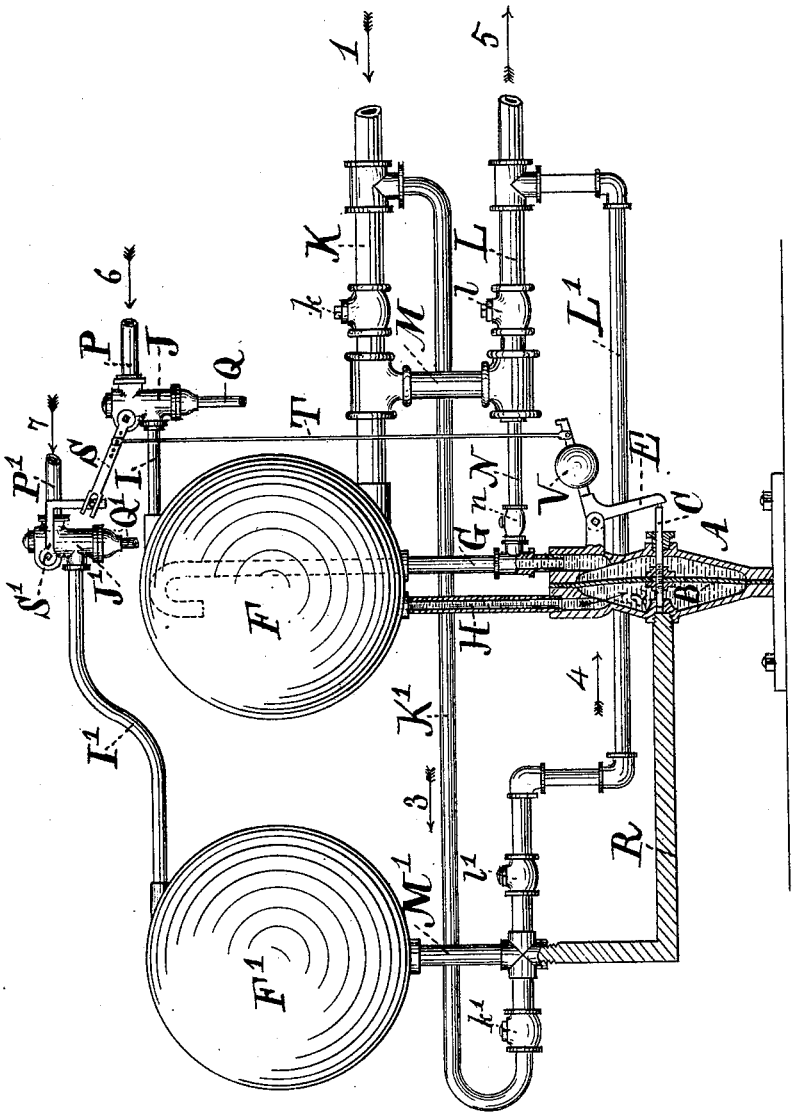
T. KIELEY.
Steam-Trap.

No. 195,933. Patented Oct. 9, 1877.



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TIMOTHY KIELEY, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-TRAPS.

Specification forming part of Letters Patent No. **195,933**, dated October 9, 1877; application filed July 26, 1877.

To all whom it may concern:

Be it known that I, TIMOTHY KIELEY, of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Traps; and that the following is a full, clear, and exact description thereof, sufficient to enable those skilled in the art to which the invention appertains to make and use the same.

My invention relates to certain improvements in automatic steam-traps, similar to the one for which Letters Patent No. 190,719 were granted to me under date of May 15, 1877.

My present invention consists in a novel construction, arrangement, and combination of devices, whereby I produce a duplex and continuously-operating steam-trap, and whereby several advantages are obtained, as hereinafter particularly described.

The accompanying drawing represents a side view, partly in section, of an apparatus embodying my improvements.

The diaphragm-chamber A, diaphragm B, rod or shaft C, receiver F, and pipes G and H are of substantially the same construction as the similar parts shown in my patent of May 15, 1877, aforesaid, except that the receiver F is here shown as of spherical form, and made in one piece, and the rod or shaft C extends outside of the diaphragm-chamber before coming in contact with the lever and connecting-rod, which communicate with the valve mechanism.

Instead of the diaphragm here shown, a piston might be employed, in which case the chamber A would be in the form of a cylinder; and, instead of entering the receiver F at the bottom thereof, the pipe G might be carried outside of said receiver, and enter the same at the upper portion; or, when said pipe enters the receiver at the bottom thereof, it might be straight for its entire length, instead of curved at the top, as shown in my patent aforesaid.

One end of the diaphragm-rod C works in a suitable guide in the chamber A, and the other end protrudes through said chamber, so as to abut against one arm of an elbow-lever, E, pivoted outside thereof. The other arm of said lever carries a counter-balance weight, V, and also connects with the lower end of a rod, T, the upper end of which is connected with one arm of a lever, S, which operates a valve located in a chamber, J. This valve may be similar to the one shown in my patent aforesaid, or it may be a double-seated valve of any suitable description. As here shown, the long arm of the lever S is outside of the valve-chamber J, and its short arm is inside thereof, and is connected with the valve-stem, so as to open or close the valve according to the direction in which the lever is moved.

The valve-chamber J is provided with a pipe, P, for the admission of steam from the boiler, a pipe, I, for the passage of steam to the receiver F, and an exhaust-pipe, Q, leading to the sewer or waste-pipe. These parts are similar to those shown in my patent aforesaid.

K represents an inlet-pipe for the passage of water to the receiver F from the heating-coils or other source of supply. Said pipe is provided with a check-valve, *k*, opening inward or toward the receiver.

