July 7, 1925. 1,544,640

J. G. GIBBS

SIPHON

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Fig. 1.

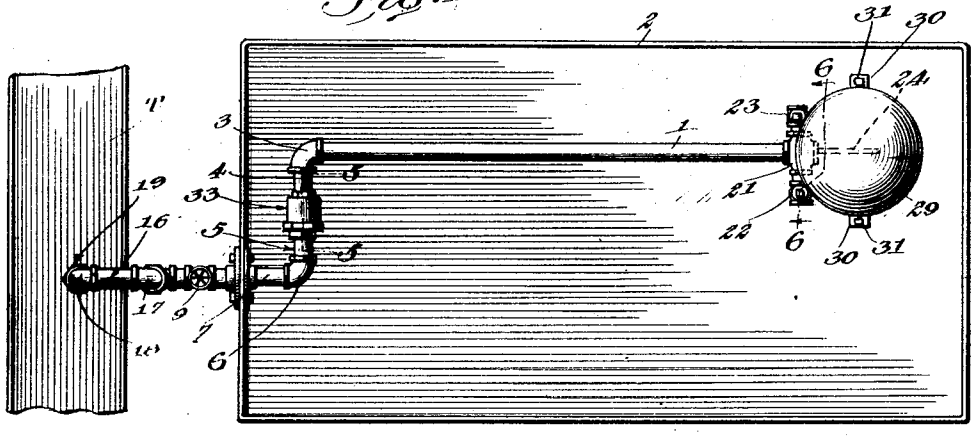
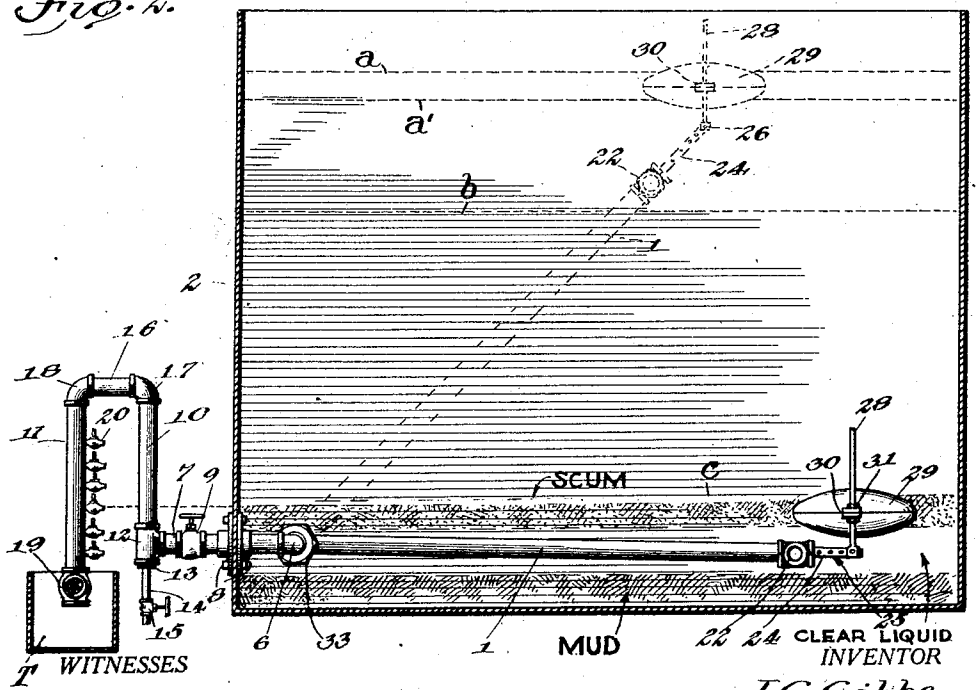


Fig. 2.



WITNESSES

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Fig. 3.

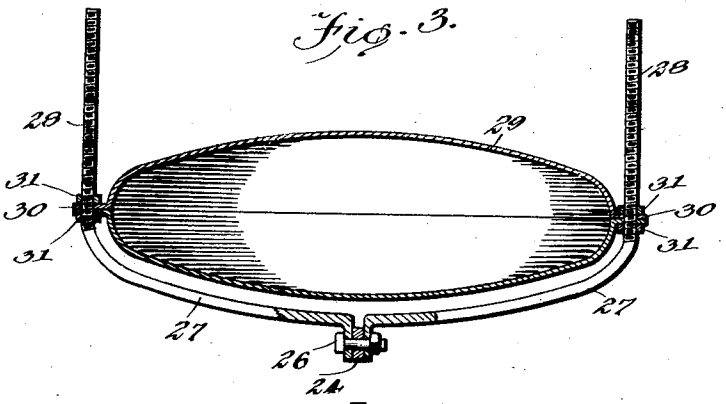


Fig. 4.

