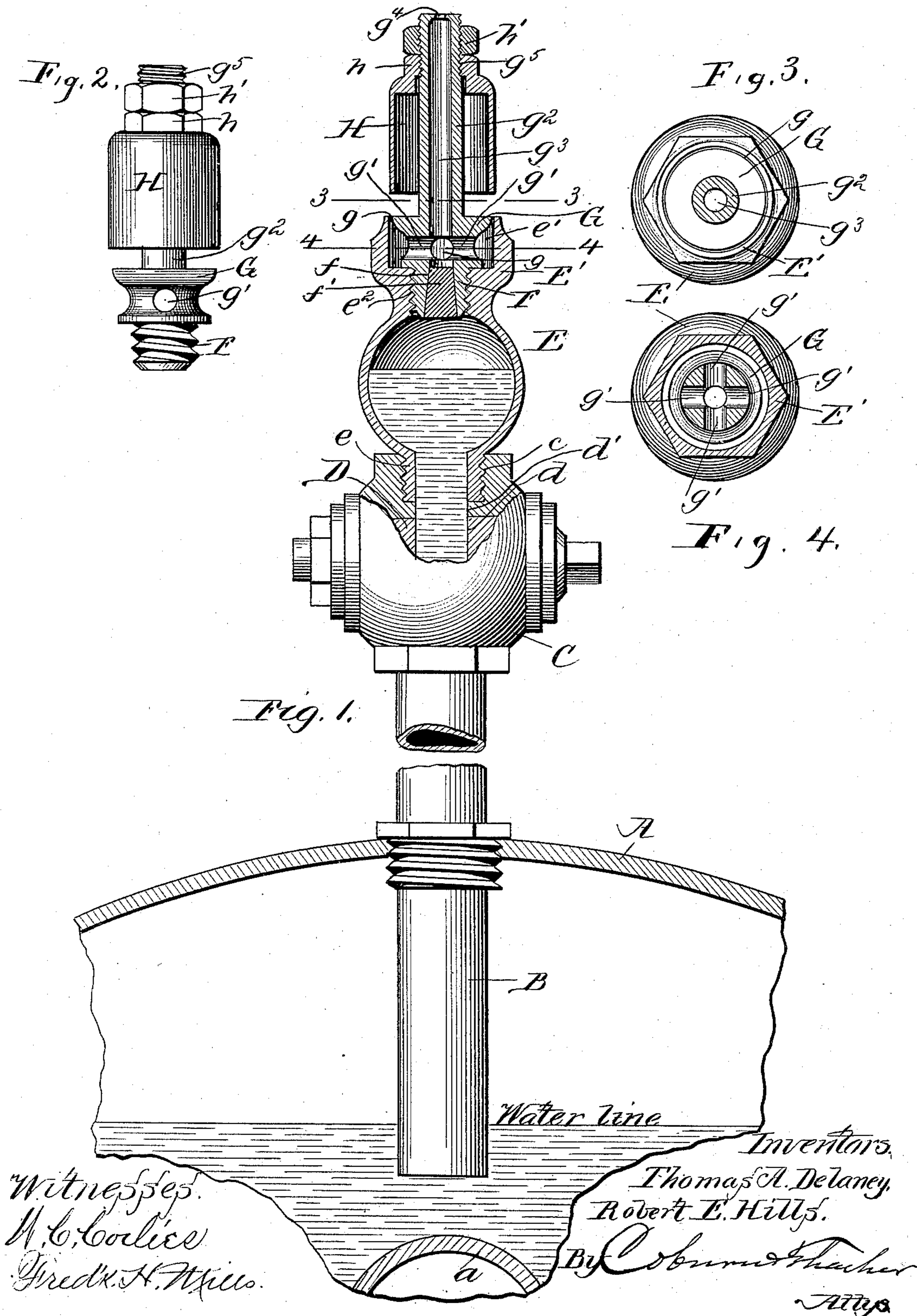


(No Model.)

T. A. DELANEY & R. E. HILLS.  
LOW WATER ALARM.

No. 474,631.

Patented May 10, 1892.



# UNITED STATES PATENT OFFICE.

THOMAS A. DELANEY AND ROBERT E. HILLS, OF CHICAGO, ILLINOIS.

## LOW-WATER ALARM.

SPECIFICATION forming part of Letters Patent No. 474,631, dated May 10, 1892.

Application filed February 18, 1892. Serial No. 421,927. (No model.)

*To all whom it may concern:*

Be it known that we, THOMAS A. DELANEY and ROBERT E. HILLS, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Low-Water Alarms, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—  
10 Figure 1 represents a cross-section of a portion of a boiler with an alarm applied thereto, partly in elevation and partly in vertical section, embodying our invention; Fig. 2, an elevation of the combined fusible-plug holder and whistle detached; Fig. 3, a plan section taken on the line 3 3 of Fig. 1, and Fig. 4 a similar section taken on the line 4 4 of Fig. 1.

Our invention relates to a device for preventing the explosion of steam-boilers by the water therein falling below the safety-level, and particularly to that class of devices in which an outlet-pipe is stopped by a steam fusible plug to which steam is admitted when  
25 the water falls below a certain point.

We will describe in detail the construction and operation of an alarm in which we have carried out our invention in one practical way; and the particular improvements which  
30 we believe to be new and wish to secure by Letters Patent will be more definitely pointed out in the claims.

