

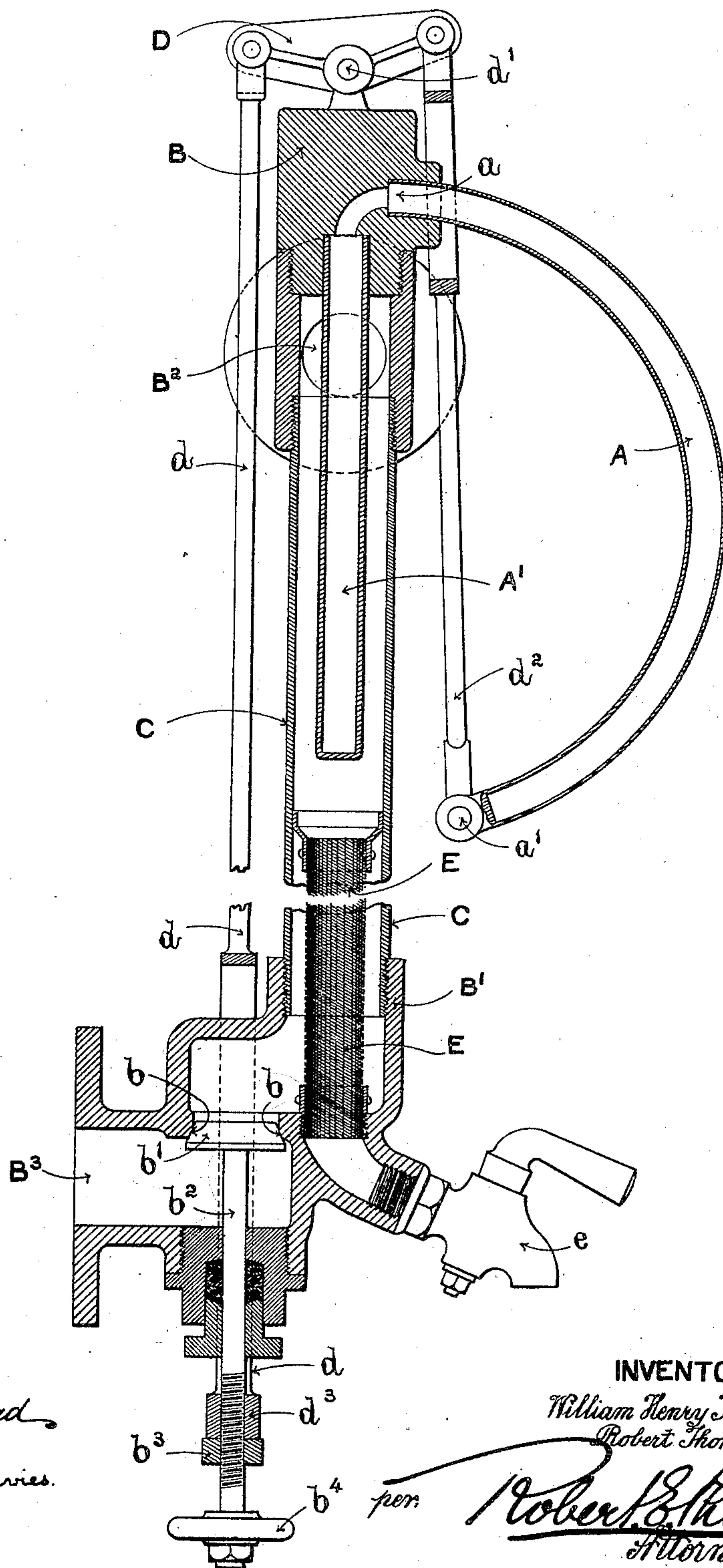
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Patented Apr. 1, 1902.

W. H. & R. THOMPSON.
STEAM TRAP.

(Application filed June 10, 1901.)

(No Model.)



WITNESSES.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 696,517, dated April 1, 1902.

Application filed June 10, 1901. Serial No. 64,000. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HENRY THOMPSON and ROBERT THOMPSON, subjects of the King of Great Britain, residing at 155 Fenchurch street, in the city of London, county of Middlesex, England, have invented a new and useful Improvement in Steam-Traps, (for which we have applied for Letters Patent in Great Britain, No. 20,150, bearing date the 9th day of November, 1900,) of which the following is a full and complete specification.

This invention relates to an improvement in steam-traps, and particularly to that type in which the tendency of a curved and flattened spirit-filled tube to assume a straight line when heated and to resume its normal form on contracting is utilized.

The object of the present invention is, first, to obviate the defects apparent in such traps should they become overheated, as it has been found in practice that after a certain temperature is reached the metal of which the curved expanding and contracting or spring tube is made deteriorates, and consequently the tube receives a permanent set, which disastrously affects the efficiency of the trap; secondly, to utilize the longitudinal expansion and contraction of a straight expansion-tube in combination with a curved spirit-filled tube, and, thirdly, to generally increase the efficiency and reliability of steam-traps.

