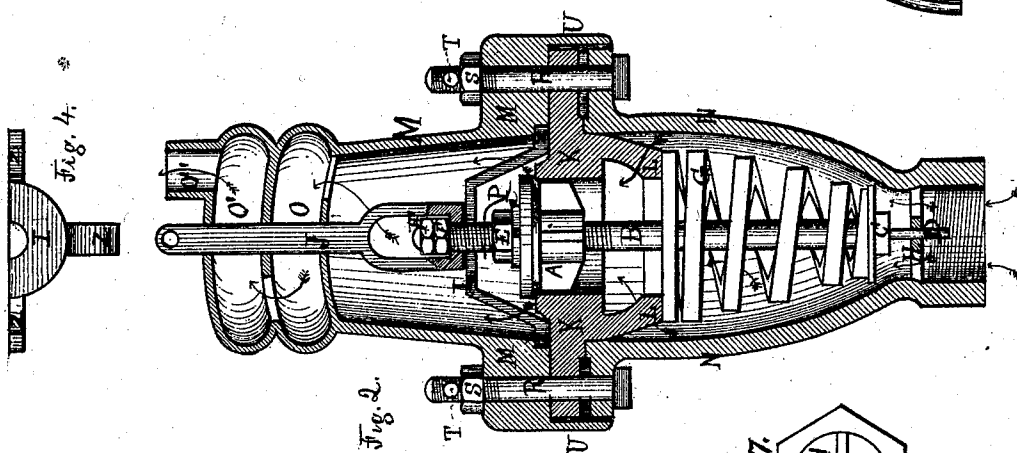
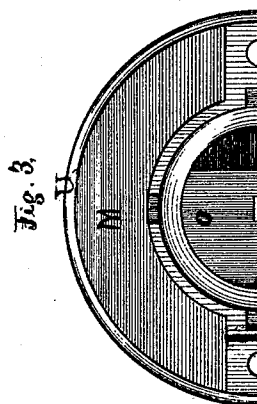
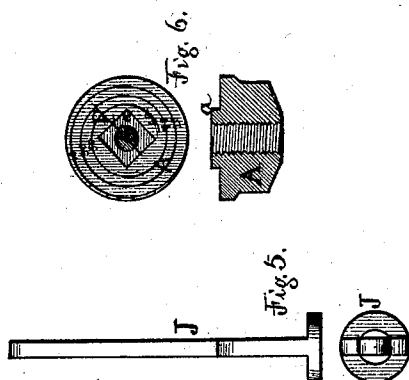
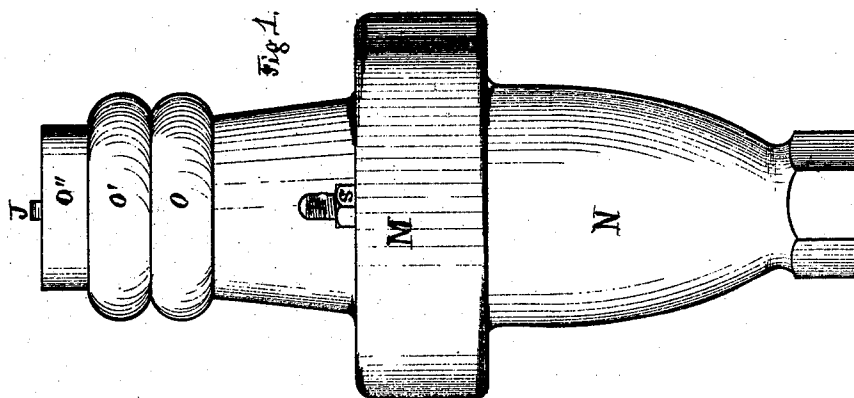


G. W. Cushing,

Safety Valve.

No. 99762,

Patented Feb. 15. 1870.



Inventor

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Witnesses.

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Wm. C. Barwell.

United States Patent Office.

