

(No Model.)

A. STUCKI.  
STEAM TRAP.

No. 598,824.

Patented Feb. 8, 1898.

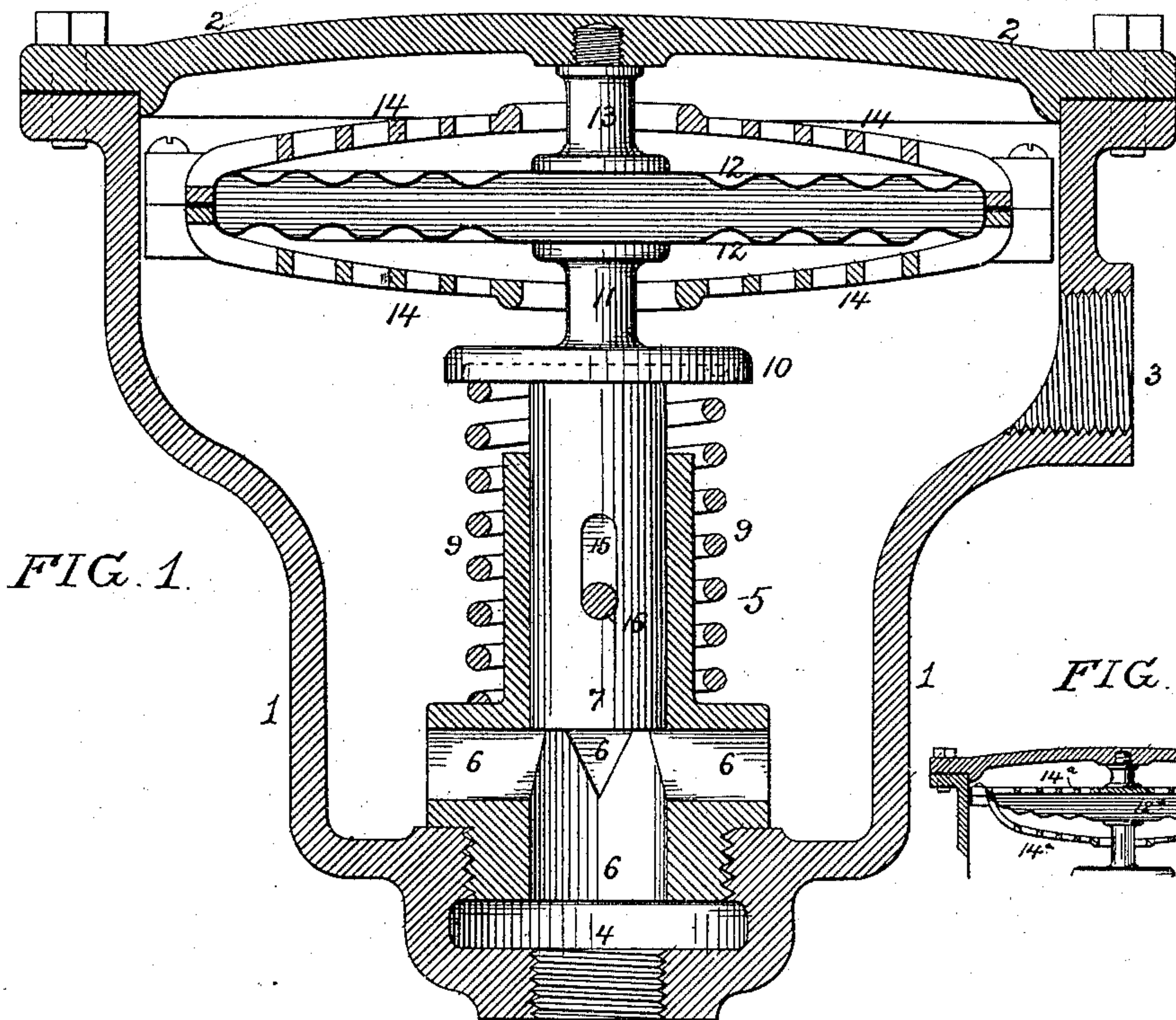


FIG. 1.

