No. 676,407. Patented June 18, 1901.

C. L. BASTIAN.

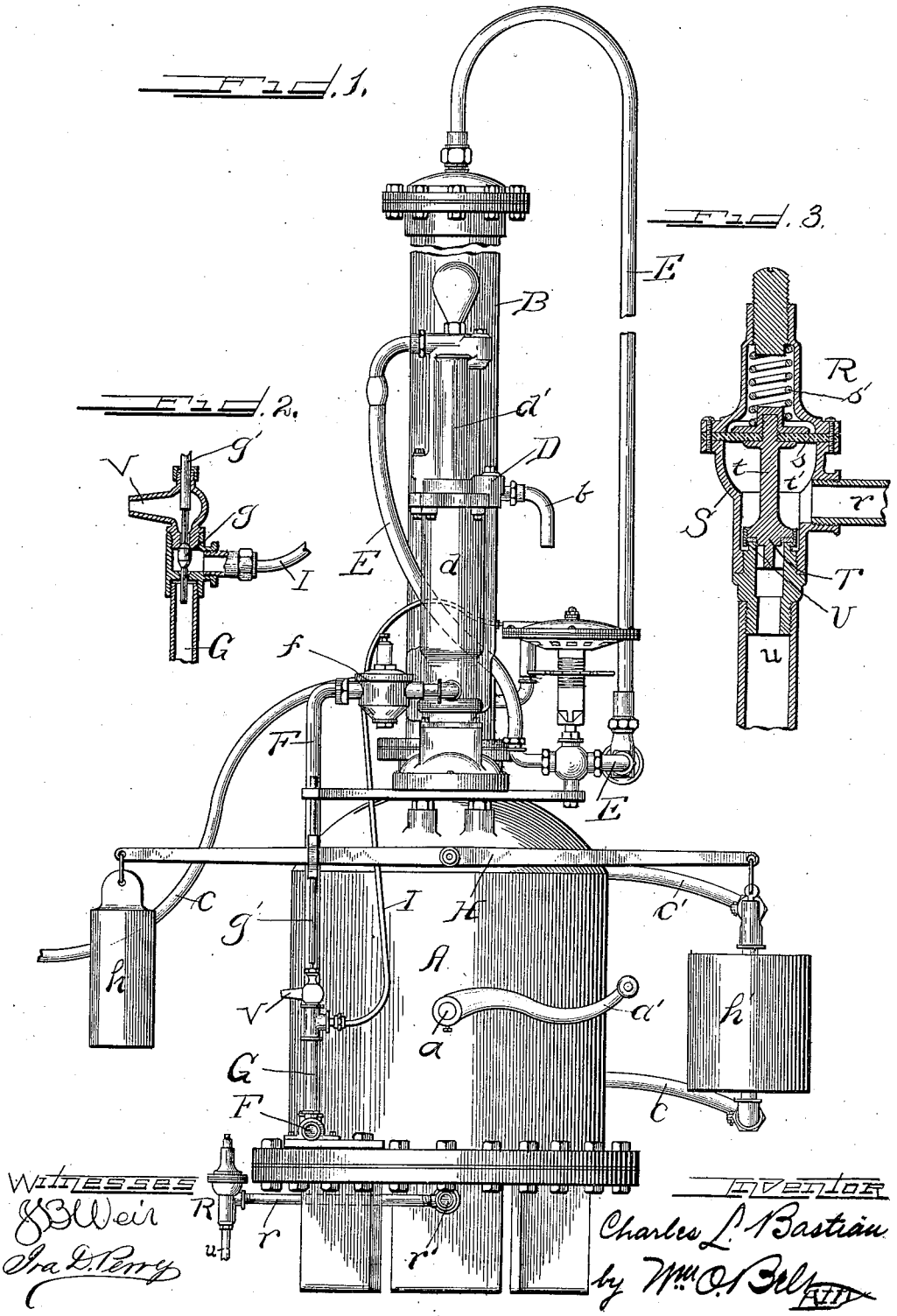
CARBONATING APPARATUS.