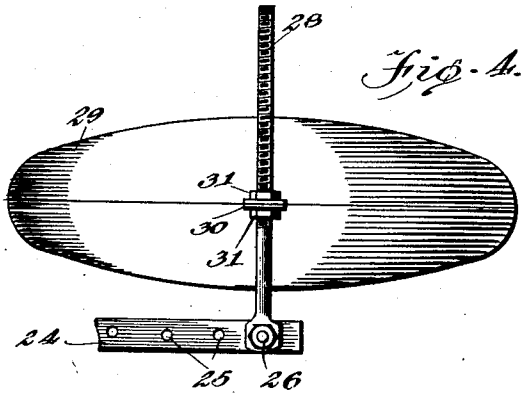


Fig. 5.

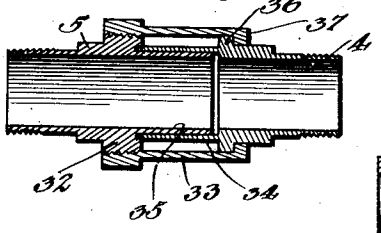
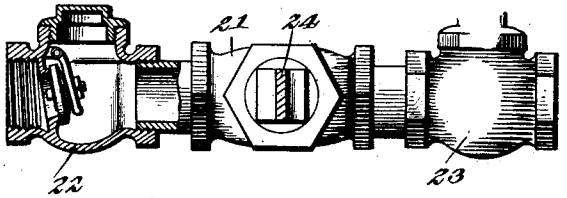


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SIPHON.

Application filed December 11, 1923. Serial No. 679,990.

To all whom it may concern:

Be it known that I, JOHN G. GIBBS, a citizen of the United States, and a resident of New Orleans, in the parish of Orleans and State of Louisiana, have made certain new and useful Improvements in Siphons, of which the following is a specification.

My invention relates to improvements in siphons, and it consists of the constructions, combinations and arrangements herein described and claimed.

An object of the invention is to provide a siphon particularly adapted for use in decanting clear cane juice in the manufacture of sugar.

A further object of the invention is to provide a siphon which, although primarily intended for the aforesaid purpose, is adaptable to any circumstance where it is desired to separate a stratum of clear liquid from strata of scum, sediment and the like.

A further object of the invention is to provide a siphon by the use of which the separation of liquids and solids in the manufacture of sugar is facilitated when such separation is carried out by the process of subsidation and decantation.

Another object of the invention is to provide a siphon having a novel arrangement of air cocks by the use of which the siphonic action may be automatically stopped at various liquid levels.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:

Figure 1 is a plan view of the siphon.

Figure 2 is a horizontal sectional illustrating the various positions of the movable siphon pipe.

Figure 3 is a longitudinal section of the float.

Figure 4 is a side elevation of the float.

Figure 5 is a section taken substantially on line 5—5 of Fig. 1 and illustrating the construction of the swivel joint of the movable pipe.

Figure 6 is a detailed section taken substantially on line 6—6 of Fig. 1 and illustrating the check valves at the free extremity of the movable pipe.

In carrying out the invention provision is made of a pipe 1, which is movable in a tank 2. This tank is adapted to contain cane juice from which the clear liquid is to be drawn off in the manufacture of sugar. The container 2 may be of any dimensions inasmuch as this has nothing to do with the invention.

An elbow 3 joins the movable pipe 1 with a nipple 4 of the swivel joint illustrated in detail in Fig. 5. A complementary nipple 5 screws into a similar elbow 6 which in turn has connection with a pipe 7. This pipe is rigid inasmuch as it is suitably clamped by plates 8 to one wall of the container 2.

The stationary pipe 7 carries a globe valve 9 which is the main valve by which the apparatus is operated. In this capacity the valve 9 controls the flow of liquid to the siphon which comprises the parallel legs 10 and 11. The pipe 7 is connected with the leg 10 of the siphon by a T 12.

This T has a plug 13 in the lower end, into which a water connection 14 is screwed. This connection is controlled by a valve 15. The valve 15 is normally closed and in fact the water connection is used only in such circumstances when the siphonic flow cannot be started without the use of water. The legs 10 and 11 of the siphon are connected by a short nipple 16 and elbows 17 and 18, all as clearly shown in Fig. 2. The siphon has the shape of an inverted U.

