

(No Model.)

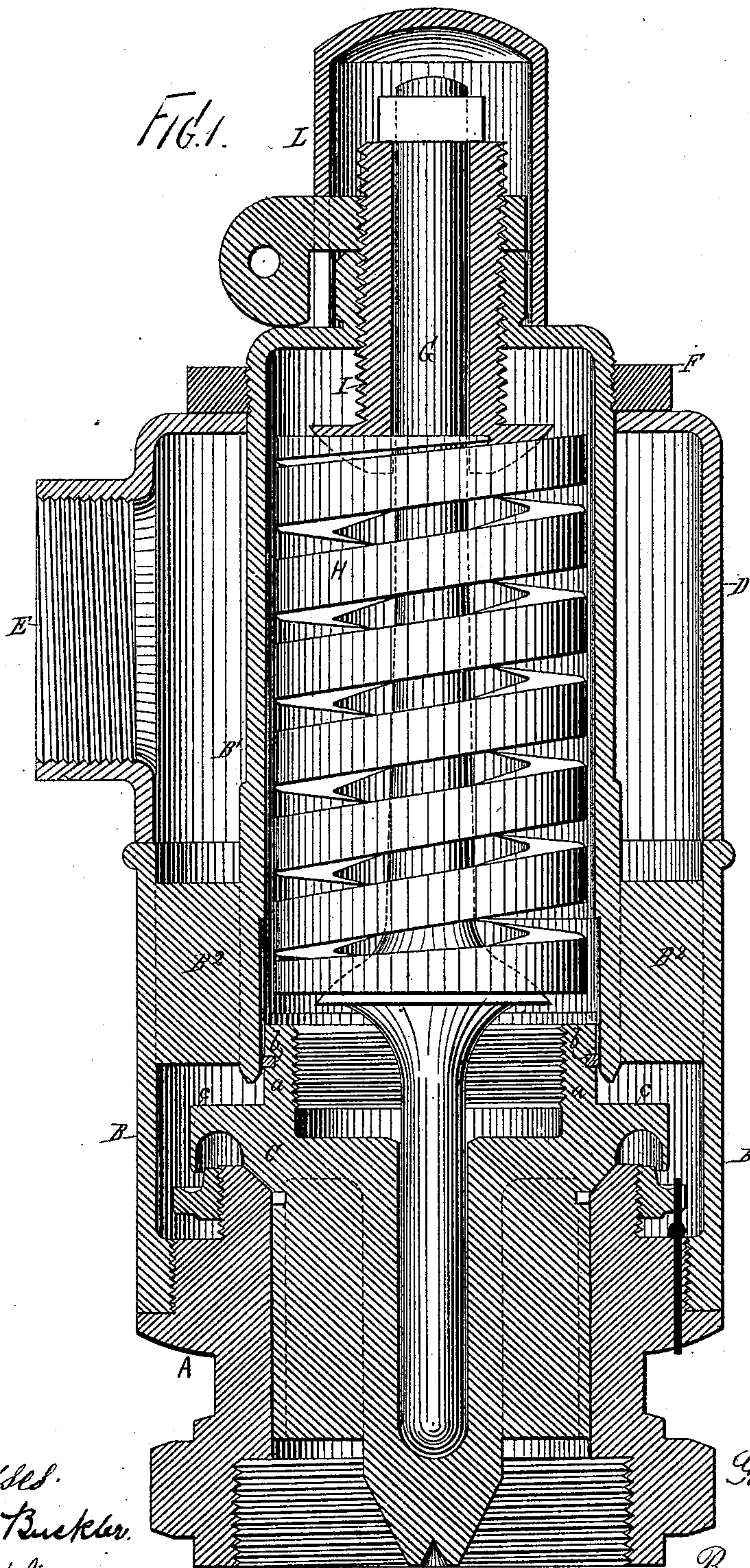
3 Sheets—Sheet 1.

G. W. RICHARDSON.

SAFETY VALVE.

No. 287,167.

Patented Oct. 23, 1883.



Witnesses.  
John Buckler.  
Henry Lieber.

George W. Richardson.  
Inventor.  
By North & Rogers  
Attorney.



