To all whom it may concern:

Be it known that I, JAMES PHILP, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Fusible Plugs for Steam-Boilers, of which the following is a specification to enable others skilled in the art to which the invention appertains to make and use the same.

My invention relates to fusible safety-plugs for steam-boilers for use either in the flues or side walls of the combustion-chambers thereof, as required by law in the case of marine boilers. These safety devices have heretofore been made in the form of a conical plug of Barnea tin or other suitable fusible metal cast in a bronze casing formed with an external male screw-thread for engagement with a corresponding female screw-thread tapped in the wall of the combustion-chamber or flue to which the plug is to be applied. The design has been so arranged the casing that the truncated smaller end of the fusible plug is exposed upon the fire side of the plate or tube to which it is applied, while the broad end of the plug is exposed to the water and the internal steam-pressure, so that the minimum of surface will be in direct contact with the products of combustion, while the maximum surface is exposed to the heat removing and absorbing water, also so that should the inner or smaller end of the plug become fused the steam-pressure will be exerted upon its broader end to wedge the plug firmly in place so long as any considerable portion thereof remains unfused. In practice, however, it frequently happens that by accident, carelessness, or indifference or mainly as a matter of convenience the bronze casing containing the fusible plug is reversed in position in the plate or tube, exposing the larger end of the fusible plug to the direct heat of the products of combustion, while the smaller end of the plug is exposed to the internal steam-pressure. Under these conditions the broad end of the plug and the mass of the plug itself are readily melted or reduced to a degree sufficient to allow the steam-pressure to escape the remaining portion of the plug, which is unsupported by the inner walls of the casing, diverging, as they do, away from the end of the plug subjected to steam-pressure. In other words, by reversing the device the plug is not only exposed to greater danger of fusion, but it is also deprived of the advantages afforded under proper conditions by its wedge shape and the converging side walls of the casing acting in conjunction.

The object of my invention is to afford a fusible plug which may be designated as "50 turnable" or alike at either extremity, so that the conditions are the same whether the plug is applied internally or externally.

The invention consists, essentially, in a fusible plug and casing in which the casing is made with centrally-contracted inner side walls which converge outward in either direction, so that the filling of fusible material constitutes a duplex wedge converging inward centrally from either end of the casing, substantially as hereinafter described and claimed specifically.

In the accompanying drawings, Figures 1 and 2 represent elevations of opposite ends of my improved device. Figs. 3 to 6, inclusive, are sectional views illustrating the variations which may be resorted to in the formation of the inner walls of the casing, and consequently in the form of the duplex-wedge-shaped fusible plug. The casing A is made of bronze or other suitable metal and is formed with an external screw-thread ρ for engagement with the female screw-thread tapped in the portion S of the steam-boiler to which the device is to be applied. The novelty in the interior construction of the casing A consists in making it with a contracted bore b at or near its center, from which the inner side walls U, V diverge outwardly, either in straight or curved lines when seen in section, as in Figs. 3, 4, 5, and 6 of the drawings. The casting or filling C, of Barnea tin or other suitable fusible alloy, practically results in the formation of a duplex wedge consisting of the members c, c', merging later on or near the center of the casing A. Thus it will be seen that in the various forms shown the sides of the members c, c' converge inward centrally, so that it makes no practical difference which way the casing and plug is inserted in the portion of the steam-boiler to which it may be applied, since in any case
the broad end of a wedge-shaped portion is presented to the water and steam pressure on the inner side of the boiler, the pressure being exerted to hold and maintain that portion of the plug firmly against the converging internal side walls of the casing. The casing is preferably tapped internally to form a female screw-thread \( d \) for the insertion of a bolt for temporary purposes should the fusible filling \( C \) become entirely fused.

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

1. A safety-plug for steam-boilers consisting of a metallic casing formed with an external screw-thread and with internal side walls which converge inward from opposite ends of the casing, and a filling of fusible alloy conforming to the said converging side walls of the casing and retained therein thereby for the purpose set forth.

2. A safety-plug for steam-boilers consisting of a metallic casing formed with an external screw-thread and with internal side walls which converge inward from opposite ends of the casing, and a filling of fusible alloy conforming to the said converging side walls of the casing, said casing being also formed with an internal female screw-thread, for the purpose set forth.

3. A safety-plug for steam-boilers consisting of a metallic casing formed with an internal chamber with walls converging inwardly from opposite ends, and an external screw-thread and an internal duplex-wedge-shaped filling of fusible alloy retained within said casing wholly by contact with the walls thereof, for the purpose set forth.

4. A safety-plug for steam-boilers comprising a metallic casing having a bore contracted at its center and enlarged in opposite directions therefrom upon inclined lines, and a filling of fusible alloy contracted at its center and having its outer walls inclined outwardly therefrom in opposite directions from end to end of the casing.

Witnesses:

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FRANK E. ROACH.