

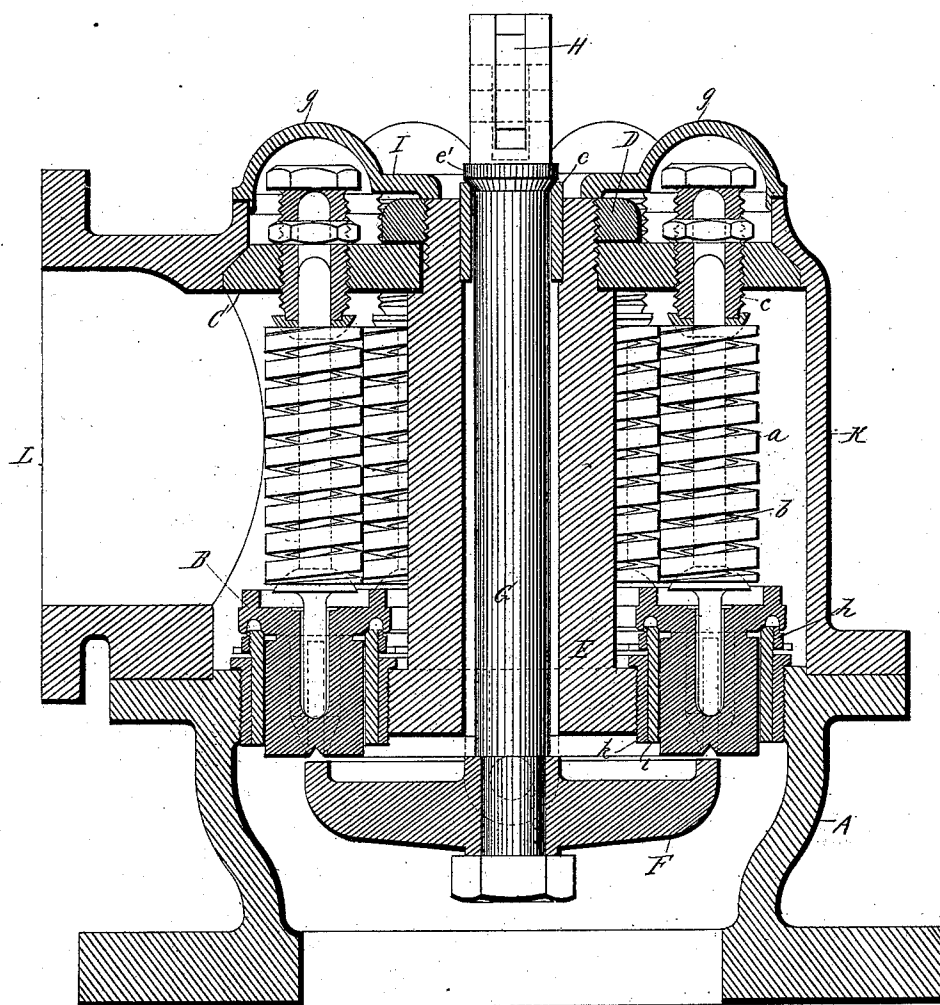
(No Model.)

3 Sheets—Sheet 1.

G. W. RICHARDSON.
MULTIPLEX SAFETY VALVE.

No. 311,147.

FIG. 1. Patented Jan. 20, 1885.



Witnesses:
John Buckler,
Frank R. Brookhead.

George W. Richardson
Inventor.
By Horace Ogden
Attorney.

