

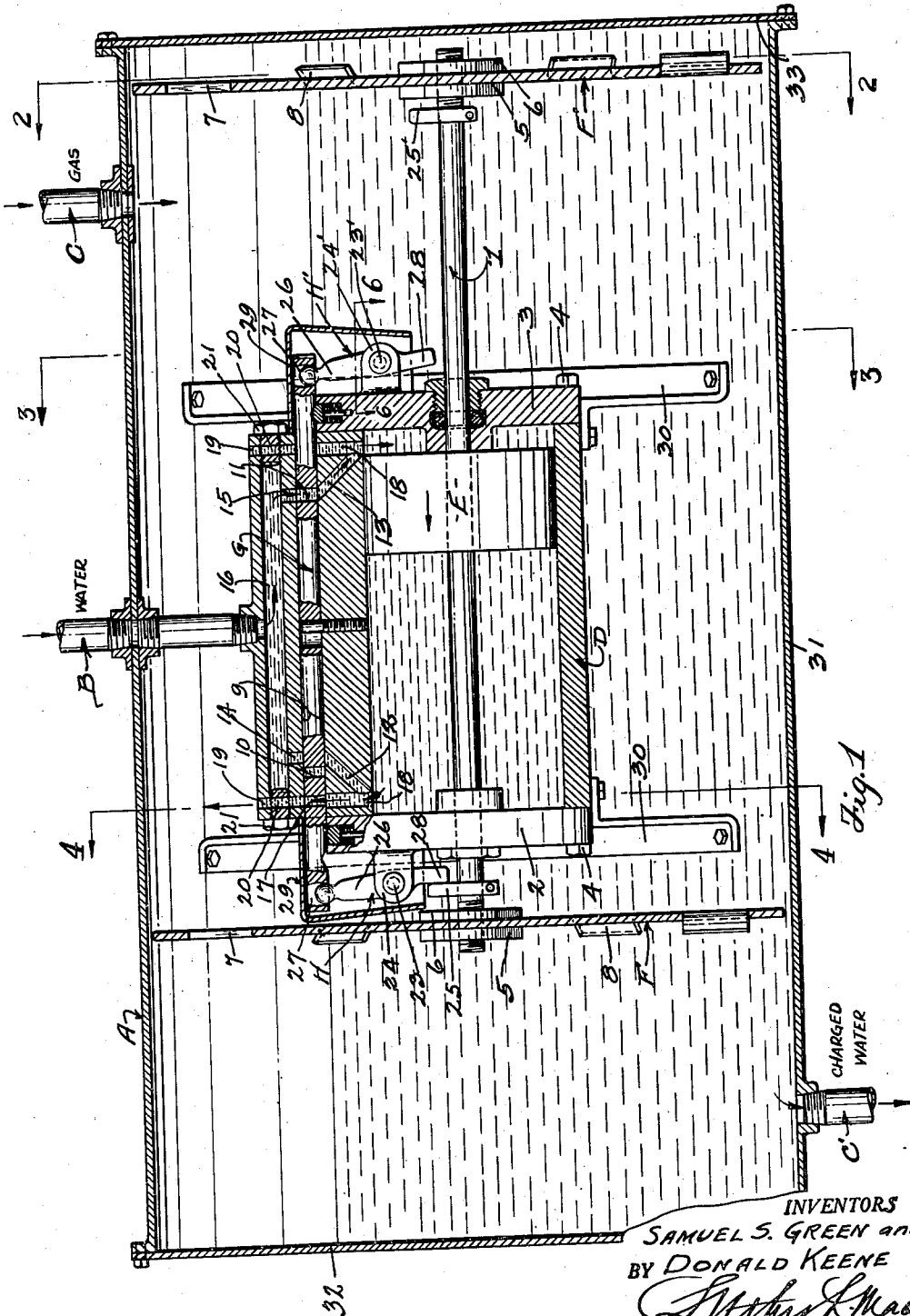
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CARBONATING APPARATUS

