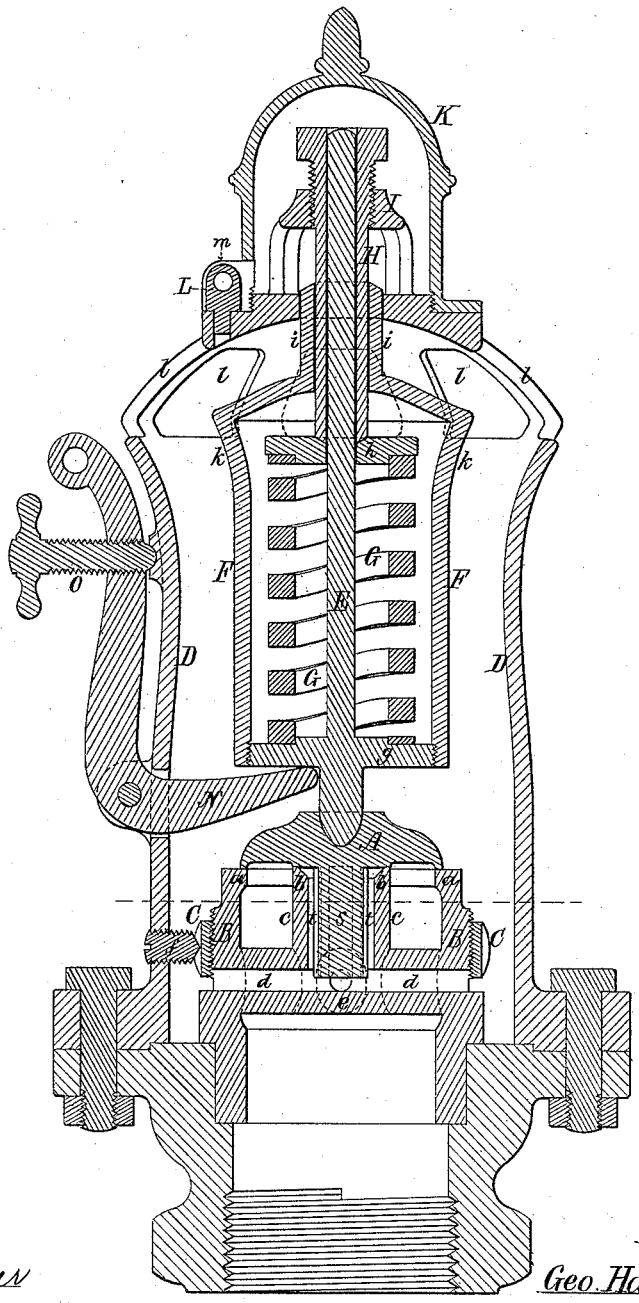
(No Model.) 2 Sheets—Sheet 1.

G. H. CROSBY.

SAFETY VALVE.

No. 306,387. Patented Oct. 14, 1884.

Fig. 1.



Witnesses.
S. N. Piper
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Inventor.
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by R. H. Eddy atty