GEORGE W. CUSHING, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND
HORATIO ANDERSON, OF SAME PLACE.

Letters Patent No. 99,762, dated February 15, 1870.

IMPROVEMENT IN SAFETY-VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE W. CUSHING, of Chicago, in the county of Cook, and State of Illinois, have invented a new and useful Improvement in Spring-Loaded Safety-Valves for Steam Generators; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of the enclosing case of my improved safety-valve;

Figure 2 is a vertical longitudinal section of the same;

Figure 3 is a detail bottom view of the enclosing case;

Figure 4 is a detail top plan view of the guard for relieving the valve of the weight of the lifting bar;

Figure 5 is a detached view of the valve and lifting bar;

Figure 6 shows a sectional and top plan view of the valve detached from the case; and

Figure 7, a plan view of the lower guard or guide for the valve.

Similar letters of reference indicate corresponding parts in the several figures of the drawings.

My invention relates to that class of steam-valves known as spring-loaded safety-valves, and has for its object to improve the construction of the valve patented by H. Anderson, February 18, 1868, No. 74,480.

My invention consists, first, in the combination with the valve-stem depending from the under side of the valve and with the seat which forms the bearing surface for the spring, of a cone-shaped steel spring, having its coils made of angular metal in cross-section, whereby the same is easily constructed and kept constantly clean by the action of the steam upon the coils.

I am aware that volute springs have been used in this connection, but they are difficult of construction, requiring the exercise of great skill, and are, consequently, expensive. In use, also, they become clogged by incrustations, and are, therefore, unreliable in their operation.

It consists, secondly, in the valve-stem or spindle provided with a collar to support the cone-shaped spring, with a projection below the collar which enters a guard placed within the steam-pot, to hold the valve-stem in a central position within the steam-pot, and with lock and jam-nuts at its upper end to regulate the tension of the spring for determining the pressure of steam required and for attaching the lifting bar to the valve-stem.

It consists, thirdly, in the combination of an index-finger with the valve-stem and graduated valve, to determine the pressure of steam required to lift the valve.

It consists, fourthly, in the combination of a guard with the valve-stem and valve-lifting bar, to relieve the valve of the weight of said lifting bar.

It consists, fifthly, in the combination of a guide with the valve-stem and steam-pot, to guide the valve-stem centrally within the steam-pot, and thus permit the valve to fit snugly upon its seat.

It consists, lastly, in the peculiar construction of the steam dome and the method of attaching the same to the steam pot, as will be hereinafter more fully described.

In the accompanying drawings—

B is the valve-stem, to which the valve A is fitted by means of a screw-thread, in a manner similar to an ordinary bolt and nut.

The valve A rests upon the seat K, and the stem projects below the seat into the steam-pot or case N, which is attached in any suitable manner to a steam generator, and to which the valve-seat K is secured by means of the bolts R.

G is the coiled spring placed below the valve around the stem B. It is made in the form of an inverted cone, and is held in place by the collar C near the lower end of the valve-stem, and the downward projection L formed upon the under side of the valve-seat K.

As the spring is composed of angular metal disposed in spiral coils, it can be constructed by ordinary mechanics, and therefore produced cheaply. The distance between the coils is such that the steam in its passage around the valve comes in contact with every part of the spring, and therefore keeps the latter constantly clean and free from incrustations.

D is a projection formed below the collar C, in continuation of the valve-stem, and is adapted to fit with easy contact within a guide-frame, H, placed in the lower end of the steam-pot. By this arrangement the valve-stem is guided centrally within the steam-pot and the valve A consequently made to fit its seat equally upon all sides. The pressure of steam required to lift the valve is governed by the tension of the spring, and the tension of the spring is adjusted to greater or lesser pressure by moving the valve up or down upon the valve-stem. When the desired tension has been obtained the valve is locked in position by means of the lock-nut E, as shown. The upper side of the valve is provided with a squared projection, a, shown in fig. 6, to receive a wrench for turning the same.

