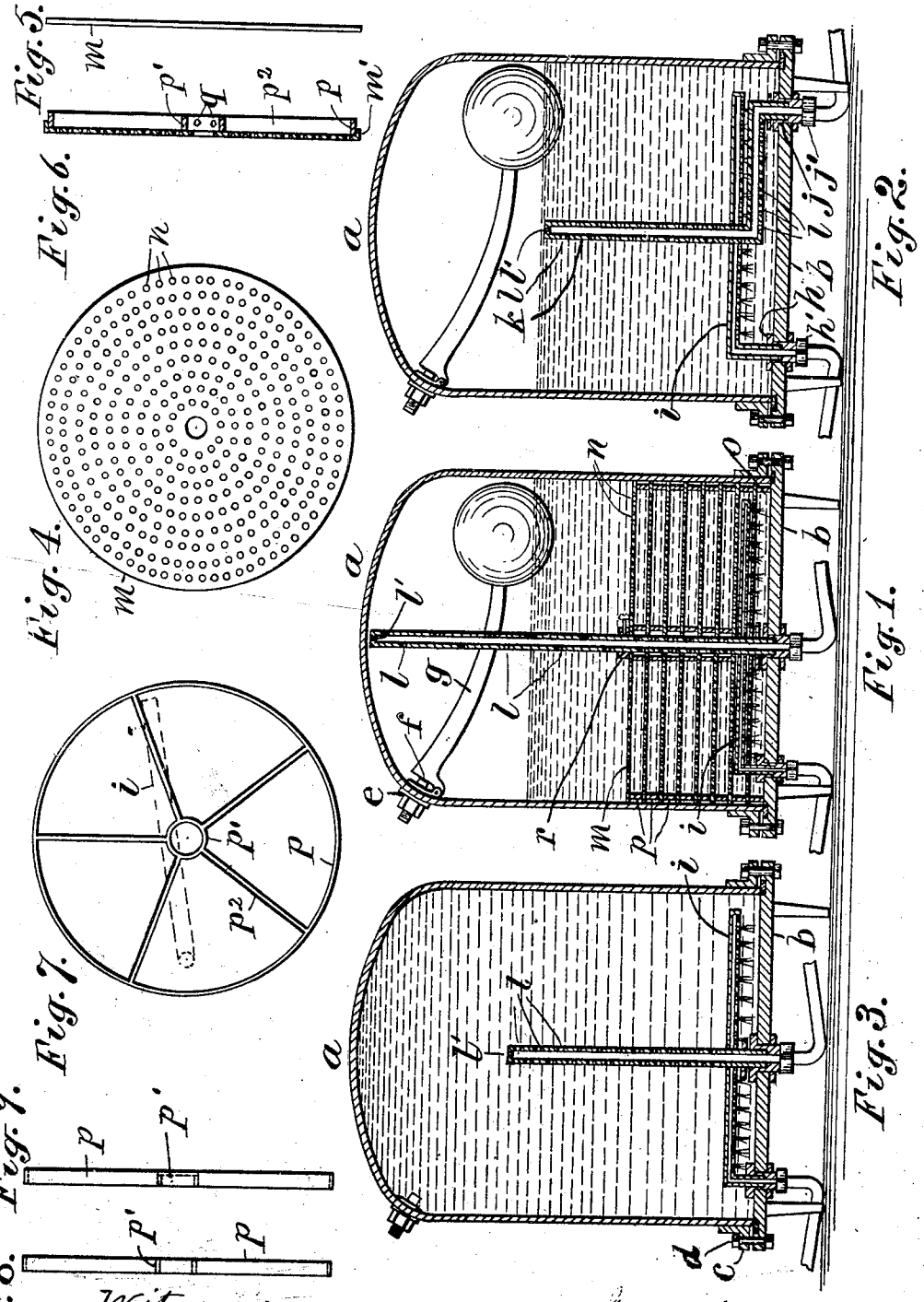
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J. H. FOX.

CARBONATING APPARATUS.

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CARBONATING APPARATUS.

No. 867,356. Specification of Letters Patent. Patented Oct. 1, 1907.

