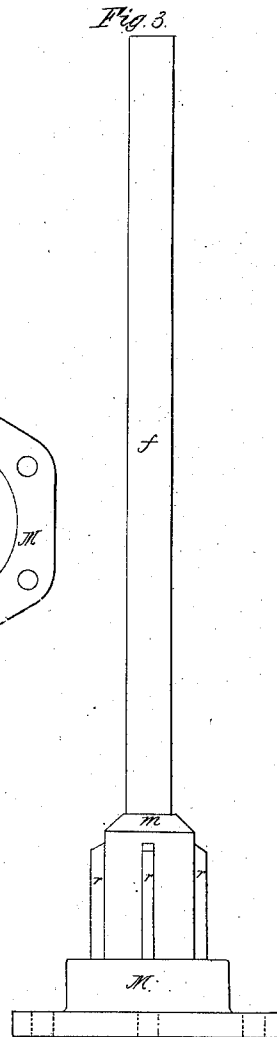
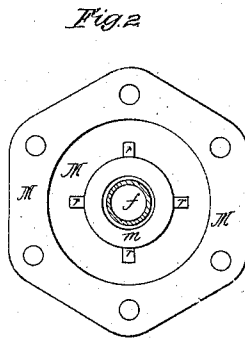
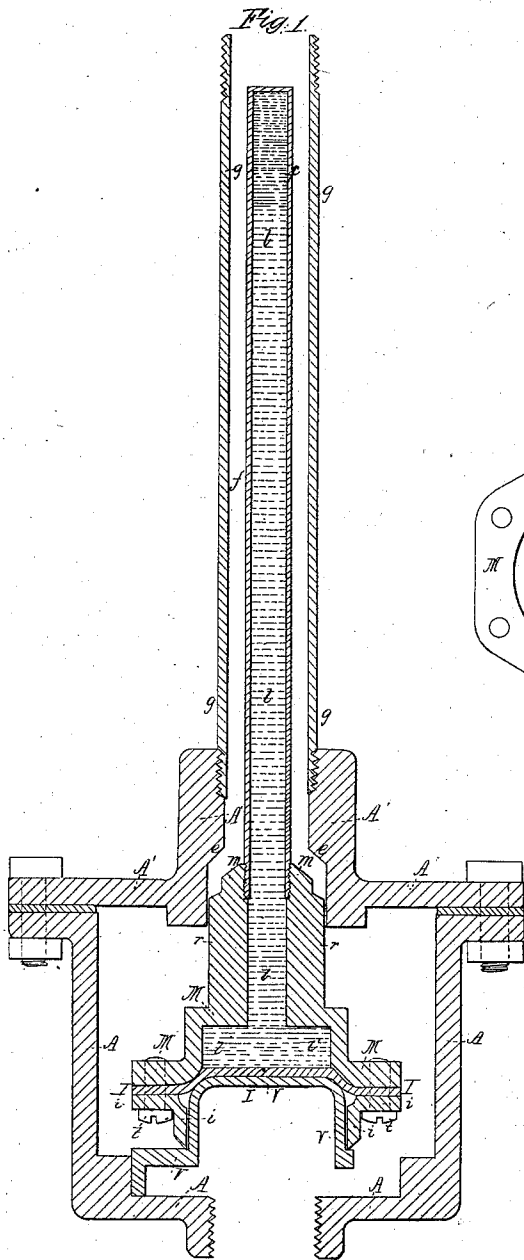


Hoard & Wiggin,
Steam Trap.

No 39,772,

Patented Sep. 1, 1863.



Witnesses
Isaac A. Bunnell
Benj. V. Luther

Inventor
J. M. Hoard
George B. Wiggin

UNITED STATES PATENT OFFICE.

JOHN W. HOARD AND GEORGE B. WIGGIN, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS TO PHINEAS D. WESSON, OF SAME PLACE.

IMPROVEMENT IN STEAM-TRAPS.

Specification forming part of Letters Patent No. 39,772, dated September 1, 1863.

To all whom it may concern:

Be it known that we, JOHN W. HOARD and GEORGE B. WIGGIN, both of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Steam-Trap Valves; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section of our improved trap-valve. Fig. 2 is a plan of the tube *f* and valve *m* detached. Fig. 3 is an elevation of the said tube and valve.

