

(No Model.)

G. W. RICHARDSON.

SAFETY VALVE.

No. 344,864.

Patented July 6, 1886.

Fig. 1.

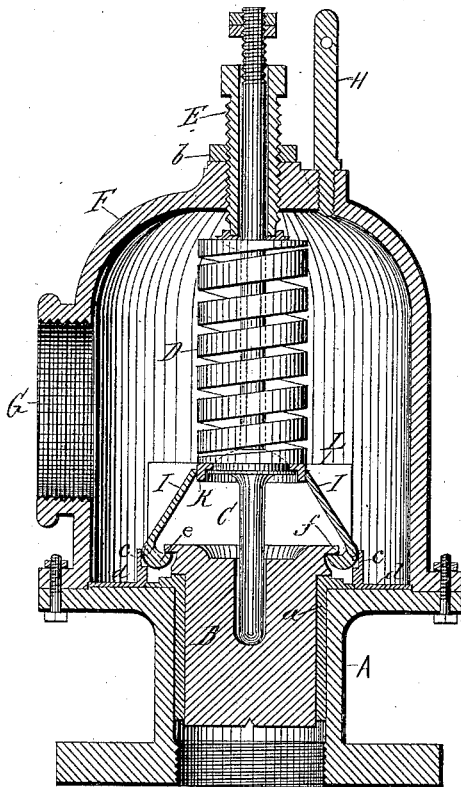


Fig. 2.

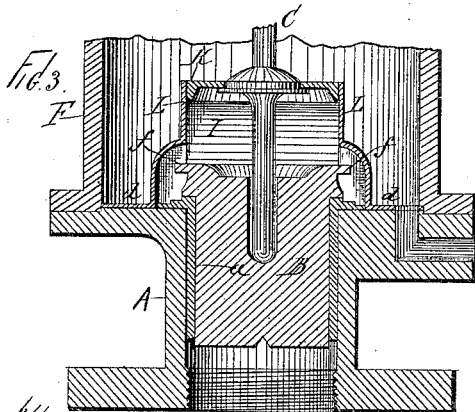
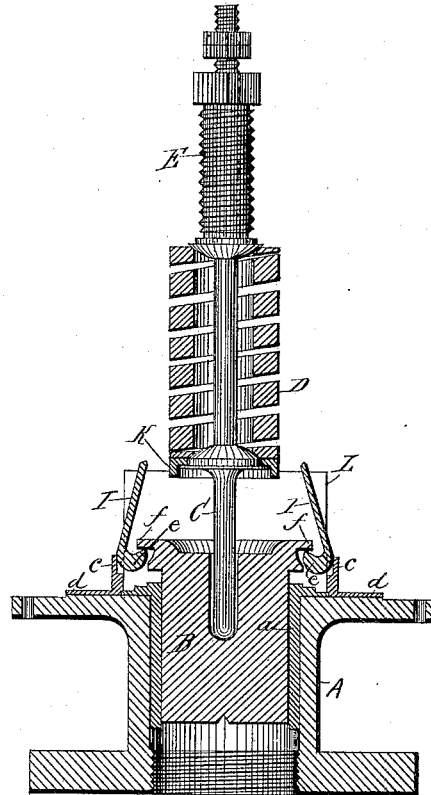
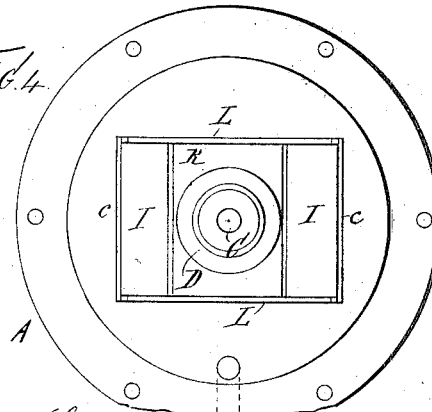


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 344,864, dated July 6, 1886.

Application filed August 1, 1884. Renewed April 27, 1886. Serial No. 200,367. (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 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.

My invention has relation to that class of devices employed in connection with steam-boilers and other vessels for containing liquids or fluids under pressure, and ordinarily known as "safety-valves."

The object of my invention is to produce a simple, cheap, and effective device of the class named, wherein the valve which governs the escape-port leading from the boiler shall be assisted to rise against the action of the tension-spring (or its equivalent weight) by the pressure of the escaping steam or fluid after such steam or fluid passes the ground joint of the valve—and this to secure accuracy, certainty, and steadiness of movement in the valve, and to insure proper and ample relief to the boiler or vessel as will hereinafter appear.

