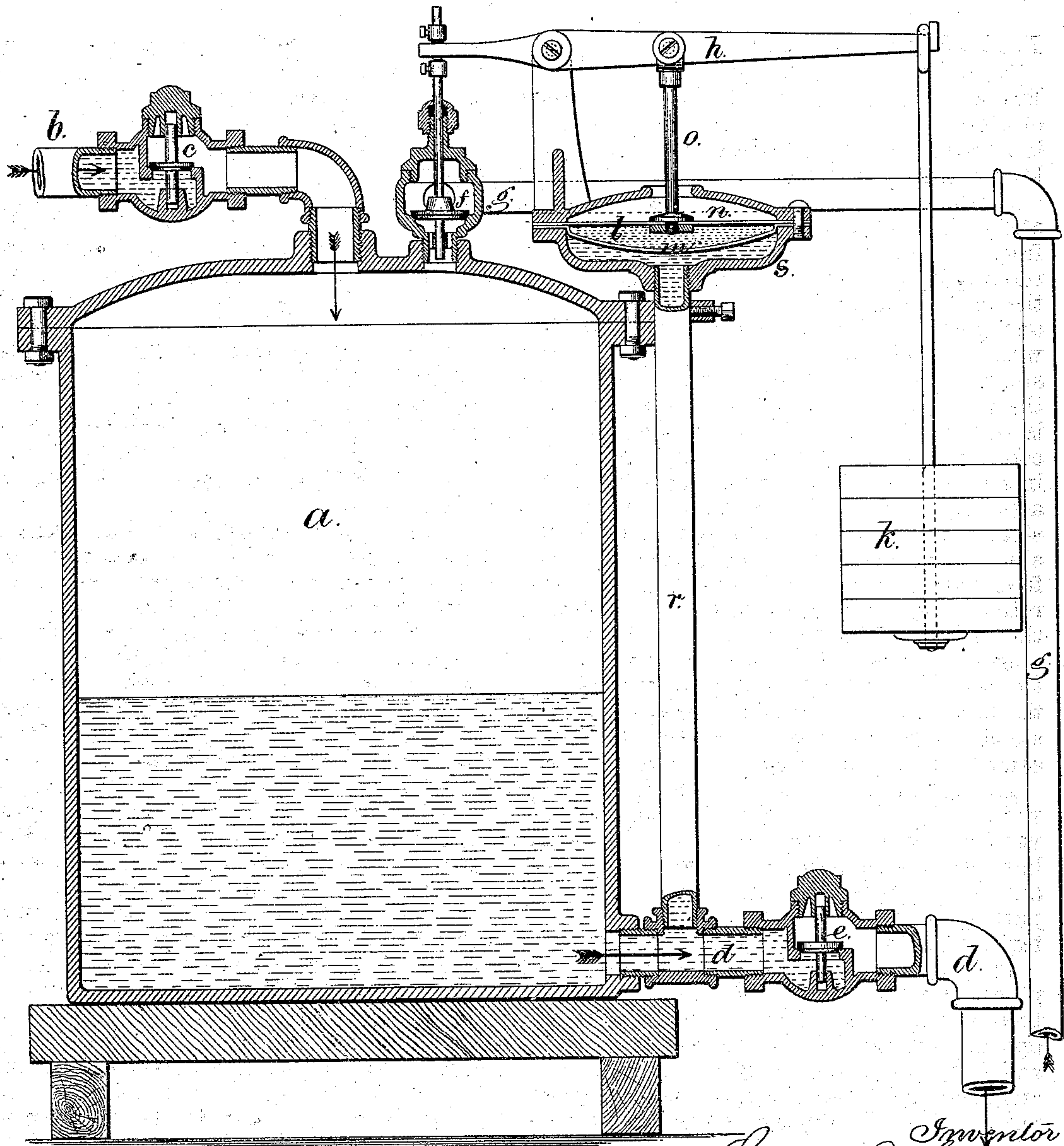


L. P. HAWES.
Automatic Boiler-Feeders.

No. 153,951

Patented Aug. 11, 1874.



Witnesses

Chas. H. Smith
Harold Burrell

Inventor
Loring P. Hawes.
per L. M. Perrell.
att'y.

UNITED STATES PATENT OFFICE.

LORING P. HAWES, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN AUTOMATIC BOILER-FEEDERS.

