No. 760,126. PATENTED MAY 17, 1904.

G. W. INGHAM.

STEAM BOILER.

APPLICATION FILED JULY 11, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

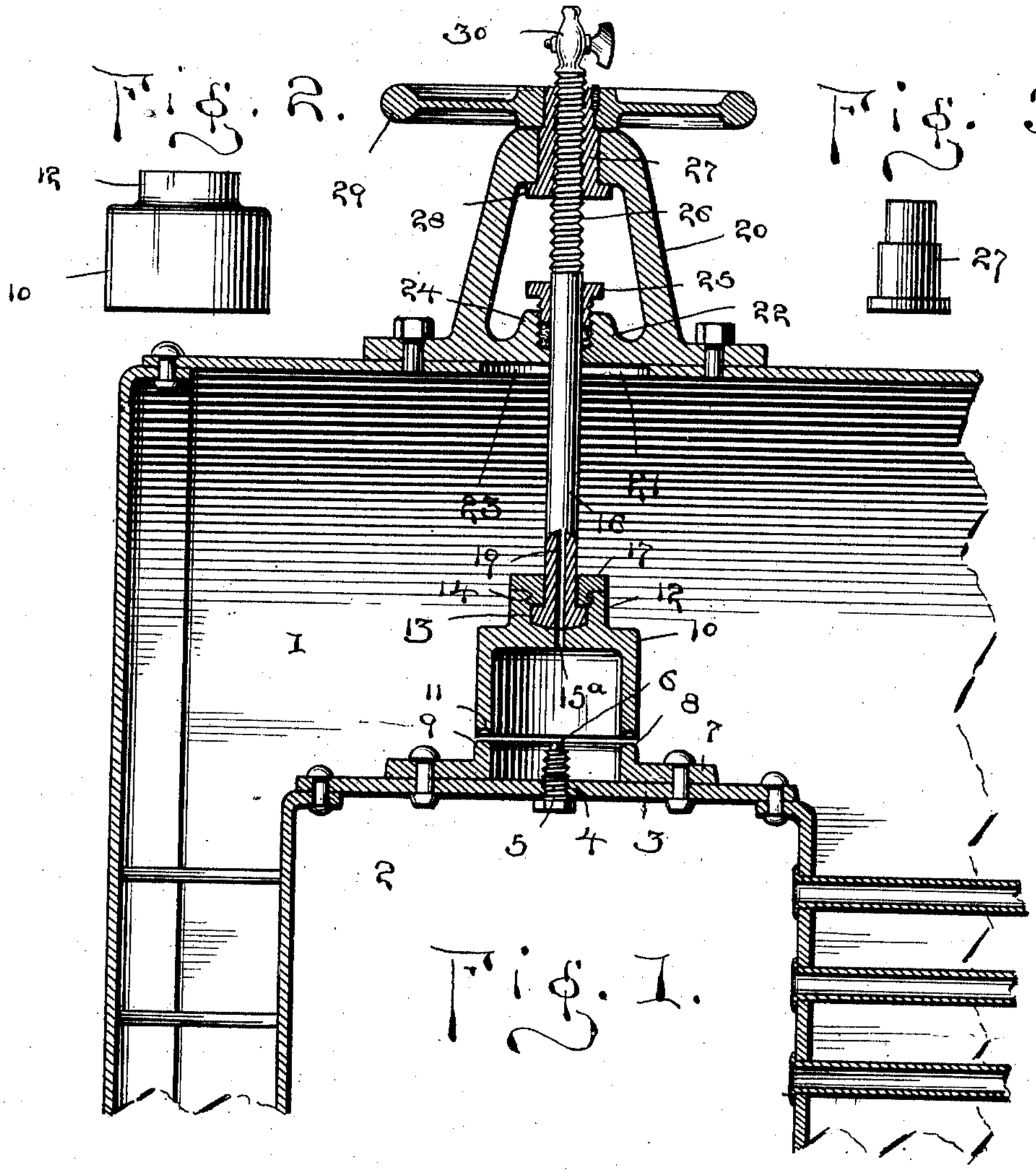

Fig. 1.

Fig. 2.

Fig. 3.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 5.

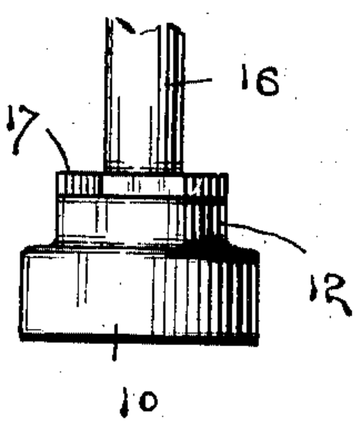

Fig. 6.

