

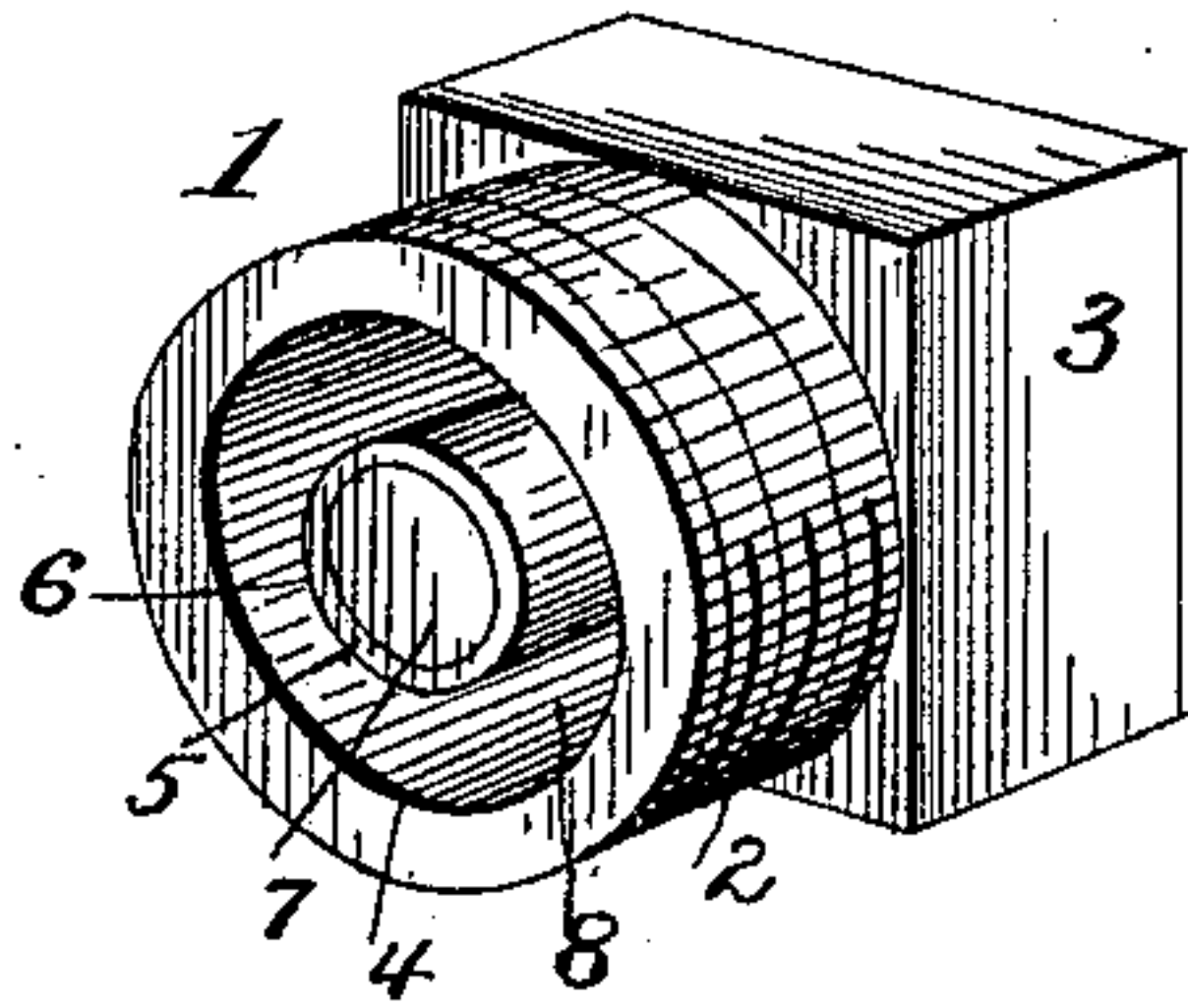
(No Model.)