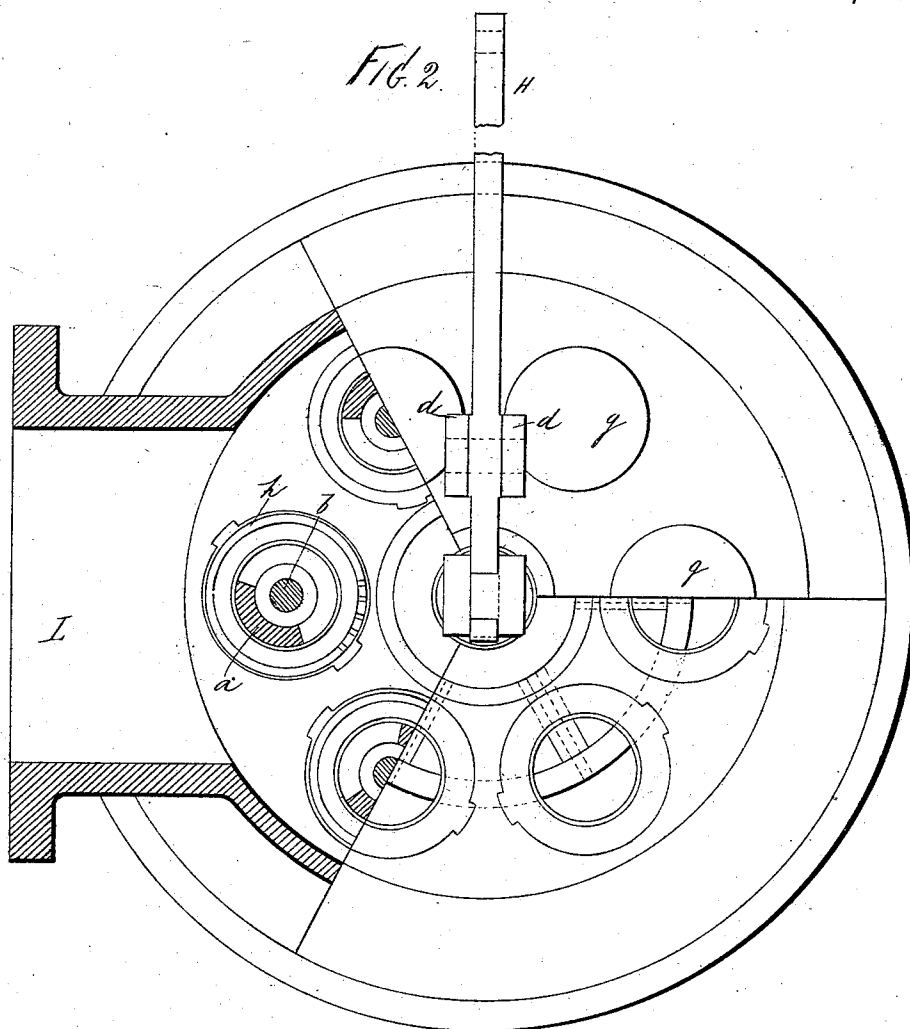
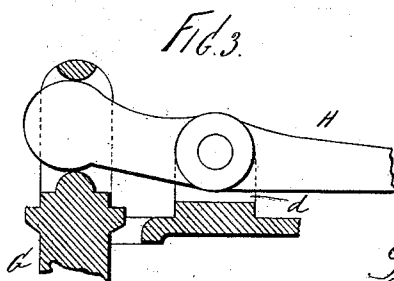
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G. W. RICHARDSON.
MULTIPLEX SAFETY VALVE.

No. 311,147.

Patented Jan. 20, 1885.



Witnesses
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(No Model.)

3 Sheets—Sheet 3.

G. W. RICHARDSON.
MULTIPLEX SAFETY VALVE.

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Fig. 4.