A steam-trap constructed according to our present invention comprises, essentially, a curved flattened spirit-filled tube rigidly held at its one end, which communicates or is made in one with a straight tube closed at its free end. This straight tube or the straight portion of the curved tube is contained within a casing or preferably within a tube capable of expanding and contracting longitudinally and is in direct contact with the steam blowing through or contained within the trap. The free end of the curved or spring tube located on the exterior of the casing or tube is connected by a suitably-arranged lever and link with a rod carrying a valve at its free end. This valve has its seating formed in the lower part of the casing or is carried by the lower end of the longitudinally expansible and contractible tube, the arrangement being such

that the curved or spring portion of the spirit-filled tube is not in direct contact with although subject to the influence of the steam blowing through or contained within the trap. Consequently any tendency for the curved tube receiving a permanent set through overheating is avoided. The casing or tube containing the straight portion of spirit-filled tube is provided with an inner cylindrical casing or screen of wire-gauze or its equivalent in order to strain or trap the particles of foreign matter contained in the steam, and so prevent them choking the valve or preventing it from properly seating. The steam enters the casing through a suitable inlet at its upper end and escapes through an outlet controlled by the valve at its lower end, suitable means being provided to adjust the valve on its seating. A separate outlet controlled by a blow-off cock is provided to allow the impurities contained within the gauze casing or strainer to be got rid of.

Assuming the trap to be connected by its inlet with the pipe or apparatus to be drained and the valve-rod adjusted to obtain the desired amount of closure of the valve, the steam on blowing through the trap will cause by its heat acting directly on the straight spirit-filled tube the spring or curved part of the spirit-filled tube to expand or assume a greater curve more nearly approaching a straight line, which, as before described, will cause the valve to more closely approach its seating, and, further, the seating, owing to the longitudinal expansion under heat of the tube composing the casing, will move downward and more closely approach the valve. The outlet will thus be sealed and the steam retained within the trap until sufficient water of condensation has accumulated in contact with the expansion-tube and straight portion of the spirit-filled tube to prevent the contact of the steam with their surfaces, and so lower the temperature until the contraction of the tubes opens the valve and allows the accumulated water to be expelled by the steam, which contacting again with their surfaces raises their temperature and causes them to again close the valve.

In the accompanying drawing, which illustrates one method of carrying our invention

into practice, the figure is a broken view, partly in section, inside elevation, of a steam-trap embodying our improvement.

A designates the curved flattened tube, preferably having an elliptical cross-section and which is securely held or brazed at its one end a to or within the union or part B, forming the top part of the casing of the trap. This tube A, closed at its free end, is filled with spirit or other fluid rapidly susceptible to variation of temperature, preferably petroleum spirit, and communicates with a straight depending tube A', also filled with spirit and sealed or closed at its lower end, so as to keep the spirit within it and the tube A, and is brazed to or fixed within the union B. It will be clearly seen that the tube A' may be well constructed integral with the tube A. The union or part B also carries a casing C, enveloping the tube A', and which preferably takes the form of a brass or other metal tube capable of longitudinal expansion and contraction under varying temperatures. The lower or free end of this casing or tube C is fixed to a casting B', carrying or formed with a seating b for a valve b' . This valve b' is carried by a rod d , hinged at its upper end to a bell-crank lever D, fulcrumed at d' to the top union or part B. The free end of the lever D is connected with the closed free end a' of the curved tube A by means of a link or rod d^2 . To allow the valve b' to be brought into proper working relation with respect to its seating, the rod d is made adjustable, preferably in the manner shown on the drawing, in which the lower part of the rod d is forked and its connecting yoke or cross-head d^3 is threaded to receive the screwed end of a valve-spindle b^2 , carrying the valve b' . This valve-spindle passes through a gland in the lower casting B', and its protruding end is squared or provided with a hand-wheel b^4 to enable it to be turned and is provided with a lock-nut b^3 .

Within the tube or casing C, and preferably concentric therewith, is so arranged a cylindrical screen or strainer E, of wire-gauze or its equivalent, that all steam or water entering the trap through an inlet B² in the union or upper part B is forced to pass through the strainer from the interior to the exterior before it can escape through the valve-controlled outlet B³ in the lower casting. To enable the particles of foreign matter which accumulate on or within the interior of the screen or strainer E to be easily got rid of or blown out of the trap, there is provided a blow-off cock e , fixed in the lower casting B' and communicating with the central annular compartment formed by the strainer E.

The curved or spring tube A may in some cases be either jacketed with asbestos or other efficient non-conducting substance or material, or it may be wholly or partially inclosed within a suitable casing.

