(No Model.)

G. H. CROSBY & A. C. MEADY.

SAFETY VALVE.

No. 356,525. Patented Jan. 25, 1887.

Fig. 1.

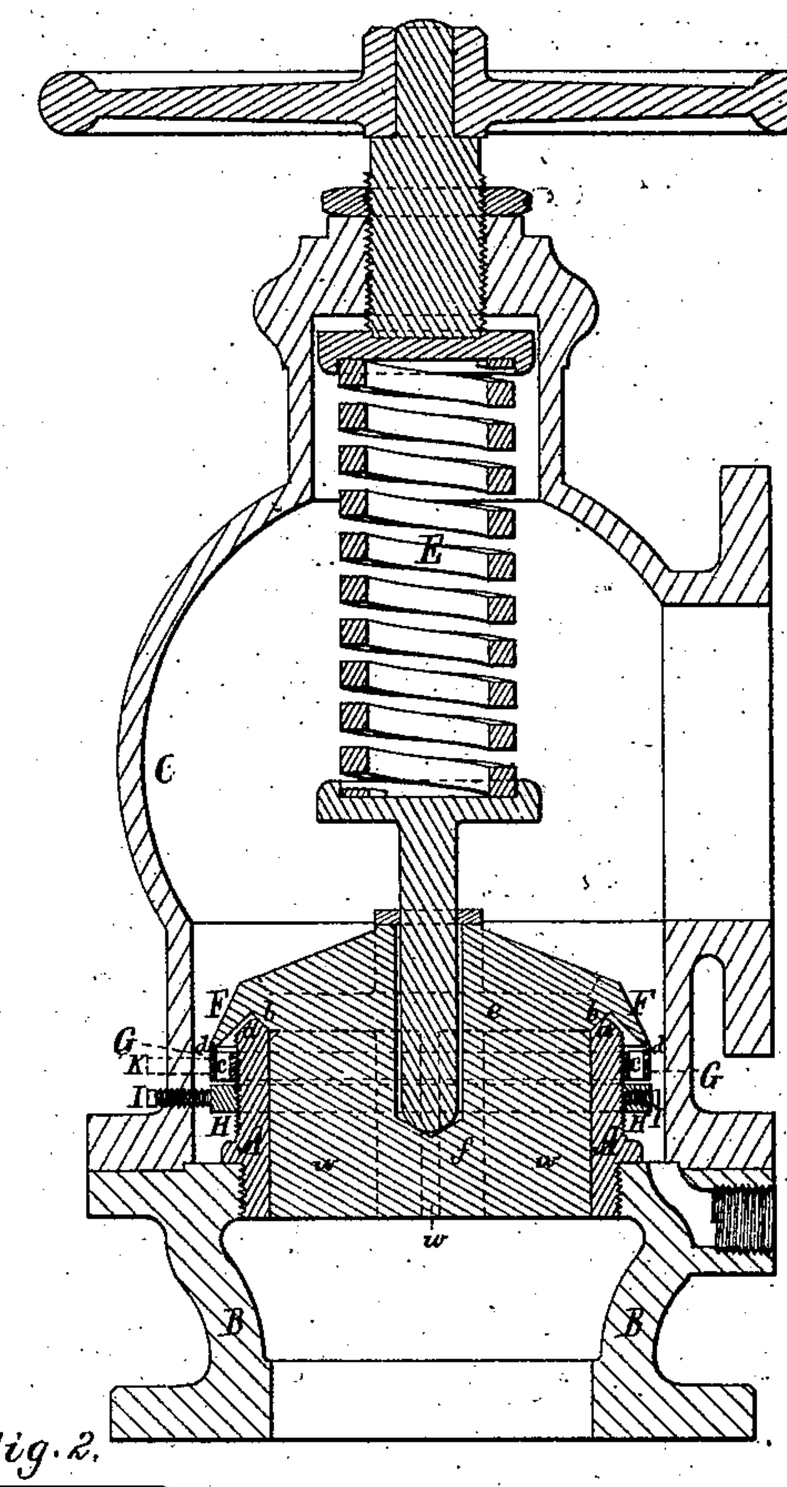


Fig. 3.

