

(No Model.)

R. J. THOMAS.
SAFETY VALVE.

No. 293,685.

Patented Feb. 19, 1884.

Fig. 1.

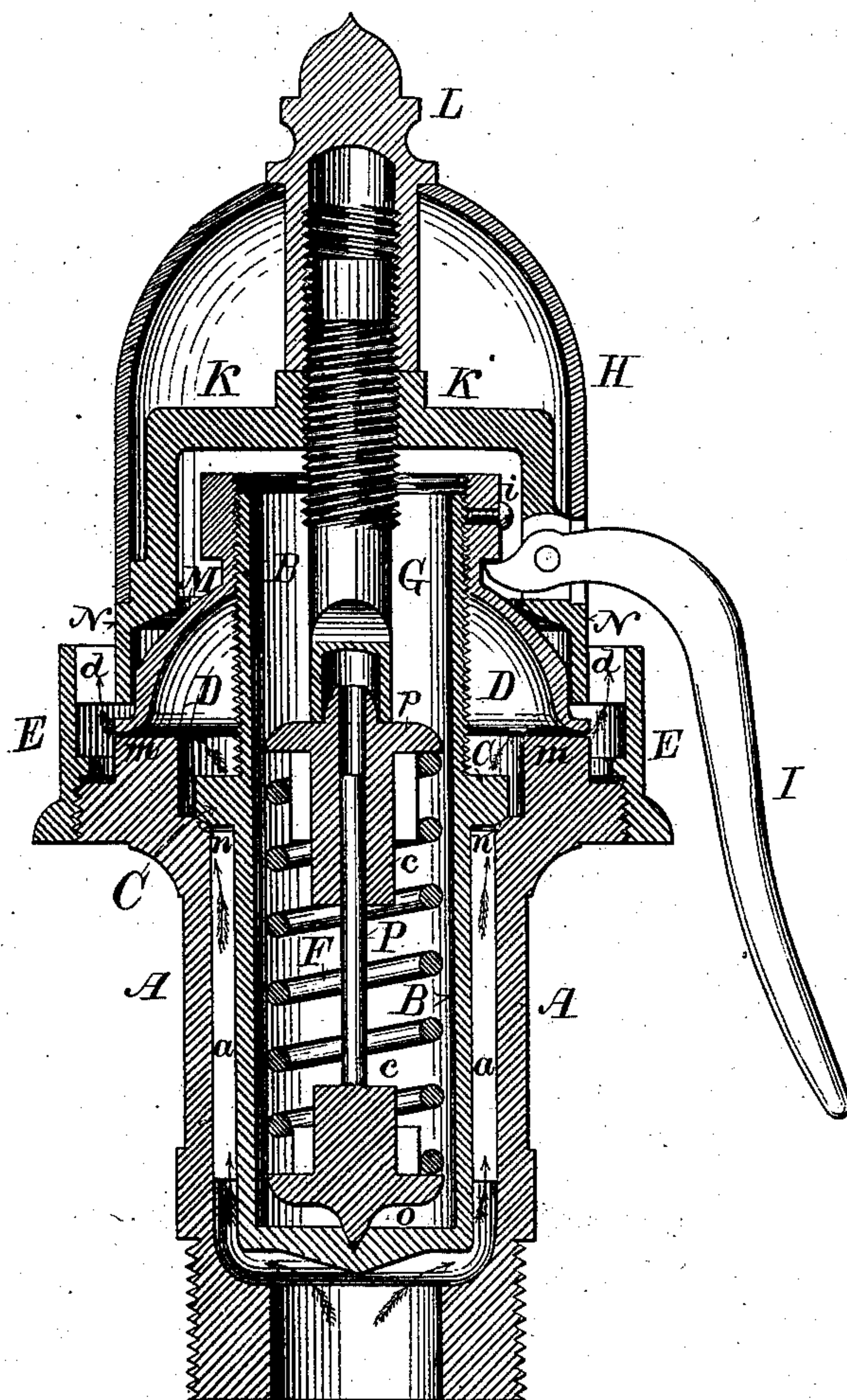
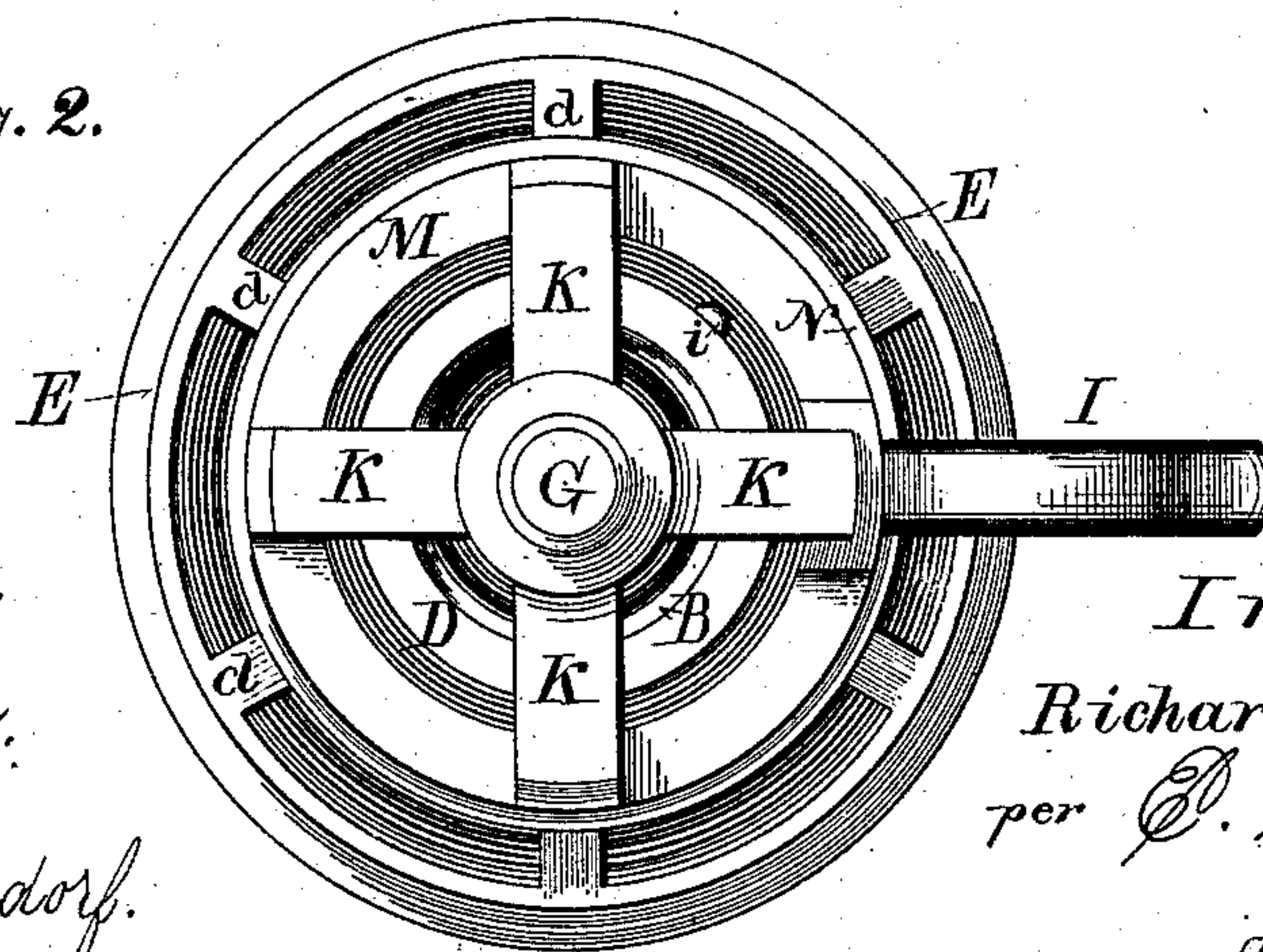