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

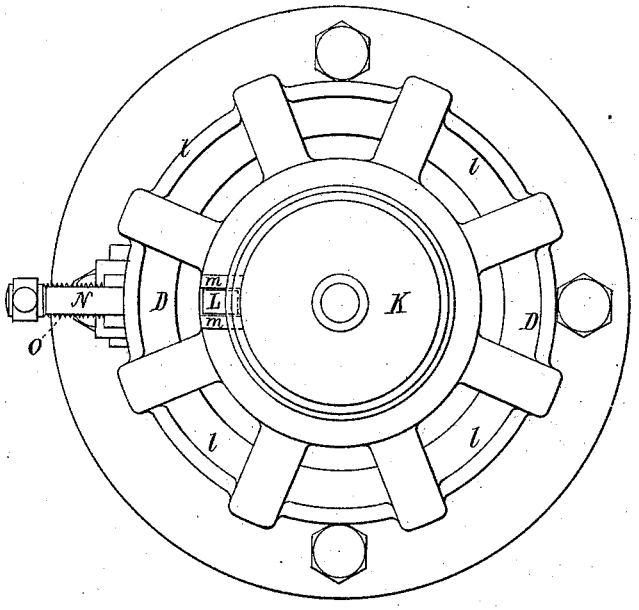
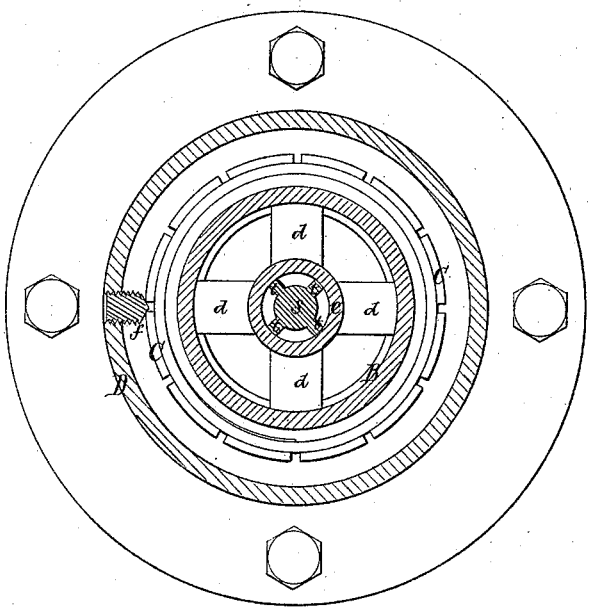


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE HANNIBAL CROSBY, OF SOMERVILLE, MASSACHUSETTS.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 306,387, dated October 14, 1884.

Application filed June 20, 1884. (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 Mechanism for 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 section of a safety-valve mechanism provided with my invention, the nature of which is defined in the claims hereinafter presented. Fig. 2 is a top view of it. Fig. 3 is a horizontal section of it, such section being taken through the wheel-shaped valve-seat base to be described.

In Fig. 1 of such drawings a safety-valve is shown at A upon a wheel-shaped base, B, having two concentric annular seats, *a* and *b*, for the valve to rest on. The base is tubular and provided with a tubular hub, *c*, supported within the bore of the base by means of a series of radial and tubular arms, *d*, extending from the hub to the base, and each opening out of the said base and into the bore of the hub in manner as represented. The bore of the hub is closed at bottom, as shown at *e*. From the valve a stem, *s*, fluted vertically or having narrow fillets *t* on its periphery, extends into the bore of the hub *c*. The fillets bear against the bore and serve to guide the valve rectilinearly in its movements toward or off its seats. Encompassing and screwed on the base is a gate or ring, C, which, on being screwed down about the passages leading through the arms *d*, suffices to close the ends of such passages more or less to intercept and regulate the egress of steam from them. This ring is prevented from accidentally revolving by a screw, *f*, which, screwed into the encompassing shell or outer case, D, within which the valve and the base B are arranged, as shown, bears against such ring. Projecting upward from the valve is a spindle, E, which extends above and below and is fixed to the bottom *g* of the case or jacket F of the spiral spring G of the valve A. The said spring rests on the said bottom *g*, which is screwed into the lower part of the body of the case, and not only constitutes a bottom for the case, but a support for the spindle and the spring. On the top of the spring is a cap or disk, *h*, upon which the lower end of a tubular screw, H, bears. This screw is screwed into an arched support, I, resting on and fastened to the top or crown of the case D. The tubular screw H goes through and fits in the bore of a tubular neck, *i*, extending up from the top or crown of the jacket or case F and through the crown or top of the case D, such neck being to steady the case F and admit of such case being moved upward and downward. The body of the case F is conical or tapering in its upper part, as shown at *k*, to deflect steam to and through openings or educts *l* in the crown of the case B, and to prevent such steam in a measure, if not entirely, from passing up into and through that opening in the crown of the case D through which the tubular neck *i* extends. Screwed upon the said crown of the case D is a hood or dome, K, provided with two ears, *m m*, extending from it at its lowest part in manner as shown in the drawings, each of such ears having a hole through it laterally. A pin, L, goes down between these ears and into the crown of the casing D, and such pin has through it a hole in line with those of the two ears. The holes of the pin and ears are to receive the hasp of a padlock, in order to prevent the head from being unscrewed for improper access to the parts within it.