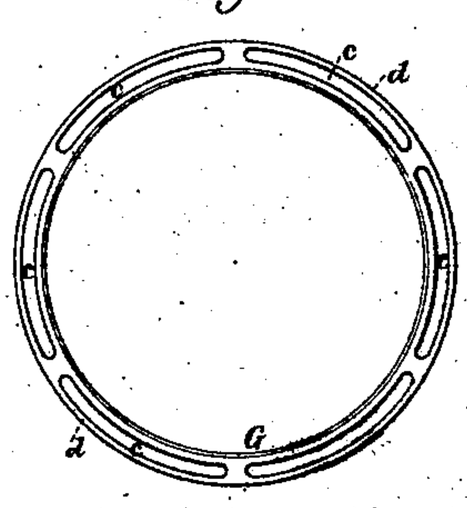


Fig. 2.

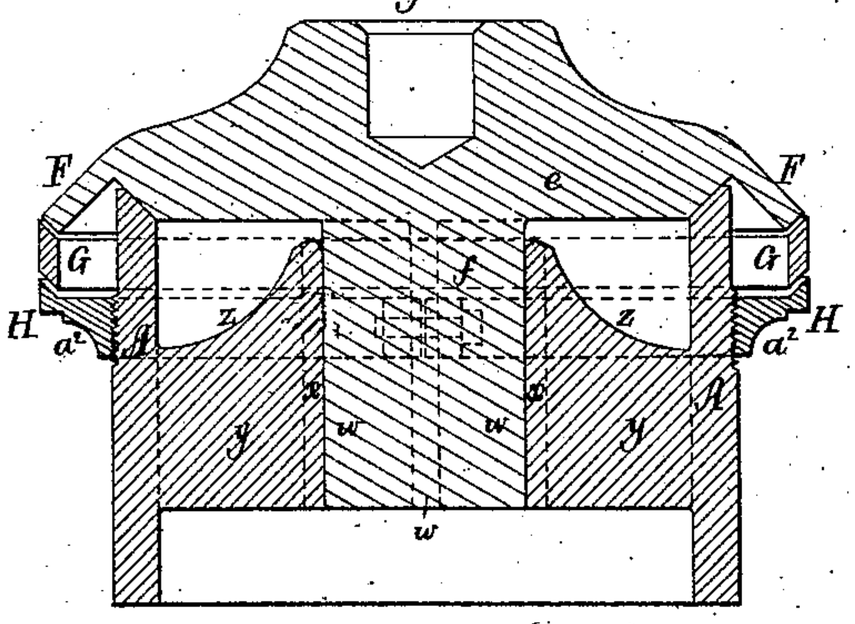
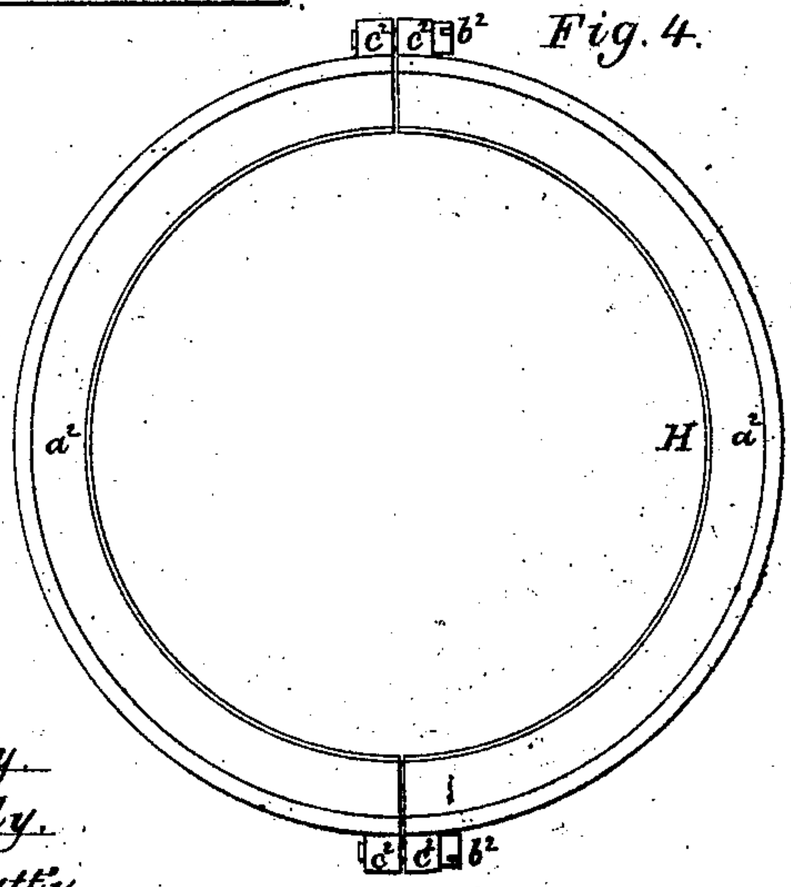


Fig. 4.



