(No Model.)

E. ETÈVE & J. LEMICHEL.

ELEVATING SIPHON.

No. 479,411. Patented July 26, 1892.

FIG_1_

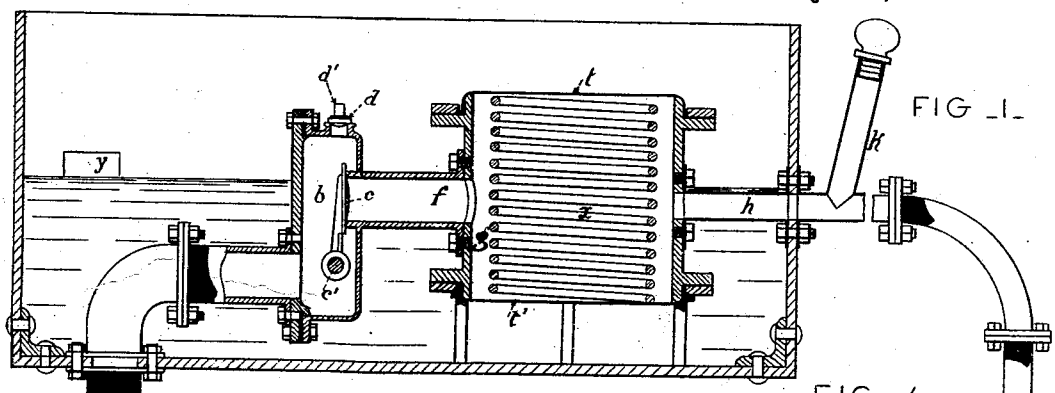


FIG_2_

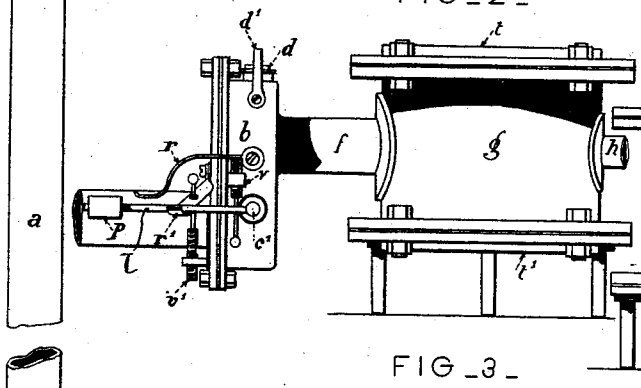


FIG_4_

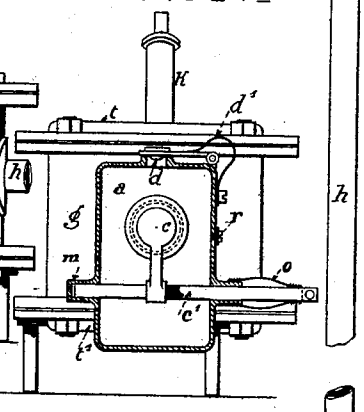


FIG_3_

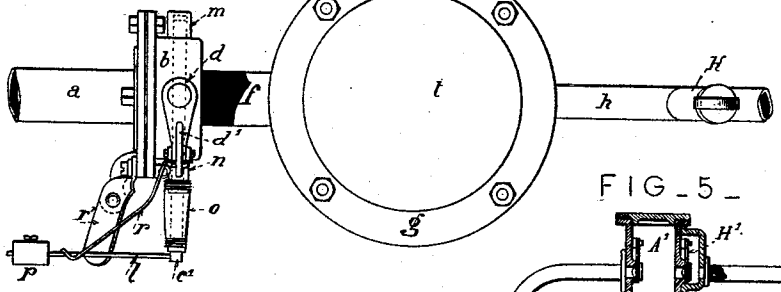
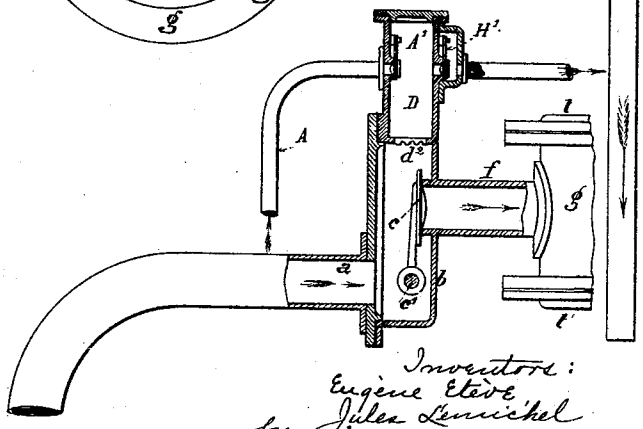


FIG_5_



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UNITED STATES PATENT OFFICE.