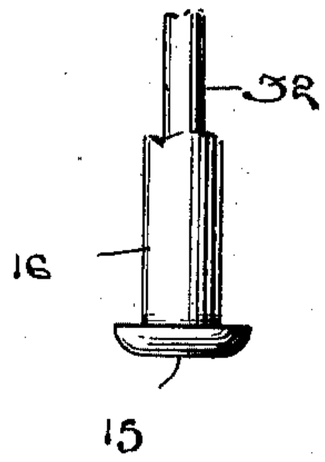

Fig. 4.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.

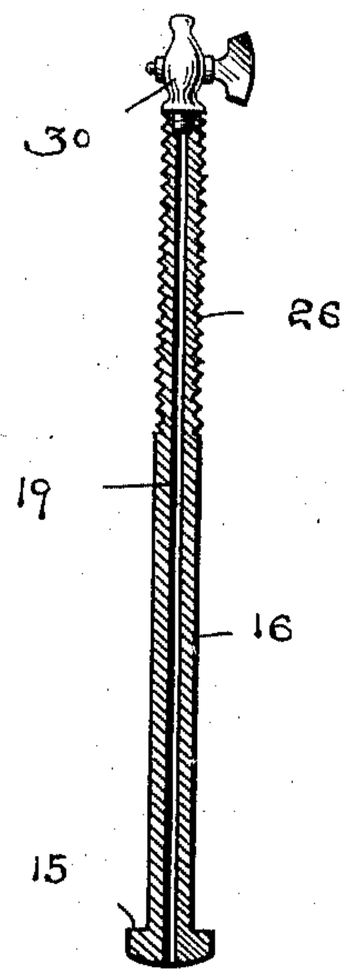


Fig. 10.

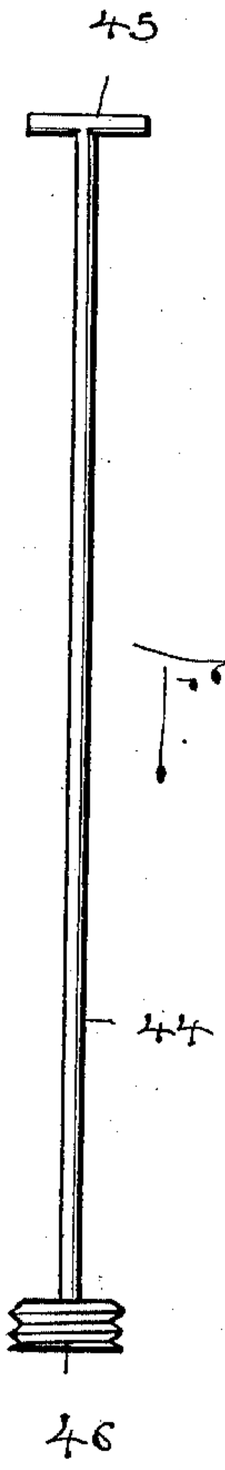


Fig. 8.