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

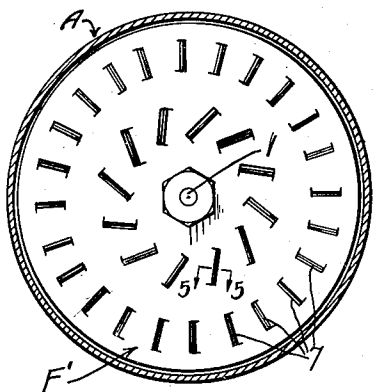


Fig. 2

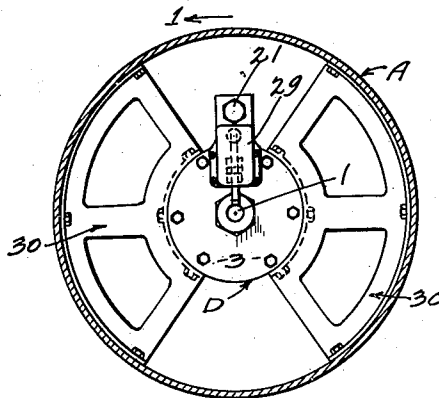


Fig. 3

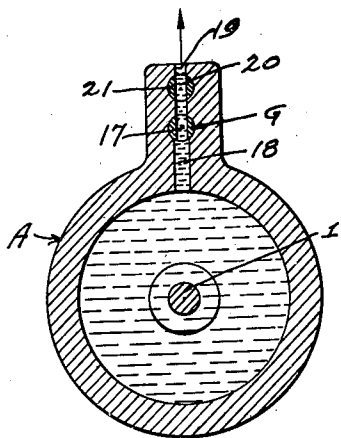


Fig. 4

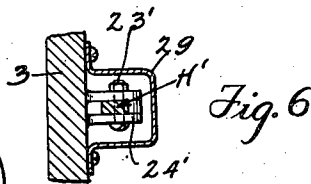


Fig. 6

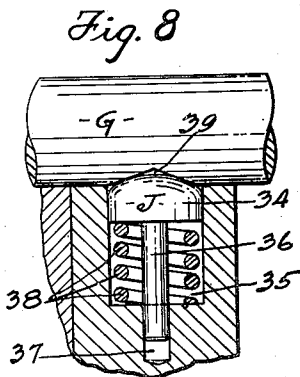


Fig. 8

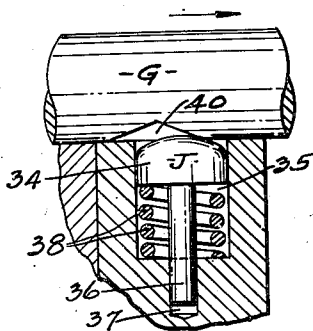


Fig. 7

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CARBONATING APPARATUS

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7 Claims. (Cl. 261—82)

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This invention relates to and has for an object the provision of improvements in carbonating apparatus whereby a maximum degree of carbonification may be effected so that the water in the carbonating receptacle will be thoroughly saturated with carbon dioxide gas (CO_2) for withdrawal for use when and as desired at soda fountains, bars and otherwise.

An object, also, is to provide a simple, economical and efficient carbonating unit which is arranged for automatic hydraulic operation and includes a cylinder, a piston reciprocable therein and automatically operable means which is operative at opposite extremities of the cylinder for reversing the direction of movement upon the completion of a stroke.

A further object is to provide one or more agitators movable by the piston in a volume of water and so formed as to violently disturb the water and break it up into small globules so that a volume of gas present in the receptacle under pressure will readily and sufficiently mix with the globules of water to the end that the water will be thoroughly saturated.

Another object is to employ the prevailing water pressure of a service system, under regulation of a suitable valve means for applying the water pressure alternately to opposite sides of the piston for moving the piston in alternately opposite directions in succeeding cycles of operation. Other objects will appear as the description of our improvements progresses.

We have shown one form of carbonating apparatus embodying our improvements in the accompanying drawings, which is subject to change within the limits of the appended claims, without departing from the spirit of the invention.

In said drawings:

Fig. 1 is a longitudinal section, on line 1—1 of Fig. 3, of our apparatus;

Figs. 2, 3 and 4 are transverse sections on lines 2—2, 3—3 and 4—4 of Fig. 1;

Fig. 5 is a fragmentary section of an agitator on line 5—5 of Fig. 2;

Fig. 6 is a section on line 6—6 of Fig. 1; and

Figs. 7 and 8 are fragmentary sections of the structure in the plane of Fig. 1, but enlarged to show different positions of the valve and valve detent means for regulating the operation of the piston.

