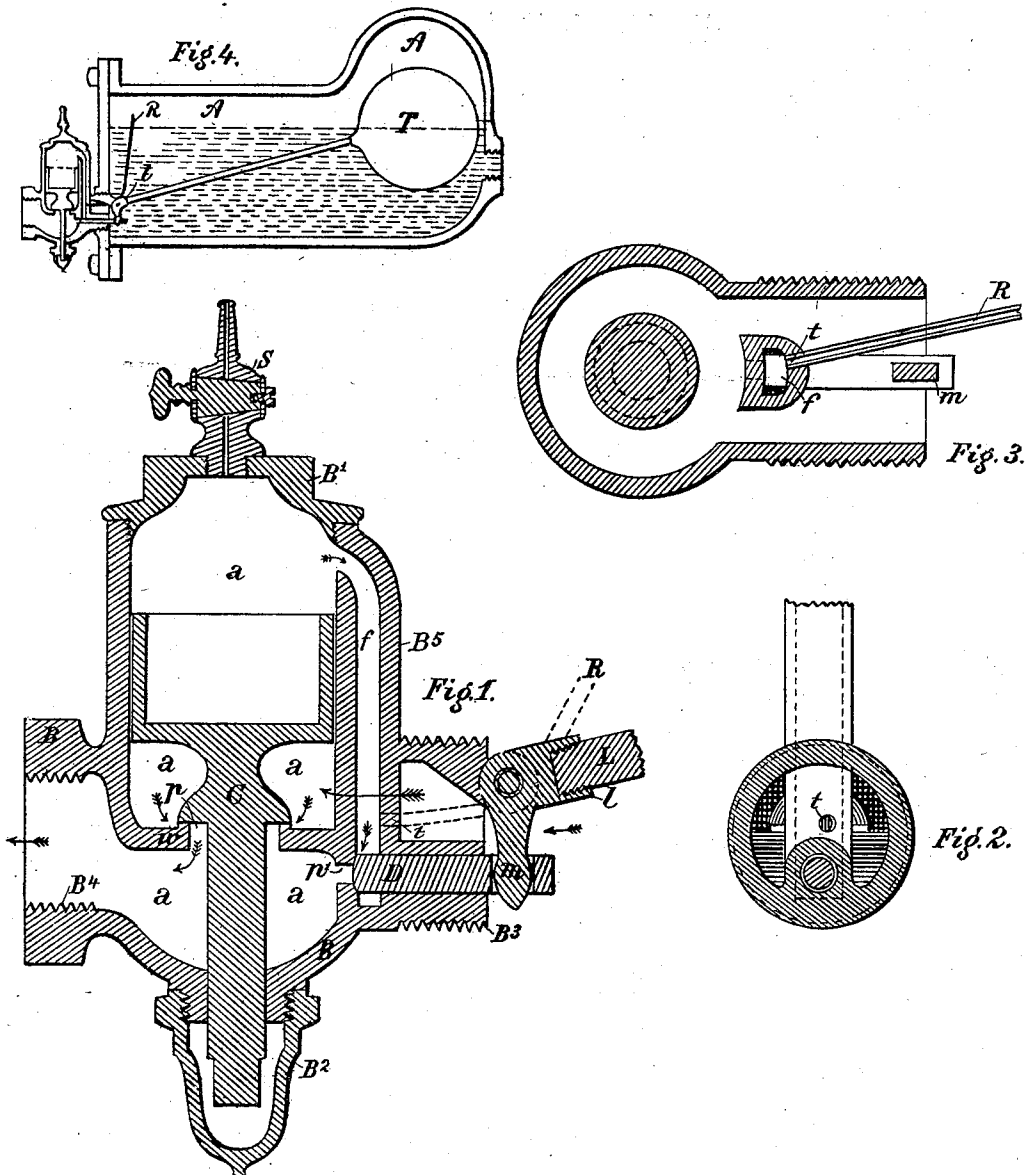


(No Model.)

N. CURTIS.  
STEAM TRAP.

No. 253,984.

Patented Feb. 21, 1882.



Witnesses.

Walter E. Lombard.  
C. W. Huntington

Inventor.

Nelson Curtis  
W. W. Swain  
his atty.

# UNITED STATES PATENT OFFICE.

NELSON CURTIS, OF NEWTON, MASSACHUSETTS.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 253,984, dated February 21, 1882.

Application filed December 14, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, NELSON CURTIS, of Newton, in the State of Massachusetts, have invented a new and useful Improvement in Steam-Traps, of which the following is a specification.

The invention consists broadly in the combination, with a water-chamber, of a discharge pipe or passage and a piston-valve therein, a smaller passage connecting the two portions 10 of the discharge-pipe which lie on either side of the port of the piston-valve, an auxiliary valve in said smaller passage, and suitable mechanism within said water-chamber for automatically controlling the said auxiliary valve, 15 the whole so arranged that the piston-valve will open automatically when the smaller valve is opened and close when the smaller valve is closed.

It also consists in a detail of construction 20 with reference to the particular means employed in the foregoing combination for automatically controlling the auxiliary valve.

It also consists in a hollow casting provided with hollow arms or projections by which it is 25 adapted to be connected with the water-chamber of a steam-trap and to receive a discharge-pipe, and containing a main passage with a piston-valve therein, and a smaller passage and a valve therein, all the parts enumerated 30 being combined and arranged substantially as shown.

Another part of the invention consists in the combination, with the water-chamber and discharge passages and valves therein, or pas- 35 sage and valve therein, of an automatic blow-off for compressed air, as hereinafter more particularly set forth.