Similar letters of reference indicate corresponding parts in all the figures.

Our invention consists in the combination and arrangement of a closed tube within the steam-pipe with a diaphragm and a valve within a metallic case, substantially as herein described.

To enable others skilled in the art to make and use our invention, we will proceed to describe the same.

In Fig. 1 of the drawings, *A* is the metallic case inclosing the working parts, and *g* is the steam-pipe which is screwed into the cover *A'* of the said case. *f* is the closed tube of thin metal, inclosed within the said steam-pipe and connected at the bottom with the casting *M*, in the interior of which is formed a central chamber, which is a continuation of the interior of the tube, and which terminates in a cup-shaped recess, *l'*, at its base. *m* is the valve formed upon the casting *M*, and fitted to its seat *e*, formed in the cover *A'* at the entrance of the steam-pipe to the case *A*, and *I* is the diaphragm, of vulcanized india-rubber, secured to the base of the casting *M* by screws *t*, passing through the ring *i*, thus closing this end of the tube and confining therein the column of water *l*. Four ribs, *r r r r*, are formed upon the casting *M* to guide the valve to its seat, and to afford a space for the water of condensation to pass off, and the casting *V*, which is fixed within the case, also serves to guide the vertical movement of the valve, the ring *i* surrounding and sliding upon the outside of the casting *V*.

The apparatus being constructed and arranged as described, the operation is, that with

the presence of steam in the steam-pipe *g* the column of water *l* becomes heated and expands, thereby inflating the diaphragm *I*, and lifting the valve *m* against its seat *e*, to close the entrance of the steam-pipe and stop the escape of steam therefrom. The valve remains tightly closed until the water of condensation accumulates in the steam-pipe in a quantity sufficient to cool the column of water *l*, whereby its bulk is reduced, the diaphragm *I* is in consequence depressed, and the valve *m* drops from its seat *e* by its own weight, which allows the water of condensation to run off and its place to be occupied by steam, which has the effect to again close the valve, and to operate as above explained. It will be seen that the tube *f*, inclosing the column of water *l*, is of thin metal, and that from being arranged within the steam-pipe it is subjected to the immediate contact with the steam which is to be prevented from escaping, and, on the other hand, to the water of which the steam pipe is to be relieved; that in consequence thereof the said column of water *l* is the more sensibly affected by the difference in the temperatures of the steam and water of condensation, and exerts a more perceptible and decided influence upon the diaphragm than would be possible if the said tube were otherwise arranged, and thereby farther removed from the immediate effects of the steam and water which it is intended to regulate and control; and it will further be seen that the expansive force of the column of water is directly opposed to the weight of the tube *f* and the valve-casting *M*; that owing to the considerable length of the tube *f* and the corresponding height of the column of water the valve *m* has a large range of motion and consequent delivering capacity, and therefore acts more promptly and effectively than it would do if this condition were different—that is, if instead of the tube *f* a shorter and thicker tube were used and arranged more remote from the steam or water of condensation upon which the essential action of the valve depends.

Though we prefer a column of water as the medium for communicating the change of temperature of the surrounding steam or water in the pipe *g* to the diaphragm, because the effect produced on the latter corresponds more nearly with the cause or variation in the tem-

perature which produced it, yet, a column of mercury, alcohol, and, perhaps, some other fluid may be used instead with good results, the principal objection to such fluids being the disproportionate expansion, which has the effect to keep the valve so nearly closed under a constant temperature or pressure of steam through the day as to allow fragments and particles of foreign matter to collect and clog the valve and prevent it from working, which is avoided by the more equal and proportionate expansion of a column of water arranged as above described.

Having described the arrangement and op-

eration of our improved steam-trap, it should be understood that we do not claim any of the parts separately; but

What we claim, and desire to secure by Letters Patent, is—

The combination and arrangement of a closed tube, *f*, within the steam-pipe, with a diaphragm, *l*, and a valve, *m*, substantially as herein described, for the purpose specified.

J. W. HOARD.

GEORGE B. WIGGIN.

Witnesses:

ISAAC A. BROWNELL,

BENJ. T. LUTHER.