

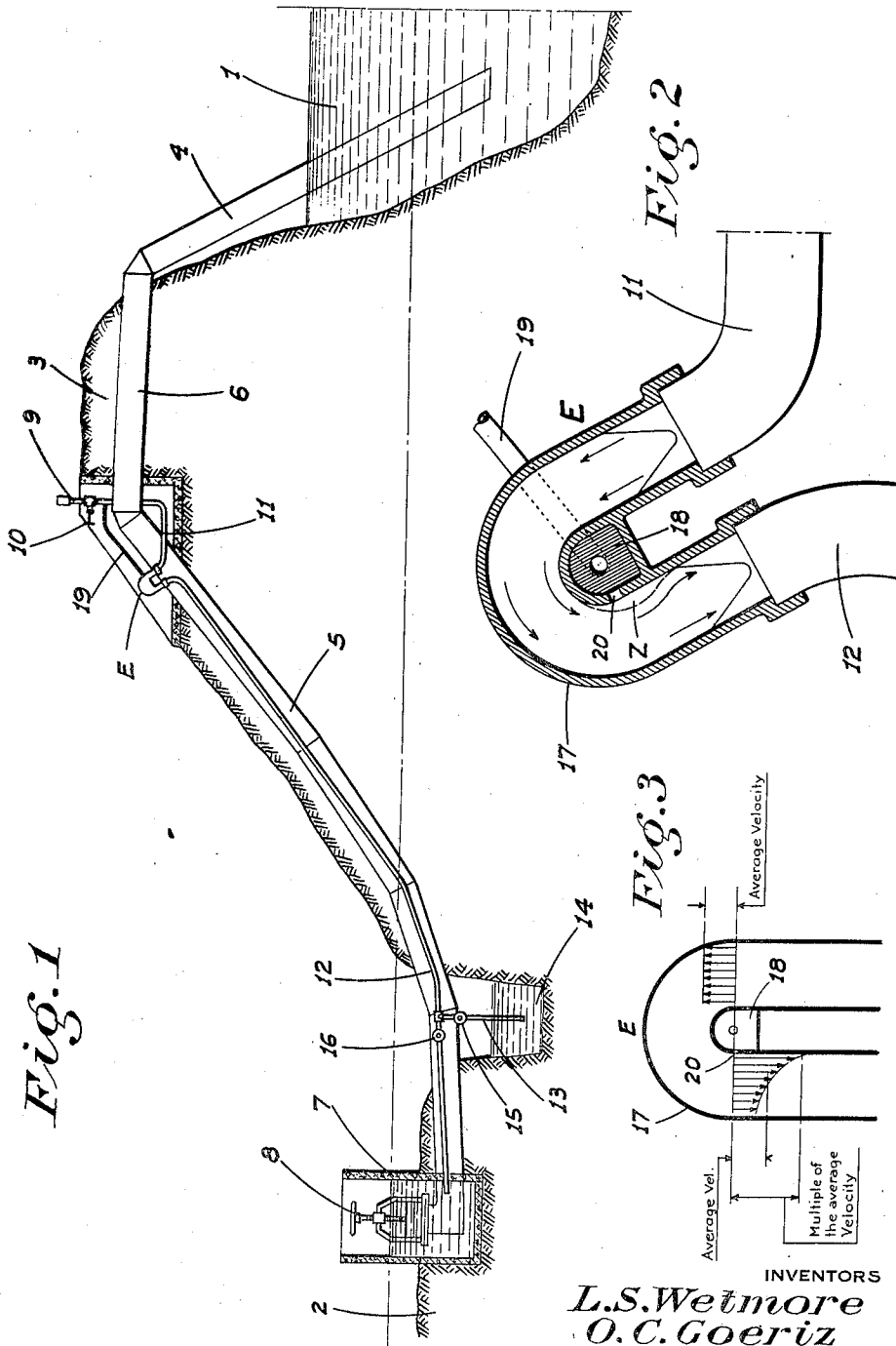
Jan. 19, 1937.