In the drawings, Figure 1 is a sectional elevation of a casting embodying the valve system 40 of my said invention of working size. Figs. 2 and 3 are partial sections of details of the same. Fig. 4 is a sectional elevation of the same, in combination with the water-chamber, the float, and the automatic blow-off, upon a reduced scale.

A is the water-chamber, made steam-tight in the ordinary manner.

B is a casting, within which is a chamber, a, closed above and below by caps B' and B<sup>2</sup>.

50 A blow-off, S, is screwed into the cap B', as shown.

The casting B has two hollow projections,

B<sup>3</sup> and B<sup>4</sup>, the former adapted to be screwed into a wall of the water-chamber and the latter to receive an outlet-pipe, and the passages 55 within the said projections both communicating with the chamber a. For the purposes of this description, however, these two passages, together with the chamber a, may be considered as themselves forming the main passage 60 through which water is to be allowed to escape, a wall, w, in the said chamber containing the main port p and affording a seat for the piston-valve C, the stem of which extends through the port p and into the cap B<sup>2</sup>, as 65 shown. The acting areas of the valve-port and of the valve proper and of the piston are proportioned substantially as shown. The piston fits loosely in the chamber to permit the passage of steam and water from its lower to its 70 upper side.

The casting B has at one side a flange, B<sup>5</sup>, containing a narrow passage, f, connecting that part of the chamber a which lies above 75 the piston-valve with the part which lies below the port p, and D is an auxiliary valve having bearings in a hole bored in the projection B<sup>3</sup> and sliding across the lower end of the passage f to open or close a port, p', at the lower entrance of the passage f into the cham- 80 ber a.

Near the outer end of the auxiliary valve D is a slot, m, which receives, as if pivoted therein, the short arm of a bell-crank lever, L, which is pivoted to the projection B<sup>3</sup>, and the long arm 85 of which carries a float or ball, J. The long arm of the bell-crank lever L is in two parts, united at l, as shown, this construction permitting the casting B to be readily screwed into the wall of the water-chamber A, and it 90 follows that the said casting, with its internal valve system, is adapted to be applied to and used with any steam-tight water-chamber, and may be made and sold separately therefrom.

R is a blow-off pipe connecting the upper 95 part of the water-chamber A with the lower part of passage f in the flange of the casting B. In construction the pipe R, passing down through the water, as shown in Fig. 4, is carried through the hollow projection B<sup>3</sup> and inserted in a hole, t, in a part of the flange B<sup>5</sup> 100 lying within the projection, as shown in Figs. 2 and 3 and in dotted lines in Fig. 1.

The operation is as follows: When the water

in the water-chamber A stands below a certain level the auxiliary valve D, under control of the float J, is closed, but water flows freely into the casting B until it substantially fills so much of the valve-chamber  $\alpha$  as is above the port  $p$ , and also the passage-way  $f$  above the valve D, the loose fit of the piston allowing this to be done. The valve C now closes or remains closed from its own weight, the pressure above and below the piston being equal. When, however, the water in the water-chamber A rises above the said lever the valve D is opened by the float J. This relieves the pressure above the piston of the main valve, the area of the port  $p'$  and the passage  $f$  being much larger than that of the aperture caused by the loose fit of the piston, and accordingly the main valve C is lifted from its seat, allowing the water to flow through the port  $p$  until its level in the water-chamber A is sufficiently lowered to again close the valve D, when the valve C closes as before.

When the valve D is opened and the pressure above the piston of the piston-valve is diminished, as above set forth, there will be less pressure at the lower end of the blow-off pipe R than at the upper end, and consequently compressed air in the water-chamber A above the water and steam is forced out through the said blow-off pipe. There is also a suction at the lower end of the said blow-off pipe which tends to draw off the compressed air above the water and steam, and this would be true of any similar pipe connecting the upper part of a steam-tight water-chamber substantially like the water-chamber A with any exterior discharge-pipe above the valve-port through which the water flows under pressure—that is, the advantage of the pipe R to some extent would be gained by causing its lower end to open into the chamber  $\alpha$  just above the port  $p$ .

I have shown and described the auxiliary valve as connected with and controlled by an ordinary float in the water-chamber A; but although I claim as a subordinate part of my invention the combination of which this device is an element, yet, broadly considered, my in-

vention is independent of any particular means by which the auxiliary valve may be automatically operated. For instance, it may be operated by a thermostatic device, as appears in an application of even date herewith for a patent for a combination in which the auxiliary valve is worked by the expansion and contraction of its valve-stem under the changes of temperature within the water-chamber.

I claim—

1. The combination, with a steam-tight water-chamber, of a discharge pipe or passage and a piston-valve therein, a smaller passage connecting the two parts of said discharge-passage, the one above the piston and the other below the port of the said piston-valve, an auxiliary valve in the said smaller passage, and suitable mechanism within the said water-chamber for automatically controlling said auxiliary valve, substantially as described.

2. The combination, with a steam-tight water-chamber, of a discharge-passage and a piston-valve therein, a smaller passage connecting the two parts of said discharge-passage, the one above the piston and the other below the port of the said piston-valve, an auxiliary valve in the said smaller passage, and a float in said water-chamber connected with said auxiliary valve, substantially as described.

3. The combination of the blow-off pipe R with the steam-tight water-chamber A, a discharge-passage and piston-valve therein, a smaller passage connecting the two portions of said discharge-passage, one above the piston and the other below the port of said piston-valve, and an auxiliary valve in said smaller passage, substantially as described.

4. The combination of the steam-tight water-chamber A and blow-off pipe R with an exterior discharge-passage and a valve therein, substantially as described, for the purpose specified.

NELSON CURTIS.

Witnesses:

W. W. SWAN,  
W. P. PREBLE, Jr.