EUGÈNE ETÈVE AND JULES LEMICHEL, OF PARIS, FRANCE.

ELEVATING-SIPHON.

SPECIFICATION forming part of Letters Patent No. 479,411, dated July 26, 1892.

Application filed February 17, 1892. Serial No. 421,833. (No model.) Patented in France May 24, 1890, No. 205,888; in England December 24, 1890, No. 21,024, and in Belgium October 19, 1891, No. 96,853.

To all whom it may concern:

Be it known that we, EUGÈNE ETÈVE and JULES LEMICHEL, citizens of the Republic of France, residing at Paris, in said Republic, have invented a new and useful Elevating-Siphon, (for which we have obtained Letters Patent in France, No. 205,888, dated May 24, 1890; in Belgium, No. 96,853, dated October 19, 1891, and in England, No. 21,024, dated December 24, 1890,) of which the following is a specification.

The hydraulic siphon which forms the subject of this invention is adapted to operate intermittently, though at such exceedingly short intervals that the supply is continuous, as will be clearly understood from the following description and by reference to the accompanying drawings, in which the principle of the invention is illustrated, and in which—

Figure 1 is a vertical section of the apparatus; Fig. 2, an outside elevation; Fig. 3, a plan; Fig. 4, a vertical section through the axis of the stop-valve, and Fig. 5 a modified form of the apparatus.

As a continuation of the suction-pipe *a* is arranged a box *b*, containing valves *c* and *d*, the latter being the external valve controlling the supply of liquid from the siphon. The valve *c* is arranged internally and adapted, as required, to open or close the junction pipe or passage *f* between the box *b* and the chamber *g*, having movable and resilient walls and situated at a level a little above the suction-pipe *a*. From this chamber *g*, provided with the movable and resilient walls, the construction of which is described farther on, and on the same level as pipe *f* starts the discharge-pipe *h*, descending to a somewhat lower level than that to which the suction-pipe extends. Thus, supposing the suction-pipe descends seven meters, the discharge-pipe will reach to a depth of seven meters or eight meters. The diameter of the pipe *h* is about one-half less than that of the pipe *a*, and it is provided with a priming branch *k*. The supply-valve *d* closes by its own weight, a spring *d'* being merely provided to prevent its being displaced by the rush of liquid. The valve *c*, oscillating with its spindle *c'*, is counterbalanced by a weight *p*, screwed to a lever-arm *l*, of which the valve-spindle *c'* constitutes the pivot. The valve-spindle extends across the valve-box, and its rearward end revolves within a tube or socket *m*, closed at one end and secured to the valve-box by solder or the like, while its front end is supported and adapted to rotate within a similiar tube or socket *n*, similarly fixed to the box *b*. The air-tight packing of the valve-spindle *c'* within this tube or socket *n* consists of a long sleeve *o*, of india-rubber or similar material, the backward end of which is tied to the tube *n* and the forward end to the spindle *c'*. This arrangement enables the stuffing-box to be dispensed with and the friction and repairs connected therewith to be avoided, while absolute air-tightness is insured to the operating parts without appreciable resistance or strain. The weight *p* is adapted to slide upon its lever, so as to facilitate the control of the valve. The lever *l* is arranged to operate between two springs *r r'*, which are controlled or adjustable by set-screws *v v'*. The chamber *g* is a cylindrical casing erected vertically and having its top and bottom plates formed of diaphragms or membranes *t t'*, of india-rubber or other like elastic material, or of thin metal sheets, which may or may not be corrugated. These membranes form the movable and resilient walls of the chamber *g* and are held separate by a strong spiral spring, the strength of tension of which may be determined by experience.