Situated at the extremity of the outlet leg 11 of the siphon is a valve 19, by means of which the out-flowing liquid may be throttled. Circumstances may arise when the rate of flow exceeds the proper amount and in such instances the throttle 19 is used to cut down the rate of flow. The leg 11 carries a plurality of air cocks 20.

Six of these are shown in the drawing. More or less may be used, as may be desired or become necessary. The purpose of the air cocks is to determine the level of liquid in the container 2 at which the flow is intended to automatically cease. For example, if the uppermost air cock is opened, the liquid will continue to flow out by siphonic action until the level of liquid in the container coincides with the open air cock. The flow will then automatically cease.

Mounted on the free extremity of the movable pipe 1, is a fitting 21, which carries check valves 22 and 23 (Figs. 1 and 6) which permit the liquid to flow into the pipe when the siphon is in operation, but which close and thereby trap clear liquid in the pipe when the siphon action ceases as stated before. The fitting 21 carries a bar 24, which has a number of perforations 25

to any one of which the bolts 26 of the yoke 27 (Figs. 3 and 4) may be connected.

This yoke branches out laterally in respect to the bar 24, the upright portions 28 thereof being threaded so that the float 29 may be adjusted high or low. The float has lateral ears 30 which are loosely movable on the uprights 28. Nuts 31 above and below the ears serve as the adjusting means for the float. The purpose of adjusting the float is to station the inlet check valves 22 and 23 at various positions in respect to the liquid levels in the container.

Attention is directed to Fig. 5. As before stated, this is a detail of the swivel connection of the movable pipe 1 with the stationary pipe 7. The nipple 5 has a threaded shoulder 32 which receives the swivel coupling 33 of the nipple 4. Both nipples 4 and 5 have sleeves 34 and 35 which fit together so as to make a good joint and yet permit turning of the nipple 4. The space between the coupling 33 and outer sleeve 34 is occupied by packing in practice. Both the nipple 4 and the coupling 33 have annular shoulders 36 and 37 by the engagement of which the two nipples are drawn together upon turning the coupling 33 in one direction.

The operation of the siphon may readily be understood from the foregoing and the following description. It has been stated that the container 2 is intended to receive cane juice as one of the steps in the clarification thereof in the manufacture of sugar.

Assume the container 2 to be full to the level indicated by the line *a*. The float 29 will assume the dotted line position substantially as shown in Fig. 2. Inasmuch as the float is connected with the movable pipe 1, the latter will assume such position in which the inlet check valves 22 and 23 will be in a certain position below the liquid level. This particular position is regulated either by means of the bolt 26 or the threaded uprights 28 of the yoke 27.

After having filled the container 2 as stated that portion of the cane juice which is lighter than the liquid accumulates at the top between the level *a* and the line *a'*. This is a stratum of scum. That portion of the suspended matter in the cane juice which is heavier than the liquid begins to settle and within a certain period of time may be assumed to have settled to the level *b*.

The stratum between the scum at the top and the mud beneath the line *b* is clear liquid. As soon as it has been determined that the inlet valves 22 and 23 are situated in clear liquid, the main valve 9 is opened and the siphon begins to draw off the clear liquid. It is discharged into a trough T of any suitable design.

Should there be any difficulty at all in starting the siphon the valve 15 in the connection 14 may be opened to admit a jet of water into the siphon and start the liquid flow. However, such difficulty will not be experienced when there is a well defined head of liquid in the container 2. As the clear cane liquid flows out, the level of the suspended impurities below the line *b* will continually get lower, this by virtue of the fact that such impurities are constantly settling.

By regulating the rate of flow of the clear liquid through the apparatus by means of the throttle valve 19 the main valve 9 may be opened wide and require no further individual attention. The rate of flow is governed by the valve 19. The inlet valves 22 and 23 will follow the suspended impurities (mud) down but will never reach them. Assume that it is desired to stop the siphonic action at the level *c*. That air cock of the series 20 which is in line with the level *c* (see dotted line) is opened wide. The others are closed. The flow of liquid into the trough T will continue regardless of the open air cock, until the level *c* comes even with the open air cock.

