, although other means involving the same principle could obviously be employed. The shaft or axle 5 is made stationary and preferably extends the whole length of the cylinder, although a middle section of it could be removed and short shafts projecting from the ends of the cylinder or into the ends of the cylinder could be used instead. These projecting and supporting ends of the shaft are counterbored, as at 7 and 8, for the ingress and egress of the gas and liquid to be mixed in the chamber, the inlet 7 opening at 9 into the interior of the chamber and having connection at the other end with the force-pump 10 through the medium of pipe 11. This pump 10 is shown located in one of the lower compartments of the box or chest beneath one end of the shaft 5 and is bolted



to a vertical base 12, secured to the end piece of the box in any desired manner, an intake-pipe 13 leading from the pump to the hydrant or other source of liquid-supply without the box. Of course it will be understood that any kind of force-pump suitable for the purpose may be used and any desired mounting for the same may be employed. A gas-inlet pipe 14 from the gas-tank is also connected with said opening 7 in the shaft 5, so that both gas and water are together forced into the commingling-chamber. The interior of the commingling-cylinder is provided with projections or protuberances of any form, but which may take the shape of longitudinal ribs 15, as shown in Figs. 4 and 5, which project sufficiently therefrom to splash, disturb, agitate, churn, and throw the water and gas about, whereby they are brought into intimate contact over and over again and are most thoroughly and completely mixed and commingled. To prevent the gas or liquid from escaping about the stationary shaft, stuffing-boxes may be provided at each end thereof, to accomplish which the following structure is provided, reference being made to the left end of the cylinder, Fig. 4: The end of the cylinder fits within the annular flange 16 of the cap 17, which has an aperture closely fitting the reduced or shouldered end 18 of the shaft 5. To the edge of this disk cap 17 is bolted a disk 17<sup>a</sup> of similar size, having an aperture somewhat larger than the end 18 of the shaft, with a projecting flange 19 threaded on the outside, on which is screwed the flanged nut 20, having interior cooperating threads and which is apertured to closely fit the end 18 of the shaft. A leather or rubber washer 21, projecting inwardly, is clamped between these parts. This effectually prevents the escape of the contents of the rotating chamber, while permitting free rotation or revolution thereof. The other end of the cylinder is similarly constructed, except that the outer edge of the disk 17<sup>a</sup> is provided with teeth 22 for a purpose hereinafter explained.

It will now be apparent that while the above-described arrangement of cylinder and shaft and connections is effective to accomplish all that is required of them various changes could be made therein and not depart from the principle thereof. The stuffing-boxes could be arranged in innumerable ways, and might even be secured on the support and make loose connections with the cylinder. So, too, the part termed a "shaft" need not be circular in cross-section and need not extend clear through the cylinder, and the shape, form, and size of the chamber itself may be varied at will so far as the broad features of my invention are concerned.

For the purpose of conveniently operating the force-pump and revolving the cylinder I mount a shaft 23 in the pedestals 6, parallel with the cylinder 4, and secure thereto a gear-wheel 24, intermeshing with teeth 22 on disk

17<sup>a</sup>, secured to the cylinder. On the end of the shaft 23 an eccentric or crank 25 is fixed, which by connecting-rod 26 operatively connects with the piston 27 of the pump located therebeneath. On the other end of the shaft, outside the box, a balance-wheel 28 is affixed, a handle 29 for operating the same projecting from the rim. Other means for operating these devices can be used, but those shown and described are deemed very simple and convenient. Power could be applied to said shaft, if preferred, in any desired manner, as by placing thereon a belt-pulley or other means. From the mixing-cylinder the aerated liquid passes through a tube 30 to a storage or carbonating tank 31, which is preferably cylindrical in form, as shown, and is located in the remaining compartment beneath that containing the mixer. It is provided with a safety-valve 32 of any desired make and an outlet 33, which may be merely a faucet for filling siphons or a pipe leading to the usual fountain and dispensing-faucet. This tank is depended upon more for storage purposes than as a carbonating vessel, for reliance is mainly placed for this action upon the revolving chamber, though of course it is going on more or less as long as and wherever the liquid and gas are in contact. As shown in Fig. 4, the shaft-opening 8 is extended by the short tube 34 to a point near the lower side of the cylinder, whereby nearly all the liquid may be forced out by the pressure of the gas. The ribs 15 must be short enough to pass the tube 34. To show the depth of water in the cylinder 4, which is normally kept over half-full for better working of the device, a water-gage is provided, comprising a glass tube 35, secured to said shaft end 5 and communicating with the bore 8 through aperture 36. Without some means to equalize the pressure above the water in the cylinder and gage the latter would be inoperative, as of course the water in the cylinder covers the bore 8. I provide for this purpose a small tube 40, extending through the opening 8 and up at each end to a point in the respective chambers above the water or liquid, thus effectually accomplishing the objects sought and allowing the true height of the water to be indicated. The fact that the cylinder rotates does not affect this action.