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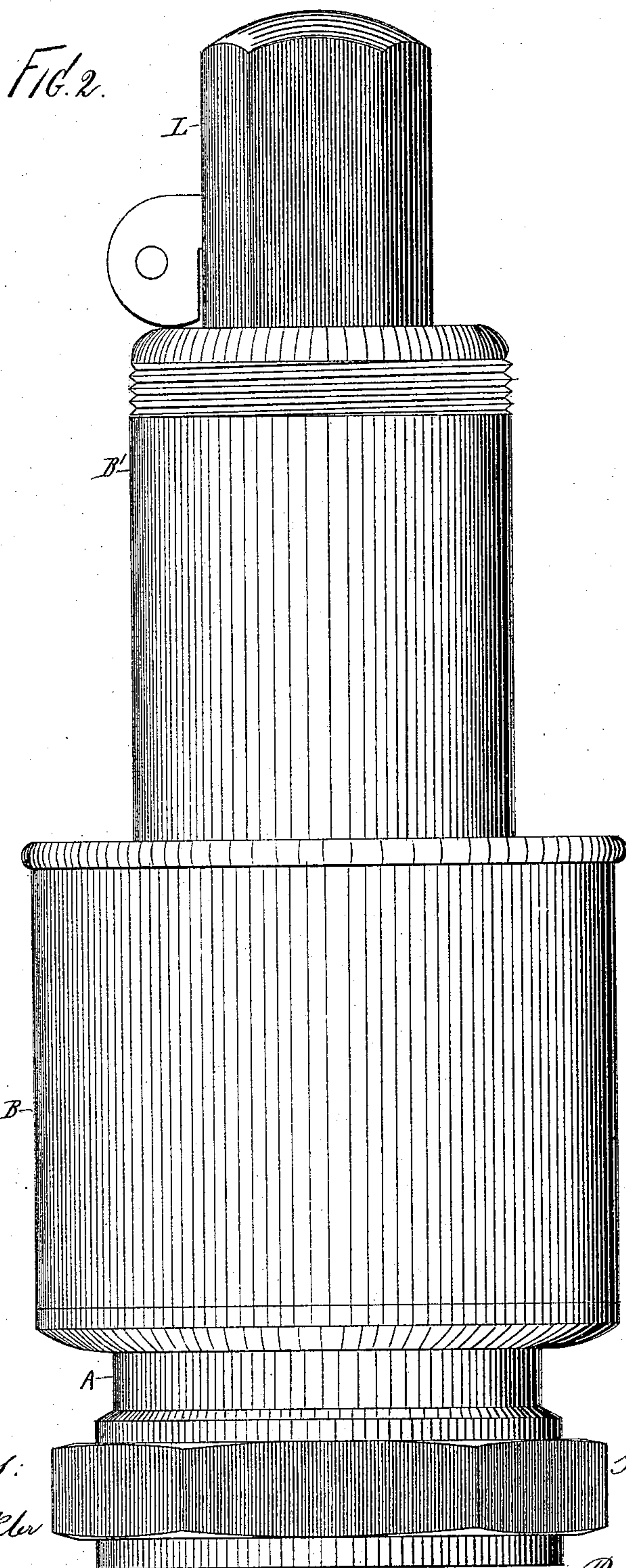
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*Witnesses:*  
*John Buckler*  
*Henry Lieb,*

*George W. Richardson*  
*Inventor:*  
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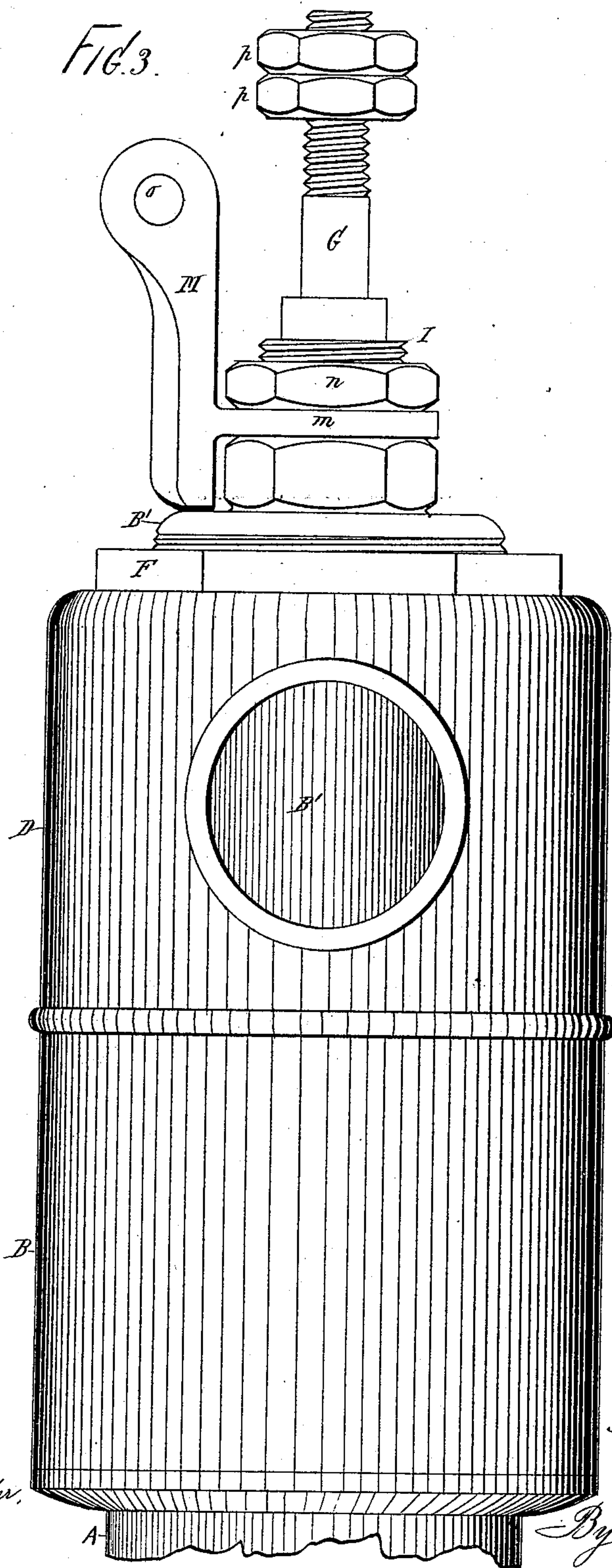
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Inventor:  
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Attorney.