Air may now enter the siphon through the open cock and permit the column of clear liquid in the leg 10 and pipe 1 to back up, but in doing so the liquid will cause the closure of the check valves 22 and 23 so that none can escape into the container. The liquid thus contained furnishes the priming fluid for the next siphonic action when the container 2 is again filled. Although not so shown the container 2 is in practice provided with a suitable connection at the bottom for drawing off the scum and mud. When the tank is again filled the float 29 rises with the surface of the liquid until it again assumes the dotted line position when the level of the liquid is at *a*. The liquid in the pipe 1 provides the primer, as previously stated. It should have been stated before that the main valve 9 should be closed when the siphonic action ceases. The trapping of clear liquid in the pipe 1 is thus complete. After allowing sufficient time for the scums and mud to collect in their respective strata the valve 9 is again opened with the result already described.

The advantages may be briefly outlined. The use of this particular siphon hastens the process of separation of the clear liquid and suspended matter of cane juice because the drawing off of the clear liquid may be begun after the suspended matter has settled only a few inches below the surface of the liquid. Known methods for a similar purpose make it necessary to wait until the suspended matter or undissolved solids have settled to within a few inches of the bottom of the container before beginning to draw off the clear liquid.

By means of the two adjusting features

of the float 29 (the adjustment at 26 along the bar 24 and the adjustment of the float along the threaded uprights 28) the drawing off of clear liquid may be begun at a point any desired distance below the liquid level *a*. By following the float 29 down from the dotted line position in Fig. 2, the reader can readily see that the inlets 22 and 23 of the movable siphon pipe 1 are constantly brought nearer to the liquid surface. The final portion of liquid drawn off may be from a point of any desired nearness to the surface layer of scum and this is largely determined by the adjustability of the float along the uprights 28.

In this way only a small percentage of the total clear liquid is left in the container between the scum and mud. Drawing off of the clear liquid may be automatically stopped when the surface of the liquid in the container is at any desired height. This is regulated by the series of air cocks 20, as already described.

The primary purpose of the pipe arrangement outside of the container is to stop the out-flow of clear liquid at any desired level and to prevent scum or mud from entering the movable pipe 1. This can be done to a nicety by making the float adjustments in such a manner that the inlet valves 22 and 23 will be stopped in the intermediate stratum of clear liquid. By the time that the suspended impurities have settled to the bottom of the container most of the clear liquid will have been drawn off, thus the total time which elapses from the moment the container is filled to the moment the desired amount of clear liquid has been drawn off is made less when this apparatus is used than it is by the old method which requires a long settlement period before clear liquid can be drawn off.

While the construction and arrangement of the improved siphon as herein described and claimed is that of a generally preferred form, obviously modification and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:—

1. A siphon comprising a movable pipe submerged in the liquid of a container, an inlet check valve at the free end of said pipe, a float supported at the surface of the liquid, means carried by the float for supporting the inlet check valve at a determined distance below the surface, a valve in the siphon for regulating the rate of flow of liquid from the container, means in the siphon which is open to admit air when the liquid surface in the container reaches the level of said open means, the liquid in said pipe then closing the inlet check valve, and a valve in the siphon between said regulating and check valves which is then closed to trap the liquid in said pipe for priming the siphon for a subsequent operation.

2. A siphon comprising a movable pipe submerged in the liquid of a container, an inlet check valve at the free end of the pipe, a float supported at the surface of the liquid, a yoke in which the float is adjustably mounted, and a bar extending from said movable pipe with which bar the yoke is adjustably connected, said adjusting means being for the purpose of regulating the position of the inlet check valve in respect to the float.

3. A siphon comprising an inverted U-section of pipe, a movable pipe submerged by the liquid in a container, a stationary pipe carried by the container to the outer end of which the U-section is connected, swivel means by which the inner end of the stationary pipe is connected with the movable pipe, an inlet check valve at the free end of the movable pipe, a float supported at the surface of the liquid, means carried by the float supporting the movable pipe so that the inlet check valve may move with the liquid at a determined distance below the surface, a vertical series of air cocks in one leg of the U-section representing various liquid levels at which the liquid flow from the siphon is intended to be stopped, one of the cocks being left open to admit air into the siphon when the liquid surface reaches the level thereof so that the liquid in the movable pipe causes the closure of the inlet check valve, and a valve in said stationary pipe which is then closed to trap the liquid in said movable pipe.

4. A siphon comprising an inverted U-section of piping, a stationary pipe with which the U-section is connected, a pipe which is movable in a vertical plane in a liquid container, a swivel by which said pipe is connected to the stationary pipe, a float which carries the movable pipe at the free end and thus moves it in said vertical plane as the liquid level varies, and a valved water connection leading into the siphon at said U-section for priming the siphon in cases when the flow is to be started with the liquid in the container at a low level.

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