C. L. Stevens.

Steam Pump.

No. 107,977. Patented Oct. 4. 1870.

Fig. 1.

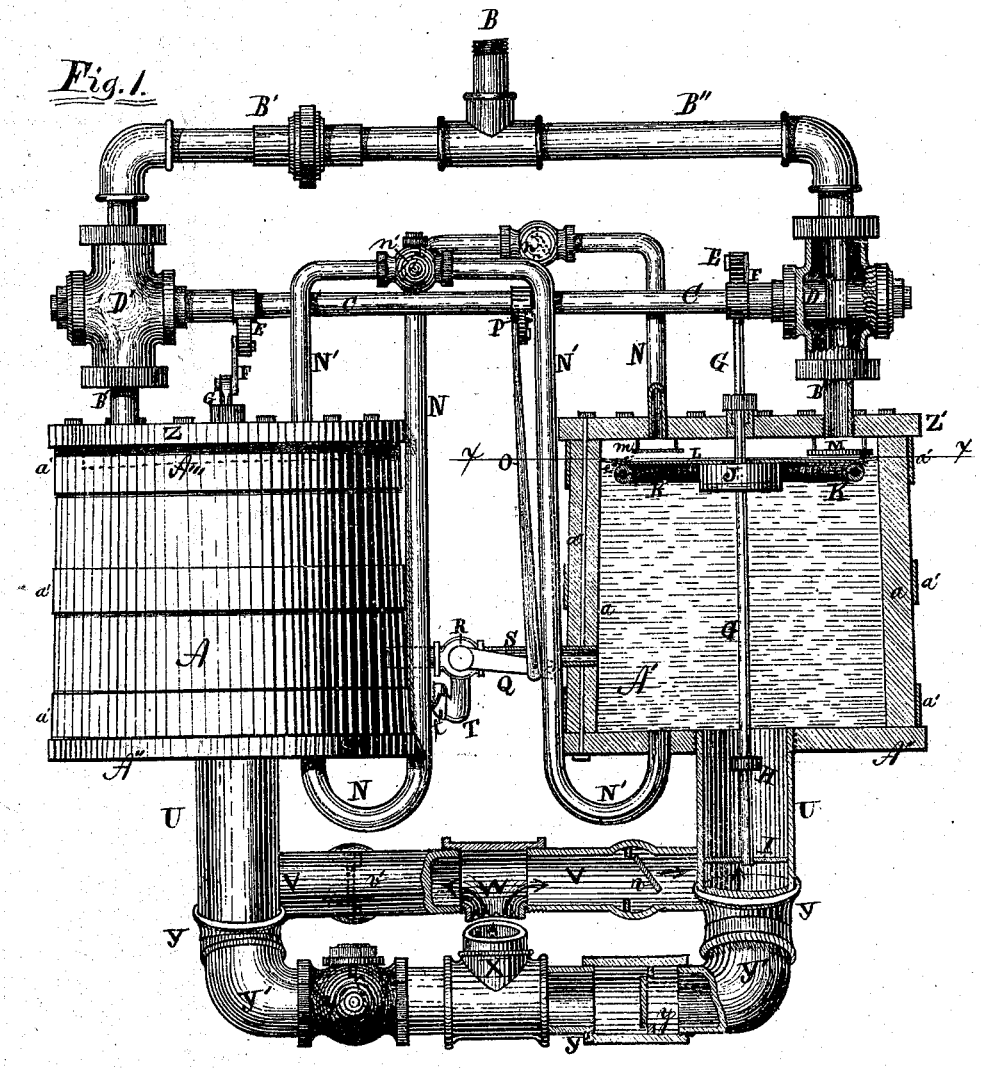


Fig. 2.

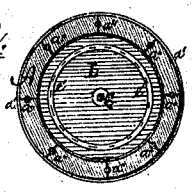
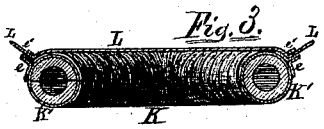


Fig. 3.



Witnesses:—

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CHARLES L. STEVENS, OF GALESBURG, ILLINOIS, ASSIGNOR TO HIMSELF, ALBERT A. DENTAN, AND D. G. DENTAN.

Letters Patent No. 107,977, dated October 4, 1870; antedated September 26, 1870.

IMPROVEMENT IN STEAM-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

I, CHARLES L. STEVENS, of Galesburg, in the county of Knox and State of Illinois, have invented certain Improvements in Double Self-acting Wooden Steam-Pumps, of which the following is a specification.

Nature and Objects of the Invention.

