J. F. MAHONEY.

Fusible Plug for Steam-Generators.

No. 161,422. Patented March 30, 1875.

Fig. 1

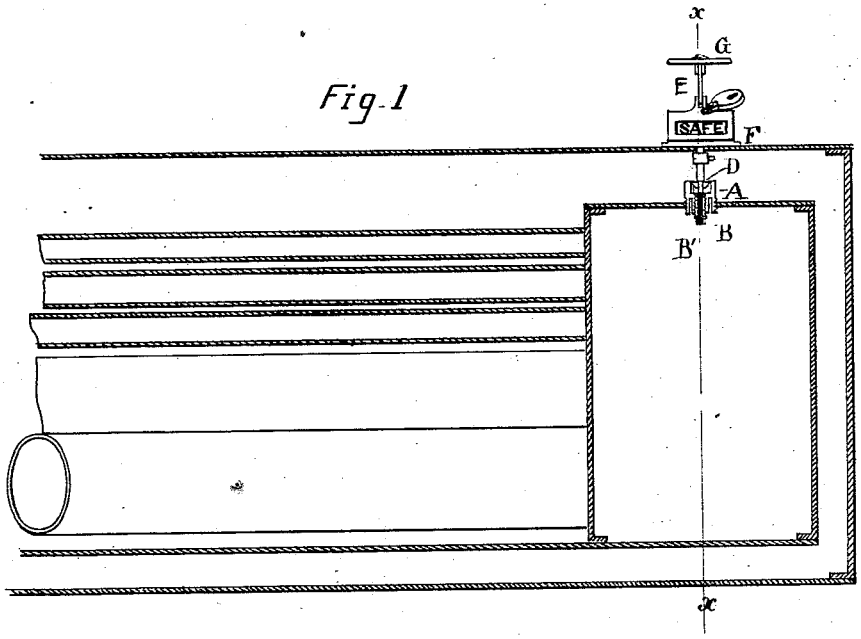


Fig. 2.

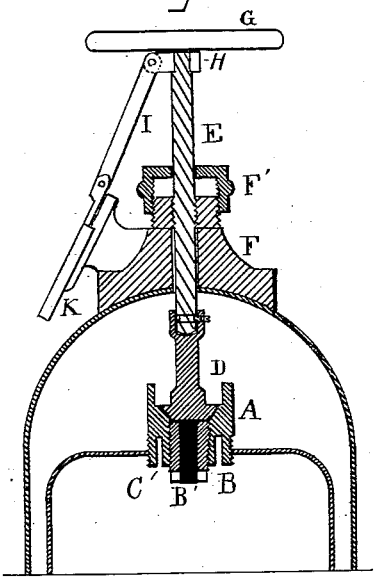
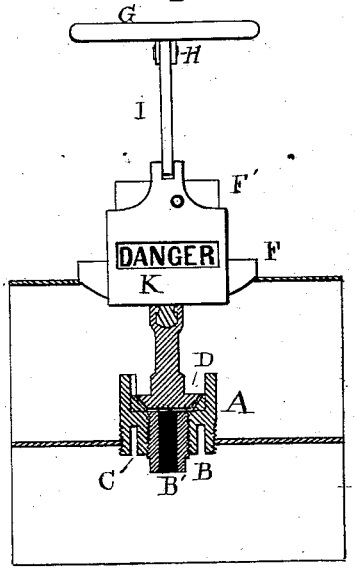


Fig. 3.



Attest
C. M. Connell
C. A. Bulley

Inventor
James F. Mahoney
Per Blanchard & Singleton Attys

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JAMES F. MAHONEY, OF ERIE, PENNSYLVANIA.

IMPROVEMENT IN FUSIBLE PLUGS FOR STEAM-GENERATORS.

Specification forming part of Letters Patent No. **161,422**, dated March 30, 1875; application filed March 19, 1875.

To all whom it may concern:

Be it known that I, JAMES F. MAHONEY, of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Fusible Plugs for Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification—

Figure 1 being a longitudinal sectional elevation of a portion of a steam-generator with my improvement attached thereto, showing the valve open and in a safe position, or in the position in which it stands when the fusible plug is in perfect condition. Fig. 2 is a transverse section of line *x x* of Fig. 1, showing the shut-off valve resting upon its seat, the fusible plug in position, the valve-stem and the hand-wheel for operating it, and the slide for indicating the safe and dangerous positions of the valve; and Fig. 3 is an elevation of Fig. 2, partly in section, showing the slide as in a dangerous position, the fusible plug, the valve-seat with an annular recess for controlling the height of the water at the time when the fusible metal in the plug shall melt.

Corresponding letters denote corresponding parts in the several figures.

This invention relates to fusible plugs for steam-generators, and to a valve and other appliances to be used in connection therewith. The use of fusible plugs in connection with some portion of every steam-generator for the purpose of preventing injury thereto, caused by allowing the water to fall to too low a level, has become a recognized necessity; and this invention has for its object to provide such a plug and devices to be used in connection therewith, which shall remove the objections which have heretofore been urged against them, and at the same time render them more efficient and less liable to cause delays in the use of the generator, to which they are attached, and to this end it consists, first, in combining with a fusible plug a valve which can be operated from the outside of the generator, and whereby the aperture in said plug can be closed when the fusible metal has been melted out, and thus the delay incident to such accidents be avoided. Second, it consists in combining with the valve a slide which shall move therewith, and thus indicate to the person in attendance and others interested the position of the valve. Third, it consists in combining with the recessed valve-seat a detachable plug having a fusible plug inserted therein. Fourth, it consists in the combination of the parts hereafter specified, to constitute the complete apparatus.

