

G. E. Hayes,
Steam Safety Valve,
No 38,899, *Patented June 16, 1863.*

Fig. 2.



Fig. 4.

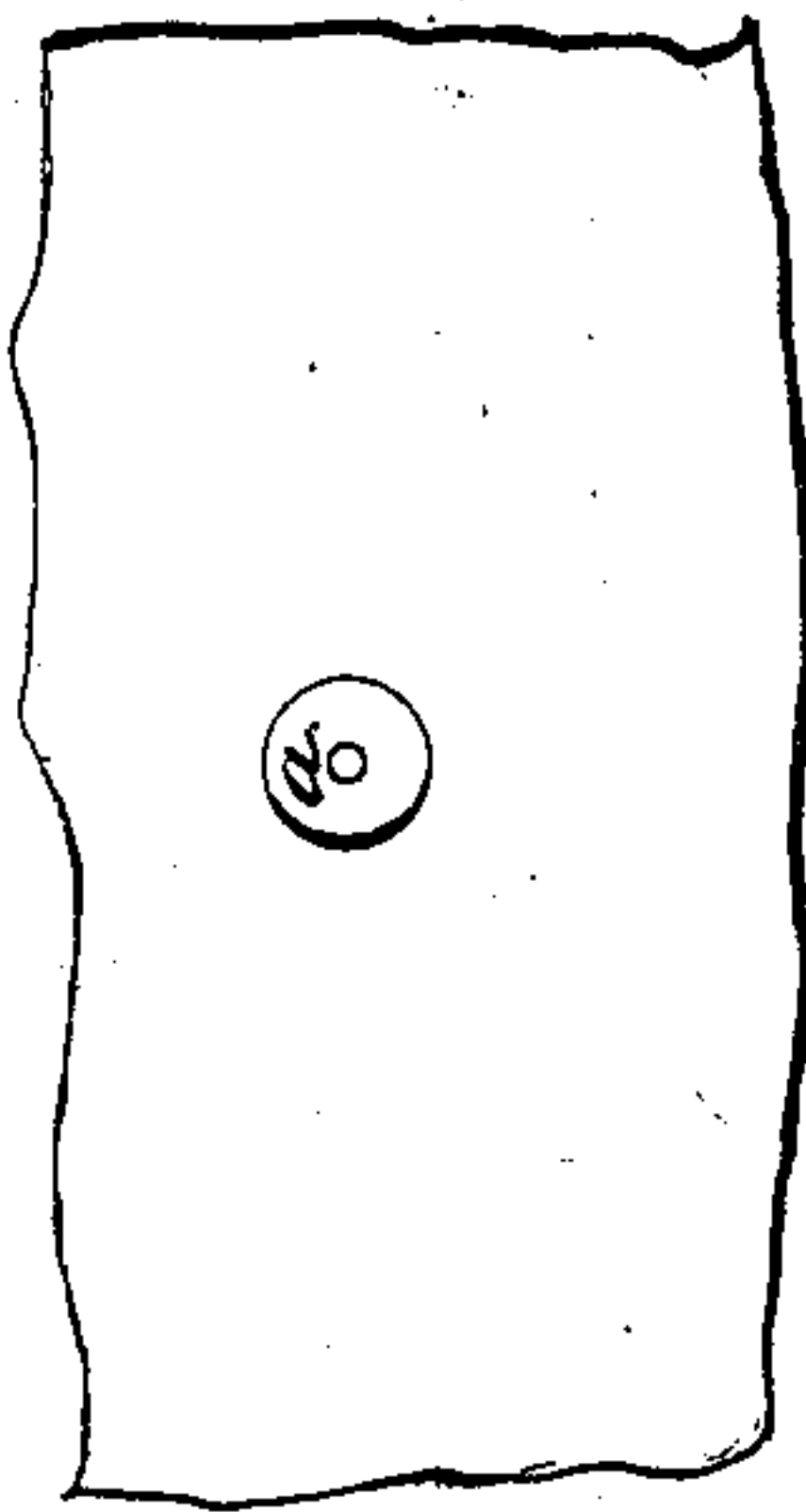


Fig. 1.



Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE E. HAYES, OF BUFFALO, NEW YORK.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. 38,899, dated June 16, 1863.

To all whom it may concern:

Be it known that I, GEORGE E. HAYES, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Safety-Valves for Steam-Boilers and other Steam Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical section of a portion of a boiler or other vessel in which steam is generated, or confined, illustrating the application of my improved safety-valve. Fig. 2 is a similar section of the portion of the vessel to which the valve is applied, without the valve. Fig. 3 is a side view of the valve. Fig. 4 is a plan view corresponding with Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

My invention, which is applicable to steam-boilers, digesters, india-rubber vulcanizing vessels, and all vessels in which steam may be generated or confined, partakes partly of the character of what is known as a "safety-valve," and partly of the character of what is known as a "fusible safety-plug," and is intended to combine the advantages of both these devices, and to insure the letting off of the steam when it arrives at a higher pressure or temperature than is safe or desirable.

Hitherto fusible plugs have generally been secured by riveting or by screwing the alloy into a hole in the boiler, or by fusing the alloy into the hole, letting a portion flow through and form a head on the inside. In all these modes steam begins to escape the moment the most fusible portion of the mold begins to liquefy and long before the plug has so far lost its tenacity as to be dislodged, the time of dislodgment varying just in proportion to the mechanical force exerted by that portion which forms the head inside, or the screw-thread within the hole, the same composition in the same sized-hole blowing out at temperatures varying from, say, 340° to 400° Fahrenheit, and in some instances not till the vessel ex-

ploded. A fusible plug has also been inserted or formed within a conical seal provided in the top of an inverted cup, arranged in the part of the boiler above the fire-box, but this position of the plug, for some reasons, is objectionable. To obviate these difficulties, I drill a taper hole, *a*, from the outside of the boiler or other vessel, into the steam-space, leaving the hole very small on the inside of the vessel, and fit to this hole a valve or valve-like plug, *b*, of brass or other metal or alloy, which is infusible at any temperature to which it can possibly be subjected by the steam, and solder it into the hole or valve-seat *a* with a fusible alloy. The alloy which I prefer to use is composed of ten (10) parts, by weight, of antimony, thirty (30) parts of tin, and thirty-five (35) parts of lead, which will fuse at about 340° Fahrenheit. For copper vessels used as vulcanizers, the copper being about one-sixteenth ($\frac{1}{16}$) of an inch thick, I make the hole of about the size of an ordinary brass pin—such as is used in a lady's dress—and cut off the head of such a pin, and use it as a valve or plug, soldering it into the seat and covering it entirely with the fusible alloy. The valve thus applied preserves that portion of the fusible alloy which is instrumental in closing and sealing the opening from oxidation, and prevents its fusibility being changed by time, and remains intact while the temperature of the steam in the boiler or other vessel remains below the fusing-point of the alloy with which it is soldered in, and as soon as the temperature reaches this point the alloy melts and the valve is blown out.

What I claim as my invention, and desire to secure by Letters Patent, is—

The conical valve or plug *b*, of infusible metal or alloy, soldered into the hole or seat *a*, provided for its reception in the boiler or other vessel, by means of a fusible alloy, substantially as and for the purpose herein specified.

GEO. E. HAYES.

Witnesses:

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