C. J. COLE.  
SAFETY PLUG FOR STEAM BOILERS.

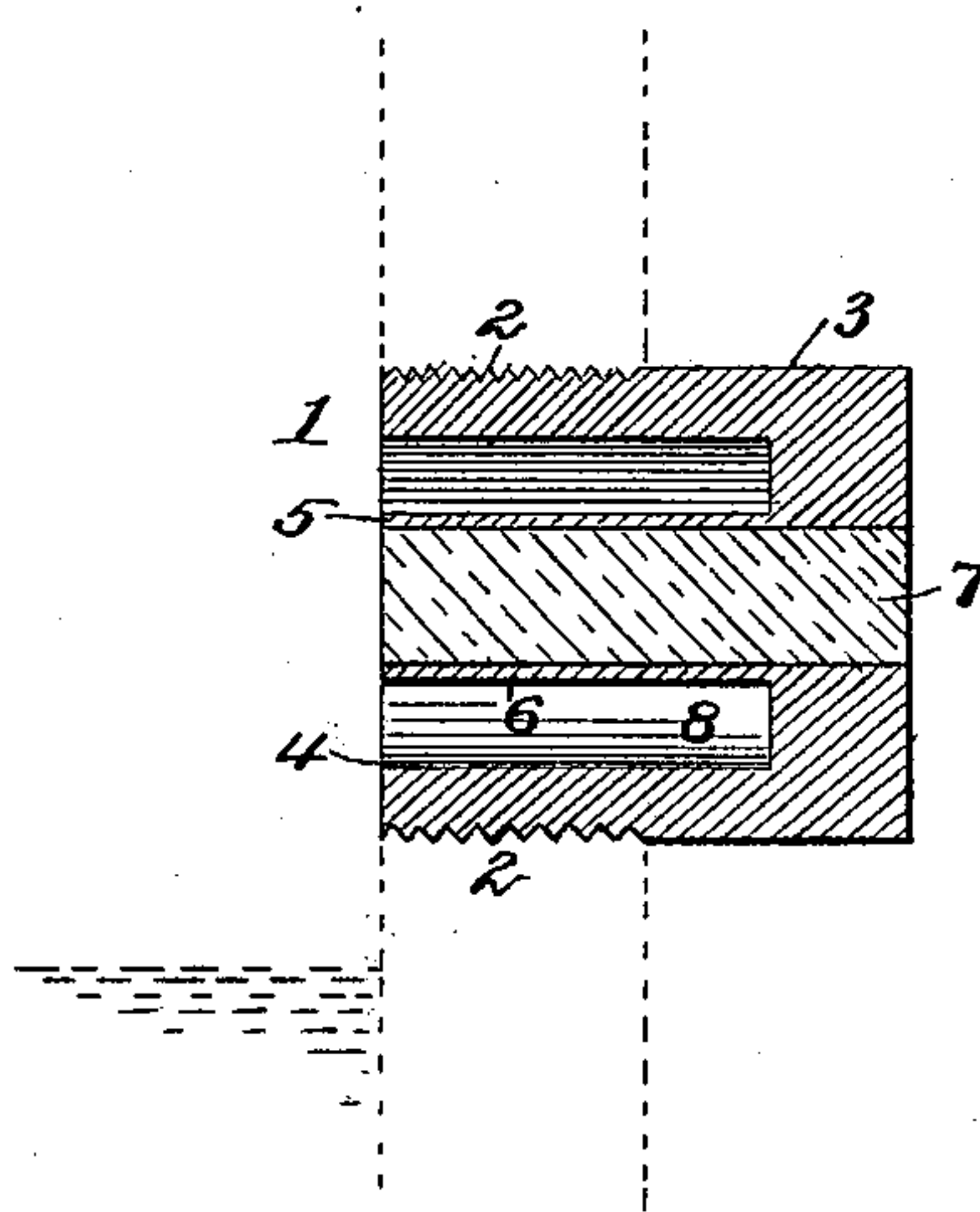
No. 594,230.

Patented Nov. 23, 1897.

*Fig. 1.*



*Fig. 2.*



WITNESSES

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INVENTOR

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# UNITED STATES PATENT OFFICE.

CHARLES J. COLE, OF PITTSFIELD, MASSACHUSETTS.

## SAFETY-PLUG FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 594,230, dated November 23, 1897.

Application filed April 5, 1897. Serial No. 630,908. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES J. COLE, a citizen of the United States, residing at Pittsfield, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Safety-Plugs for Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements, as hereinafter set forth, in safety-plugs for steam-boilers.

In the drawings, Figure 1 represents a perspective view, and Fig. 2 a vertical section, of a safety-plug constructed according to my invention.

This invention consists of an improved water-space safety-plug designed to be screwed on the crown-sheet of locomotive and vertical boilers or on the back head of horizontal boilers on the water-line to guard against low water and prevent straining, leakage, and explosion of the boiler.

In the ordinary form of plug used the plug is first made of a solid piece of metal, as brass or iron, and a hole drilled or bored centrally thereof from end to end, said bore having a filling of soft metal. Such plug is then screwed in the boiler to a distance of from three to four threads, leaving a large portion exposed to the fire with no water to protect it. Consequently when such a plug has been used a short time the heat and steam melt out a portion of the soft-metal filling of the bore, ordinarily to one-quarter to one-half of an inch from its outer end, and in practice that portion of the bore from which the fusible plug or filling has been melted becomes corroded and more or less filled with sediment, thereby rendering it practically useless as a low-water alarm, for the reason that such sedimentary deposit in and corrosion of the bore precludes the possibility of the steam heat reaching the remaining portion of the fusible plug with sufficient certainty to fuse it in time to insure its either being blown out or fused in time to prevent either the warping or explosion of the boiler. In actual practice it has frequently been found that the bore of such

plugs have been so thoroughly choked with sedimentary deposit and corrosion as to necessitate the punching out of the deposit with tools before the plug could be rendered operative. Moreover, in plugs as now constructed the surface of the fusible core upon which the steam can operate is so small as to minimize its effect, as the walls of the plug being comparatively thick extreme heat is necessary to secure action thereof on the fusible plug or core and only the extreme inner end of the fusible material is ordinarily subjected to such heat, the sediment collecting in the bore preventing the steam heat having the necessary effect on the fusible material. Consequently the utility of the plug is destroyed, because by such stoppage up of the bore while sufficient heat contacts with the stopper-plug when the water becomes too low to fuse the core, said core is protected from such heat, with the result that no indication of such dangerous condition of affairs is given the engineer before an explosion takes place or before the boiler becomes warped.