L. S. WETMORE ET AL

2,068,363

SIPHON ATTACHMENT

Filed Sept. 30, 1935



UNITED STATES PATENT OFFICE

2,068,363

SIPHON ATTACHMENT

Louis S. Wetmore, Stockton, and Oscar C. Goeriz,
Oakland, Calif.; said Goeriz assignor to said
Wetmore

Application September 30, 1935, Serial No. 42,844

2 Claims. (Cl. 137—20)

This invention relates to siphons used in irrigating lands from the waters or streams which are higher than the land, such as the delta lands of the San Joaquin and Sacramento Rivers in California, and of the States bordering the lower Mississippi River.

With such natural conditions to contend with it is of course impossible for any water once siphoned onto the land to flow of itself back to the stream. Since however it is practically impossible to so accurately gauge the amount of water siphoned that it will be just sufficient for irrigating needs, a certain amount of excess water inevitably collects and it is customary to provide a drainage ditch into which such water flows from the irrigating ditches. To get the excess water back to the stream requires a pumping plant and the amount of such water is frequently so great that the cost of pumping operations in a season is extremely high, running into many thousands of dollars.

It has been proposed to lessen this excess water flow and the accompanying expense of disposing of the same, by providing the discharge end of the siphon with a valve or gate, with the aim of shutting off the water at will but without breaking the siphon. Theoretically this can be accomplished, but in practice it very soon results in the breaking of the siphonic action. This is because for one thing the difference in level between the water and the land is insufficient to give any great head to the flow, so that the siphon is relatively sensitive in operation and less than a 25% closing of the valve results in the stopping of the siphonic action. This is especially the case when the stream level is apt to vary as when it is subject to tidal influences. For another thing, even if the valve could be tightly closed without the siphonic action being destroyed, the gas in the water which may be either air or gas generated from the natural fermentation of algae or other foreign matter in the water, will rise to the highest points of the siphon in the form of bubbles and will ultimately accumulate at such point in a quantity sufficient to form an air pocket, thus definitely breaking the siphon. Whenever this occurs the siphon must be re-primed—an arduous task with a siphon of large dimensions such as is used for irrigating purposes—and as a result the mere use of control valves has not met with favor and the waste of water and pump expense continues.

It is therefore the principal object of our invention to eliminate the time necessary to re-

prime the siphon, as well as a possible breaking of the same, by providing an auxiliary siphon and air exhausting attachment, connected to the main siphon and arranged so as to constantly remove all air accumulating in the top of the main siphon, and which also enables the flow from the main siphon to be reduced or completely shut off, or such siphon to operate at a very low head (as when the water in the stream is at an extremely low stage) without breaking the siphon.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawing similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a transverse section through a stream, a levee and adjacent land, showing a main siphon and the auxiliary siphon attachment connected thereto.

Figure 2 is an enlarged section of the air exhausting unit of the auxiliary siphon.

Figure 3 is a diagram showing the velocity distribution in the air exhauster or ejector.

Referring now more particularly to the characters of reference on the drawing, the numeral 1 denotes a stream from which the water is taken, 2 the land onto which the water is discharged and which is lower than the stream level at any state, and 3 the intervening levee which as required extends to a height above that of any possible flood level.

The siphon as generally constructed for use under these conditions comprises a stream side leg 4, a longer land side leg 5, and a top connecting portion 6, the highest point of which is usually adjacent its connection with the leg 5. The leg 5 terminates in an upwardly facing direction in a box or sump 7 depressed in the land, and its upper termination is provided with a vertically adjustable valve or gate 8 of standard character.

Upstanding from the siphon leg 6 at the highest point is a short stand pipe 9 adapted for connection to a priming pump or the like and provided with a normally closed valve 10.

The above arrangement and construction of the main siphon may be considered standard or conventional in siphons of this character.

Our improved arrangement comprises an aux-

iliary or pilot siphon pipe 11, connected to the leg 6 below the pipe 9. The pipe 9 is also connected to the intake of an air exhaustor E described in detail hereinafter, and which is disposed at a level lower than the top of the main siphon.

Connected to the discharge end of the exhaustor is a continuation pipe 12 of the auxiliary siphon, which continuation extends down the main siphon leg 5 to an open termination in the sump 7 near the bottom.

The size of this auxiliary siphon and its general mounting may vary with different installations, depending upon the lift of the siphon, the size of the siphon itself, and other factors.