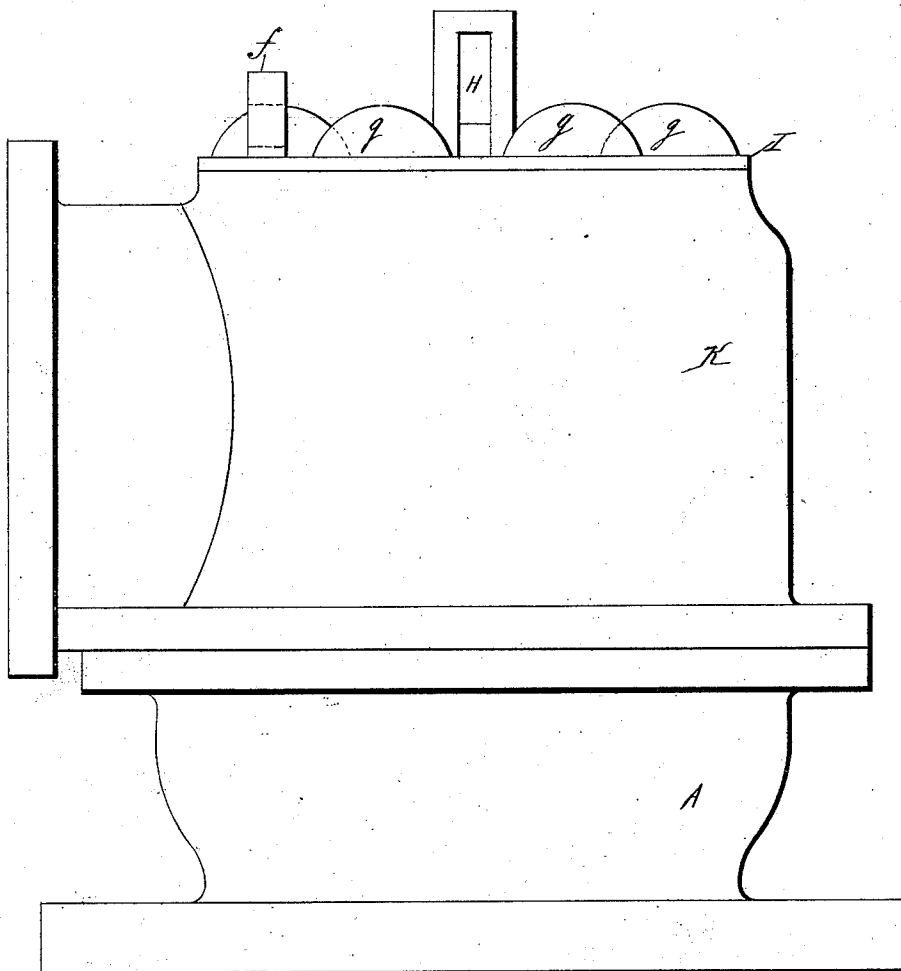
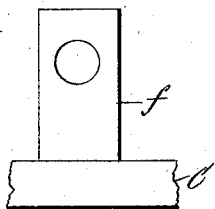


Fig. 5.



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UNITED STATES PATENT OFFICE.

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

MULTIPLEX SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 311,147, dated January 20, 1885.

Application filed May 16, 1884. (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 Multiplex 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 safety-valves intended for use in connection with steam-boilers or other vessels containing a fluid or liquid under pressure, and has for its object the production of a safety appliance which will be simple, compact, durable, and efficient, which shall expose a large extent of valve surface to the pressure of the confined fluid or liquid, be certainly effective in relieving the vessel from over-pressure, instantaneous in opening and closing, and free from danger of sticking or setting. To accomplish this, my improvement involves certain novel and useful arrangements or combinations of parts, principles of operation, and peculiarities of construction, 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 section and partial elevation of an apparatus constructed and arranged for operating in accordance with my invention, and involving the principles thereof. Fig. 2 is a horizontal section and partial plan view of the same. Fig. 3 is a sectional elevation of a fragment, showing one manner of connecting the testing-lever with the valve-lifting rod. Fig. 4 is a side elevation showing the casing. Fig. 5 is an elevation of a fragment, showing a locking stud, which may be employed to secure the cover in place.

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

In the large sizes of safety-valves as heretofore ordinarily constructed, a single very heavy spring is employed, requiring a great height of casing, thereby rendering it inconvenient to locate the valve in situations where economy of room is necessary, and further

than this, involving considerable expense in manufacture as well as in mounting and testing. Such large safety-valves are also difficult to readjust when necessary, are liable at times to stick, and when lifted by excessive under-pressure permit such a violent outflow of steam as frequently to carry a volume of water with it, thereby unnecessarily diminishing the best working effects obtainable from use of the boiler. To obviate all this, I employ a number of small valves with their adjuncts arranged within a suitable casing, and operative independently one of another.

A represents the base part of the device, which may be mounted upon the boiler or other vessel, its interior communicating with the interior of the boiler. Seated in the top of this base are a number of safety-valves, (represented at B B,) the same being compactly disposed around the central axis of the device, and their number and size being such as to insure that the combined area of their surfaces exposed to the boiler-pressure shall be fully equal to the area of valve-surface required for the particular case in which the device is to be used. In the example shown in the drawings, six of these small valves are employed, and supposing the exposed valve-surface of each of these to be one and one-half inches, the combined area would equal a value of nine inches exposed surface. The number of small valves may be increased, as desired, and it may be diminished to two. The size of the valves may also be varied, though it is preferable, for the sake of economy, to make all in one casing of about the same size. These valves are preferably of the pattern known as "pop-valves," and are each supplied with a spring, *a*, stem *b*, and a tension-screw, *c*. The tension-screws pass through a plate, *C*, held in invariable position with respect to base *A* by a nut, *D*, threaded upon a hollow standard, *E*, rigidly secured to the top of the base-piece.

