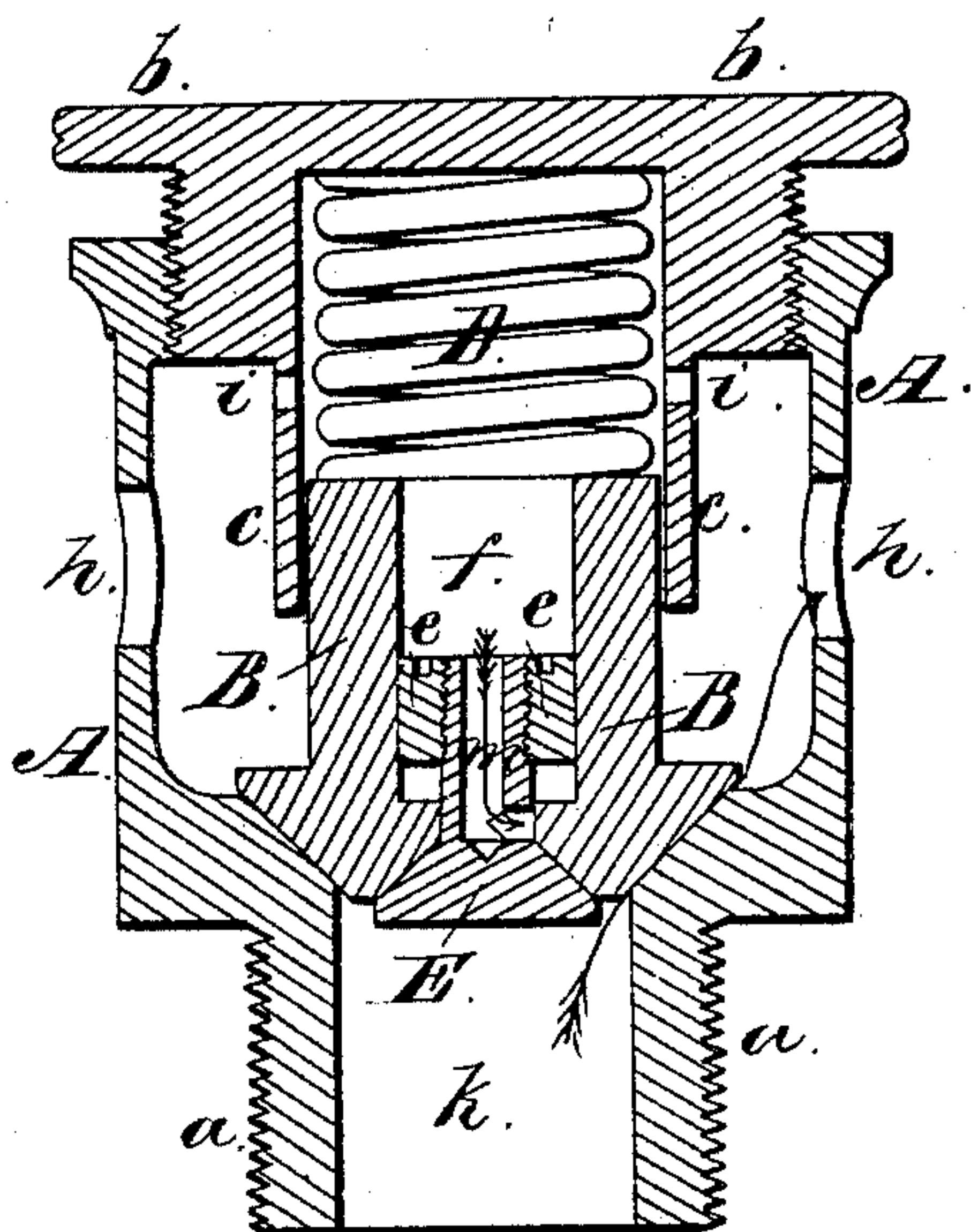


W. HARDY & J. PARKINSON.
COMBINED PRESSURE AND VACUUM VALVE.

No. 21.535.

Patented Sept. 14, 1858.

Fig:1.



UNITED STATES PATENT OFFICE.

W. HARDY AND J. PARKINSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THEMSELVES AND AARON BATES, OF SAME PLACE.

PRESSURE AND VACUUM VALVE.

Specification of Letters Patent No. 21,535, dated September 14, 1858.

To all whom it may concern:

Be it known that we, WILLIAM HARDY and JOHN PARKINSON, both of the city of Philadelphia and State of Pennsylvania, have invented a Combined Pressure and Vacuum Valve for Steam-Boilers and other Vessels; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

Our invention consists in combining in one instrument, in the manner substantially as we have hereinafter described, a pressure or safety valve and a vacuum valve, the same to be attached to steam boilers, vessels for containing malt and other fermented liquors, and to other vessels, from which it is necessary to discharge the superfluous steam or gases generated within, and into which it is required that air should be admitted, to prevent the formation of a vacuum, and in order to facilitate the drawing off of the contents when necessary.

In order to enable others skilled in the art to make and use our invention, we will now proceed to describe its construction and operation.

The figure in the accompanying drawing, which forms a part of this specification represents a sectional elevation of our combined pressure and vacuum valve.

A is the valve chamber, into the top of which is screwed the cap *b*, the bottom of the chamber having a hollow projection *a*, which is screwed into the boiler or other vessel, to which it is desired to connect the apparatus.

In the interior of the chamber A, a beveled seat is formed, for the reception of the valve B, the hollow stem of which fits snugly, but so as to move freely, in the recess formed partially within the cap *b*, and partially by the annular flange *c*, which projects from the cap. Within this recess is situated the spiral spring D, which bears at the top against the end of the recess, and at the bottom on the stem of the valve B, the rigidity of the spring being graduated to suit the pressure required in the vessel.

In the valve B is an opening furnished with a valve E, which is arranged to open downward, and the hollow stem of which is furnished with a nut *e*, the latter fitting

snugly in the interior *f* of the stem of the valve B, and thus serving the double purpose of guiding the valve and limiting its movement. Should the pressure in the vessel, to which the apparatus is attached, become greater than necessary, the spring D will yield, the valve B will open, so as to form a free passage for the escape of the excess of steam or gases from the vessel, through the interior *h* of the projection *a*, and, through openings *h h* in the valve-chamber A, to the external atmosphere. The instrument thus serves the purpose of an ordinary safety valve.

Should a vacuum be formed in the vessel, so as to incur the danger of a collapse, the valve E (which the pressure within the vessel had previously maintained tightly to its seat) now opens and allows the air to rush through the openings *h*, thence through orifices *i* in the annular flange *c*, through the interior *f* of the stem of the valve B, thence through the orifice *m* in the stem of the valve E, and into the interior of the vessel, thus destroying the vacuum.

The above described apparatus, although of great utility when applied to steam boilers, is equally applicable to vessels for containing malt and other fermented liquors, as it is advisable to dispose of the excess of pressure, caused by the generation of gases in such vessels, and to admit air, when the contents are drawn off. The moment that the cock is opened for the latter purpose, the vacuum valve will likewise open; it will also close simultaneously with the closing of the cock. Thus the apparatus not only allows the superfluous gases to escape, but also acts as a self-acting vent peg.

We claim and desire to secure by Letters Patent:

The valve chamber A, spring valve B and inner valve E, with their respective openings and passages; when constructed and arranged in respect to each other, as and for the purpose herein set forth.

In testimony whereof, we have signed our names to this specification before two subscribing witnesses.

WM. HARDY.
JOHN PARKINSON.

Witnesses:

HENRY HOWSON,
DAVID MATTHEW.