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To all whom it may concern:

Be it known that I, JOHN H. FOX, a citizen of the United States, residing at 228 East One Hundred and Twenty-third street, New York, county of New York, and State of New York, have invented certain new and useful Improvements in Carbonating Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to an apparatus employing a receptacle in which water and carbonic acid gas are mingled to promote the absorption of the gas.

The invention consists in various improvements upon the drawing-tube for drawing off the carbonated water, also in the perforated disks which are used for subdividing or diffusing the gas, and in means for spacing them apart, and in the arrangement of the above mentioned parts in relation to one another and to the casing of the carbonator.

Heretofore, it has been common to draw the carbonated water from within the carbonator by a pipe having a comparatively large inlet in which the free gas could find access and pass to the draft-arm or faucet where it causes a great deal of sputtering.

The drawing-tube in the present invention is extended into the water in the carbonator and provided with small perforations which prevent the admission of large bodies of gas, or cause the gas if entering the drawing-tube to be finely divided and mingled with the water, and thus wholly prevent sputtering at the draft-arm. Where the tube is thus surrounded by water mingled with gas, and provided with numerous small perforations, the reduction of pressure within the tube which occurs immediately when the draft-arm is opened to draw off the liquid, causes a rapid flow of the water through the perforations, which flow entrains the particles of gas which are floating in the water, and carries them with the water to the draft-arm. The water drawn from such a perforated draft-tube is therefore very sparkling and contains a large proportion of the gas.

Where disks have been heretofore immersed in water within the carbonator, they have sometimes been flanged at the edges to support them; but when block tin in sheet form is used for the disks they require support at points intermediate to the edges; and such support I avoid in the present invention by means of spiders which may be formed with a central hub, radiating arms, and a peripheral ring, so as to support the disks at the center, the margin, and at various intermediate points.

Heretofore, to prevent the displacement of the perforated disks within the carbonator during transportation, a stop in contact with the casing has been applied to the edges or center of the disks; but in the present invention I utilize the drawing-tube to hold the disks in place by extending the tube upwardly from the disks and clamping a collar upon the tube to hold the disks in place.

The invention will be understood by reference to the annexed drawing, in which

Figure 1 is a sectional elevation of a carbonator containing both the disks of the drawing-tube; Fig. 2 is a sectional elevation of a carbonator containing the drawing-tube without the disks and having a gas-space above the water-level; Fig. 3 is a sectional elevation of a carbonator having the casing entirely filled with water; Fig. 4 is a plan of one of the perforated disks; Fig. 5 an edge view of the same without flanged edge; and Fig. 6 is a transverse section of the same with one of the supporting spiders, and the disk formed with a marginal flange. Fig. 7 is a plan of one of the spiders; Fig. 8 is an edge view of the same, and Fig. 9 an edge view of a modification of the same.

The shell *a* of the carbonator is shown of cylindrical form with dome shaped top and its bottom closed by a base *b*. An angle-shaped ring *c* and bolts *d* are shown in Fig. 1 for securing the base to the shell.

A water inlet *e* is shown provided in Figs. 1 and 2 with a valve *f* regulated by a float-lever *g*, to maintain the water at the desired level. A gas-inlet *h* is shown, to which the ordinary gas-distributer *i* is attached and extended in the bottom of the carbonator with perforations upon its under side to diffuse the gas downwardly.

An outlet *j* is shown in the base *b* for the carbonated water, and the drawing-tube *k* extended upwardly from the same in the center of the casing, reaching to the top of the shell in Fig. 1; and in Fig. 2 terminated just below the water level.

Perforations *l* are shown at various points in the drawing-tube.

Eight disks *m* are shown in Fig. 1 of flat form provided with numerous small perforations *n*, as shown in Figs. 1 and 4, the two lower disks being separated by rings *o* and the remaining disks by the peripheries *p* and hubs *p'* of the spiders shown in Figs. 7 and 9. Plain rings *o* are employed, as the presence of the distributer and of the gas-inlet fixture and water-outlet fixture would interfere with the arms or hub of the spider. The distributer is in practice extended from the gas inlet *h* past one side of the drawing-tube, as shown in Figs. 1 to 3 inclusive.