Assuming the trap to be connected by its inlet B² on the top union or part B with the

pipe or apparatus to be drained and the valve b' adjusted by means of its screwed spindle b^2 so as to bring the said valve into proper working relation with its seating b , the steam on entering and blowing through the trap will by its heat acting on the exterior of the tube A' expand the spirit therein and in the tube A, causing the latter to expand or assume a greater curve more nearly approaching a straight line. Thus through the lever D, link d^2 , and valve-rod d its motion is transmitted to the valve b' , causing it to move upward and approach its seating b , which, owing to the longitudinal expansion of the tube or casing C, will move downward, thus effectually closing the valve. The outlet B³ will thus be sealed and the steam retained within the trap until sufficient water of condensation has accumulated in contact with the now expanded tube C and the tube A' to prevent the contact of the steam with their surfaces, and so lower the temperature, until the contraction of the tubes C and A opens the valve b' and allows the accumulated water to be expelled by the steam, which contacting again with the surfaces of the tubes C and A' again raises their temperature and causes the valve b' to again close.

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

1. A steam-trap comprising essentially an expansion and contraction tube formed with a straight and a curved part, the curved part being capable of assuming a greater or less curve under varying temperatures due to the contraction and expansion of a spirit contained or sealed within the said tube, a casing carried by said tube, an inlet and outlet provided on said casing and a valve operated by the curved tube and controlling the outlet of the trap.

2. A steam-trap comprising essentially an expansion and contraction tube formed with a straight and a curved part, the curved part being capable of assuming a greater or less curve under varying temperatures due to the contraction and expansion of a spirit contained or sealed within the said tube, a casing carried by said tube, a longitudinally expansible and contractible tube carried by said casing, an inlet and outlet provided on said casing and a valve, operated by the combined movements of the curved tube and the longitudinally expansible and contractible tube, controlling the outlet of the trap.

3. A steam-trap comprising a tube formed with a straight and a curved part, the curved part being capable of assuming a greater or less curve under varying temperatures due to the contraction and expansion of a spirit contained or sealed within the said tube, a casing carrying the one end of the curved part of the tube and enveloping the straight part thereof, an inlet and outlet provided on the said casing and a valve operated by the curved tube and controlling the said outlet, as set forth.

4. A steam-trap comprising a spirit-filled curved or spring tube carried on the outside of a casing and rigidly held by its one end thereto, a straight spirit-filled tube in communication with the curved or spring tube and carried and enveloped by the casing so as to contact with the steam and water passing therethrough and a valve operated through mechanism attached to the free end of said curved tube to control the outlet of the trap, as set forth.

5. A steam-trap comprising a tube formed with a straight and a curved part, the curved part being capable of assuming a greater or less curve under varying temperatures due to the contraction and expansion of a spirit contained or sealed within the said tube, a casing carrying the one end of the curved part of the tube and enveloping the straight part thereof, an inlet and outlet provided on the said casing, a screen or strainer secured within said casing and through which the steam and water must pass before reaching the outlet, and a valve operated by the curved tube and controlling the said outlet, as set forth.

6. A steam-trap comprising a spirit-filled curved or spring tube carried on the outside of a casing and rigidly held by one end thereto, a straight spirit-filled tube in communication with the curved or spring tube and carried and enveloped by the casing so as to contact with the steam and water passing therethrough a screen or strainer secured within said casing and through which the steam and water must pass before its exit from the trap and a valve operated through mechanism attached to the free end of said curved tube to control the outlet, as set forth.

7. A steam-trap comprising a spirit-filled curved or spring tube carried on the outside of a casing and rigidly held by one end thereto, a straight spirit-filled tube in communication with the curved or spring tube and carried within said casing, a longitudinally expandible and contractible tube carried by the said casing and carrying a valve-seating, and

a valve operated through mechanism attached to the free end of said curved tube and contacting with said valve-seating to control the outlet of the trap, as set forth.

8. A steam-trap comprising a spirit-filled curved or spring tube carried on the outside of a casing and rigidly held by one end thereto, a straight spirit-filled tube in communication with the curved or spring tube, and carried within said casing, a screen or strainer secured within the casing and through which the steam and water must pass before reaching the outlet, a longitudinally expandible and contractible tube carried by the said casing and carrying a valve-seating, and a valve operated through mechanism attached to the free end of said curved tube and contacting with said valve-seating to control the outlet of the trap, as set forth.

9. A steam-trap comprising a curved spirit-filled tube carried on the outside of a casing and rigidly held by its one end thereto, a straight spirit-filled tube in communication with the curved or spring tube and carried within the said casing, an inlet and an outlet provided on the said casing, a longitudinally expandible and contractible tube carried by the said casing, a screen or strainer secured within the casing and through which the water must pass before reaching the outlet, a blow-off cock communicating with the compartment formed by the screen or strainer, a valve-seating carried by the longitudinally expandible and contractible tube, a valve operated through mechanism attached to the free end of the curved tube and contacting with the said valve-seating to control the outlet, and means for bringing the valve into proper working relation with respect to its seating, as set forth.

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