L represents an outlet-pipe for the passage of water from the receiver to the boiler. Said pipe is provided with a check-valve, *l*, opening outward or away from the receiver. The pipes K and L communcate with each other by means of a pipe, M, connected with said pipes at points between the receiver F and the check-valves *k l*. The upright pipe G communicates with the outlet-pipe L by means of a pipe, N, provided with a check-valve, *n*, opening outward, or in the same direction as the valve *l*.

In my former patent the counter-balance weight is shown as carried by an arm extending from a shaft, to which is attached the lever connected with the valve-stem.

In this invention the counter-balance weight is carried by the elbow-lever, which is operated by the diaphragm-rod, and in turn operates the connecting-rod and valve-lever to open or close the steam-valve.

By this construction and arrangement of parts the weight acts more directly upon both the diaphragm and the valve-lever, and produces the same final result in a different manner. Moreover, this arragement is more simple and less complicated than that shown in said patent, and the parts are more easily accessible in case it becomes necessary to adjust them.

In my former invention the water entered the receiver and was discharged therefrom through the straight upright pipe H, to which was attached a single pipe, provided with an inlet-valve and an outlet-valve; and the column

of water which forced the diaphragm aside from the center was contained in the curved pipe G.

In this invention the construction and arrangement of parts being different the operation is also essentially different, as I will now describe.

The parts being in the positions shown in the drawing, the steam-valve is closed, the receiver is empty, the pipe G is empty as far down as the point, where it communicates with the pipe N, and column of water is contained in the straight pipe H, which column of water is constant, and has a tendency to press the diaphragm toward the right-hand side, as shown in the drawing and as indicated by the arrow 2.

The water from the heating-coil, or other source of supply, enters the pipe K, as indicated by the arrow 1, and as the valve *k* opens inward and the valve *n* opens outward the water flows into the receiver F, but cannot enter the pipe G until the receiver is full. It then flows into the pipe G and down into the diaphragm-chamber A, establishing an equilibrium therein. The counter-balance weight V then co-operates with the column of water in the pipe G and overcomes the equilibrium, forcing the diaphragm to the opposite side of the center, and at the same time drawing down the rod T and depressing the lever S, so as to open the steam-valve and to close the exhaust-valve which communicates with the pipe Q. The steam then enters the pipe P, as indicated by arrow 6, and passing into the receiver F forces the water therefrom through the pipes K, M, and L in the direction indicated by arrow 5 and returns it to the boiler. When the receiver is emptied the action of the steam is continued until the water in the pipe G is forced out through the pipe N and its valve *n*, thus leaving no water in the trap, excepting the column constantly contained in the pipe H, and the small quantity remaining in the diaphragm-chamber and the pipe G below the level of the pipe N. The column of water in the pipe H then forces the diaphragm toward the right-hand side, returning the parts to the former positions, so as to allow the operation to be repeated.

In order to produce a duplex and continuously-operating trap, one or more of the parts above described are duplicated. This may be accomplished in various ways, one of which is shown in the drawing, in which F′ represents a receiver similar to the receiver F, and supported by a solid standard, R, which may be attached to the rest of the apparatus in any suitable manner. The auxiliary receiver may be of the same size and on the same level with the main one or not, as may be preferred. A pipe, M′, enters the lower part of the receiver F′, and this pipe communicates with the pipe K by means of a pipe, K′, having an inlet check-valve, *k*′, and with the pipe L by means of a pipe, L′, having an outlet check-valve, *l*′. A pipe, I′, leads to the receiver F′ from a valve-chamber, J′, which, with its connections, may be like the similar parts in the main portion of the apparatus, except that the valve and its operating-lever S′ work with a reverse result—that is to say, when one steam-valve is open the other is closed, and vice versa. If desired, the valves may be inclosed in one valve-chamber provided with a seat for each valve. The levers S and S′ are here shown as connected by a pin on one and a fork or slot in the other; but they may be connected in any suitable manner, or one lever may be made to operate both valves.

The operation of this duplex trap is as follows: When the steam is forcing the water out of the receiver F the steam-valve in the chamber J′ is closed. The water from the heating-coil or elsewhere continues to flow into the pipe K, and, as it cannot pass the check-valve *k*, it passes through pipe K′, as indicated by arrow 3, and enters the auxiliary receiver F′. As soon as the receiver F is emptied and the parts resume the positions shown in the drawing, the steam-valve in the chamber J′ is opened, and the steam passes through pipe P′, as indicated by arrow 7, into the valve-chamber J′, and thence through pipe I′ to the receiver F′, from which it forces the water through pipes L′ and L, as indicated by arrows 4 and 5. Thus, while one receiver is collecting water the other is discharging water to the boiler. The dimensions of the two vessels with relation to each other, or the height of the pipe G inside the receiver F, may be so regulated that the operation of one receiver, either in collecting or discharging, will instantaneously follow the operation of the other.

The duplication of the parts, as above described, is applicable to a trap similar to the one described in my patent aforesaid, or to any other trap of suitable construction.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the diaphragm B and and its rod C, the elbow-lever E, counter-balance weight V, and connecting-rod T, arranged as shown and described, with a valve-operating lever, substantially as and for the purpose set forth.

2. In combination with the receiver F and pipe G, the inlet-pipe K and its check-valve *k*, the outlet-pipe L and its check-valve *l*, and the connecting-pipe M, substantially as herein described.

3. In a steam-trap constructed as herein described, the combination of the pipe N and its check-valve *n*, the upright pipe G and the outlet-pipe L, substantially as and for the purpose specified.

4. A duplex automatic steam-trap consisting of two receivers and their connecting devices, constructed, arranged, and operating in connection with each other, substantially as herein described.

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