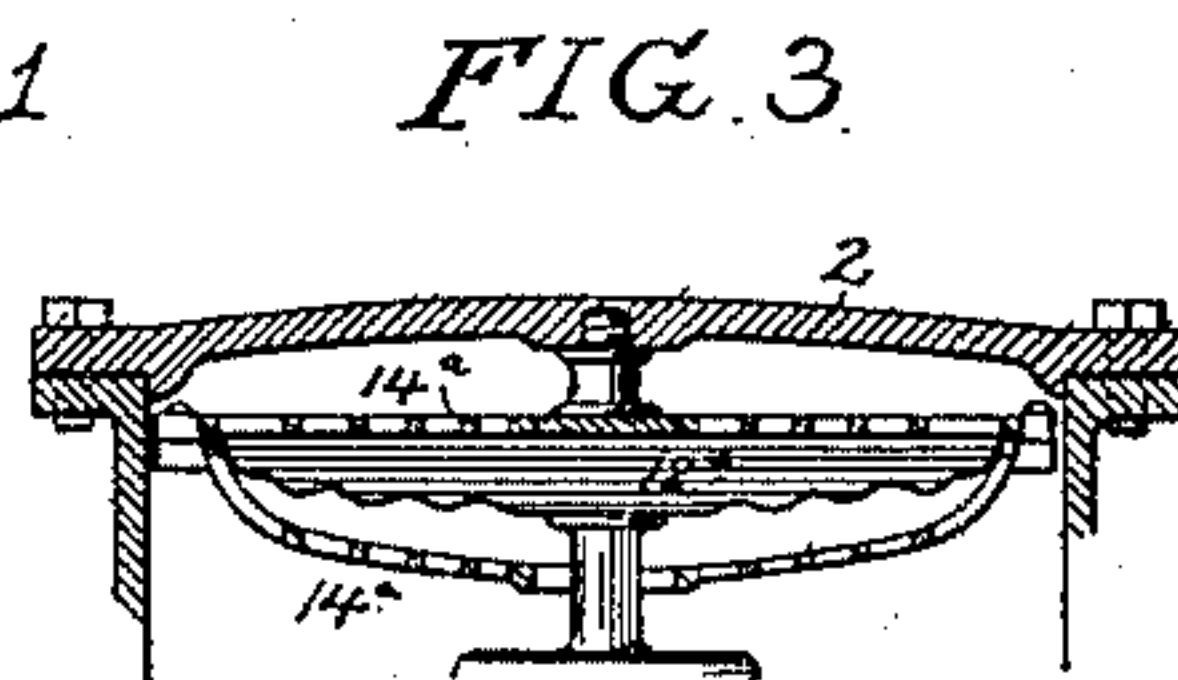


FIG. 3.