F represents a spider, the rim of which is of such extent as to bear upon the under parts of all the valves, and this spider is capable of being moved from the exterior through the medium of a rod, *G*, passing up through the hollow standard, *E*, and a testing-lever, *H*, engaging with the upper end of said rod. The

lever H may be fulcrumed at any convenient point—as between the standards *d d*, erected upon the cap-plate I. Under this arrangement it is plain that by bearing down upon the outer end of lever H all the valves will be unseated. The fulcrum may be so located as to require that the outer end of lever H be raised instead of lowered, in order to raise the valves. Any light spring may be used to maintain the weight of the lever under the first arrangement, or any weight or spring to hold it down under the second, so that the plug or valve *e'* will not be unseated by reason of any accidental movement of the lever. The spider does not quite touch the bottoms of the valves when the lever is at its final resting-place. The lever is frequently moved for the purpose of insuring that none of the valves stick, and for other purposes well understood. The rod G passes through a box, *e*, within the hollow standard E, and this serves to guide the upper end of the rod in all its vertical movements. The valve or plug *e'* on the rod, in connection with packing box or ring *e*, prevents the escape of steam up through the hollow standard.

K is the main shell of the casing, surrounding the valves and springs, and provided with an outlet, as at L, through which escaping steam may be conducted off to any point and for any purpose. The cap-plate I rests upon the top of this shell, and preferably has a ground-joint connection therewith. The cap-plate may be locked in place, as by use of the perforated stud *f*, connected with the plate C, and projecting up through a slot in the cap-plate, a padlock or other lock being employed in connection with the stud. This prevents access to the valves or the tension-screws by unauthorized persons.

At *g g* are a number of hollow protuberances, under which the tension-screws are situated, affording room beneath them for all the required workings of the valve-stems, and enabling me to make the shell K shorter than might otherwise be required; but these protuberances may be omitted, if desired, and the cap-plate made flat or plain.

In connection with each valve is shown an adjustable ring, *h*, by which the area of steam-outlet around the valve may be regulated. The valve-seats *i* are mounted in bushings *k*, which may be readily unturned from their positions in the top of the base-piece A. Each valve may be separately tested to "blow" at a certain pressure and the position of the spring suitably marked. All the valves may then be quickly mounted in the structure and their springs brought to the marking by the tension-screws. The device as a whole may then be tested and such further adjustments as may be required be quickly made.

It is not intended that all the valves of the system shall rise simultaneously, and indeed it would be practically impossible to so adjust them that they could blow at the same time. They rise one after the other and thereby relieve the boiler gradually and without producing any disturbance in the water. To remove one for repairs or other reasons is a simple matter, and it need not prevent the use of the remainder, since the port may be easily closed and the rest employed as before without disturbing any of their adjustments, whereas in the single valve as heretofore made the removal is a work of considerable difficulty and requires the use of the boiler to be suspended, as well as an entirely new adjustment of the spring when replaced. The casing is very low as compared with the single valve-casing, and the valves and their ports being all small are much more easily, accurately, and cheaply made and mounted than the corresponding parts of the single valve.

The improved device is termed the "multiplex valve," for the reason that the aggregate valve-surface is composed of a multiplicity of independent surfaces.

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

1. In a safety-valve of the character herein set forth, the combination, with the series of independently-operating valves, of a spider and a lever connected therewith for the purpose of lifting all the valves simultaneously, substantially as shown and described.

2. The base-piece carrying the seats for the series of valves, the hollow standard erected upon said base-piece, the spider for lifting the valves, and the rod passing through said standard and packed therein, combined and arranged substantially as shown and described.

3. In combination with the series of independently-operating valves and their stems arranged around a central standard, the tension-screws located in a plate rigidly connected with the plate containing the valve-seats, substantially as and for the purposes set forth.

4. The herein-described safety-valve, composed of the base, the series of independent valves, the springs, stems, and adjusting-screws, the shell provided with the outlet, and the cap-plate, combined and arranged substantially as shown, and for the purposes explained.

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.