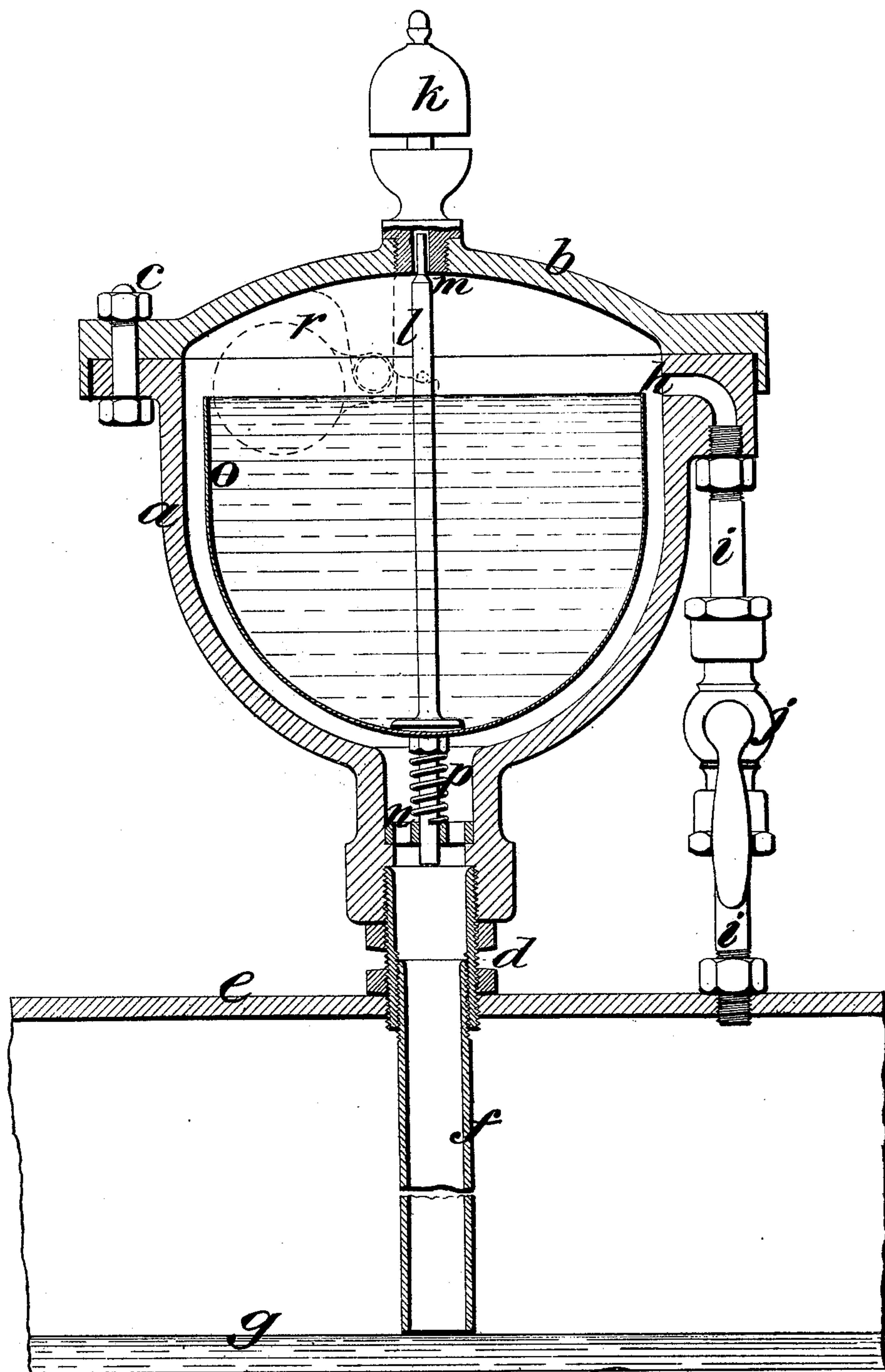


J. W. KENYON.

LOW-WATER ALARM APPARATUS FOR STEAM-GENERATORS.

No. 176,318.

Patented April 18, 1876



Witnesses

Edward H. Dutton

Alfred G. Grand

J. W. Kenyon



# UNITED STATES PATENT OFFICE

JOHN W. KENYON, OF MANCHESTER, ENGLAND.