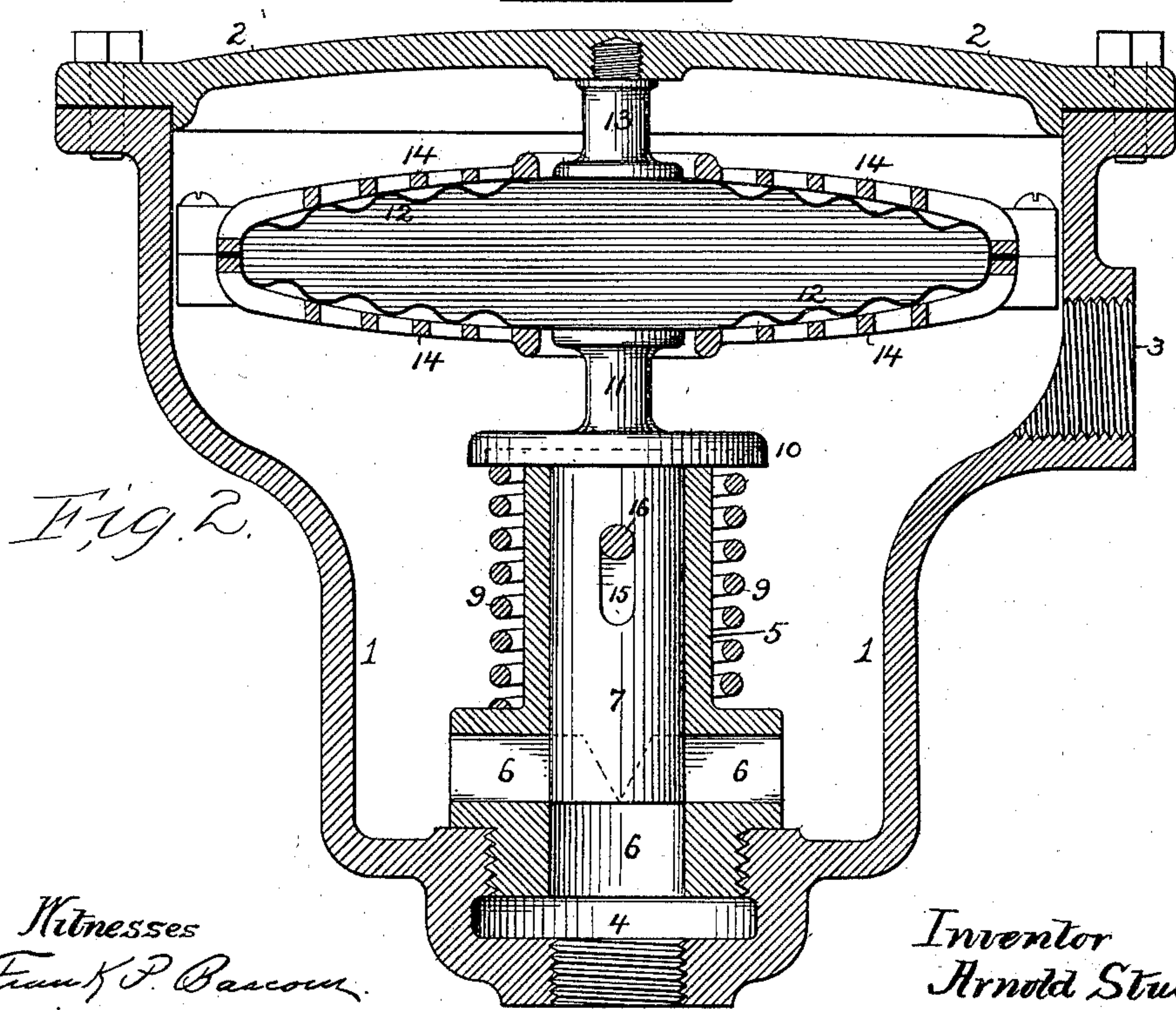


Fig. 2.

Witnesses  
Frank P. Bascom.  
J. E. Bechtold.

Inventor  
Arnold Stucki  
by his Attorneys.  
Howson & Howson



# UNITED STATES PATENT OFFICE.

ARNOLD STUCKI, OF ALTOONA, PENNSYLVANIA.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 598,824, dated February 8, 1898.

Application filed May 14, 1897. Serial No. 636,525. (No model.)

*To all whom it may concern:*

Be it known that I, ARNOLD STUCKI, a citizen of Switzerland, and a resident of Altoona, Blair county, Pennsylvania, have invented certain Improvements in Steam-Traps, of which the following is a specification.

My invention relates to that class of steam-traps in which the movement of the valve which governs the flow from the trap is effected by the expansion and contraction of a vessel containing a volatile liquid, said vessel being exposed to the steam or water of condensation flowing from the pipe or system of pipes in connection with which the trap is employed.

The object of my invention is to prevent injury to the said vessel, such as is ordinarily caused by excessive expansion of the same, and this object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional view of a steam-trap constructed in accordance with my invention, the valve being shown open. Fig. 2 is a similar view showing the valve closed; and Fig. 3 is a sectional view, on a smaller scale, illustrating a modification of the invention.

Steam-traps of the character to which my invention relates, while generally applicable, are especially intended for use in connection with the steam-heating pipes or systems of railway-cars. When intended for such use, the valve must be large and must have considerable movement in order to provide an opening of sufficient area to rapidly drain off the water of condensation when a train is nearing or has reached its destination and the steam is cut off, such rapid drainage being necessary in many cases in order to prevent the freezing of the water in the trap and pipes. A considerable movement of the valve means a corresponding expansion of the vessel containing the volatile liquid, and this in turn requires the use of an expansion vessel with thin walls in order to permit it to readily respond to the internal stress and so that when expanded to the maximum extent the elastic limit of the metal will not be reached or exceeded.

The expansion vessel is usually such that it will move the valve from the fully-opened position to the completely-closed position by

a variation in temperature of about 40°. For instance, if the valve is wide open when the temperature of the water of condensation passing through the trap is 160° Fahrenheit the valve should be entirely closed when the temperature of the water of condensation reaches 200° Fahrenheit, as it would be a waste of heat to discharge water of so high a temperature. Steam at a pressure of forty, sixty, or even eighty pounds is, however, sometimes used in the heating-pipes, and the subsection of the expansion vessel to a temperature such as that represented by these pressures causes excessive expansion of the walls of the vessels. Hence the elastic limit of the metal composing the same is exceeded and the walls of the vessel are thereby caused to bulge or take a permanent set, and hence the vessel on a reduction of temperature does not contract to its normal extent and therefore does not work properly until readjusted. In order to overcome this objection, I limit the expansion of the valve-operating vessel so that it cannot pass beyond certain limits, even when subjected to extremely high temperatures.