In the drawings, A represents a boiler provided with ordinary flues *a*. It will be understood that when in operation the water in the boiler must stand above the level of these flues, as indicated by the words "Water-lines" in Fig. 1. The pipe B is set in the boiler in a suitable way and extended down a little below the water-line in the same. This pipe is carried up above the boiler any convenient distance and surmounted by a suitable valve-casing C, in which is mounted and properly seated an ordinary two-way valve D, the port *d*  
45 of which lies diametrically through the valve, so that evidently communication with the pipe below may be closed or opened according to the adjustment of the valve.

A small chamber in the shape of a cast

bulb E is mounted on the top of the valve- 50 case, the connection, as shown in the drawings, being made by a threaded socket *c* in the case, which receives a threaded stem *e* of the bulb, the latter being perforated of course and communicating with a port *d'* in the 55 valve-case above the valve. At the upper end of the bulb E there is an enlarged head *E'*, which extends upward from the bulb, is of general circular form, and is cut out to form a small circular recess or cup-shaped opening *e'*, which 60 is open at the top and communicates at the bottom by an aperture *e''* with the bulb below. This aperture *e''* is threaded to provide for the seating of a plug-holder F, which has a short stem threaded to fit the said aperture. 65 The plug-holder is surmounted by a hollow head G, which is preferably made in one piece with the holder. The upper portion of this head is enlarged, so that it nearly fills the cup, leaving between the two an annular slit *g*, 70 like that usually found in steam-whistles. The central opening *f* in the plug-holder communicates directly with the interior of the head G and is stopped with a plug *f* of metal, fusible at steam-heat. Preferably this plug- 75 opening and plug are slightly conical to give an enlarged head for steam-contact. Apertures *g'* open out radially from the interior of the head G to the space between the cup and the latter, as seen in Fig. 1. The head 80 is also provided with a long stem *g''*, extending upward, and this stem is hollow, being provided with a passage *g'''*, running its entire length, but constricted at the upper end to provide a very small opening *g''''*. The lower 85 end of this passage *g'''* communicates with the central opening in the head and is arranged directly over the fusible-plug opening. The upper end of the stem is threaded for a little distance, as seen at *g''''*, and an ordinary steam- 90 whistle bell H is mounted on the stem by means of a threaded aperture *h* in its upper end, through which the stem passes. The bell is thus made readily detachable and may be secured in any position desired on the stem 95 by means of a jam-nut *h'*.

It is obvious that we have here combined a safety-plug of fusible metal and a steam-

whistle; or the device may be stated as a "steam-whistle" constructed and adapted to operate also as a low-water alarm.

The operation is as follows: So long as the water in the boiler stands above the lower end of the steam-pipe the latter will be substantially filled with water, the valve D being turned so as to communicate with the bulb E, which is also filled, or nearly so, with water. If, however, the water in the boiler falls below the lower end of the pipe, the water therein runs out, steam enters and, coming in contact with the plug, fuses it, as usual, and thereby provides an escape for the steam into the head G and thence out through the annular space  $g$ , thereby sounding the whistle if the bell is in place. It is evident that if the head G were made as usual in steam-whistles the metal of the fusible plug would be driven into the latter, thereby stopping the ports and preventing the steam from escaping more or less. The opening in the stem above the head is for the purpose of obviating this difficulty. The fused metal will be blown up into this space, thereby leaving the steam-outlets free. The opening in the stem is constricted at its upper end to prevent the too rapid escape of the steam therefrom, which would perhaps affect the operation of the whistle. It will be seen that the holder for the fusible plug is essentially a part of the whistle—that is to say, it is made in one piece with the head G, which, with its cup, is very much the same as in ordinary whistles.

In some locations it may not be desirable to sound a whistle—for instance, in school-buildings, or stores employing many young people, where the sounding of the whistle would very likely cause a panic. For this reason we make the bell detachable, so that in locations, such as mentioned above, the bell may be removed, in which case the device will be operative just the same as before, except that there will be no whistle, but only the hissing

of escaping steam through the annular opening, which, however, will be sufficient to notify the attendants in the boiler-room.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a low-water alarm, a main pipe extending down into the boiler, in combination with a fusible-plug holder set in the upper end of the pipe and provided with lateral passages above the plug-opening for the escape of steam, and a passage directly over the plug to receive the latter when blown out, substantially as described.

2. In a low-water alarm, a main pipe B, in combination with the cup E', the hollow head G, set in said cup, with an annular opening between them, the fusible-plug holder F on the lower end of said head and mounted at the upper end of the main steam-conduit, and the hollow stem  $g^2$ , arranged immediately over the fusible plug, substantially as described.

3. In a low-water alarm, the main pipe B, in combination with the cup-shaped head E', the hollow head and plug-holder F G, set in said cup and closing the upper end of the steam-conduit, a fusible plug  $f'$ , set in an opening in the holder just below the hollow head, a hollow stem  $g^2$ , surmounting the said head and arranged just over the fusible plug, and the bell H, detachably mounted on said stem, substantially as described.

4. In a low-water alarm, the main pipe B, in combination with the valve-case C, valve D, bulb E, cup-shaped head E', hollow head and plug-holder F G, fusible plug  $f'$ , and hollow stem  $g^2$ , substantially as described.

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Witnesses:

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