(No Model.) (Application filed Nov. 5, 1900.) 2 Sheets—Sheet 1.

Fig. 1.

Fig. 3.

Fig. 2.



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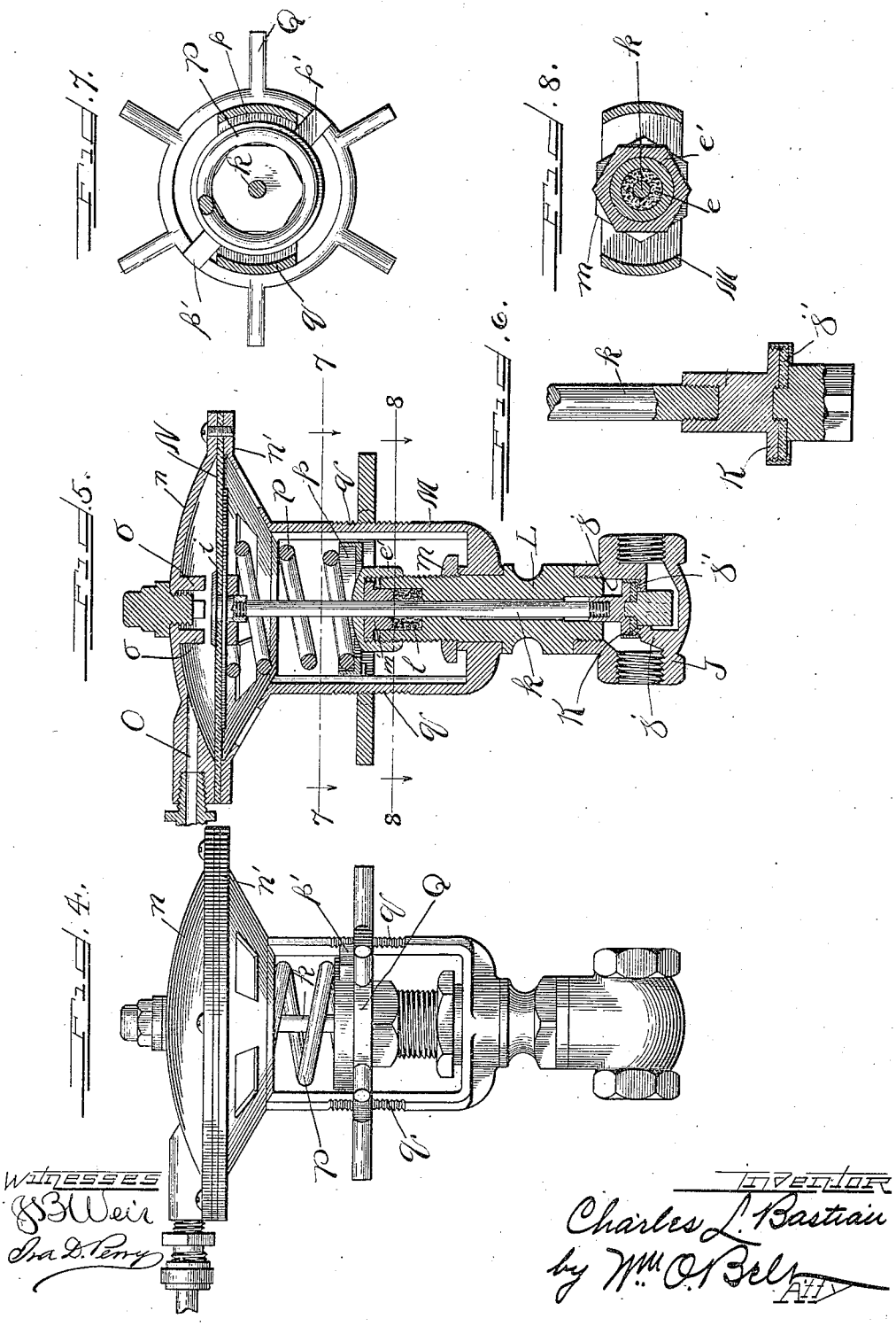

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CARBONATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 676,407, dated June 18, 1901.