Briefly described our apparatus includes a water tank A arranged with a water inlet B, a gas inlet C and an outlet C' for the charged water. Within tank A we mount a cylinder D in which a piston E is reciprocable and has a stem 1 extend-

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ed through heads 2 and 3 which are attached to opposite ends of D as by means of screws or bolts 4.

Stem 1 carries on its opposite ends agitators F and F' which are fixed in position on stem 1 between pairs of nuts 5 and 6. Said agitators are shown as discs, but not necessarily so, with perforations 7 formed by cutting and bending portions 8 from the plane of the discs in such a manner and at angles which will occasion a rush of water through the perforations and a deflection of the multiplicity of jets for agitating the water and causing it to bubble and foam whereby the separately produced globules may readily adsorb molecules of gas to the end that the water in the tank may be saturated to a maximum extent during the operation of the agitators. Of course, it is apparent that agitators F and F' may be formed otherwise than as shown to produce a desired saturation of water with gas.

In order to effect the reciprocation of piston E and agitators F and F' we provide a slide valve G in the cylinder body which has an axis paralleling the axis of piston E and is supported in a bore 9. Said valve has a pair of spaced parts 10 and 11 near opposite ends thereof which are adapted to selectively register, respectively, with passages 12 and 13 in the cylinder body and also, respectively, with passages 14 and 15, whereby water from a pressure source delivered from a pipe B to an elongated chamber 16, may pass through the valve to one or the other side of the piston E.

Valve G also has exhaust parts, as at 17, near each end adapted for registration at times with aligned outlet passages 18 and 19 in the body D and 20 in closure plugs 21 which are screwed into the ends of chamber 16. Thus, water under service pressure is admitted to and exhausted from cylinder D when the carbonating apparatus is operating, as will be hereinafter more fully described.

As piston E approaches one or the other extreme of movement in cylinder D its movement is reversed by means of members H and H' which are pivotally held at 22 and 23', respectively, on lugs 24 and 24' on opposite cylinder heads 2 and 3 and corresponding actuators 25 and 25' fixed in position on stem 1 of piston E. Members H and H' are identical and each has an upper arm 26, seated in a slot 27 in valve G, and a heel portion 28 adapted to be engaged by actuator 25 or 25' when piston E is retracted in a proper direction.

Members H and H' are enclosed at their outer sides by shields 29 which may be formed on or

attached to the cylinder heads 2 and 3, as shown in Figs. 1 and 6, so as to prevent the operation of valve G due to a surge of water in cylinder D occasioned by reciprocation of the agitators F and F'.

The assembled unit shown in Fig. 1 is insertable into tank A and is concentrically supported as by means of one or more brackets 30 fixed to cylinder D or its heads 2 and 3 and to the wall 31 of tank A, said tank having detachable ends 32 and 33, one of which may be removed for attaching the unit to the tank (Figs. 1 and 3).

As shown in Figs. 1, 7 and 8, we provide detent means near one or both of the members H and H', which, at least as shown, are mounted in the cylinder heads 2 and 3 and are adapted to hold valve G in its position during the movement of piston E against accidental displacement but, more particularly, are so formed and spaced that in the event of the stoppage of the piston, as at closing time, or otherwise, the valve G will be urged to one or the other extreme of movement in order that upon a renewal of operation the piston E will complete its previously intended and partially completed stroke, without occasioning a lock-up requiring external or artificial effort or means. So, in each of heads 2 and 3 we provide a detent J which is formed with a rounded head 34 slidable in a counterbore 35 and having a stem 36 slidable in a pilot bore 37, with a compression spring 38 confined between the head 34 and the bottom of said counterbore and tending to urge the head into operative engagement with valve G.

Valve G is formed with two angular notches 39 and 40 adapted to be selectively engaged by the heads 34 of the detents J, respectively, and said notches are so arranged that when one detent (Fig. 8) is seated in a notch 39 or 40 the other detent will rest in such a position as to insure a sufficient movement of valve G to seat the other detent (Fig. 7), or vice versa. Thus, if pressure is released on either side of piston E the valve G will either remain locked in one position or the tension of spring 38 on an oppositely operative detent J will occasion its movement to another position, depending upon the position of the piston at the moment of its stoppage.

