

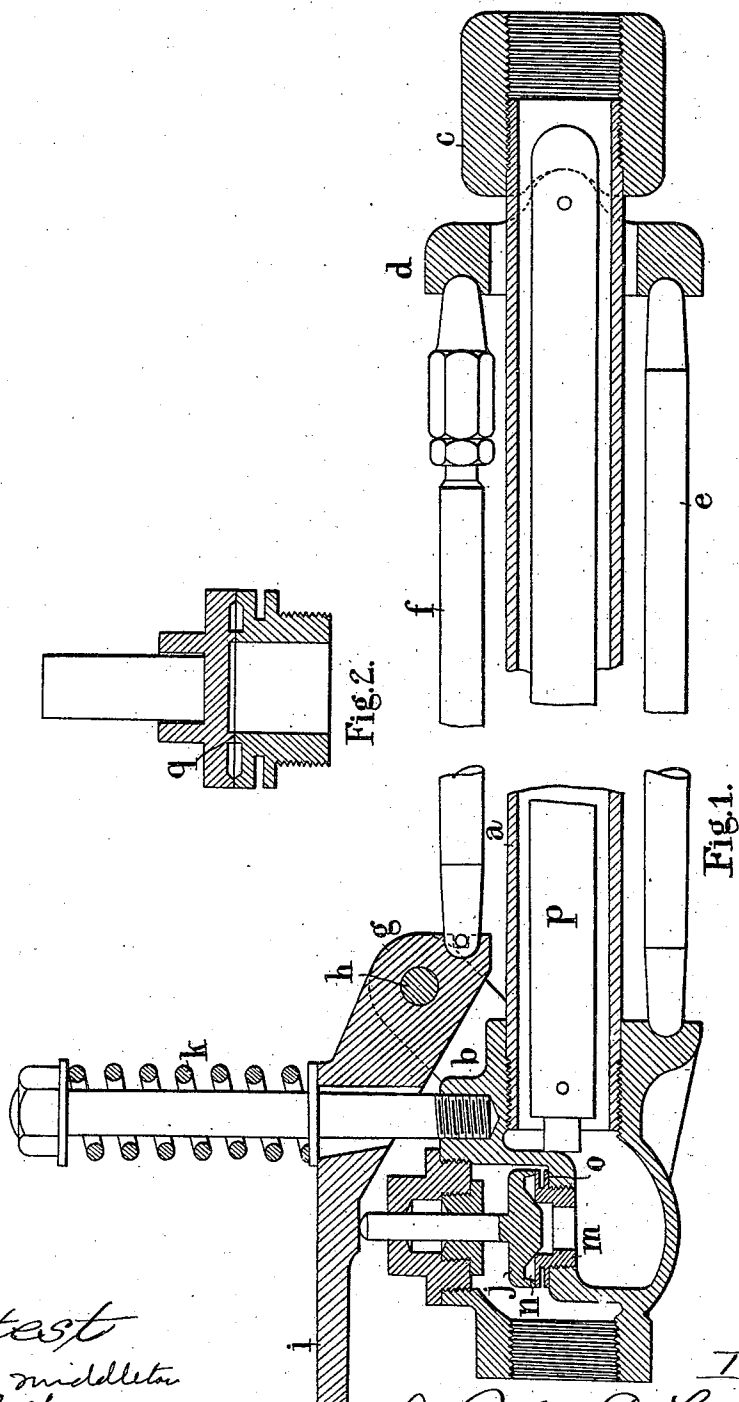
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J. E. L. OGDEN.

VALVE AND VALVE SEAT FOR STEAM TRAPS.

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UNITED STATES PATENT OFFICE.

JOHN EDWARD LEWIS OGDEN, OF LISCARD, ENGLAND.

VALVE AND VALVE-SEAT FOR STEAM-TRAPS.

No. 848,389.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed January 5, 1905. Serial No. 239,786.

To all whom it may concern:

Be it known that I, JOHN EDWARD LEWIS OGDEN, a subject of the King of Great Britain and Ireland, residing at Penshurst, Lincoln Drive, Liscard, in the county of Chester, England, have invented new and useful Improvements in Valves and Valve-Seats for Steam-Traps, of which the following is a specification.

My invention relates to steam-traps which work on the expansion principle.