Specification forming part of Letters Patent No. **153,951**, dated August 11, 1874; application filed April 7, 1874.

To all whom it may concern:

Be it known that I, LORING P. HAWES, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Automatic Boiler-Feeders, of which the following is a specification:

A vessel is placed at a proper elevation above the boiler. Into this water is admitted from a suitable supply or head, the same running by gravity past a check-valve. From the feed-vessel two pipes lead to the boiler, one going to the lower part, and provided with a check-valve, and the other to the steam-space of the boiler, either at or above the water-line, and to this steam-pipe a valve is applied, controlled by the expansion of alcohol or other material, or its vaporization in a vessel that is periodically exposed to the action of steam. The expansion closes the steam-valve, and, as the apparatus cools, the steam condenses, the pressure lessens, the feed-water runs in, and, cooling off the apparatus, lessens the pressure of the alcohol in the expansion-vessel, and the steam-valve is opened by a weight, the pressure equalizes in the feeder and boiler, and the water runs into the boiler by its hydrostatic pressure, and the steam reaches the expansion-vessel, heats the same, and the operations are repeated.

An apparatus has been made for feeding water to a boiler, in which the expansion or vaporization of alcohol or similar material, has been availed of to turn cocks in the steam and water pipes; but these are liable to be partially turned and allow steam or hot water to blow through the supply water-pipe.

By using valves in the supply and water pipes, leading to and from the feed-vessel, these become self-acting, and the steam-valve, opening against the steam pressure, will move suddenly, when the weight is unsupported, and opening fully admits steam into the feeder-vessel; hence the apparatus will always be in a fully-operative condition.

In the drawing I have represented this improvement by a vertical section of the apparatus.

The vessel *a* is provided with a pipe, *b*, and

check-valve *c* leading to a reservoir, or other water-supply. The check-valve *e* is in the pipe *d*, that passes to the water-space of the steam-boiler, or to a steam-generator for heating apparatus. The valve *f* is in the coupling that connects the steam-pipe *g* to the vessel *a*, and this valve is opened against the steam pressure by the lever *h* and weight *k*.

The expansion-vessel *l* is preferably made of a copper case, *m*, and diaphragm *n*, above which is the press-bar *o*, that connects with the lever *h*.

The alcohol, or other expansive or volatile material contained in the vessel *l*, expands and, raising the lever *h*, closes the valve *f*, whenever the steam heat, reaching such vessel *l* through the tube *r* to the containing-case *s*, is sufficient to generate the required pressure.

It will now be understood that when the vessel *l* is cool the valve *f* is open, and steam passes in from the boiler to the vessel *a*, and, closing the valve *c*, shuts off the inlet of water, and whenever the pressure of steam in *a* corresponds to that in the boiler the water will run from this feed-vessel *a* into the boiler by gravity, and the steam reaching the lower end of the pipe *r* will take the place of the water therein, and pass to and heat the expansion-vessel *l*, and close the valve *f*. The valve *e* will close by the pressure from the boiler, and both *e* and *f* will remain closed until the pressure in *a* decreases, the fed water runs into the vessel *a*, and the expansion-vessel *l* is cooled and contracted sufficiently to allow the weight *k* to open the valve *f*, and the operations are repeated.

When the steam-pipe *g* is connected to the boiler, at or near the standard water-line, the vessel *a* will not become empty until the water-line descends so as to allow steam to take the place of the water; but there may be a circulation of the water through this vessel *a* if the same is entirely filled, but that will not heat the expansion-vessel *l*; hence the valves *f* and *e* will remain open.

I do not claim a boiler-feeding apparatus with cocks operated by the expansion of al-

cohol, or other similar material, as in the patent of J. W. Bishop, April 11, 1865, No. 47,181.

I claim as my invention—

The valve *f* to the steam-pipe *g*, closing in the direction of the flow of steam by expansion of alcohol or similar liquid in the vessel *l*, and opened against the steam pressure by the weight and lever *h*, in combination with the vessel *a*, inlet-pipe *b*, valve *c*, delivery-pipe

d, valve *e*, and pipe *r*, to the case *s*, the parts being constructed and arranged substantially as and for the purposes set forth.

Signed by me this 3d day of April, A. D. 1874.

L. P. HAWES.

Witnesses:

GEO. T. PINCKNEY,
CHAS. H. SMITH.