The spiders are formed with peripheral ring *p* and hub *p'* adapted to loosely encircle the drawing-tube *k*, and spokes or arms p^2 attached to the hub and ring *p*. The arms and the peripheral ring are of uniform depth, but the hub is shown in Figs. 1 and 9 a little shallower than the arms, leaving a space at the edge of each hub

through which the water may gain free access to the holes in the drawing-tube, where they are situated between the disks. To afford such access, the hubs may be made of the same depth as the arms and ring, as shown in Figs. 6 and 8, and provided with perforations *q* to admit the water to the holes in the drawing-tube.

To stiffen the pans at the edge, they may be beaded or formed with a slight flange *m'* as shown in Fig. 6, within which the rings *p* of the spiders may be inserted. The flange or bead upon the disk is in any case made of less projection than the distance between the disks, so that the weight of the disks is supported wholly upon the spiders.

A collar *r* is shown clamped by a set-screw upon the drawing-tube contiguous to the upper disks *m*, and serves to hold all the disks from displacement.

The drawing-tube in Fig. 1 is shown provided with the perforations *l'* above the water level. Such perforation is in practice made very small, much smaller than can be indicated upon the scale of the drawing, and such hole operates to permit a small supply of gas to enter the drawing-tube to mingle with the water drawn therefrom. It is found in practice that the gas admitted by such a fine hole does not cause sputtering at the draft-arm or faucet, but does make the water more gaseous.

In Fig. 2, the water level, as with the carbonator in Fig. 1, is kept at a suitable distance below the top of the shell to form a gas chamber, and no pans are shown in this construction, but the drawing-tube is connected with a water-outlet at one side of the center and is bent to bring it up into the center of the casing so that it will draw the water from all sides. The top of the drawing-tube may be terminated in such a machine below the water level, as shown in Fig. 2, and made with or without a small perforation *l'* in the top.

In Fig. 3, the carbonator is shown entirely filled with water being supplied through the water-inlet *e* from a source of water under suitable pressure.

The gas admitted by the distributer *i* is discharged at various points in the lower part of the casing and rises through the water, mingling with it and being absorbed by it. Where the gas chamber is provided in the upper part of the casing, the gas which is held in contact with the surface of the water is to some extent absorbed thereby. The sub-division of the gas by the perforated pans as the gas rises upwardly through their numerous small holes, greatly promotes the discharge of the gas with the water through the small perforations of the drawing-tube *k*. Perforated pans have long been used to diffuse gas in water to promote its absorption, but never in connection with a drawing-tube having numerous perforations in the water-space, through which the gas could pass mingled with the water. The use of the perforated drawing-tube extended into the body of water operates to draw off with the water small globules of gas which are rising and floating with the water, and such gas and water are thoroughly mingled, so that a large part of the gas thus drawn off is absorbed in the water in its movement through the drawing-tube and the conveying pipe. I find in practice that this drawing-tube prevents the continued accumulation of the gas in the upper part of the casing, which often in the operation of other carbonators renders it impossible to introduce a sufficient amount of water, and necessitates the blowing off of gas at intervals at the top of the shell, which necessarily involves great waste of gas. The extension of the drawing-tube upward in the center of the shell through the pan enables the drawing-tube to furnish a lock, in conjunction with the collar *r*, to hold the pans in place, and perforations formed in the drawing-tube between the pans also enables the drawing-tube to receive a certain proportion of the gas which is sub-divided in its movement through the pans and is passing upward between the same. The drawing-tube and the pans thus both coöperate to sub-divide the gas and mingle it in a finely sub-divided condition with the water, whether in the carbonator shell, the drawing-tube, or the pipe which conveys the carbonated water to the draft-arm. It is obviously immaterial whether the arms *p'* of the spiders are straight, as shown in the drawing, or crooked.

The gas-inlet *h* and carbonated water-outlet *j* are both formed as thimbles extended through the bottom of the carbonator and clamped therein by nuts *h'* and *j'*. These thimbles are formed with threaded sockets upon their inner ends which face upwardly on the base *b* of the carbonator, and the gas distributer *i* and drawing-tube *k* are formed with threaded shanks adapted to screw into their respective threaded sockets. This construction enables the distributer and drawing-tube to be removed for repairs, and it permits the shank of the distributer to be screwed into the socket of the thimble *h* after the first perforated disk is set in place upon the lower ring *o*, the shank of the distributer being bent at right angles, and the first pan being formed with a hole to permit the passage of the shank through the same, by which it can be screwed into the socket of the thimble *h* before the other pans or the shell *a* are set upon the base. Special spiders may be made to support the two lower pans instead of the plain rings *o* to rest upon the base *b*, by cutting out a portion of the arms of the spiders where the distributer would intersect the same. The relation of the distributer to the spiders is indicated by the dotted lines *i* in Fig. 7, which show the distributer extending from the gas-inlet *h* at one side of the center.