Application filed November 5, 1900. Serial No. 35,470. (No model.)

To all whom it may concern:

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

This invention relates to certain new and useful improvements in apparatus for carbonating liquids; and its object is to provide means for automatically regulating and controlling the supply of liquid admitted to the mixer, so that a proper supply of carbonated liquid may be regularly maintained and the pump operated only when this supply becomes diminished and needs replenishing.

The invention also has for its object to automatically stop the pump by shutting off the liquid-supply to the mixer when the liquid in the mixer has reached a level which determines the supply desired to be regularly maintained and also prevent the escape of gas from the mixer while the pump is not working.

My invention also includes a regulating-valve of novel construction in the liquid-supply pipe from the pump to the mixer, which is automatically controlled by the liquid in the mixer to shut off the supply when the liquid in the mixer has reached the predetermined level and turn the supply on again when the liquid in the mixer has been diminished.

In the accompanying drawings, Figure 1 is an elevation of a carbonating apparatus embodying my invention, showing the parts in position when the pump is not working. Fig. 2 is a detailed sectional view showing the valve in the water-supply pipe to the pump. Fig. 3 is a detailed sectional view of the safety-valve. Fig. 4 is an enlarged view of the regulating-valve in the liquid-supply pipe from the pump to the mixer. Fig. 5 is a sectional view of the regulating-valve. Fig. 6 is a detail enlarged sectional view of the valve. Figs. 7 and 8 are sectional views on the lines 7 7 and 8 8 of Fig. 5.

Referring to the drawings, in which like letters of reference denote corresponding parts in all of the figures, the apparatus comprises a mixing vessel consisting of a collecting-tank A, upon which the saturating chamber or dome B is mounted. The gas is admitted into the lower part of the saturating-chamber through a pipe C, and the liquid to be carbonated is forced by the pump D into the top of the saturating-chamber through the liquid-supply pipe E, so that the liquid passing down through the saturating-chamber into the collecting-tank will become thoroughly saturated with the ascending gas. An agitator of any desired kind may be arranged within the collecting-tank on a shaft *a* and operated manually by a crank *a'* or by power suitably supplied. I employ a water-lift pump of approved construction, comprising the power-cylinder *d* and the pump-cylinder *d'*, water being led into the power-cylinder through the pipe F and reducing-valve *f* from a city water-main or other source of supply to operate the pump and the liquid to be carbonated being led into the pump-cylinder from a source of supply through the pipe *b* and discharged by the pump into the liquid-supply pipe E, which, as before stated, is connected with the top of the mixer.

I provide an extension G on the water-supply pipe, in the upper end of which is a double-seating wing-valve *g*, guided on a stem *g'*, which is connected with a balance-lever H, pivotally secured on the mixer. This lever carries a weight *h* at one end and a balance-tank *h'* at its other end, the balance-tank being connected by flexible pipes *c c'* with the mixer, so that the liquid will maintain the same level in the balance-tank as in the mixer. It will be observed that the lever H will rock or oscillate on its pivot as the level of the liquid in the balance-tank and mixer varies, and in the drawings I have shown the valve and other parts in the position which they assume when the balance-tank has overcome the weight *h* and causes the lever to rock downward, thereby raising the valve-stem *g'* and the valve *g*, Fig. 2, until it is seated against its upper seat, permitting the water to flow upward through the extension G and pipe I into the water-chamber *i* of the regulating-valve, Fig. 5, which causes this valve to close and shut off the outlet of liquid from the pump, which will cause the pump to cease working. I have provided a valve for the liquid-supply pipe from the pump to the mixer of novel con-