## IMPROVEMENT IN LOW-WATER-ALARM APPARATUS FOR STEAM-GENERATORS.

Specification forming part of Letters Patent No. **176,318**, dated April 18, 1876; application filed November 19, 1875.

*To all whom it may concern:*

Be it known that I, JOHN WILLIAM KENYON, of Manchester, in the county of Lancaster, in the Kingdom of Great Britain, have invented certain Improvements in Low-Water-Alarm Apparatus for Steam-Generators, of which the following is a specification:

The invention relates to apparatus for attachment to a boiler or steam-generator, for sounding an alarm in the case of the level of water within the boiler falling to a dangerous extent. A chamber provided with a steam-whistle communicates with the interior of the boiler by means of a pipe which extends to the low water line. A passage leading to the steam-whistle is fitted with a valve, which is kept closed by means of a spring, or of springs, or of a weight, and a basin or vessel to hold water is suspended from the said valve. During the ordinary working of the boiler the said chamber remains filled with water, and the said valve remains closed. On the water-level reaching the low-water line the water runs out of the chamber into the boiler, and the weight of the water left in the said basin or vessel opens the valve, and the whistle sounds an alarm.

The accompanying drawings represent a vertical section of the apparatus, drawn about one-half the full size.

In the drawing, *a* is a vase-shaped vessel, made of cast-iron or other suitable metal, of a strength sufficient to withstand the pressure to which it will be subjected. The vessel is fitted with a cover, *b*, the joint between the two being steam-tight, and being secured with bolts *c*. The said vessel is supported by means of a short length of tubing, *d*, which is screwed into the foot of the vessel, and into the shell *e* of any boiler to which it may be applied. A tube, *f*, screwed into *d*, descends into the boiler, and extends downward to the low-water level, represented by *g*. In one side of the vessel a steam-passage, *h*, is formed, and this is connected, by means of the pipes *i* and stop-cock *j*, with the steam-space in the boiler. On the top of the cover *b* is fixed a steam-whistle, *k*. A spindle, *l*, is turned down at one end, so as to form a conical shoulder, and the end turned down enters the steam-passage *m* in the whistle. The lower end of the spin-

dle is kept in position by means of a guide, *n*, which is formed with passages to permit the flow of water and steam. To the said spindle is fixed a basin, *o*, which is formed of copper or other suitable metal, and which may be made comparatively thin and light, as it has only to bear the weight of contained water when quite full. A spiral spring, *p*, on the lower part of the spindle, rests on the guide *n*, and has sufficient resistance to sustain the weight of the basin and spindle when the basin is empty, and to press the conical seating upward, so as to close the steam-passage *m*, but yields when the basin is full of water, excepting when the vessel *a* is also filled with water.

Under ordinary circumstances, the said vessel, together with the basin *o*, the tube *f*, and the other parts of the passage, is filled with water, which is sustained by the pressure of steam within the boiler. The basin *o*, being thus entirely surrounded with water, exerts only a downward pressure upon the spring *p* equal to the weight of the said basin and of the spindle *l*, less the sustaining power of the steam, which will be proportionate to the pressure and the area of the steam-passage *m*. The said spring is thus capable of pressing upward the spindle *l*, and the passage *m* is thereby kept closed.

In the event of the water-level within the boiler sinking to a dangerous extent the lower end of the tube *f* becomes uncovered, so that steam is permitted to enter the vessel *a*, and to take the place of the water. The entire weight of the water retained by the basin, in the manner seen in the drawing, now bears upon the spring, which yields and permits the basin to sink to some extent, whereby the passage *m* is opened, and the steam has access to the whistle to sound an alarm.

When desired, the apparatus may be tested by opening the cock *j*, so as to admit steam directly into the upper part of the vessel *a*, the result being that the water in the vessel is displaced by the steam, and the whistle is sounded.

As the passage *h*, the pipe *i*, and the cock *j* are only used to ascertain the condition of the apparatus, they may be dispensed with if it is desired to simplify the arrangement.

If preferred, a counter-balance weight may be substituted for the spring *p*.

The dotted lines at *r* indicate one method whereby the weight of the basin and spindle may be sustained by means of a weighted lever mounted on a fulcrum cast or attached to the cover *b*.

I claim—

The combination of the basin *o* and spindle

*l*, rigidly attached thereto, and arranged to act as a valve, with the whistle *k* and the spring or weighted lever, all substantially as set forth.

J. W. KENYON.

Witnesses:

EDWARD K. DUTTON,  
HUGH G. GRANT.