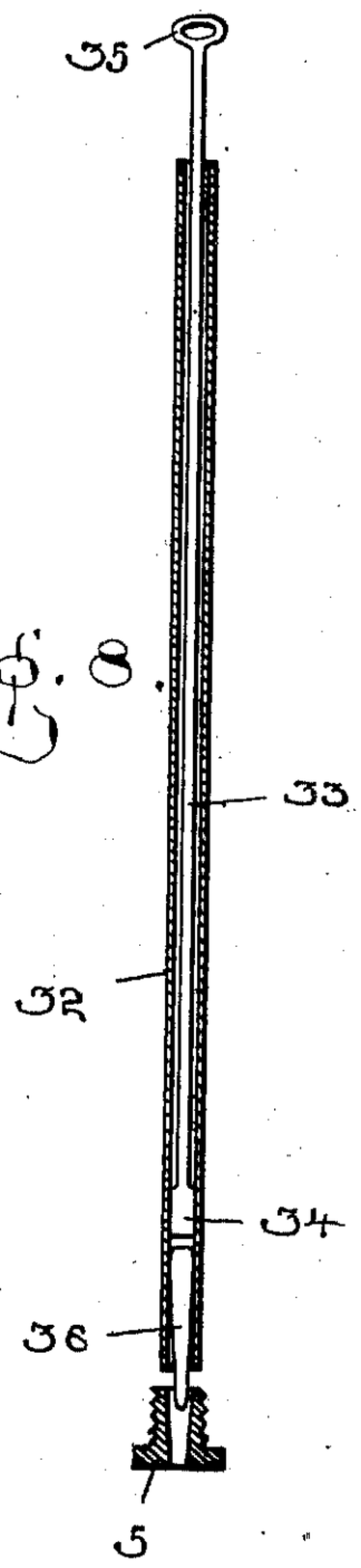
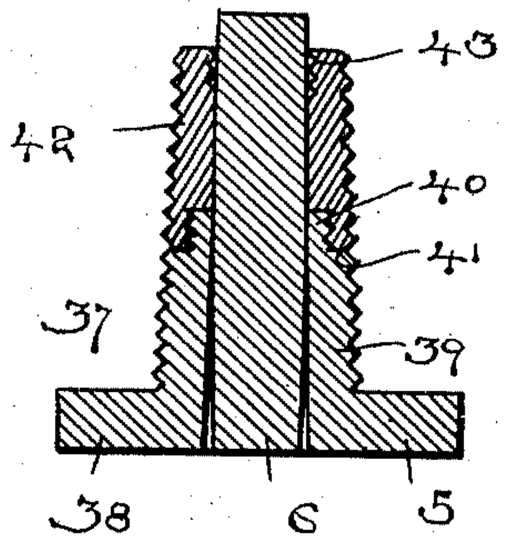


Fig. 9.



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UNITED STATES PATENT OFFICE.

GEORGE WHITHOUSE INGHAM, OF PORT HURON, MICHIGAN.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 760,126, dated May 17, 1904.

Application filed July 11, 1903. Serial No. 165,136. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WHITHOUSE INGHAM, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to safety attachments for boilers of that class embodying fusible plugs adapted to establish communication between a fire-box and boiler when the water in the latter reaches a certain low level.

In the present forms of safety attachments for boilers the fusible or safety plug is located in the top of the combustion-chamber, and consists of a brass plug filled with a metal composition which melts out when the water in the boiler becomes low enough to endanger the flues by burning or otherwise with evident damage to the boiler structures. When the water reaches a certain low stage or level, the top of the plug is exposed and the heat in the combustion-chamber melts the composition out of the plug and allows steam to escape into the combustion-chamber to deaden the heat and fires and avoid injury to the boiler. Under the present construction when this melting operation ensues it becomes necessary to work off the steam from the boiler and blow the water in it down below the level of the fusible plug, remove the latter, and insert a new filled plug. Afterward the water is pumped into the boiler to a safe level and steam raised to the necessary pressure. This always causes a loss of time of material duration, and in cases of a ship at sea or in a large factory employing many men the present system of repair is expensive and dangerous. In the first instance, a ship is liable to be wrecked and lives lost owing to the depletion of the boiler force, and particularly where only one boiler is carried within the vessel, and if more than one boiler is employed a considerable loss of time ensues. While the ship is thus depleted and rolling, as in a storm, the water rushes to one side of the boiler or boilers, leaving the fusible or safety plug exposed, with the result that they melt out successively and at times when they would last for a considerable period. In the case of a large factory valuable time is lost when a plug becomes fused and is repaired under the present methods and the employees are required to remain idle until such repair is made.

The present invention is intended to overcome the numerous disadvantages heretofore encountered; and it consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a longitudinal vertical section of a portion of a boiler and combustion-chamber, showing the improved device applied thereto. Figs. 2 and 3 are detail side elevations of parts of the improved devices. Fig. 4 is a transverse vertical section of a portion of the boiler and combustion-chamber, showing a modification in the construction of the improved device. Figs. 5 and 6 are detail elevations, broken away, of different parts of the improved device as shown arranged by Fig. 4. Fig. 7 is a transverse vertical section of another part of the organization of elements shown by Fig. 4. Fig. 8 is a sectional view of a part of the mechanism employed in the organization of the elements shown by Fig. 4 and illustrating the mode of applying a fusible plug to its holder. Fig. 9 is a detail view in transverse vertical section, showing the preferred form of plug used in either of the structures shown by Figs. 1 and 4. Fig. 10 is a detail elevation of the pull used in conjunction with the plug shown by Fig. 9.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