# UNITED STATES PATENT OFFICE.

GEORGE W. RICHARDSON, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE  
CONSOLIDATED SAFETY VALVE COMPANY, OF HARTFORD, CONN.

## SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 287,167, dated October 23, 1883.

Application filed July 19, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. RICHARDSON, of Boston, county of Suffolk, and State of Massachusetts, have invented certain new  
5 and useful Improvements in Safety-Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

10 My invention has relation to safety-valves intended to be applied upon steam and other boilers; and the objects of my improvements are to so arrange and proportion the valve in its casing as to prevent the admission of steam  
15 into the spring-chamber, and at the same time obviate back-pressure upon the valve without interfering with its certainty of operation to carry the lip of the valve beyond the casing of the spring-chamber, so as to make the annular  
20 escape-channel very large without increasing the diameter of the lower casing; to provide a simple and cheap jacket which may be readily applied, when desired, to carry the escaping steam back or off for any useful purpose, and  
25 to provide a simple, durable, and convenient fulcrum for the testing-lever. To accomplish all of these objects, my improvements involve certain novel and useful peculiarities of construction, relative arrangements or combina-  
30 tions of parts, and principles of operation, all of which will be herein first fully described, and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is an axial  
35 section of a valve and its casing, the jacket for collecting the escaping steam being shown in place, and a lock-up casing applied for securing the spindle and compressing-screw against unauthorized manipulation, but omit-  
40 ting the testing-lever or hand-lever. Fig. 2 is an elevation of the same valve, omitting the steam-jacket. Fig. 3 is an elevation of the upper part of the valve-casing, showing the steam-jacket in place, as in Fig. 1, but omit-  
45 ting the lock-up casing, and showing the location and arrangement of the fulcrum for the testing or hand lever.

In all these figures like letters of reference, wherever they occur, indicate corresponding  
50 parts.

A is the base-piece, by which the valve is secured in place. It may have a male or female screw at bottom, and it carries the valve seat and also the threaded seat for the lower section, B, of the casing. B' is the upper sec- 55  
tion of the casing, inclosing the valve-spring and forming the spring-chamber. The two parts B and B' are connected by ribs B<sup>2</sup>, leaving an annular chamber between B and B' for the passage of steam when the valve is raised. 60

C is the valve, of the character well known as "pop-valves." Its lip *c* extends well out into the annular space above named, or, what is the same thing, the upper casing, B', is made of less interior diameter than the out- 65  
side of the ground joint or seat of the valve. This enables me to make the annular passage larger than would otherwise result, and this without increasing the diameter of the lower section, B, the object of which is to afford as 70  
free an escape for the steam as possible. Upon the upper part of the valve C, I erect a collar, *a*, and this is made to fit so as to move easily within the lower mouth of the section of casing B', the same being properly turned for the 75  
purpose; and on the collar or projection *a* is a packing-ring, *b*, accurately fitted so as to prevent admission of steam to the spring-chamber, but not made so tight as to interfere with the required movements of the valve. 80  
In order to prevent back-pressure on the valve, and yet allow the proper working of this packing-ring, I have found that certain proportions between the diameter of the valve-seat and that of the collar or ring are necessary. 85  
In a valve of the size represented in the drawings (two and one-half inch valve) I make the collar or ring about an eighth of an inch more in diameter than the inside of valve-seat, (or the line of the collar or ring should fall at 90  
about the center of the valve-seat,) and these relative proportions should be substantially followed in valves of other sizes. When the steam "blows," it passes up through the annular channel provided for it, and may pass then 95  
directly into the atmosphere, which it will do with diminished noise.

