

(No Model.)

G. H. CROSBY.

SAFETY VALVE.

No. 318,961.

Patented June 2, 1885.

Fig. 1.

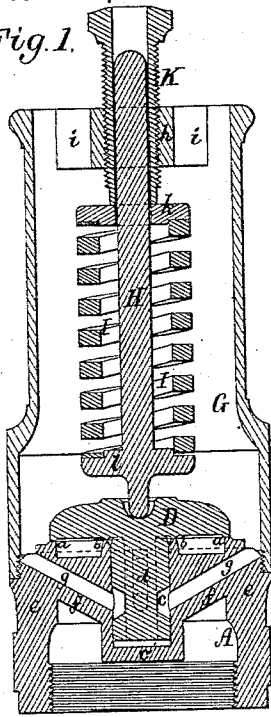


Fig. 4.

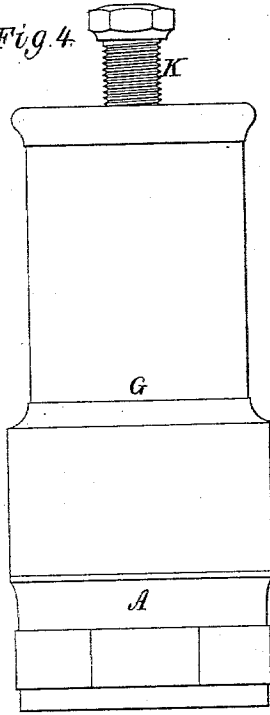


Fig. 7.

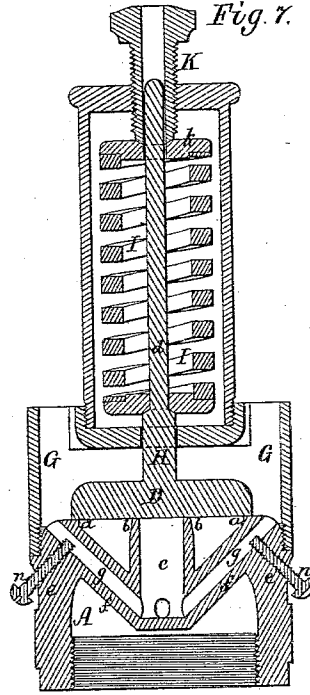


Fig. 3.

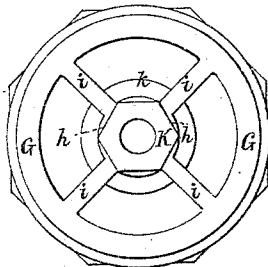


Fig. 2.

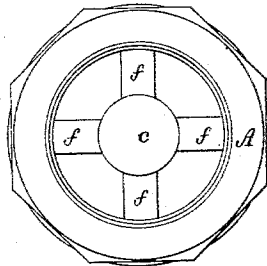


Fig. 8.

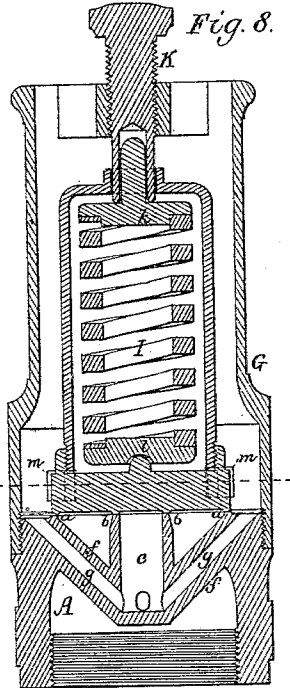


Fig. 5.

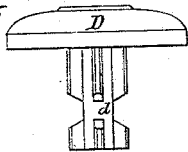


Fig. 9.

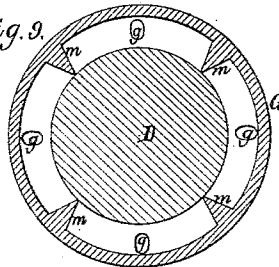


Fig. 6.

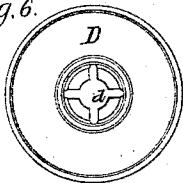
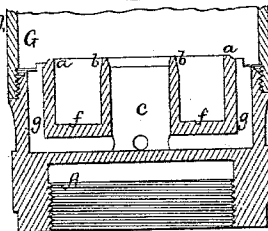


Fig. 10.



Witnesses.

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GEORGE HANNIBAL CROSBY, OF SOMERVILLE, MASSACHUSETTS.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 318,961, dated June 2, 1885.

Application filed March 31, 1885. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HANNIBAL CROSBY, 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 I 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 and transverse section, Fig. 2 a bottom view, Fig. 3 a top view, and Fig. 4 a side elevation, of a safety-valve provided with my invention, the nature of which is defined in the claims hereinafter presented. Fig. 5 is a side view, and Fig. 6 a bottom view, of the valve D and its stem *d* to be described. Fig. 7 is a section showing the valve-guide stem as projected upward from the valve. Fig. 8 is a section showing the valve as guided by ears projecting inwardly from the surrounding case. Fig. 9 is a horizontal section of the case and valve, it being taken through the said ears. Fig. 10 is a section of the base or shell, showing the passages *g* as right angular instead of straight, as in the other figures.