It is preferable to locate the drawing-tube in the center of the shell *a*, as shown in Figs. 1 and 2, so as to draw the gas and water equally from all sides; and in building new machines the thimble *j* for the drawing-tube may therefore be placed in the center of the base. In applying my improved drawing-tube to machines in which the gas-inlet and water-outlet are placed near opposite edges of the base, the drawing-tube may have a bent shank, as shown in Fig. 2, to bring the perforated portion of the tube in the center.

In Fig. 2, the jets of gas from the holes in the distributer are shown passing downward behind the horizontal portion of the drawing-tube which is entirely unperforated. If the drawing-tube were perforated at this point the gas would flow directly into the perforations and would cause a great deal of sputtering when the liquid was drawn from the draft-arm.

By perforating the drawing-tube at various points in its height above the level of the distributer, the water is drawn from different levels within the shell and water in different degrees of carbonation is thus mingled together.

Having thus set forth the nature of the invention what is claimed herein is:

1. A carbonator having a casing adapted to contain carbonated water and free gas with means to prevent the water from rising above a certain level, and a drawing-tube extended into the water and gas space, and having perforations within the water space for the discharge of the liquid, and a perforation in the gas space for the entrance of gas to the drawing-tube, whereby the gas is mingled with the water in the drawing-tube.

2. A carbonator having a series of horizontal disks spaced apart and immersed in water and perforated for diffusing the gas, a gas-inlet with pipe for distributing the gas below the perforated disks, means for supplying water to the casing, means to prevent the water from rising above a certain level, a carbonated water-outlet having a drawing-tube extended through the water into the gas-space of the casing and having perforations in the water to withdraw the liquid, and a perforation in the gas-space for admitting gas to the drawing-tube to mingle with the water.

3. A carbonator having a casing adapted to contain carbonated water and free gas and provided with a removable bottom, a water inlet to the casing for supplying water, means to prevent the water from rising above a certain level, thimbles extended through the bottom of the carbonator and clamped therein and provided with threaded sockets upon their inner ends and a gas distributer and drawing-tube screwed into the said sockets respectively, the drawing-tube extending through the water into the gas-space of the casing and having a perforation in said gas-space for the entrance of gas to the drawing-tube, whereby the gas is mingled with the water in the drawing-tube.

4. A carbonator having a casing adapted to contain carbonated water and free gas and provided with a removable bottom, a water inlet to the casing for supplying water, means to prevent the water from rising above a certain level, a gas-inlet extended through the bottom for supplying gas, a carbonated water-outlet extended through the bottom for withdrawing the charged liquid, with a drawing-tube extended through the water into the gas-space of the casing, and having perforations in both the said spaces for admitting gas and water, whereby the gas is mingled with the water in its passage through the drawing-tube.

5. A carbonator having a casing adapted to contain carbonated water and free gas and provided with a removable bottom, a water-inlet to the casing for supplying water, a series of horizontal disks resting upon the bottom and spaced apart and immersed in water and perforated for the upward passage of the gas, the detachable bottom having a gas-inlet with pipe discharging below the perforated disks for supplying the gas, and a carbonated water-space having a drawing-tube extended through the water-space into the gas-space and having perforations in both the said spaces for admitting gas and water, whereby the gas is mingled with the water in its passage from the drawing-tube.

6. A carbonator having a casing adapted to be partially filled with water, and a series of perforated disks normally immersed in the water to diffuse the gas, means for supplying gas beneath the disks, a drawing-tube extended through the center of the disks and having perforations between the disks to discharge the liquid, and loose spiders arranged between the disks for spacing them apart, and having each a hub of less depth than the spider encircling the drawing-tube, whereby the liquid between the disks has access to the perforations in the tube.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN H. FOX.

Witnesses:
L. LEE,
THOMAS S. CRANE.