In the drawings, 1 represents the casing of a steam-trap closed at the top by a detachable cap or cover 2 and having at one side an inlet 3 and at the bottom an outlet 4, there being within the chamber contained in this casing a valve-chest 5, having passages 6, which communicate with said chamber in the casing and also with the outlet 4.

The valve-chest 5 is in the present instance of cylindrical form and contains a sliding cylindrical valve 7, which is normally raised to its full extent by means of a coiled spring 9, interposed between the expanded base of the valve-chest 5 and a flange or collar 10 on the valve.

The upper end of the valve has a stem 11, which has an enlarged head bearing upon the underside of the expansion vessel 12, the latter consisting of a pair of corrugated disks, preferably of cylindrical form, connected together at the outer edges, so that the vessel is hermetically sealed. Bearing upon the upper side of the vessel 12 is a stud 13, which is secured to and projects inwardly from the cap or cover 2 of the casing 1.

The vessel 12 is contained within a box or



cage 14, which preferably consists of upper and lower halves suitably secured together at their meeting edges, this cage having slots, perforations, or other openings, thus forming an open-work cage, so that free access of steam or water to the outer surface of the vessel 12 is permitted. Said vessel 12 contains alcohol, bisulfid of carbon, or other volatile liquid, which will be so acted upon by the heat of the steam or water of condensation as to cause rapid expansion or contraction of the vessel in order to close or open the valve 7; but when the desired limit of expansion has been reached, as shown, for instance, in Fig. 2 of the drawings, the walls of the vessel 12 come into contact with the inner sides of the box or cage 14, and any further expansion of said vessel 12 is thereby prevented, such further expansion being resisted by the strength of the box or cage 14, which is too great to be overcome by the expansive force of the liquid contained in the vessel 12 under any temperature to which it is likely to be subjected in practice. Hence undue strain on the walls of the vessel 12 is effectually prevented and the trap always remains in operative condition.

The vessel 12 shown in the drawings is constructed so as to expand both as to its upper and lower sides. Hence the box or cage 14 is carried by the vessel and is free to move in the casing 1 as said vessel expands or contracts, and, while this construction is preferred, a palpable modification of my invention is one in which the box or cage is fixedly mounted in the casing, as shown, for instance, at 14<sup>a</sup> in Fig. 3, and provides a rigid backing for the top of the vessel 12<sup>a</sup>, the expansion of the latter being downward.

The valve 7 has a transverse slot 15, through which passes a transverse pin 16, carried by the valve-chest 5, this pin limiting the upward movement of the valve under the thrust of the spring 9 and thereby restricting the compressive action of the vessel 12.

While I have shown in the drawings and prefer to use a valve sliding in a chest so as

to open and close passages formed in said chest, it will be evident that my invention is not limited to this construction, but can be used in steam-traps having any desired form of valve operated by the expansion and contraction of a vessel under the influence of varying degrees of temperature.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A steam-trap in which are combined a casing, a valve governing the outlet therefrom, an expansion vessel whereby the operation of said valve is controlled, and an open-work box or cage in which said expansion vessel is contained and by which its expansion is limited.

2. A steam-trap in which are combined a casing, a valve governing the outlet therefrom, an expansion vessel controlling the operation of said valve, and an open-work cage containing said expansion vessel and limiting the expansion of the same, said cage being free to move in the casing.

3. A steam-trap in which are combined a casing, a valve governing the outlet therefrom, an expansion vessel controlling the operation of said valve, and an open-work cage mounted upon and movable with said expansion vessel, and serving to restrict the expansion of the same.

4. The combination in a steam-trap, of a casing, a valve governing the outlet therefrom, a spring for moving said valve so as to open the same, an expansion vessel serving by its expansion to close the valve against the action of the spring, and an open-work box or cage containing said expansion vessel and serving to limit the expansion of the same.

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

ARNOLD STUCKI.

Witnesses:

A. V. DIVELY,  
JNO. C. INNES.