struction, as it is of essential importance to provide a complete and absolute check against the discharge of gas back through the valve when it is closed and the pump is not working to prevent the gas from accumulating in the pump and interfering with its use. This regulating-valve I have shown on Sheet 2 of the drawings, and it consists, essentially, of a valve-casing J, provided with a partition *j*, which forms a seat *j'* of contracted area for the valve K. This valve is provided with a stem *k*, which is guided in the upward extension L of the casing, a yoke M being mounted on this casing and held in place by a collar *m*, which is screwed down on the threaded upper end of the casing extension. This extension of the casing has a hollow end to receive packing *l*, and it is held in place by means of a cap *l'*, screwed down on the end of the extension over a plug *m'*. The upper end of the stem *k* is fastened to a diaphragm N, which is securely held between the curved top plate *n* and the flared upper end *n'* of the yoke. The water-chamber *i* is formed between the curved top plate *n* and the diaphragm, the water being admitted through the passage O. The valve is normally held open by means of the spring P, which bears against the under side thereof, and the upward movement of the diaphragm is limited by the lugs *o*. The spring P is supported on a plate *p*, arranged within the yoke and provided with lugs *p'*, which extend beyond the plate and rest upon a spider Q, operating on a threaded portion *q* of the yoke. By this means the spider can be adjusted as desired to increase or decrease the tension of the spring, and thereby cause the valve to open and close under a greater or less pressure, as desired.

I have also provided a novel form of safety-valve, which may be used in many different connections, but is of especial importance in carbonating apparatus. This valve R, Figs. 1 and 3, is located in a convenient place on a pipe *r*, leading from the discharge-pipe *r'* from the mixer, and as the liquid is highly carbonated it is of course necessary to provide a safety-valve strong enough to prevent the escape of the gas and also one which will operate and correctly to a very fine degree. This valve comprises a casing S, in the upper part of which the diaphragm *s* is securely held beneath an inclosed spring *s'*, which bears upon the diaphragm to keep the valve closed. The valve T is carried on a stem *t*, which extends through the liquid-chamber *t'*, and this valve is provided with a comparatively small seat U. The pipe R opens into the liquid-chamber, so that the pressure of the liquid is exerted down upon the valve to keep it closed, as well as up against the diaphragm; but as the area of the diaphragm is much greater than that of the valve the carbonated liquid will open the valve when it exceeds a certain pressure; but by this construction I add to the force of the spring the pressure of the carbonated liquid up to the opening point to keep the valve closed, which is of great importance, as it prevents the accumulation of gas or air-bubbles between the valve and its seat and provides a safety-valve of very great strength. When this valve is opened, the liquid is discharged through the pipe *u*.

My improved carbonating apparatus works automatically and in a very simple manner to accomplish a thorough and complete carbonation of the liquid. The operation is very simple and will be understood from the foregoing description and the drawings. As the water-supply is turned on through the pipe F, the valve *g* being seated against its lower seat and the regulating-valve open, the pump will force the liquid led into it through the pipe *b* and through the pipe E and the regulating-valve into the top of the mixer. When the liquid in the mixer and balance-tank has reached the predetermined level, the balance-tank will fall, rocking the lever H, raising the valve-stem *g'*, and seating the valve *g* against its upper seat, so that the water from the supply-pipe F may pass up through the extension G and pipe I into the water-chamber of the regulating-valve until it overcomes the pressure of the spring P, forces the diaphragm down, and closes the valve under a pressure sufficient to keep the gas from escaping back into the pump, which, having its outlet closed, will come to a stop. When the supply of liquid in the balance-tank and mixer is diminished, the lever H will rock back again, seating the valve *g* against its lower seat, shut off the flow of water from the supply-pipe up to the regulating-valve, and permit the water in said pipe and regulating-valve to exhaust through the nozzle V.