A lateral 13 is connected to the pipe 12 and depends to an open termination as low as possible on the land, as in the drainage ditch 14 which follows along the base of the levee as is customary. The lateral is provided with a shut-off valve 15, while the pipe 12 has a similar valve 16 beyond the lateral.

The air exhaustor or ejector E which is an important feature of the auxiliary or pilot siphon comprises a U-shaped passage member 17 of rectangular cross section to the outer ends of the legs of which the pipes 11 and 12 are connected. It will thus be seen that the pipe 11, the exhaustor, and the pipe 12 form a continuous passage unit. The member 17 is disposed in an inverted position and is formed between the legs at the base of the bend with an enclosed chamber 18. A small air pipe 19 is connected to one outer side of the chamber and to the pipe 9 below the valve 10. A port 20 provides communication between said chamber and the discharge leg of the member 17 just below and on the inner side of the bend where a vacuum zone Z is created by the flow of water through the ejector.

The functioning of any type of hydraulic air or gas exhaustor (or ejector) depends upon the velocity of the fluid at the zone where air or gas is admitted. In a water-jet siphon of the usual construction there is a nozzle through which the water is issued into a throat. The velocity is greatest in the center of the stream, and smallest at the periphery, where it comes in contact with the air. For that reason we have had better success by using our improved type of exhaustor (or ejector) where the highest velocity prevails at the zone of contact between water and air.

By means of our auxiliary or pilot siphon there is always assured a flow of water because its intake is from the bottom of the leg 6 of the major siphon. The flow of water through the auxiliary or pilot passes through the exhausting attachment uninterrupted, and as it makes the bend in the exhaustor the velocity of the water, while the average velocity remains the same, varies from a maximum at the inside to a minimum at the outside of the curve so as to produce at the point or port 20 a suction about five times as great as that produced by the average velocity of the water in the legs 11 and 12 of the auxiliary or pilot siphon.

The air accumulating in the stand pipe below valve 10 is removed through the air pipe 19 to chamber 18 and the port 20 into the auxiliary or pilot siphon because of the relatively high vacuum at the port 20; the auxiliary or pilot siphon having at this particular point a velocity

(suction or injecting power) equal to about five times what would be in either the major or pilot siphons.

An exhaustor of the form shown has been proved to be most effective for exhausting or ejecting the air from the main or major siphon, since it operates effectively with the smallest possible head of water.

This highly efficient action is based on the fact that the velocity of flow of a liquid through a U-shaped passage varies in inverse proportion to the radius of the stream lines. In other words, the velocity of the water is greatest about the inner surface of the bend of the member 17, or where the air port 20 communicates with the interior of said member. With this apparatus therefore we are able to keep both siphons primed and in operative condition at all times regardless of low head, accumulation of air at the top of the main siphon, or any relative open or closed position of the valve 8.

If no water at all is wanted in the sump 7 it is only necessary to close the valve 16 and open the valve 15, which allows the auxiliary siphon to continue in operation but to discharge its constant but small flow into the drainage ditch. And by this method with no more relative loss of water than would be the loss of gas in a pilot light of an automatic hot water heater, the main or major siphon can be kept primed and ready for use at any time or interval, provided only that the level 1 remains slightly higher than the outlet of level of the water in the drainage ditch into which the pipe or leg 13 discharges.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent is:

1. In combination with a main siphon, a pilot siphon connected to and leading downwardly from the bottom of the main siphon adjacent the highest point thereof, said pilot siphon including a curved ejector interposed therein, and an air pipe leading from the top of the main siphon at the highest point thereof to a connection with the discharge leg of said ejector on the inner curve thereof.

2. In combination, a main siphon having a flow control valve, a pilot siphon connected to and leading downwardly from the bottom of the main siphon adjacent the highest point thereof and in the main disposed at an acute horizontal angle, said pilot siphon including an ejector interposed therein, and an air pipe leading from the top of the main siphon at its highest point to a connection with said ejector; the ejector having means to increase the velocity of flow of the liquid therethrough at the point of connection of the air pipe with the ejector whereby to obtain the maximum suctional effect on the air in the pipe.

LOUIS S. WETMORE.
OSCAR C. GOERIZ.