In constructing devices of this character, I employ a valve seat or ring, of metal, A, upon one end of which there is formed a screw-thread for the purpose of screwing it in the crown-sheet of the fire-box of a steam-generator, or in some other portion thereof, the surface of which is, upon one side, exposed to the action of the heat arising from the burning fuel, while the opposite side is in contact with the water within said generator. Through the center of this there is made an aperture, which is provided with a screw-thread for the reception of a plug B, through which there is made an opening which is to be filled with fusible metal, as shown at B′. This metal is to be made of an alloy of lead and tin, or other easily-fusible metals, such as will cause it to melt at any desired temperature, according to the pressure and temperature of the steam to be carried within the generator, and is to be inserted in the aperture formed in the plug B, in such a manner as to cause it to form a steam-tight joint therewith and to cause its lower end to be exposed to the action of the heated products of combustion in the fire-box.

In order that when in use the fusible metal may be melted before the water in the generator has been allowed to fall to a level with the crown-sheet of the fire-box, or below the same, and thus endanger the integrity thereof, as well as the lives of persons in its vicinity, there is formed in that portion of the valve seat or ring A which is within the fire-box or flue an annular recess, C, which surrounds the plug B, and extends upward to such a distance as to cause its upper portions to be above the crown-sheet or flue, so that as the

water falls below the upper portion of said recess the heat from the furnace will act upon the plug B to such an extent as to cause the fusible metal to be melted while the water is yet above the crown-sheet, and thus prevent the injuries incident to allowing it to fall below or to a level therewith. The valve seat or ring A extends above the sheet or flue for some distance, and has formed upon it a seat for the valve D, which is hinged to the lower end of a stem, E, furnished with a screw-thread, which works through a threaded aperture in a saddle or nut, F, placed upon the outer surface of the generator, its outer end being provided with a hand wheel or crank, G, for turning it. Upon the upper surface of the saddle or nut F there is placed a stuffing-box, F′, for packing the rod E. When the parts just enumerated are in the positions shown in Fig. 1 they are supposed to be in working order, the valve D being raised to such an extent as to cause the water to come in contact with the fusible metal. In this position the parts will remain so long as the water is kept above the upper end of the annular recess in the valve seat or ring A; but should it from any cause fall below such point the heat communicated from said recess to the plug B will melt the fusible metal therein, which will have the effect to extinguish, or partially extinguish, the fire, and will at the same time notify the attendant that his generator is in a dangerous condition. Under the present system, upon the occurrence of such a condition of things, great delay is caused in consequence of the fact that a new plug cannot be inserted until the generator has been allowed to cool down to such an extent as to make it possible for some person to enter and insert a new plug. This delay is often of great inconvenience, and especially is this the case when it occurs at sea or upon railroads, where an hour's delay may be fraught with serious consequences.

With my improvements, in connection with fusible plugs, the aperture caused by the melting of the fusible metal may be closed at once by screwing down the valve D upon its seat, and thus any delay be avoided, as the generator may continue to be used under such circumstances until an opportunity is afforded for replacing the plug.

In order that persons other than those in immediate charge of the generator may know at a glance the condition of the apertures, there is attached to the upper end of the valve-stem a clamp, H, which is made to move with said stem. From this clamp a connecting-rod, I, extends to, and is connected with, a slotted plate, K, which slides over another plate fixed to the saddle or nut F, the latter having upon it the words "safe" and "danger," the former being in such a position as to admit of its being read when the fusible plug is in order and the valve is raised from its seat, as shown in Fig. 1, while the latter word can only be seen when the valve is screwed down upon its seat, as shown in Fig. 3.

To prevent the valve and indicating-slide from being tampered with, and thus made to deceive any person, a lock, L, is provided, which locks the valve in its open position, and which may be sealed in the usual or any desired way, and thus preclude the possibility of closing the valve without notice being given to the interested parties.

This apparatus is applicable to all forms of generators, whether they be supplied with large flues extending through them or with fire-boxes, as in the marine or locomotive type.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with a valve seat or ring containing a fusible plug for use in steam-generators, an adjustable valve, which may be forced down upon its seat or raised therefrom from the outside of the generator, substantially as and for the purpose set forth.

2. In combination with a valve for closing the aperture in a fusible plug for use in steam-generators, caused by the melting out of the fusible portion of the metal, a slide made to move with said valve, and a stationary seat, the parts being arranged substantially as and for the purpose set forth.

3. The combination of the recessed valve seat or ring A and the plug B B′, a portion of which is made of fusible metal, substantially as and for the purpose set forth.

4. The combination of the recessed valve seat or ring A, the valve D, rod E, clamp H, connecting-rod I, sliding plate K, and the stationary plate upon which it moves, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JAMES F. MAHONEY.

Witnesses:

C. M. CONNELL,

E. A. BULLEY.