The improved devices which I have combined in this carbonating apparatus with other parts common in the art may be used with different kinds of these well-known parts. For instance, a different form of mixer may be employed which is not provided with a saturating-chamber, such as B, but has other means for effecting a complete saturation of the liquid. Other changes may be made in the construction and arrangement of parts without departing from the spirit and scope of my invention. I have, however, combined in this apparatus a very simple and convenient arrangement of parts designed to work automatically to accomplish the complete saturation of the liquid without the loss of power and without permitting the gas to escape. Just as soon as the regulating-valve closes the pump will stop working, and when the supply of liquid needs replenishing the regulating-valve will open again and the pump immediately begin work.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, and a

spring-pressed diaphragm-regulating valve located in and forming a part of said liquid-pipe and controlled in its operation by the level of the liquid in the mixer to throttle said pipe and shut off the supply of liquid to the mixer when the liquid therein has reached a predetermined level, substantially as described.

2. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer through which the pump forces liquid to the mixer, and a spring-pressed diaphragm-regulating valve located in and forming a part of said liquid-pipe, said valve being controlled and operated by the level of the liquid in the mixer to automatically throttle the liquid-pipe when the liquid in the mixer has reached a predetermined level, thereby confining the liquid in the liquid-pipe between the pump and said valve and causing the pump to stop, substantially as described.

3. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, a diaphragm-regulating valve in said pipe, and means for producing a pressure on the diaphragm to close the valve when the liquid in the mixer has reached a predetermined level, substantially as described.

4. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, a diaphragm-regulating valve in said pipe, and means controlled by the level of the liquid in the mixer for producing a pressure on the diaphragm to close the valve when the liquid has reached a predetermined level and for removing the pressure and opening the valve when the liquid has fallen below said level, substantially as described.

5. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, a regulating-valve in said pipe, and a water-valve controlled and operated by the level of the liquid in the mixer and adapted to permit the water to flow into the regulating-valve and close the same when the liquid in the mixer has reached a predetermined level, and to shut off the water from said regulating-valve when the liquid in the mixer has fallen below the predetermined level and permit the water in the regulating-valve to escape, substantially as described.

6. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer through which the pump forces liquid to the mixer, a regulating-valve located in and forming part of said pipe, a balance-tank connected with the mixer so that the liquid will maintain the same level in the balance-tank as in the mixer, and connections intermediate of said balance-tank and the regulating-valve whereby the valve is closed to throttle said pipe when the tank falls and opened when the tank rises according as the liquid in the mixer and tank varies from the predetermined level, substantially as described.

7. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, a regulating-valve in said pipe, a water-valve having a pipe connection with the regulating-valve, a balance-tank connected with the mixer so that the liquid will maintain the same level in the tank as in the mixer, and devices intermediate of the tank and the water-valve for opening the latter when the tank falls to admit water-pressure into the regulating-valve to close the same, and for closing the water-valve to shut out the water-pressure and allow the regulating-valve to open and the water therein to escape when the tank rises, substantially as described.

8. In a carbonating apparatus, the combination with a mixer, of a pump, a liquid-pipe leading from the pump to the mixer, and a regulating-valve in said pipe having a water-chamber to receive water under pressure to close the valve, substantially as described.

9. The combination with a pump, of a supply-pipe thereto and a discharge-pipe leading therefrom, a regulating-valve in the discharge-pipe and having a pressure-chamber, a pipe leading from the supply-pipe to said pressure-chamber, and means automatically operated for directing a flow of fluid through said pipe to the pressure-chamber to close the regulating-valve, substantially as described.

10. The combination with a pump, of a supply-pipe thereto and a discharge-pipe therefrom, a regulating-valve in the discharge-pipe and having a pressure-chamber, a pipe connected with the supply-pipe and communicating with said pressure-chamber, a valve in said pipe, and automatic devices for operating said valve to direct a flow of fluid through the pipe to the pressure-chamber to effect the closing of the regulating-valve and shutting off the discharge from the pump, substantially as described.

11. The combination with a pump, of a regulating-valve connected with the liquid-supply thereto and the discharge therefrom, a receptacle into which the pump discharges, and means controlled and operated by the level of the liquid in said receptacle for directing liquid from the supply into the regulating-valve to close the same and for permitting the same to escape to open the valve, substantially as described.

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