Fig. 2.



Witnesses:
Chas. L. Goss.
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UNITED STATES PATENT OFFICE.

RICHARD J. THOMAS, OF MILWAUKEE, WISCONSIN.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 293,685, dated February 19, 1884.

Application filed August 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, RICHARD J. THOMAS, of Milwaukee; in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Lock-Up Safety-Valves; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to safety-valves for steam generators or boilers; and it consists, essentially, of a novel device or arrangement whereby the action of the valve is rendered more positive and certain in keeping the pressure within the boiler below a certain limit, and of the means of adjusting the same for different pressures, and of locking the adjusting mechanism when set as desired.

In the accompanying drawings like letters refer to the same parts in both figures.

Figure 1 is a vertical medial section of my improved valve, and Fig. 2 is a top view of the same with the cap removed.

A is the base of the valve, cylindrical in general form, threaded at the bottom, so as to be screwed into the boiler, and also at the top to receive the shell or collar E, supporting the spider-frame K K. The long neck of the base A is provided with the inwardly-projecting guides *a a*, which hold the large hollow valve-stem B in position and furnish bearings, upon which it slides when the valve is in operation.

C is an annular valve formed with and about the stem B a little above its middle. It is beveled off at its lower and outer edge to fit exactly the beveled valve-seat *n n*, formed near the top of the base A, which is spread to receive the valve, and raised about the same into a wide flange, *m m*, which furnishes a seat for the overhanging umbrella-shaped plate D, formed at its upper part into a collar, by means of which it is screwed to the threaded portion of stem B above the valve C. A small set-screw, *i*, passing through the threaded collar on plate D against the stem B, holds the plate in position when it has been properly set. The top of base A

is extended laterally beyond the wide upwardly-turned flange *m m*, so as to leave a space for the escape of steam between the collar or shell E and the depending edge of plate D.