Witnesses.

S. N. Piper.

W. G. Fairey

Inventors.

George H. Crosby.

Albert C Meady.

by R N Lusby atty

UNITED STATES PATENT OFFICE.

GEORGE HANNIBAL CROSBY AND ALBERT CECIL MEADY, OF SOMERVILLE, ASSIGNORS TO THE CROSBY STEAM GAGE AND VALVE COMPANY, OF BOSTON, MASSACHUSETTS.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 356,525, dated January 25, 1887.

Application filed November 8, 1886. Serial No. 218,291. (No model.)

To all whom it may concern:

Be it known that we, GEORGE HANNIBAL CROSBY and ALBERT CECIL MEADY, of Somerville, in the county of Middlesex, of the Commonwealth of Massachusetts, have invented a new and useful Improvement in Safety-Valves for Steam-Boilers; and we do hereby declare the same to be described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a vertical transverse and median section of a safety-valve embodying our invention, the nature of which is defined in the claims hereinafter presented. Fig. 2 is a vertical and transverse section of the neck or valve-seat tube, the valve, the chambered ring, and the adjustable annular bottoming of the latter, the chambered ring in this figure being represented as immovable or inadjustable vertically relatively to the conical deflector of the valve, whereas in Fig. 1 the chambered ring is shown as screwed upon the valve-seat tube, in order for such ring to be adjustable in altitude with reference to the deflector. In Fig. 1 the valve-seat tube is represented as having two conical bevels at its upper end, whereas in Fig. 2 it is shown as having but one—viz., the valve seat. Fig. 3 is a top view of the chambered ring G, hereinafter referred to. Fig. 4 is a top view of the ring H as made in sections.

In such drawings, A denotes the valve-seat tube projecting upward from and connected, as usual, to a tubular base or standard, B, on which rests the valve and spring-case C, which at its lower part is concentric with the valve-seat tube A, and surrounds it at a suitable distance from it. The upper end of the tube A has in it the valve-seat *a*, which is formed like a conic frustum, the valve being correspondingly shaped, as shown at *b*, to rest on such seat. The said valve, like others of the class, is forced downward upon its seat by a spiral spring, E, and such valve has extending from it peripherally an inclined conical deflector, F, whose inner surface is conical and at a right angle, or about so, to the valve-seat *a*.

Immediately below the deflector F is the chambered ring G, which, as shown, is provided with an adjustable bottoming, H. The said ring has in it arcal chambers or openings *c* extending down through it, the ring projecting above them, and the extension *d* being beveled on its inner face, as represented—that is, in parallelism with the lower end of the deflector F, which is at or about at a right angle to the inner face of the deflector.

The ring G, which encompasses the seat-tube A, may be applied thereto so as to be either adjustable or inadjustable vertically with reference to the deflector, it being shown in Fig. 1 as screwed upon the valve-seat tube, and in Fig. 2 as firmly fixed thereon. The annulus or bottoming H also encompasses the tube A, and is screwed thereon, so as to be adjustable in distance from the ring G, and there may be screwed either through the case or transversely through the ring a set-screw, I, for preventing the annulus H from accidentally revolving on the tube A. When screwed into the case, the screw bears against the periphery of the annulus H; but when screwed through the annulus the said screw bears against the tube A, (see Fig. 1,) whose outer surface is screw-threaded to engage with the internal screw-threading of the annulus. When the ring G is inadjustably connected with the tube A, as shown in Fig. 2, we construct the annulus H in two or more parts, a^2, connected at their ends by screws b^2 going through projections c^2 from such ends, they enabling the annulus to be firmly clamped in position. When the chambered or perforated ring G is screwed upon the neck or tube A, so as to be adjustable with reference to the deflector F, there may be to the ring G a stop-screw, K, to keep it from accidentally revolving, such screw being shown in dotted lines in Fig. 1 as screwed through the case and butting against the ring G, or the set-screw may screw through the ring and against the seat-tube.

