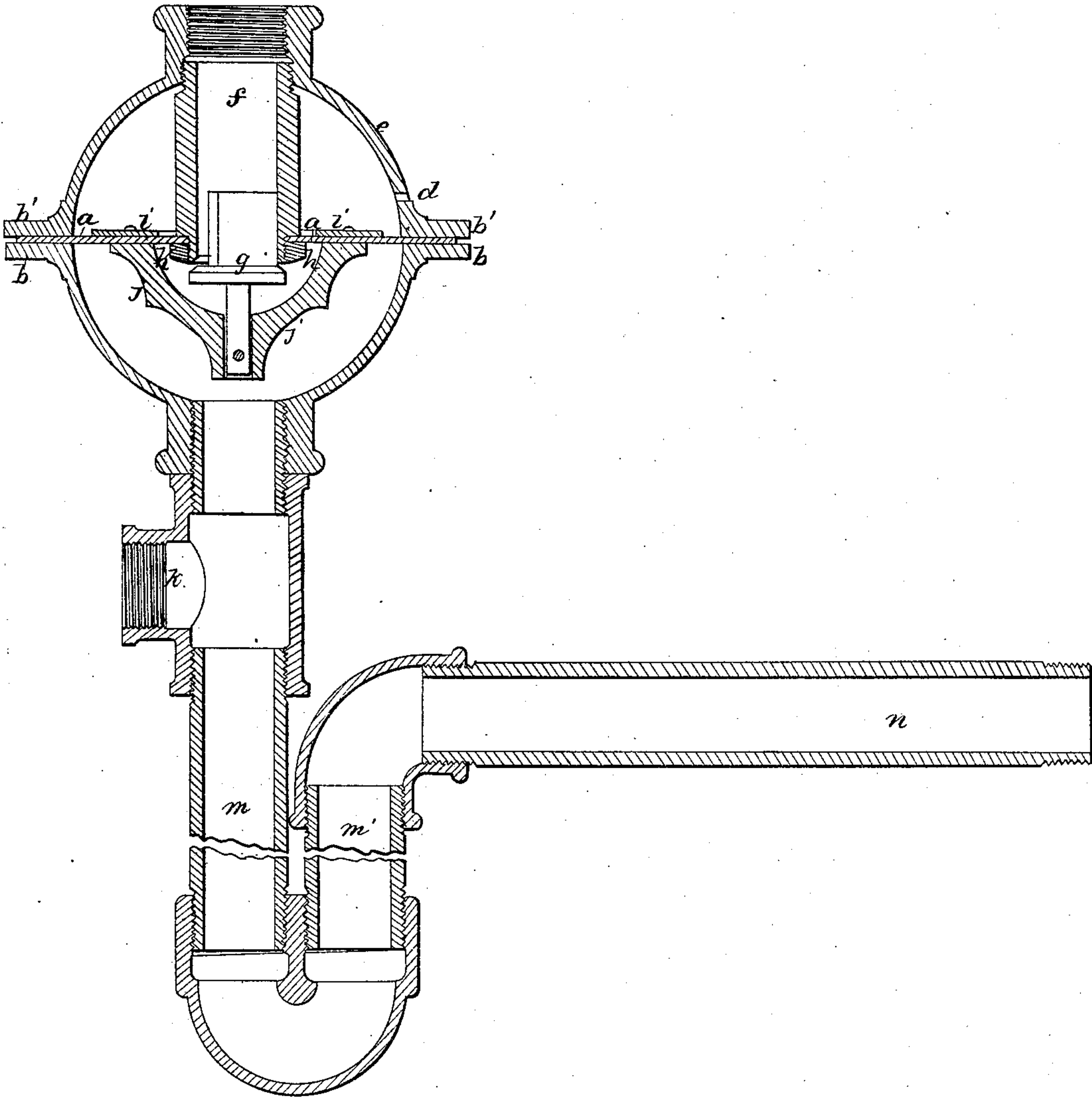


*C. C. Walworth,*

*Steam Trap,*

*No. 28,795*

*Patented June 19, 1860.*



*Witnesses;*

*W. B. Crosby*

*Gordon M. Kay*

*Inventor;*

*C. C. Walworth*



# UNITED STATES PATENT OFFICE.

CALEB C. WALWORTH, OF BOSTON, MASSACHUSETTS.

## STEAM-TRAP.

Specification of Letters Patent No. 28,795, dated June 19, 1860.

*To all whom it may concern:*

Be it known that I, CALEB C. WALWORTH, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Reducing Pressure-Valve and Steam-Trap; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description thereof so full and exact as to enable those skilled in the art to practice my invention.

The accompanying drawing is a sectional elevation illustrating my invention.