Referring to Figs. 1 and 4, the numeral 1 designates a boiler having a combustion-chamber 2, as in ordinary boiler constructions, the said combustion-chamber being provided with the usual crown-plate 3. In this crown-plate a threaded aperture 4 is constructed to receive a plug 5, having a fusible filling or composition 6 therein. The plug projects above the crown-plate 3. Secured on the crown-plate 3 is an annular plate 7, having an upstanding flange 8 surrounding a central opening therethrough, the plug 5 being in concentric relation to the flange 8. The upper edge of the flange 8 is convex, as at 9, and coöperating

therewith is a tubular or hollow cap 10. The cap 10 is of the same diameter as the flange 8 and has a lower concave edge 11, which is adapted to closely fit over the convex edge 9 of the said flange. The cap also has a boss 12 rising from the center of the top thereof, and said boss is formed with an enlarged socket 13 and a screw-threaded bore 14, a reduced opening 15ª extending through the top of the cap and communicating with the socket 13. The lower enlarged terminal 15 of a stem 16 is held in the socket 13 by a seat or cap-nut 17, applied to the upper end of the boss 12 and having a reduced member 18, with a screw-threaded aperture removably entering the bore 14. The cap-nut 17 is annular and adapted to move longitudinally over the stem 16, and the latter is tubular and has a bore 19 therethrough, corresponding in diameter to the opening 15ª in the top of the cap 10 in the form of the improved device shown by Fig. 1. When the lower enlarged terminal of the stem 16 is secured to the boss 12 of the cap 10 by the nut 17, as clearly shown by Fig. 1, the bore of said stem alines with the opening 15ª to form a continuous outlet from the said cap.

On the top of the boiler is secured a yoke 20, which is disposed over an opening 21. The base 22 of the yoke is solid, and in the center thereof, over the said opening 21, is a bore 23, communicating with a screw-threaded socket 24, to receive suitable packing and a stuffing-box gland 25, and through the said bore 23, packing, and stuffing-box gland the stem 16 projects to a suitable distance for a purpose which will now be explained. The upper extremity of the stem 16 is screw-threaded, as at 26, and adjustably extends through a screw-plug 27, rotatably held in the upper converged portion of the yoke 20 and having a lower flange 28 to prevent upward movement thereof through the yoke. The upper end of the plug 27 projects above the top of the yoke 20 and is reduced, and on such reduced terminal of the plug is keyed a hand-wheel 29, and by rotating the said hand-wheel the valve-stem 16, together with the cap 10, may be adjusted downwardly toward or upwardly away from the flange 8 of the annular plate 7. On the upper terminal of the stem 16 a petcock is applied for exhausting purposes, it being understood that the bore 19 continues through the full length of the stem 16. The cap 10 and the plug 7 are shown in detail by Figs. 2 and 3.

The organization of devices shown by Fig. 4 is similar to that shown by Fig. 1 and has similar reference-numerals applied thereto. The bore through the stem 16 as shown by Fig. 4 is larger than the bore through the stem shown by Fig. 1, and on the upper terminal of the stem the petcock 30 is removably applied by a cap 31, to which the lower end of said petcock is directly secured. The stem is adjustable in the organization shown by Fig. 4 to bring the cap 10 nearer to or elevated away from the flange 8 of the plate 7; but in this instance an additional feature is provided and consists in the use of a guide-tube 32, which extends completely through the stem 16 and projects below the cap 10. The lower end of the guide-tube 32 is in proximity to the upper end of the plug 5 for the purpose of directing a filling into the said plug to replace a fused filling. For this purpose a separate implement is employed and may be termed a "setting" or "ramming" tool and is clearly shown by Fig. 8, wherein the operation of disposing a filling within the plug is clearly illustrated. This filling or raming tool comprises an elongated shank 33, having a lower enlarged head or tamper 34 and an upper grip or handle 35. The filling 36 is inserted in the upper end of the guide-tube 32 and is pushed downwardly by the head or tamper 34 into the plug 5. The bore through the plug, as shown by Fig. 8, is of inverted conical form and the plug 36 is of elongated similar form, so that when it is pushed down into the bore of said plug it may become firmly lodged in place by repeated blows delivered on the end thereof through the use of the tool.