The first part of my invention relates to the construction of the wooden air-tight tanks, as hereinafter fully described.

The second part of my invention relates to the arrangement of devices for opening and closing alternately the cocks through which steam is admitted to the tanks, as hereinafter described.

The third part of my invention relates to the arrangements of the blow-off pipes, and the devices for operating the same, as hereinafter fully described.

The fourth part of my invention relates to the combination and arrangement of pipes with the tanks, the object of which is to pass a jet of cold water from one tank to the other, and alternately, to aid in the rapid condensation of the steam.

The fifth part of my invention relates to the construction of the diaphragm, which is intervened between the surface of the water and the steam in the tanks, mainly for the purpose of preventing the water, when entering the tanks, from being dashed to the top and cooling the same, together with the air contained in the tanks.

Description of the Accompanying Drawing.

Figure 1 is a view of a machine embodying my invention, shown partly in elevation and partly in section.

Figure 3 is a horizontal section of the tank A', fig. 1, on the plane of the line *x x*.

Figure 3 is a vertical sectional view of the diaphragm L K in fig. 1.

General Description.

A A' are the tanks, the one, A, shown in elevation at fig. 1, and the other, A', shown in vertical section.

B is the pipe leading from the steam-generator; and

B' B'' are pipes leading from the pipe B to the tanks A A'.

C is a horizontal rod extending from the vertical part of the pipe B' to the vertical part of the pipe B''.

D D' are stop-cocks, the keys of which are attached to the ends of and operated by the rod C, the opening through the keys at D D' being so arranged that, when the rod C is turned to open the passage for steam through the pipe D, the pipe D' will be closed, and *vice versa*.

E E are cranks extending from opposite sides of the rod C.

F F are links, pivoted at one end to the crank E.

G G are rods, pivoted to the other end of the links F F, and extending downward through the tanks A into the cross-bar or guide I.

H is a fixed collar on the rod G.

J is a wooden float, sliding freely on the rod G, and provided with suitable metallic plates where it strikes the collar H.

U U are enlarged pipes extending from the bottom of the tanks A, their inner surface bored out to admit the float J snugly.

Y Y are T-pipes on the lower end of the pipes U U.

Y' is a pipe connecting the near ends of the T on pipes U U, and

X is the water-outlet pipe.

y y' are valves in the pipes Y Y', opening toward the outlet-pipe X.

V is a pipe connecting the distant ends of the T on pipes U U, and

W is the water-inlet pipe leading, by pipes V V, to pipes U U.

v v' are valves in the pipes V V, opening toward the pipes U U.

N is a pipe leading from the bottom of the tank A to the top of the tank A', and contains a clack-valve, *n*, opening toward the tank A'.

N' is a pipe leading from the bottom of the tank A' to the top of the tank A, and has a clack-valve, *n'*, opening toward the tank A.

S is a pipe, connecting the inner parts of the tanks A A' near their lower ends.

R is a three-way cock in the pipe S, the key of which is operated by the crank Q, from the end of which an arm, O, extends to the crank P on the rod C.

T is a blow-off pipe, connected with the three-way cock R, and provided with a valve, *t*, opening outwardly.

M is a deflector under the steam-pipe B'', another similar being under the pipe B'.

m m are deflectors under the pipes N, where they enter the tops of the tanks.

K is a float, composed of a hollow ring of wood, covered with a sheeting of copper, K', soldered neatly thereon.

e is a copper flange, soldered securely to the sheeting K'.

L is a circular disk or diaphragm, of rubber, or other non-conducting material, and is sewed securely to the flange *e* with a copper thread.

e' is a welt of copper, to prevent the copper sewing-wires from cutting the rubber diaphragm L.

The diaphragm L is pierced in the center with a hole near three times the diameter of the rod G, through which the rod G passes.

The tanks A A′ are constructed of wooden staves, from four to ten inches thick, as the tanks may be smaller or larger, and are dressed slightly tapering, so that the tank itself may be a little larger at the base than at the top.

Holes are bored longitudinally with and between the staves, as shown at fig. 2, through which the bolts *a″ a″ a″ a″* may pass.

The tops and bottoms of the tanks may be formed of wood, and rest flat on the ends of the tanks, as shown at A′, fig. 1, or they may be formed of metal, and have a wooden lining or projection, as shown by the dotted lines A‴ at the tank A, fig. 1, which lining is made to fit in an annular rabbet in the upper end of the tanks.

The heads of the tanks are held in position by bolts *a″ a″ a″ a″* with heads and and nuts as usual.

The object in forming these tanks of wood is to prevent the condensation which occurs in metal tanks when the steam is first admitted, and before its full power has been used in expelling the water.