My improvement is designed to secure and does secure by a simple and inexpensive construction a plug which, when the water in the boiler becomes low, is immediately and throughout the length of its fusible core or plug subjected to the action of the heat, so as to properly and thoroughly melt and blow out the plug-core and thereby certainly notify the engineer and prevent either injury to or explosion of the boiler, the partial melting of the inner end only of the fusible core and the filling of the bore by sediment and corrosion prevented, and the melting and blowing out of the fusible plug or core instantly on a dangerous condition of affairs being reached always and positively secured.

I will now proceed to describe my improved plug.

1 represents the plug proper or shell, which is threaded at 2 in the usual manner to screw from the outside into the appropriate portion of the shell of the boiler.

3 represents the head of the plug, which is shown as square to receive a wrench.

This plug or shell is formed either by casting or boring, as preferred, with an inner bore 4 extending from its inner edge to and



partly within the head 3, as shown, a central bore of less circumference than the bore 4 extending through the head, as shown at 5.

6 represents a longitudinal tube of substantially corresponding diameter to that of the bore 5 and extending centrally of the bore 4 to the inner edge of the shell 1. This central tube is preferably integral with the shell, though of course it may be formed separately therefrom and brazed or otherwise connected therewith, as desired.

7 represents the fusible plug or core, usually of soft solder to admit of its ready melting, contained within the thin-walled central tube 6 and extending, as shown, from end to end of the shell 1. It will be observed that by this construction a central space 8 is provided circumferentially around the fusible plug which constitutes either a water or steam chamber, according to the height of the water in the boiler. Normally this chamber is filled with water, but when the water descends below safety-point the steam then enters said chamber, and consequently, as the shell of the tube 6 is thin and readily heated thereby, the natural result is that the soft-solder filling of said tube will speedily fuse as soon as the water becomes low in the boiler and immediately notify those in charge of the boiler of the condition of the water therein.

By constructing the plug proper with a bore of greater circumference, as shown at 4, than is customary the danger of sedimentary deposit within or corrosion of the plug sufficient to retard its operation is entirely avoided. The fusible plug or core is always protected so long as covered by water, while as soon as the water descends sufficiently to expose the plug the steam enters said bore 4 and heats the central tube and the fusible material therein the entire distance from the inner end of the plug to a portion about half-way through the head of the plug. The fusible plug is thus immediately and constantly subjected throughout nearly its entire length and area to the heat, resulting, as will be readily apparent, in its immediate fusion and blowing out.

When a plug is made, according to the usual practice, with simply a central bore just sufficient to contain the fusible material, only the inner end of the fusible plug comes in contact with the steam, and, as before stated, when that has been partly fused, which is apt to be the case after the boiler has been used a short while and the water has become low once or twice and the loss of water supplied sometimes before accident has happened, the space left by the partial fusion of the fusible plug becomes choked by sediment and corro-

sion. Then when in such condition, the shell surrounding the fusible plug being thick, the steam has practically no opportunity to operate on the fusible material, with the natural result that notification of the condition of the water in the boiler is not given except by the straining or explosion of the boiler.

Plugs according to my construction can be used indefinitely, for the reason that when the filling has become fused an additional fusible filling can be readily supplied, and there is no necessity, as in the usual constructions, to remove sediment or corrosion or to discard plugs by reason thereof.

Plugs constructed according to my invention are maintained in a clean and usable condition, for the reason that inasmuch as the fusible plug melts and blows out as soon as the level of the water becomes low neither time nor opportunity are afforded for the accumulation of either sediment or corrosion.

Having thus described my invention, what I claim is—

1. A safety device for steam-boilers consisting of a plug adapted to be screwed into the boiler from the outside and having a central fusible plug and a water or steam chamber surrounding said plug, substantially as and for the purpose set forth.

2. A safety device for steam-boilers adapted to be exteriorly screwed into the shell of the boiler and consisting of a plug having an inner water and steam receiving chamber, and a thin metal tube located centrally within said chamber and having a fusible filling, substantially as and for the purpose set forth.

3. A safety device for steam-boilers consisting of a plug adapted to be screwed into the boiler from the outside and having a rectangular head and an inner water and steam receiving chamber, and a central tube seated in said head and extending therefrom into said chamber and having a filling of fusible material, substantially as and for the purpose set forth.

4. A safety device for steam-boilers consisting of a plug having an outer threaded portion which is screwed into the shell of the boiler from the outside, a rectangular head resting on the outer face of the boiler-shell, a chambered inner portion extending within the boiler and a fusible plug centrally located within said chamber, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES J. COLE.

Witnesses:

M. CALLAHAN,  
C. A. BURBANK.