The operation of the organization of elements shown by Fig. 1 is as follows: When the fusible plug blows out or becomes melted, the cap 10, which is normally elevated, so as to leave an opening between the lower edge thereof and the flange 8, is screwed down so that the said lower edge of the cap will firmly bear on the upper edge of the flange 8 to form a tight joint. To ascertain if the plug is shut out from communication with the boiler, the petcock 30 is opened. There are two different lengths of fusible plugs in use at present, one being about two and one-half inches long and the other one and one-half inches long. The longer plug will be inserted when the repair operation is completed, and when one of the said long plugs melts out it is replaced by a shorter one, the longer plug by its use responding to the melting operation when the water gets low at a time when the water is higher than when a short plug is used, because the longer plug will become uncovered first, and hence the difference in the depth of water above the crown-plate will permit the temporary introduction of the shorter plug. The shorter plug then will be first introduced and enough water will be over the top of said plug to permit charging the boiler with a new supply of water to a proper level, and it will only be necessary to pull out the fires while the old plug is being removed and the new one inserted. During this operation the machinery depending upon the boiler can be allowed to run slowly and it does not become necessary to blow the steam down at all, and it is not necessary to blow the water down below the combustion-chamber or crown-plate of the

latter to avoid scalding, as is the case in the old mode of inserting plugs.

It is proposed to form the parts of brass, so that they will not corrode, with obvious advantages.

The operation in connection with the organization shown by Fig. 4 is similar to that just explained except that the fusible filling for the plug is inserted through the guide-tube 32 by the means heretofore explained.

The form of plug preferred for use in connection with the improved safety attachment is shown by an enlarged detail section in Fig. 9 and comprises a lower body member 37, having a flange 38 to bear against the under side of the crown-plate 3, and rising from the said flange is a tubular stem 39, which is exteriorly screw-threaded and has an upper reduced terminal 40, which provides a circumferential shoulder 41. An exteriorly-screw-threaded member 42 is applied to the extremity 40 of the body member below, and through both members of the plug a bore is formed, which becomes continuous when the two members are united, the bore in the lower or body member being of greater diameter than that of the upper member or gradually increasing in diameter in a downward direction. The upper portion of the bore of the member 42 is formed with left-hand screw-threads 43. A fusible filling of the longer type is inserted in this preferred form of plug, and as a means of convenience in operating said plug a tool is provided which consists of an elongated stem 44, having a handle 45 on the upper end thereof, and a lower left-hand screw-threaded head 46 to fit in the bore of the upper member 42 and coact with the threads 43. When the filling blows out of the plug, the cap 10 is closed down, as before explained, and the pull shown by Fig. 10 is then inserted through the valve-stem and the head 46 thereof is caused to enter the upper member 42 and become fast to the latter through the medium of the threads 43. The member 42 is then detached, thereby leaving the bottom half or body member remaining in the crown-plate of the combustion-chamber. The new filling is then inserted in the lower half or body member of the plug by means of the pull shown by Fig. 8. The advantage of this form of plug and the mode of separating it as set forth is that when the top of the plug is taken off and a new filling is inserted in the lower half or body member 37 the latter is covered with water and does away with the necessity of pulling out fires or other delays.

In referring to the difference in the long and short plugs and the advantage in the use of a short one after a longer has been fused or blown out it will be understood that if a longer plug was immediately reinserted or a plug having the same length as that which has been blown out the replacing or substituted plug would be just as quickly melted, as it would be exposed to the heat and not covered with water.

Having thus described the invention, what is claimed as new is—

1. In a safety attachment for boilers, the combination with the crown-plate of the combustion-chamber having a fusible plug therein, of an inclosing device for shutting out the water from the plug after fusing, a tubular stem attached to said inclosing device and having a valve on its upper extremity, and an inner guide-tube extending below said stem to proximity with the plug and means for adjusting the said stem.

2. In a safety attachment for steam-boilers, the combination with the crown-plate of the combustion-chamber having a fusible plug therein, of an annular flange-plate surrounding and spaced from the plug, a tubular inclosing device the lower edge of which is of equal diameter with the flange and adapted to be seated thereon, a tubular stem secured to the inclosing device and projecting upwardly through the top and to the exterior of the boiler, a valve on the upper terminal of the stem, and means for adjusting the stem and inclosing device.

3. A plug for the purpose set forth, comprising a lower member, an upper member detachably secured to the lower member, both members having registering bores therethrough, and the upper member having an internal screw-thread at the upper end to receive a pull-tool, inclosing means for the plug and means for replacing the filling in the bore of the lower member.

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

GEORGE WHITHOUSE INGHAM.

Witnesses:
WILLIAM MAXWELL,
JNO. A. KERR.