The bottom of the tanks may be formed of metal, as the steam is prevented striking them by a few inches of water always left in the tank when discharged.

Experience has shown that metal bolts used in staying tanks, if left exposed to the action of the steam inside of the tank, would condense a great portion of the steam, thereby causing great loss, and, if placed outside of the tanks, the action of the weather soon corrodes them to uselessness, unless they are made very heavy; for these reasons this construction of tanks is deemed especially useful in pumps of this class.

Operation.

Steam being admitted through the pipe B″, and the cock D being open, its passage is uninterrupted until it reaches the arrester or deflector-plate M, by which the descending column is scattered and thrown to the top and sides of the tanks A′, and prevented from coming in direct contact with the water by the diaphragm L, the pressure of the steam carrying down the diaphragm L and float J, and forcing out the water through the pipes U, Y, and X, the valve *y* opening to admit its passage, and the valve *v* closing at the same time.

When the water in the tank has been nearly discharged, the float J will be carried, by the rapidity of the current, into the tube U, and, striking the collar H, will carry the rod G down with it, and with the rod G the crank F, thus turning the rod C, closing the cock D, and opening the cock D′ into the tank A, where the same operation is repeated.

When the steam is admitted into the tank A′, ascending the pipe N, it closes the valve *n*, and its pressure on the water in the tank A′, at the same time, forces a portion of the water in the tank A′, through the pipe N′ and valve *n′*, into the upper part of the tank A, where, striking the deflector *m*, it will be scattered into spray, and aid in condensing the steam in tank A.

The same operation takes place through the pipe N when the pressure of the steam is used in the tank A.

The same partial revolution of the rod C which opens the cock D, also turns the key in the stop-cock R, by means of cranks P and Q, and rod O, and allows the steam to blow off from the tank A, and when the rod C is again rotated to open the cock D′, the same devices turn the key in stop-cock R, so as to close the passage to tank A, and open the passage from the tank A′ for the passage of the steam from it, the valve *t* opening outwardly, and preventing any air from rushing in to the pipe S.

In my former patent of January 19, 1869, the blow-off pipes were arranged in the top of the tanks, and allowed all air to pass out as the tank filled with water, and the diaphragm to thump the top of the tank. The present arrangement of the blow-off pipes S, allows a portion of air to remain above the diaphragm, which serves as a cushion to prevent such results.

It will be readily seen that when the steam is allowed to blow off from one of the tanks through the pipe S to the extent that it will force out the resisting atmospheric pressure, the jet or spray from the pipes N will condense the remaining portion and produce a vacuum, which, the water rushing in through pipes W, V, and U, will soon fill, the water, as it rises in the tank, carrying up the float J, which closes the hole in diaphragm L, and both ascend on the surface of the water until arrested by the compressed air in the top of the tank. The warm water resting on top of the diaghragm L, and the warm air in the top of the tanks, prevent the condensation of steam, which occurs when wooden diaphragms or followers are used, which do not fill out closely and adjust themselves to the tapering tanks, the part of the rubber diaphragm L, in this invention, which projects beyond the ring K, allowing the outer edge or periphery of the same to rub closely the inner surface of the tanks at top and bottom. The same feature prevents thoroughly, the water, when entering the tanks, from being dashed past the outer edges of the diaphragm and cooling the air and top of the tank.

The tanks may be placed on suitable supports at any distance above the water to which the atmospheric pressure will raise the same, and the water-outlet pipe X may be extended, as desired, the water being expelled through it with a force and rapidity proportioned to the pressure of the steam.

Claims.

I claim as my invention—

1. The construction of the wooden air-tight tanks, with bolts *a″ a″ a″* passing through the heads and staves, substantially as described, and for the purpose set forth.

2. The arrangement of the rod C, with the cocks D D′, for opening and closing alternately the steam-passage in the pipes B′ B″, and controlling the admission of the steam to the tanks A A′, substantially as described, and for the purpose specified.

3. The combination and arrangement of the rod C, cocks D D′, cranks E E, links F F, rods G G, collar H, float J, and tubes U U with the tanks A A′, substantially as described, and for the purpose set forth.

4. The blow-off pipe S, with the three-way cock R, arranged as described, and operated by the arm Q, rod O, and crank P, when combined with the tanks A A′, substantially as described, and for the purpose specified.

5. The tubes N N′, with valves *n n′*, when combined with the tanks A A′, substantially as and for the purpose specified.

6. The construction of the non-condensing diaphragm, with the buoy K, sheeting K′, flange *e*, and welt *e′*, substantially in the manner and for the purpose specified.

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Witnesses:
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