P is an index-finger, attached in any suitable manner to the valve-stem above the valve, and extending over the graduated upper surface of the latter, as shown in fig. 6. By this arrangement the exact pressure of steam required to lift the valve is indicated as the valve is turned to adjust the tension of the spring G.

The register upon the upper surface of the valve is indicated by graduated concentric circles, the figures

indicating the different pressures. For example, the first turn of the valve will indicate, by the index-finger, twenty pounds on the outer circle, the second turn thirty pounds, and so on to the maximum pressure.

From the foregoing description it will be understood that a simple and effective safety-valve is produced.

In order to enclose the same in such a manner that after having been set to the predetermined pressure, it cannot be changed or tampered with from the outside, I provide a case or dome, M, which encloses the upper portion of the valve, and is secured to the valve-seat K and steam-pot N by means of the lock-bolts R R. The dome M is also provided along its lower edge with a flange or ring, U, which covers the joint formed by the connection of the dome with the valve-seat and steam-pot.

The lock-bolts R are provided with holes T above the nuts S, for the reception of padlocks, wires, or other devices which may be employed as seals or for the purpose of security.

The upper end of the dome M is formed or provided with a chamber divided into three or more divisions, O O' O'', in which the steam passages occupy reverse positions relatively to each other, to prevent any instrument being inserted through the discharge-opening O'' to turn the valve.

J is a bar extending vertically through the steam-dome M, and is designed to afford means for testing the valve under pressure. It is flattened, to prevent turning and save space, and fits with easy contact the partitions which form the chambers O O'. Its lower end forms a yoke fitting over the upper end of the valve-stem, and is held upon said valve-stem by the jam-nuts E F. To the upper end of the bar any suitable device may be attached for lifting the valve, so that a proper application of force will counterbalance the tension pressure of the spring G, and permit the opening of the valve with a minimum pressure of steam in the steam-pot N.

To prevent the lifting bar from being forced down upon and thereby increase the load of the valve, I introduce a guard-frame, I, shown in fig. 2, between the valve and lower end of the yoke, with its legs Z clamped between the valve-seat K and dome M, as shown. This guard, while it supports the lifting bar above the valve, does not interfere with the requisite movement of the valve-stem.

As the spring G is at all times exposed to the action of the steam in the pot N, it will at any given pressure indicate a uniform elasticity. The course of the steam is shown by the arrows, fig. 2.

From the foregoing the operation of my improved safety-valve will be readily understood without further description.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the valve-stem B and spring-seat L, the inverted cone-shaped coiled spring G, constructed and arranged as herein shown and described, for the purpose specified.
2. The screw-threaded valve-stem B, provided with the collar C, guide D, and lock and jam-nuts E F, as herein shown and described, for the purpose specified.
3. The combination of the index-finger P with the valve-stem B and graduated valve A, substantially as described, for the purpose specified.
4. The combination of the guard I placed within the dome with the valve-stem B and lifting-bar J, substantially as described, for the purpose specified.
5. The combination of the guard H with the projection D of the valve-stem, and guiding the same and lower end of the steam-pot N, substantially as described, for the purpose specified.
6. A steam-dome, for converting a safety-valve into a lock-valve, provided with a series of chambers or pipes having their discharge-openings in reverse positions with relation to each other, substantially as described, for the purpose specified.
7. A steam-dome, for converting a safety-valve into a lock-valve, provided with a projecting flange, rim, or ring, to enclose the joints formed by the connection of said dome to the valve-seat and steam-pot or valve-case, substantially as described.
8. The combination of the steam-dome M and valve and spring-seats K L and the steam-pot N, when constructed as shown and connected together by means of the lock-bolts R and nuts S, substantially as herein described, for the purpose specified.

GEO. W. CUSHING.

Witnesses:

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WM. C. FARWELL.