This consists in the means which I employ or their substantial equivalents to cause steam of low pressure to act upon a surface of large area to counterbalance higher pressure steam on a surface of smaller area, and vice versa in such a manner that the pressure of steam direct upon, and the movement in consequence thereof of the said surfaces shall act to control communication from one surface to the other, and in so doing shall keep a constant relative difference between the said pressures proportional to the exposed areas. Also in the combination with such means of a siphon of such length as is suited to the pressure which acts upon the large area whereby I am enabled to pass off the condensed water without loss of steam and am furnished with a safety apparatus which cannot fail to act to relieve the pressure on the reduced side if ever it exceeds the amount designed by any fault or accident whatever.

(a) is an annular diaphragm clamped and held around its outer edge between the flanges (b) and (b'). The lower flange (b) forms part of a tight cup shaped vessel (c) which terminates suitably for connecting a pipe thereto. The upper flange (b') forms part of a cap (e) shaped and terminated similarly to (c) but having communication with the air at (d). The lower part of (f) which forms part of or is secured to (e) is made the seat and guide of puppet valve (g); it is also necked and screwed so that the inner edge of the diaphragm is secured thereto as shown in the drawing by the nut (h). The wide ring (i) is secured to the upper surface of the diaphragm and the yoke (j) is secured to lower surface thereof and to the ring (i). The valve (g) is connected to the yoke as shown in the drawings or in any other suitable manner so that

movements of the diaphragm are communicated to the valve and vice versa. From the pipe which is fixed to the lower end of (c) there is an outlet (k) for connecting with, and supplying reduced pressure steam to, calender rolls or any other heating apparatus. Below the outlet (k) is a siphon (m) (m') and an open outlet (n).

The operation of the parts is as follows: Assuming the areas of (g) and (a) exposed to pressure of steam within (f) and (c) to be respectively one, and one hundred square inches, and the pressure of steam conducted to (g) through (f) at one hundred pounds, it will be evident that if the outlet (n) is closed by water in the siphon as will be hereafter explained, or if it is closed by a plug, the steam will flow into (c) and any receivers beyond connected with (c) till the pressure therein is one pound, when the valve (g) will be in equilibrium being acted upon by one hundred pounds pressure in each direction. Any excess of pressure in (c) or any diminution thereof in (f) will operate to destroy this equilibrium and to close the valve and any excess of pressure in (f) or diminution thereof in (c) will open the valve. In this illustration the pressures named are above atmospheric pressure and no allowance made for friction of the moving parts which would require a slight increase of pressure in (c) over the theoretical one. It will be evident that the pressures in (f) and (c) will bear a uniform ratio to each other, if the steam in (f) was reduced to fifty pounds then that in (c) would be one half pound. The ratio may be easily changed by a change in the exposed area of the valve or diaphragm. Under the circumstances assumed in the illustration the arm (m) of the siphon should be about three feet in length below the outlet (n) and if in letting the steam into the instrument it is not filled with water by condensation then water should be supplied. With one pound pressure in (c) the water will stand at about 26½ inches higher in (m') than in (m) which prevents any escape of steam but permits the constant flow from (n) of any condensation which flows into (m). If the valve (g) should get jammed or be prevented from working by dirt or rust the pressure will increase in (c) beyond that designed, and will overcome the weight of water in (m') blowing it out through (n) thus giving notice of



the derangement of the apparatus. The length of ( $m'$ ) must be made to correspond to the pressure of steam designed to be carried in ( $c$ ).

5 My reducing pressure apparatus is useful whenever high pressure steam is generated when it is desired to use steam of less pressure for heating purposes as in paper mill rolls &c. Also wherever exhaust steam from  
10 an engine is used to supply a variable demand, my invention may be used to connect the high pressure steam with the exhaust to supply any deficiency in the latter.

15 While I have described ( $a$ ) as a diaphragm it is plain that it might be an annular piston; the diaphragm however I believe to be the best. In the U. S. Patent No. 24,402 a diaphragm or piston is operated against a variable weight or scale beam to  
20 open and shut a steam valve for the purpose of reducing steam pressure and which arrangement operates to give reduced steam of uniform pressure without any fixed ratio be-

tween its pressure and that of the steam from which it is reduced I am aware that it  
25 is not new to reduce the pressure of high steam by throttling it.

What I claim as my invention and desire to secure by Letters Patent of the United States is—

1. The combination of the high pressure steam chamber ( $f$ ) reduced steam chamber ( $c$ ), valve ( $g$ ) and diaphragm ( $a$ ) or its equivalent so arranged that the communication between these chambers is controlled by  
35 the direct action of high pressure steam upon one side of the valve to open it, and of reduced steam upon the diaphragm and the other side of the valve to close it.

2. Also in combination with a reduced  
40 steam chamber a siphon ( $m'$ ) ( $m$ ) substantially as and for the purpose specified.

C. C. WALWORTH.

Witnesses:

J. B. CROSBY,  
GORDON MCKAY.