D is a separate jacket, intended to slip down over the section B', and to rest at bottom upon the top of section B. It has an outlet-opening, 100



E, through which steam may be discharged and conveyed thence by a suitable pipe. The jacket so made may be turned to any position, so as to bring the outlet E around to any required point, thus facilitating the piping and rendering it unnecessary to specially set the valve-casing on the boiler, and it (the jacket) is held in place by a suitable nut, F, for which a thread or winding is cut upon the exterior of section B'. The back-pressure caused by the steam in jacket D will have no effect upon the safety-valve, (to close the same,) and the jacket may therefore be employed to good advantage in carrying steam back or away to perform any required work—as to heat the feed-water or to furnish power for any purpose, or do other work—thus utilizing completely and advantageously all the steam which would otherwise be wasted. If the valve casing or jacket be connected with a surface-condenser, the vacuum produced will have no effect to raise the valve. If desired to use the valve without the jacket, it may be omitted, and it may be easily and quickly applied whenever required. This form of movable jacket may also be advantageously applied in cases wherein the valve arrangements are not of the desirable character above set forth.

G is the valve-spindle; H, the spring, and I the tension-adjusting screw. The particular form of these parts is made the subject of a previous application for Letters Patent, and are not sought to be covered herein. In fact, they might be otherwise constructed or arranged, so far as the features of this invention are concerned.

L is a lock-up casing, which may be applied whenever desired.

In Fig. 3, M represents a fulcrum-piece for sustaining the hand-lever. It has a perforated collar, *m*, intended to pass over the valve-spindle G, and which is clamped and held at any required point—as by the clamping-nut *n*—thus enabling the lever to be located wherever desired. The fulcrum-piece at its bottom touches the upper part of the casing, so as to brace it. Any preferred means of mounting the lever upon its fulcrum may be adopted—as, for instance, by a pin passing through the opening *o*.

At *pp* are nuts upon the valve-spindle, which afford the bearings for the lever thereon. The lever may be of either one or the other of two orders: First, the fulcrum may be between the hand-piece and the valve-spindle, in which case the outer end of the lever is to be depressed in order to unseat the valve; or, second, the bearing on the valve-spindle may be between the fulcrum and hand-piece, in which case the outer end of the lever must be elevated in order to unseat the valve, so that with this improved device the lever may be located as desired, and may be made to operate as desired, both of which features will be readily appreciated by those employing safety-valves, and especially by those manufacturing, inas-

much as the one style of fitting will answer for all required variations in location and operation. It has not been deemed necessary to show the lever in the drawings, as it may be of any shape. The lock-up case may be applied in connection with the fulcrum-piece by simply cutting a slot in the case at the required point to accommodate the neck which joins the ring *m* and piece M.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the safety-valve, of a projecting collar made slightly greater in diameter than the interior of the valve-seat and less than the exterior thereof, and movable in the lower mouth of the spring-chamber, being packed therein to prevent passage of steam, substantially as set forth.

2. In a safety-valve, the two sections of the casing, having an annular steam-passage between them, the packed collar upon the valve, made movable in the lower mouth of the inner casing, and proportioned with respect to the valve-seat as explained, and the lip of the valve, arranged to project beyond the line of the inner casing, the several parts being arranged, substantially as set forth, so that the valve may operate under an excessive external pressure, for the objects named.

3. In a safety-valve, the two sections of casing, forming an annular chamber between them, the lip of the valve extending beyond the line of the inner casing, and the collar upon the valve, made movable in the lower mouth of the inner casing, to prevent admission of steam thereto, substantially as shown and described.

4. The steam-jacket, in combination with and applied around the spring-casing, and upon the outer wall of the annular steam-passage, substantially as shown and described.

5. In combination with the two sections of the casing, forming an annular escape-passage between them, the movable jacket held in place by a nut upon the spring-casing, substantially as and for the purposes set forth.

6. In a safety-valve wherein the overhanging lip, the packed collar, and the two sections of the casing are arranged as specified, so as to prevent back-pressure upon the valve, the steam-jacket arranged to receive and direct escaping steam, substantially in the manner and for the purposes set forth.

7. The herein-described fulcrum-piece, having the perforated collar, and extended down to touch the casing, the same being made movable around the valve-spindle, and combined with a clamping-nut arranged to bear upon the collar, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

GEO. W. RICHARDSON.

Witnesses:

JOHN BUCKLER,  
WORTH OSGOOD.