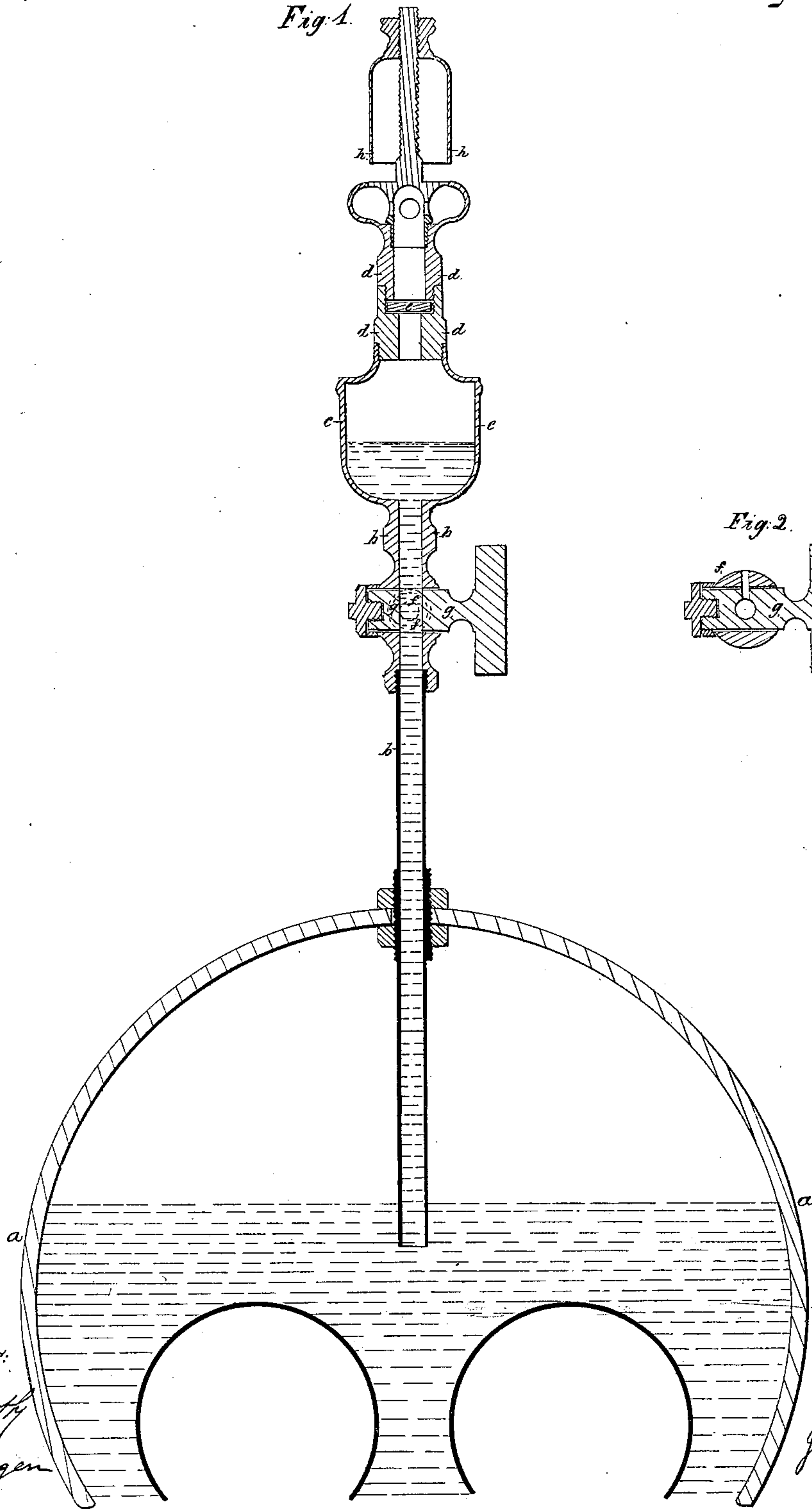


*J. W. Hopper,*  
*Steam-Boiler Indicator.*

*N<sup>o</sup> 29,277.*

*Patented July 24, 1860.*

*Fig. 1.*



*Fig. 2.*

*Witnesses:*

*Chas. M. Carthy*  
*G. P. Bergen*

*Inventor:*

*Jos. W. Hopper*

# UNITED STATES PATENT OFFICE.

JOEL W. HOPPER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, AND E. G. ALLEN, OF BOSTON, MASSACHUSETTS.