My invention consists in the arrangement with steam-traps of combinations of valves and valve-seats, which will be described in the following specification, and more particularly pointed out in the appended claims.

Figure 1 illustrates one convenient form of steam-trap with its valve and seat constructed according to this invention. Fig. 2 shows a modified form of valve and seat.

a is a tube, of brass, copper, or other metal having high coefficient of expansion. One end of this tube is secured to the valve-casing *b*, while the other end is secured to the thrust-piece *c*, which bears against a collar *d*. Between this collar and the valve-casing *b* is placed a rod *e*, one end of which acts as a fulcrum for the collar *d*. This collar also bears against a rod *f*, adjustable in length, which is adapted to act on the lever *g*, pivoted at *h* to the valve-casing. It will be seen that a contraction of the tube *a* will draw the thrust-piece *c* toward the valve-casing and through the rod *f* raise the end *i* of the lever *h* so as to relieve the valve *j* of the pressure of the spring *k*, and thus allow the pressure below the valve to open it.

The valve *j* is formed with an annular flange, which when the valve is in its closed position rests upon the top of the seat *m*, leaving an annular space or chamber *n* between the valve and seat. I preferably form the valve-seat *m* with a slit *o* therein for the purpose of giving elasticity to the top surface of the seat.

The rod *p* within the expansible tube *a* is for the purpose of forming an annular space inside such tube, allowing only a thin film of water to come into contact with the tube. This thin film of water rapidly cools and causes a quick contraction of the tube *a*, thus increasing the efficiency of the trap.

The action of the apparatus is as follows: When water collects in the tube *a*, such tube contracts and by means of the thrust-piece *c*, rod *f*, and lever *h* relieve the valve *j* of the

pressure of the spring *k*. The valve *j* can now open slightly under the fluid-pressure acting beneath it. The water in the trap then obtains access to the annular space or chamber *n* between the inner and outer surfaces of the valve and by acting upon the additional area thus opposed to it forces open the valve still further to allow a rapid outflow of the water; but when after the passage of the water the steam passes the inner valve-seat and enters the annular chamber the force it exerts is insufficient to overcome the spring force or load, with the result that the valve *j* closes as far as is permitted by the condition of the expansion-tube. The final closing movement is imposed by the spring when the tube expands under the heat of the steam sufficiently to relieve the lever *h* from the pressure or thrust imposed through the rod *f* when the tube *a* contracts. It will be seen that the opening of the valve is not due, as in the case of a safety-valve, to any fluctuation in steam-pressure. A safety-valve cannot be opened until the fluid-pressure acting on the one side of it exceeds the pressure imposed on its other side by the spring or mechanical weight and cannot close until the fluid-pressure falls just below the pressure due to the spring or weight; but with the steam-trap, as aforesaid, it is essential that the spring-load shall be much greater than the steam-pressure employed in the system with which the trap is connected in order that there shall be an effective tightening effort acting on the valve when it is closed to prevent the escape of steam. The preliminary opening of the valve must therefore be obtained from some force other than that of the steam-pressure in order to overcome what may be termed the "surplus" spring load, and, as before described, this is obtained from the expansion-tube or element whose length varies with the temperature variations. When the valve has been slightly opened by a contractile movement of the expansion element, it is opened further by the pressure imposed by the outflowing water acting upon the comparatively large area provided by the annular chamber; but when the liquid (water) is succeeded by the gas (steam) the force or the momentum of the latter is not sufficient to overcome the spring-load, with the result that the valve closes.

In the valve shown in Fig. 2 I substitute a flat seating-surface *q* on the valve for the miter-surface shown in Fig. 1.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In steam-traps, the combination consisting of an element expansible by heat, a valve having inner and outer seating-surfaces with an intervening chamber and connections between the said valve and the said expansible element permitting of a preliminary movement of the said valve respectively by the contraction and expansion of said expansible element under varying temperatures, substantially as described.

2. In steam-traps, the combination con-

sisting of a valve having inner and outer seating-surfaces with an intervening chamber, a spring-loaded lever acting upon the said valve, an expansion-tube provided with a thrust-piece and a connecting-rod between the said thrust-piece and the said lever, substantially as described. 15 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN EDWARD LEWIS OGDEN.

Witnesses:

ROBERT MORRISON NEILSON,
VIVIAN ARTHUR HUGHES.