In this special safety-valve, A denotes what is termed the "base" or "shell," which at its top is provided with an annular valve-seat, *a*, and also within and concentric therewith a central bearing, *b*, the latter having at its upper end an auxiliary annular seat for the valve D to rest on as well as upon the seat *a*. The said central bearing has within it a cylindrical chamber, *c*, open at top, such chamber, as shown in Fig. 1, being to receive and guide in its vertical movements the valve-stem *d*, formed as shown in Figs. 5 and 6.

Leading radially from the bearing *b* to the outer annulus, *e*, of the shell are four arms, *f*, which connect such bearing and annulus, there being in each of such arms lengthwise of it a passage, *g*, that opens out of the chamber *c* and inclines upward therefrom at an angle of forty-five degrees, or thereabout, and opens through the upper part of the shell outside of the outer valve-seat and into the case G, screwed upon such shell, and extending above it, as represented. Within this case, which is

open at top, as usual, is the valve-spindle H and its operative spiral spring I, whose contracting-screw is shown at K as screwed down through a hub, *h*, connected to the case by radial arms *i*. The lower end of the screw K bears against a collar or disk, *k*, resting on the upper end of the spring. The spring is supported at its lower end on a flange, *l*, concentric with and projecting from the spindle.

From the above it will be seen that the passages *g* for the escape of steam from the chamber *c* are not horizontal, as they usually are in other safety-valves of like kind, but inclined upward and discharge the steam not outside of the case, but directly into it; and there is on the shell no ring screwed thereon about the eduction ends of such passages. In fact, the present improvement renders such an adjustable ring as used in various other safety-valves of this class unnecessary. On the valve D being forced off its seat by the pressure of the steam, the steam will not only escape into the case by passing directly over the outer valve-seat, but will rush over the inner valve-seat into the chamber *c*, and thence through the passages *g*, and thence into and upward through the case. The said passages being inclined to the inner surface of the case, the steam in escaping from them is not reflected directly backward into them so as to impair its initial velocity of escape, but is deflected upward entirely clear of them and against the steam escaping from over the outer valve-seat. By impinging against the latter steam, the steam discharged from the passages *g* turns upward the escaping steam over them, and prevents it from rebounding upon itself to impair its velocity of egress into the case.

Generally speaking, the sum of the areas of cross-sections of the passages *g* should be such in comparison with the effective area of the opening at the inner seat at the top of the central chamber as to impede the flow of steam from such chamber to cause an additional pressure to lift the valve higher after it has opened, and to close it again at a very slight reduction below the pressure at which it opened.

My invention is not necessarily limited to having the valve-guide stem to extend down-

ward from the valve, as it may project upward from it, as shown in Fig. 7 at *d*, as going through an aperture in the bottom of the spring-case, and fitted to slide therein, the said stem being united to the valve-spindle H or making part thereof; or the valve, instead of being provided with a stem to extend either above or below it, may be guided in its vertical movements by ears extending from the interior of the case G in manner as shown at *m* in Figs. 8 and 9.

In Fig. 10 each of the passages *g* is shown as right angular, or as extending horizontally for a part of its length, and thence vertically or upward. This arrangement or form of each of such passages, though causing the steam to escape from the passage directly into the case G, is objectionable, as in passing from the horizontal into the vertical part of each passage the steam is reflected back upon itself, and is thus prevented from freely escaping through the passage, as it will when the passage is inclined and straight, as shown in the other figures.

There may be screwed into the shell or base A, and transversely into one or each of the passages *g*, a screw, *n*, (see Fig. 7,) it serving as a means of interrupting, more or less, the flow of steam through the passage, or to answer the purpose of a ring or gate, as screwed on the base just above the discharging ends of the passages, when such passages are horizontal and straight.

By having the valve-guides outside of the chamber *c* and above the valve-seats such chamber becomes unobstructed for the reception of the steam and its flow through and from it.

I claim—

1. In a safety-valve, the base or shell A thereof, provided with the two concentric annular valve-seats *a* and *b*, and with the central

chamber, *c*, extending down from and opening through the inner of said seats, and with passages *g*, leading out of the said chamber and opening upward into the space encompassing the valve D and within the case G, surrounding and extending above such valve, all being substantially as set forth.

2. The base or shell A, provided with the two annular concentric valve-seats *a* and *b*, and with the central chamber, *c*, extending down from and opening through the inner of such seats, and with passages *g*, leading out of such chamber and inclined upward to and opening into the space encompassing the valve D and within the case G, surrounding and extending above such valve, all being substantially as set forth.

3. The base or shell A, provided not only with the two annular concentric valve-seats *a* and *b*, the central chamber, *c*, extending down from and opening through the inner of the said seats, and the passages *g*, leading out of such chamber and opening upward into the space encompassing the valve, but with a screw, *n*, screwed into such shell, so as to extend into one of such passages transversely thereof, all being essentially as represented.

4. The base or shell A, provided with the two annular concentric valve-seats *a* and *b*, the central chamber, *c*, opening through and down from the inner of such seats, and the passages *g*, leading out of such chamber, in combination with the valve provided with guides arranged above its seat, whereby the said chamber becomes entirely unobstructed for the passage of steam into and through and from it, as set forth.

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Witnesses:

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