## LOW-WATER DETECTOR FOR STEAM-BOILERS.

Specification of Letters Patent No. 29,277, dated July 24, 1860.

*To all whom it may concern:*

Be it known that I, JOEL W. HOPPER, of New York, in the county and State of New York, have invented certain new and useful Improvements in Low-Water Detectors for Steam-Boilers, and that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plate of drawings represent my improvement.

Figure 1 is a central vertical section of my improved low-water detector, attached to a steam-boiler. Fig. 2 is a detail view.

In the low-water detectors, heretofore commonly used in connection with steam-boilers, a disk or plug of metal that would fuse at a low degree of heat or when steam came in contact with it, has been used in a tube containing water from the boiler, the disk or plug being prevented from fusing when the water in the boiler was sufficiently high, by the presence of the water around it. In such an arrangement it is of course essential that the metal of which the disk or plug is composed should be of such a nature as to fuse at a certain and stated degree of heat, and that its certainty of fusing should not be impaired by use or time. But it has been found that the plug or disk of metal which when first inserted would melt at a certain temperature, will after a certain length of time require a considerable higher degree of heat to cause it to fuse owing to the gradual change in the metal of which it is composed, produced by the constant presence of water around it, which causes oxidation and consequent change in the component parts of the metal. From this fact many accidents have arisen, the fusible plug or disk not melting quick enough, to give an alarm in season to indicate the low condition of water in the boiler.

The object of the present improvement is to prevent the possibility of the changing of the character of the fusible metal or the degree of heat at which it will melt, my ap-

paratus being so contrived that the water can not come in contact with the fusible plug or disk and consequently its oxidation can not take place.

To effect the desired result of preventing the water of the boiler from acting upon the fusible plug or disk, I form in the pipe that communicates with the boiler an air chamber or space, between the highest level to which the water rises in the said tube and the fusible plug or disk, the air-chamber or space being provided with a suitable aperture or passage for the admission of air from the external atmosphere at proper times. The air in this chamber or space thus forms an elastic cushion as it were and prevents the water, whatever may be the pressure to which it is exposed from the steam in the boiler, from rising sufficiently high in the tube, which contains the fusible plug, to come in contact therewith, thereby subjecting the fusible plug only to the action of air, which will not change its character, instead of to that of water as heretofore.

*a a a* in the drawings represent a steam-boiler in the top of which is inserted a pipe *b b* that extends a suitable distance below the level of the water therein. The top of the pipe *b b*, terminates in an air-chamber or space *c c* communicating with a hollow screw-coupling *d d* containing a fusible plug or disk of soft metal *e* that will fuse at a low degree of heat. The water from the boiler rises from pressure, in the pipe *b b* only a certain height in the air-chamber or space *c c* so that it can not come in contact with and oxidize the fusible plug *e*. Air is supplied at the proper time to the air-chamber or space *c c* either under a slight pressure or otherwise through a right-angular passage *f f* shown in Fig. 2 and by dotted lines in Fig. 1 in a cock *g*, the air passage *f f* being closed when the cock *g* is open to admit the rising of the water in the tube *b b*. When the water in the boiler is maintained at the proper height, the pipe *b b* is filled with water, but when the water in the boiler falls below the required level the pipe *b b* of course empties itself of water and allows the steam to come in contact with and melt the fusible plug. When the fusible plug is thus melted the steam rushes into a steam-whistle *h h* and gives an alarm.

By this arrangement it will be seen that



the desired result of allowing the steam to act upon the fusible plug or disk when the water in the boiler falls below its proper level and preventing the steam from coming  
5 in contact therewith, when the water is at its proper height, is accomplished without permitting the boiler-water to come in contact with the fusible metal thereby preventing its oxidizing or otherwise changing its  
10 character so that it will always fuse at one and the same temperature.

Having thus described my improvements,

what I claim as my invention and desire to have secured to me by Letters Patent is—

Forming in the pipe *b* that communicates 15 with the boiler an air-chamber or space between the water in the said tube and the fusible plug, as set forth and for the purposes specified.

JOEL W. HOPPER.

Witnesses:

CHAS. MCCARTHY,  
G. P. BERGEN.