Below the disk or central portion, *e*, of the valve there may be or is extended concentrically therewith the spring-spindle step projection *f*, from which radiate to the inner cylindrical surface of the tube A (see Fig. 1) a series of guide-wings, *w*, all being as usual in

safety-valves. As shown in Fig. 2, the guide-wings *w*, extending downward from the valve, bear against the interior surface of a guide-well, *x*, which is integral with the tube A, it being connected therewith by arms *y*, each of which, instead of having its top straight or connected to the tube A at or near its valve-seat, is curved or inclined downward from the top of the guide-well to where it connects with the tube A, as seen at *z* in said Fig. 2, in order that when heated the expansion of the metal of the arms will not change the form of the valve-seat and cause leakage, which will occur when the wings are attached to the tube A near its seat, as experiment has fully demonstrated. When the valve is closed on its seat, the lower face only of such valve will be exposed to the pressure of the steam. When such pressure may exceed the resistance of the spring by which the valve is held down upon its seat, the valve will rise slightly and the steam will escape and impinge directly against the conical inner surface of the deflector. The force of impact or the momentum of the steam will cause the valve to rise higher. The steam on striking the deflector will be deflected against the valve and also downward into and through the openings of the ring G and against the upper surface of the annular bottoming H, and will finally escape into the case through the space between the deflector and the ring G, and also through that between the rings. The reaction of the steam on the bottoming, together with the force of expansion of the steam in the chambers *c*, will assist in elevating the valve.

With our invention we are enabled to utilize to very great, if not the best, advantage the impact or momentum of the steam escaping betw en the valve and its seat. We do this by causing the steam to strike squarely, or substantially so, against the deflector, and by it to be deflected both upward and downward, and into and through or out of the ring G, from whence it escapes through the space between the ring and the deflector, and also through the space between the ring and its bottoming, as desired, for the regulating of the "pop." In case the bottoming be raised up into contact with the ring G, all the escaping steam would be reflected upward by the bottoming and pass off through the space between the deflector and the ring G, provided the said ring G be down out of contact with the deflector.

In practice our invention or improvement is attended with most excellent results.

We claim—

1. The combination, with the valve and the inclined deflector thereof, and the valve-seat tube, of the chambered ring G, open from top to bottom and encompassing the said tube below the deflector, and arranged at a short distance therefrom, as set forth.

2. The combination, with the valve and the inclined deflector thereof, and the valve-seat tube, of the chambered ring G, screwed or applied to the said tube so as to be adjustable thereon in altitude with reference to the deflector, as set forth.

3. The combination, with the valve and the inclined deflector thereof, and the valve-seat tube, of the chambered ring G, encompassing the tube below and extending downward from the deflector, and with the bottoming-ring H, screwed upon or applied to the said tube so as to be adjustable in altitude with reference to the said ring G, all being substantially as set forth.

4. The combination, with the valve and the inclined deflector thereof, and the valve-seat tube, of the chambered ring G, encompassing and forming a part of the said valve-seat tube, and extending downward from the said deflector, and the bottoming-ring H, formed in sections connected as described, said ring being screwed on the tube A and clamped in position by the devices which connect its sections, as set forth.

5. The combination, with the valve provided with the inclined deflector and the guide-wings, and the valve-seat tube having the arms connecting it with the guide-well curved or inclined downward at top, as described, of the ring G, encompassing such tube and arranged below the said deflector, and the bottoming-ring H, made in sections and applied to the said tube so as to be adjustable vertically and clamped in position by the devices which hold the said sections together, all being as set forth.

6. The combination of the chambered or perforated ring G, provided with the lip *d*, inclined on its inner surface, and extending above the ring, as set forth, with the valve and its deflector, and the seat-tube, all being substantially as represented.

7. The combination of one or more set-screws with the chambered or perforated ring G, encompassing and screwed upon the seat-tube A, and the valve and its deflector arranged above the said ring, all being substantially as represented.

8. The combination of the chambered or perforated ring G, provided with the lip *d*, inclined on its inner surface and extending up from such ring, with the valve, the deflector inclined on its lower edge, and the seat-tube, all being substantially as set forth.

GEORGE HANNIBAL CROSBY.
ALBERT CECIL MEADY.

Witnesses:
C. B. CROSBY,
A. D. CROSBY,
R. H. EDDY,
R. R. TORREY.