As shown in Fig. 1, piston E is at the extreme of its movement to the right and water from pipe B flows through chamber 16, and passages 15, 11 and 13 to that portion of cylinder D to the right of the piston, and thereby will move the piston to the left so long as valve G remains in the position shown. During such period water is exhausted from that portion of the cylinder to the left of the piston through passages 18, 17, 20 and 19 to the tank A.

As the piston nears its leftward extreme of movement the actuator 25' engages portion 23 of member H' and thus slides valve G to the right until the inlet passages 14, 10 and 12 are in registration, and the exhaust passages 18, 10 and 19 are also registered, whereupon piston E will begin and continue a movement to the right until actuator 25, through its engagement with portion 23 of member H again moves valve G to a position necessary for a return stroke of the piston.

The agitators F and F' are so formed as to produce a maximum agitation of the liquid contents of tank A, there always being provided a substantial space above the level of the liquid so that the liquid may be readily displaced and

broken up into globules whereby the gas (above the liquid level) has an opportunity to saturate the water.

Our improvements, therefore, provide an automatically operative hydraulic means for charging water with gas by the employment of water pressure from a source of supply as an operating medium, thereby eliminating the necessity for electric motors or other mechanical media, and without impairing the volume of production of charged water or the degree of saturation thereof.

We claim:

1. In carbonating apparatus having a tank for holding water and gas under pressure and having a gas inlet and an outlet, and operating mechanism positioned in the tank; a cylinder fixedly supported therein formed with a water receiving passage, a valve slidable in the cylinder body and having parts adapted for registration at times with inlet and exhaust parts of the cylinder body so as to direct a flow of water under pressure from an external source to opposite ends of the cylinder and to exhaust water from the cylinder to the tank, a piston slidable in the cylinder under the influence of water pressure, and means for operatively connecting the piston with said valve for automatically regulating the flow of water to and from the cylinder during the alternate strokes of the piston.

2. A carbonating apparatus comprising: a tank a cylinder stationarily supported therein, a piston reciprocable in the cylinder, means for introducing water into the tank through the cylinder for applying pressure to and for moving the piston in opposite directions, and means operated by the piston for agitating the water in the tank, and a valve operatively associated with the piston and adapted to be reversely actuated as the piston approaches the end of each successive stroke having a stem formed with notches therein; and spring pressed means engaging with one or another of the notches in the valve stem for holding the valve in adjusted positions until it is again actuated.

3. In a carbonating apparatus having a closed tank arranged with an inlet for gas and an outlet for carbonated products; a hydraulic cylinder mounted in the tank; a piston reciprocable in the cylinder; valve means mounted in the tank automatically operated at predetermined points in the travel of and controlled by the piston rod for alternately admitting liquid under pressure from a source external of the tank to the cylinder at one side of the piston and exhausting liquid from the cylinder at the other side of the piston into the tank or automatically reversing the movement of the cylinder at the end of each stroke; and agitators fixed to the ends of the piston rod externally of the cylinder for reciprocation with the piston for effecting thorough agitation of the liquid and a resultant saturation of the liquid with gas in the tank.

4. A carbonating apparatus as set forth in claim 3 and in addition including: a stem fixed to the piston, and cooperating actuating devices carried by the piston stem and the cylinder and operatively connected with the valve, and means for effecting and timing the reversal of the valve with the movement of the piston.

5. A carbonating apparatus as set forth in claim 3, and in addition including: a stem fixed to the piston, and cooperating actuating devices carried by the piston stem and the cylinder and

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operatively connected with the valve, means for effecting and timing the reversal of the valve with the movement of the piston, said actuating devices including members pivotally supported on opposite ends of the cylinder and engaged with the valve, and other members fixed to the piston stem and engageable with the pivoted members only as the piston approaches one or the other extreme of travel.

6. A carbonating apparatus as set forth in claim 3, and in addition including: a stem fixed to the piston stem and the cylinder and operatively connected with the valve, means for effecting and timing the reversal of the valve with the movement of the piston, said actuating devices including members pivotally supported on opposite portions of the cylinder and engaged with the valve, and other members fixed to the piston stem and engageable with the pivoted members only as the piston approaches one or the other extreme of travel, and means for shield-

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ing the valve actuating members against inadvertent operation due to the surge of liquid in the tank during the movement of the piston.

7. A carbonating apparatus as set forth in claim 3 in which said agitators are formed as perforated members through which water is displaced and broken up into globules for saturation with gas contained in the tank.

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