An inner shell, N, is formed with the shell E, and joined thereto by means of holders *d d*, between which long openings are left for the passage of the escaping steam. The upper edge of the shell N is provided with a broad inwardly-projecting flange, M, upon which the spider-frame or cross-head K is raised.

Into the deep hollow stem B of the valve C is inserted a stiff spiral spring, F, which rests at the bottom upon the disk or shield *o*, and is covered at the top by the disk or shield *p*. The lower disk, *o*, is formed with a central beak on its under face, which sets in a conical depression at the center of the bottom of the hollow stem B. The disk *o* is provided, also, with a small central vertical stem, P, which passes into a central perforation in the disk *p*, in which it slides freely, so as to permit of the compression and expansion of the spring F. The disks *o* and *p* are each provided with long winged shanks to hold the spring F in its proper position, and also to hold the stem firmly at the bottom, and to furnish it with a long bearing at the top. The stem P in turn braces the disks *o* and *p*, and keeps them in planes parallel to each other and at right angles to the axis of the valve. The disk *p* is provided on its upper face with a conical central elevation, which fits into a cavity in the lower end of the adjusting-screw G, which passes through a central threaded eye at the meeting of the legs of the spider-frame or cross-head K.

H is a hemispherical cap, which incloses the top of the valve and the adjusting-screw G. L is a long cap-nut, which fits over the upper end of the screw G, and locks the same when it has been properly set. The nut L passes through a perforation in the top of cap H, and is provided near the top with a flange, which rests upon the top of said cap when the nut is screwed down upon the cross-head K, and thereby effectually locks the valve-case and prevents interference with the adjustment made within. The top of the nut L is formed to be turned with a wrench.

I is a lever pivoted to the top of the shell N,

with the point of the short arm resting against the lower edge of the collar at the top of plate D in such manner that the valve C may be opened from the outside, when desired, by pressing down the outer arm of said lever.

My improved device operates as follows: The plate D having been properly set upon the stem B at a point found by experiment when the valve is made, the tension of the spring F is regulated by means of the adjusting-screw G, so that the valve will open at any desired pressure within the generator. The valve-case is then covered by the cap H and locked up by nut L, the valve having been previously screwed to the boiler or generator. The steam passes in the direction of the arrow shown in Fig. 1 up through the base A, between the wings or guides *a a*, and presses against the face of valve C. When the pressure reaches the limit at which the valve is adjusted to relieve the boiler, the spring F is compressed slightly and the valve C is lifted from its seat *n n*, allowing the steam to escape into the chamber formed by the umbrella-shaped plate D and upturned flange *m m* on base A. Here the steam meets the increased area presented by the under face of the plate D and raises the valve a little more, holding the same open until the pressure in the boiler is reduced a little below the limit required to open the valve in the first instance. The steam escapes through the opening left between the edge of disk D and the flange on base A, and passes out between the shells E and N and reduces the pressure in the boiler until the force of the compressed spring is sufficient to close the valve. The pressure exerted by the steam upon the plate D will be greater or less, according to the relief-opening left between the edge of the plate and the flange *m m* on base A, which opening is regulated by screwing the plate D up or down upon the threaded stem B. The smaller the opening the greater will be the force expended upon the plate, and consequently the valve will be lifted more positively and held open longer.

A great advantage which I claim for my improved device is that the increased area and

the means of adjusting the relief-opening are furnished by a single part—viz., the plate D.

Another advantage which I claim for my valve is that when the adjustments have been made the parts may be inclosed and locked to prevent interference therewith by means of the cap H and lock-nut L.

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

1. In a safety-valve, the combination of the base A, valve C, plate D, and stem B, substantially as and for the purposes set forth.

2. The combination, in a safety-valve, of the base A, valve C, hollow threaded stem B, adjustable plate D, spiral spring F, disks *o* and *p*, cross-head K, and adjusting-screw G, substantially as and for the purposes set forth.

3. In a safety-valve, the cap H and lock-nut L, in combination with the spring F and adjusting-screw G, substantially as and for the purposes set forth.

4. In a safety-valve, the combination of the cap H, shell E, screw G, and lock-nut L, substantially as and for the purposes set forth.

5. The combination, in a safety-valve, of the base A, valve C, stem B, spring F, disks *o* and *p*, stem P, adjusting-screw G, and cross-head K, substantially as and for the purposes set forth.

6. In a safety-valve, the combination of the base A, shell E, inner shell, N, cross-head K, adjusting-screw G, spring F, valve C, hollow stem B, adjustable umbrella-shaped plate D, cap H, set-nut L, and lever I, substantially as and for the purposes set forth.

7. The combination, in a safety-valve, of the adjustable umbrella-shaped plate D, the base A, provided with the flange *m m*, and the valve C, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

RICHARD J. THOMAS.

Witnesses:

E. H. BOTTUM,
CHAS. L. GOSS.