The operation is as follows: The crank 29 is turned, which revolves the cylinder and operates the force-pump to inject water into the cylinder, where it is churned and thrown about to mix it with the gas, which tends to separate and collect at the top of the receptacle, the pressure here being sufficient to force the water through the outlet to the storing-tank 31 below, where it is ready to be drawn off as made or at any time thereafter. It will be understood that suitable cocks, valves, and check-valves will be provided throughout the system, that the gas-inlet will be properly proportioned as to size and pressure therein, and that the pressures in the two



chambers—that is, the mixing and the storage chambers—will also be properly regulated to permit the desired flow therebetween, the safety-valve on the latter being capable of  
5 adjustment, as usual.

While the above operation and many applications of the invention are entirely independent of the precise location of the said parts, for it is evident that they could be dis-  
10 posed in any desired manner, it is found that the arrangement of locating them in the chest or box having the several partitions 42, 43, and 44 and compartments described and provided with the top lid 45 and side door 46, presents  
15 many advantages, as compactness, completeness, and a good appearance, as well as being portable. It has the further advantage of being practically a refrigerator, the side walls being made of suitable material, and is so used  
20 in practice, ice, either in large blocks or cracked, being placed in the upper compartment with the commingling-chamber, which serves as well to keep the lower compartments cool, or, if preferred, the latter can be left  
25 open, and thus at normal temperature, while the upper chamber alone is cooled. It is always desirable, however, in this class of work to keep as much of the apparatus cool as is possible.

30 While the invention has been described with reference to the details of construction, I would have it understood that it is not limited thereto, as I hold it to include such modifications and changes as fairly fall within the  
35 scope thereof; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, the combination with a revolving mixing-  
40 chamber, of hollow bearings, closed at their outer ends, supporting said mixing-chamber and communicating with the interior thereof, means for simultaneously injecting water and  
45 gas through one of said hollow bearings into said chamber, and means leading from said other hollow bearing for carrying off the commingled contents of said mixing-chamber, substantially as described.

2. In an apparatus of the class described,  
50 the combination of a hollow stationary shaft having closed ends, a revoluble mixing-chamber mounted on said shaft, apertures in said shaft communicating with said chamber, means for injecting gas and water into said  
55 chamber through said hollow shaft, and means for drawing off the commingled contents of said chamber, substantially as described.

3. In an apparatus of the class described, the combination of a stationary shaft having  
60 counterbored ends, a revoluble mixing-chamber mounted on said shaft, apertures in said shaft communicating with said chamber, means for injecting gas and water into said chamber through one of said counterbored  
65 ends and means for drawing off the commingled contents of said chamber through the

other counterbored end, substantially as described.

4. In an apparatus of the class described, the combination with a rotatable cylinder, a  
70 stationary shaft provided with tubular bearing ends supporting said cylinder, means for simultaneously injecting liquid and gas through one of said tubular ends into said cylinder, a storage-receptacle, and communicat-  
75 ing means between said storage-receptacle and the other of said tubular bearings, substantially as described.

5. In an apparatus of the class described, the combination with a revolving mixing-  
80 chamber, of hollow bearings, closed at their outer ends supporting said mixing-chamber and communicating with the interior thereof, means for simultaneously injecting water and gas through one of said hollow bearings into  
85 said chamber, means leading from said other hollow bearing for carrying off the commingled contents of said mixing-chamber, and a series of narrow continuous strips projecting radially within said mixing-chamber and dis-  
90 posed longitudinally substantially the length thereof, substantially as described.