The apparatus constructed as described is placed in a tank or reservoir of given dimensions. For this purpose the chamber *g* is provided with legs, so that the bottom plate or movable and resilient wall *t'* may have full freedom. An orifice *y* is provided where the raised water is to be drawn off directly; but this is of course dispensed with where the siphon is employed for feeding another adjacent elevating apparatus. The operation is as follows: Assuming that the siphon has been primed, the water or liquid sucked in at *a* passes through the box *b*, tube *f*, and chamber *g* and issues through the discharge-pipe *h*. This pipe *h*, owing to its small diameter, which is about one-half less than that of the pipe *a*, affords but a comparatively small out-

let. Hence the pressure within the box *b* increases and the valve *c* closes, while at the same time the valve *d* opens and the suction process continues. By this time the pipe *h* is partially evacuated and is causing a certain depression within the chamber *g*. On the other hand, the pressure within *b* has also decreased, with the result that the valve *c* opens and the suction is continued through the chamber, while the valve *d* is closed. The diaphragms *t t'*, which form movable and resilient walls, then take up their positions again and the same series of operations is repeated. It should, however, be observed that the interval of time between such succession of operations and the following one is exceedingly short, so much so that the number of pulsations of an apparatus of about the size of the views in the drawings will be from two hundred to three hundred per minute. Thus it will be understood that a practically continuous jet is obtained at *d*.

This improved siphon, in which we make use of the pressure of the liquid in circulation in it to obtain the elevation of a certain quantity of the said liquid, is applicable wherever liquid is to be drawn from a depth or raised—for example, for irrigating purposes, for the supply of feed-water, and the like. It being adapted to operate without the use of motive power and requiring no surveillance or repairs, its use will be found extremely economical.

By a very simple connection this apparatus will be able to raise liquid in an independent pipe. Fig. 5 shows the apparatus used in such a way. The valve *d* is replaced by a membrane d^2, which constitutes the bottom of a chamber D. The suction-pipe A, having the stop-valve A', ends in this chamber. The discharge-pipe H starts from the said chamber D and is provided with the stop-valve H'.

The operation of the chief apparatus is the same as that hereinbefore described and whereby the live force of the liquid produces on the membrane d^2 expansions and contractions which succeed each other and which of course transform themselves into suctions at A A' and into discharges at H H' in the chamber D, the result being that the raising or elevation and the discharge of the liquid are continuous at A H.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. The combination, in a siphon, of a suction-pipe *a* and discharge-pipe *h*, of smaller diameter than said suction-pipe *a*, with the box *b*, containing the stop-valve *c* and valve *d*, and with the chamber *g*, having movable and resilient walls, in connection with said box *b* through stop-valve *c*, and having flexible heads *t t'*, separated by a spring *x*, said box *b* and chamber *g* being interposed between said suction-pipe *a* and discharge-pipe *h* and so arranged that a portion of the water circulating in said suction-pipe will be discharged through valve *d* into a suitable elevated reservoir, substantially as described.

2. The combination, in a siphon, of a suction-pipe *a*, leading into a compartment *b*, having an upper outlet-valve *d* and a weighted stop-valve *c*, with chamber *g*, having movable and resilient walls, and discharge-pipe *h*, of smaller diameter than the pipe *a*, all arranged so that at stated intervals the valve *d* will open and stop-valve *c* close, and vice versa, whereby a portion of the water in said suction-pipe *a* will be discharged through valve *d* into a suitable elevated reservoir and a portion will be discharged into said discharge-pipe *h*, substantially as described.

3. In a siphon, the combination of the box *b*, having an orifice *f*, with a spindle *c'*, passing through said box *b* and carrying the valve *c* within the box *b*, adapted to close said orifice *f*, and with a weighted lever *p*, adapted to actuate said spindle *c'*, adjustable springs *r r'*, between which said weighted lever *p* vibrates, and with the sleeve *m* and elastic packing *o* placed about said spindle *c'*, substantially as and for the purposes set forth.

In witness whereof we have hereunto set our hands in presence of two witnesses.

EUGÈNE ETÈVE.
JULES LEMICHEL.

Witnesses:
GEORGE LAURENT,
ALEXANDRE FLUBANT.