To accomplish this object, my improvements involve certain new and useful peculiarities of construction, relative arrangements or combinations of parts, and principles of operation, which will be herein first described, and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is an axial section and elevation of a safety-valve constructed and arranged for operation in accordance with my invention and involving the principles thereof. Fig. 2 is a similar view showing the valve in raised position, as when permitting the outflow of steam, and omitting the casing represented in Fig. 1. Fig. 3 is a sectional elevation upon a plane at right angles to that of Fig. 1, the upper part of the structure being broken off. Fig. 4 is a plan view showing the pressure-plates closed, and omitting the casing.

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

A represents the base-piece, by which the

safety-valve may be connected with the boiler or vessel in any approved manner.

B is the valve, of any size and pattern, shown as seated in the base-piece upon a bushing, a, which may or may not be used.

C is the valve-spindle, upon which a tension-spring, D, (or an equivalent weight,) is made to act. This spring may be adjusted as to its tension by a hollow adjusting-screw, E, and set by any set-nut, as b.

F, Figs. 1 and 2, is a casing surrounding the valve and its spring, said casing being provided with an outlet, as G, through which escaping steam may be discharged directly into the surrounding atmosphere or conducted away by suitable piping for any useful purpose or to accomplish any desired work. When this casing is used, it affords a seat for the tension or regulating screw E, and when not used the regulating-screw may be sustained in any suitable manner.

H is a standard upon which any testing-lever may be applied in any known way.

I I are plates suitably hinged, as upon ledges c c of a ring, d, the latter being secured upon the base-piece in any preferred manner. The construction or arrangement of the hinges may be variously modified according to circumstances. These plates I I each carry a tongue or hook, e, by which they transmit the force of the escaping steam or fluid in a direction to further compress the tension-spring or to further raise the valve.

When the valve is seated, the hinged plates close against a washer or other abutment, as K, through which the valve-spindle passes, the plates forming, with the stationary walls L L, (in the example shown,) a measurably tight chamber to receive the escaping steam as soon as it passes the valve-seat. The hooks e are represented as engaging with the under side of a flange or projection, f, formed on the valve.

From the construction so far explained it will appear that as soon as the valve rises and permits the escape of steam this steam will exert a pressure upon the hinged plates, causing them to swing open farther and farther as the pressure increases, and thus to raise the

valve higher and higher, and thereby enlarge the port for the escape of steam. This enlargement of the escape-port is proportioned always to the pressure of the outgoing steam, and it accomplishes the relief from internal pressure in degree and at times precisely as needed, and obviates foaming and discharge of water through the safety-valve port. The closing of the valve under the influence of the tension appliance is likewise proportioned to the pressure of the escaping steam, and when the hinged plates are applied in connection with the "pop" safety-valves, or those having enlarged heads, the effect of the plates is to obviate the violent vibrations or "chatterings" commonly observed in such valves, causing them to work steadily. The plates allow the valves to close more suddenly than the ordinary valves, (without them,) but not so suddenly as the pop-valves, causing them to work steadily. The leverage with which each plate (in the example shown) tends to raise the valve is about eight to one in favor of the plate, so that the pressure of the escaping steam, whether great or small, is ample to hold the valve steady in all its movements. The leverage may be varied at pleasure. Instead of having only two hinged plates or levers, I may employ any number, and they may close all around the washer, which may be either round or rectangular. The washer permits the spindle to turn without disturbing the position of the washer.

In the drawings the hinged pressure-plates

are shown as operating directly upon the valve. Manifestly the same results would be attained if they operated upon the spindle, for it is the force of the tension appliance which is to be overcome.

The improvements are adapted for use in connection with many forms of safety-valves as now constructed, and may be readily applied thereto without material alteration of parts.

The improvements are found in practice to admirably answer the purpose or object of the invention as previously set forth.

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

1. In a safety-valve, a hinged plate arranged to be moved by the escaping steam or fluid, said plate being combined with the valve and a tension appliance, substantially as and for the purposes set forth.

2. In combination with a safety-valve having a tension appliance, the hinged plates provided with hooks engaging with the valve and arranged to open the same, substantially in the manner and for the purposes set forth.

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

GEORGE W. RICHARDSON.

Witnesses:

F. A. SPENCER,
E. A. PHELPS.