N is a lever for forcing the valve off its seat by a screw, O, applied to such lever and the case D in manner as shown. I would remark that, if desirable, the case D may have a steam-discharge opening or openings in its lower part.

The operation of the described mechanism may be thus explained: The valve, resting on the two flat annuli seats *a* and *b*, will be held down thereon by the spring G against the pressure of steam when such may tend to force the valve off its seat. The tension of the said spring may be increased by screwing down the screw H. The valve area between the two seats is what the steam-pressure ordinarily acts upon to overcome the resistance of the spring. The area bounded by the smaller seat will not be so acted on by the steam until the valve may be forced upward off its seats. When the pressure of the steam under the

valve is nearly to the maximum required, the valve will open or rise slightly, and the steam will escape across the larger of the valve-seats into and up through the case D, and impinging against the tapering part *k* of the spring case or jacket F, will by such part be deflected into and through the openings *l* of the case D. The steam will also be forced inward across the inner valve-seat, and thence down through the hub *c* and the tubular arms *d*, from whence it will pass into and up through and out of the case D. On the pressure having attained its maximum, the valve will be forced upward, so as to allow the steam to act on the valve area within or bounded by the inner seat, and thereby produce a greater pressure on the valve, one to suddenly overcome the increasing resistance of the spring and force the valve higher, so as to rapidly relieve the boiler. After this the valve will slowly settle down and close upon its seat. By depressing the gate C, so as to diminish the escape of steam through the tubular arms *d*, the pressure on the valve area bounded by the inner valve-seat may be diminished. Thus it may be regulated or diminished or increased as occasion may require.

Having on January 21, 1884, filed in the Patent Office an application for a patent numbered 117,694, and containing subject-matter hereinbefore described, I do not herein claim what is claimed by me in the said application 117,694—the combination of the fastening-screw *f* with the case D and the ring or gate C, screwed on the base B and to operate with the educts of its tubular arms, as explained; but

I claim—

1. The tubular valve-seat base B, provided with the two concentric valve-seats *a* and *b*, the tubular hub *c*, and radial tubular arms *d*, arranged essentially as set forth, the bores of such arms leading out of the lower part of the bore of the hub, as shown, in combination with the valve A, adapted to such base and hub in manner and to operate therewith substantially as represented.

2. The combination of the base B, provided with the two valve-seats, and the hub and its tubular arms, as explained, with the ring or gate C, screwed on the said base above the bores of said arms, and to operate therewith as set forth.

3. The spring case or jacket F, having its upper part, *k*, made tapering or conical, to deflect steam from it laterally to and through the openings of the crown of the outer case, D, all being substantially as and for the purpose specified.

4. The spring case or jacket F, provided with the tubular neck *i*, extending through the crown of the case D, as described, in combination with the tubular screw H, screwed into the fixed arch-piece I, and extending down through such neck to the cap-plate *h* of the spiral spring G, arranged within such case or jacket, all being substantially as represented.

5. The spring-case F, provided with the separable bottom *g*, fixed to the valve-spindle E, and serving to support the spiral spring G, all being essentially as represented.

6. The combination of the spring-case F, provided with the tubular neck *i*, with the tubular screw H, and its supporting arch-piece I, and with the valve-spindle E, extending through such screw lengthwise thereof, and through the spring G and its cap *h*, all being essentially as set forth.

7. The hood K, screwed on the case D, and with such provided with the perforated ears and with the perforated pin, arranged between such ears and in the said case, all being substantially as represented.

8. The combination of the tubular base B, having the two concentric valve-seats *a* and *b*, the tubular hub *c*, and arms *d*, with the valve A, applied to such seats and hub, as described, and with the valve-spindle E and its operative spring G, cap *h*, necked jacket or spring-case F, tubular screw H, its supporter I, and the case D, all being arranged and adapted substantially in manner to operate as set forth.

GEORGE HANNIBAL CROSBY.

Witnesses:
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E. B. PRATT.