6. In an apparatus of the character described, the combination with a revolving cylinder, of a stationary shaft having tubular  
95 ends supporting said cylinder and communicating with the interior thereof, a pump, connection between said pump and one of said tubular ends, means for drawing off the contents of said cylinder through the other said  
100 tubular end, a shaft mounted in proximity to said revolving cylinder, and means on said shaft for simultaneously operating said revolving cylinder and pump, substantially as described.

7. In apparatus of the character described, the combination with a revolving mixing-  
105 chamber, a gas and water inlet for said chamber, an exit-pipe for said chamber, a force-pump connected with said water-inlet, a gear-wheel on said revolving chamber, a shaft mounted in proximity to said revolving chamber carrying a pinion meshing with said gear-wheel, means on said shaft for operating said  
110 force-pump, and means for revolving said shaft, substantially as described.

8. In an apparatus of the character described the combination with a revolving mixing-  
chamber mounted on hollow bearings opening into said chamber, a gas and water  
120 inlet opening into one of said hollow bearings, a storage or carbonating tank, connections between the other of said hollow bearings and said storage-tank, a force-pump controlling the supply of water to said water-inlet, a shaft  
125 mounted in proximity to said revolving chamber, connections between said shaft and said revolving chamber, connections between said shaft and said force-pump, and means for simultaneously operating said shaft, revolving  
130 chamber and force-pump, substantially as described.



9. In apparatus of the class described, the combination with a hollow cylinder having longitudinal ribs on the inside, a stationary shaft or axle on which said cylinder revolves, stuffing-boxes at the ends of the cylinder, one end of said shaft being counterbored, and opening into the cylinder, gas and liquid mains connected therewith, the other end of the shaft being also counterbored and opening inside the cylinder, this opening being extended down near the lower side of the cylinder, and a pipe leading away from said last-named counterbore.

10. In apparatus of the class described, the combination with a revolving mixing-chamber having a hollow stationary journal, a water gage or indicator communicating with the interior of said chamber through said hollow journal, and means for equalizing the pressure on top of the water in the chamber and in the gage.

11. In apparatus of the class described, the combination with a revolving mixing-chamber having a stationary hollow journal, a water-gage outside said chamber, and communicating with the interior thereof through said hollow journal, and a small pipe or tube also leading through said hollow journal, and ending above the water in both the mixing-chamber and the water-gage, whereby the gas-pressure in both are equalized.

12. In apparatus of the class described, the combination with a revolving cylinder having a gear-wheel secured thereto, a shaft parallel with said cylinder and carrying a pinion or gear-wheel meshing with said other gear-wheel, an eccentric also carried by said shaft, a force-pump connected with said cylinder, and having a connecting-rod secured to said eccentric, a balance-wheel and handle or crank on said shaft whereby upon applying power to the wheel or crank the cylinder is revolved and the force-pump operated to inject liquid into the cylinder.

13. The combination with a revolving cylinder having hollow stationary journals, a force-pump connected with one of the hollow journals to force water thereinto, a gas-pipe also connecting with said hollow journal, a storage or carbonating cylinder having a connection with the other hollow journal, and means to operate the cylinder and the pump.

14. In a carbonating apparatus, a box-like structure having an upper compartment closed by a lid or cover to the box, and two lower compartments closed by doors in the side of the box, a revoluble commingling-chamber in the upper compartment, a force-pump in one of the lower compartments, a pipe leading from the main outside the box to the force-pump and to the said chamber, a gas-pipe also leading from outside the said chamber, a storage or carbonating cylinder or tank located in the other lower compartment into which the mingling-chamber discharges through a tube or pipe, the tank being provided with a safety-valve and dispensing-pipe, a water-gage for said chamber, and means projecting outside said box for operating said chamber and pump, the whole box and apparatus being adapted to be kept cool by ice placed in the upper compartment.

15. In an aerating apparatus, the combination of a mechanically-operated cylinder, longitudinal ribs projecting radially within said cylinder, fixed hollow cylindrical supports for the said cylinder, pipes connected to each end of the said cylinder through the said supports, packing-boxes fastened to the said cylinder, and conical packing-rings located in the said boxes.

Signed in the city, county, and State of New York this 15th day of January, 1901.

PETER E. MALMSTROM.

Witnesses:

CHAS. G. HENSLEY,  
SOPHIE SEKOSKY.