

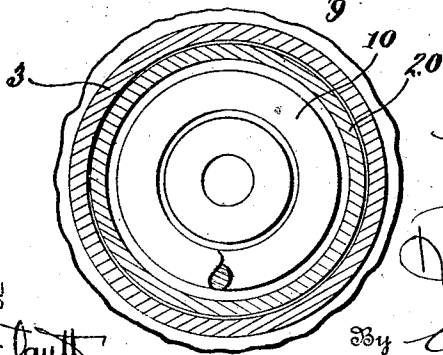
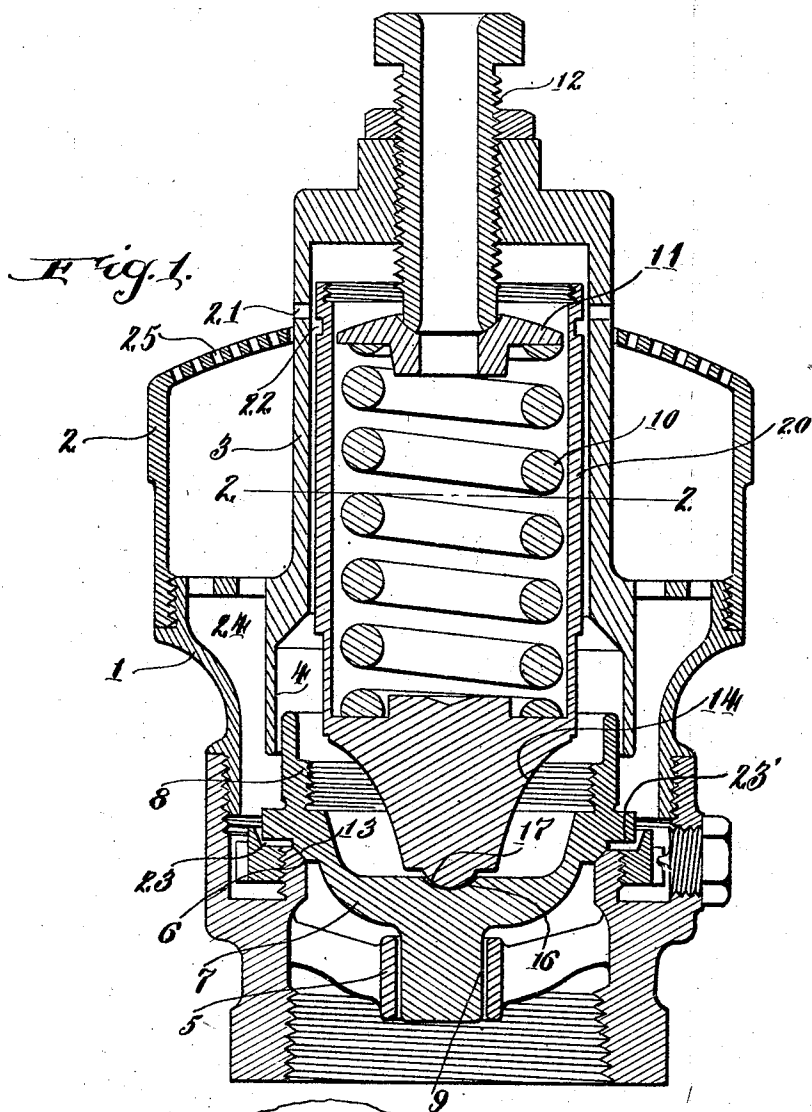
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**B. J. MORRISON**



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LOCOMOTIVE SAFETY VALVE

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## UNITED STATES PATENT OFFICE

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## LOCOMOTIVE SAFETY VALVE

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In accordance with the present existing practice all or nearly all locomotive safety valves are of the type known as feather valves having a cylindrical guide at the top and bottom. In such valves the feather or guide at the top forms a cup which contains the lower spring button and a large part of the lower portion of the spring. The spring is seated at its lower end on the button which is in turn positioned by means of a socket in the bottom of the cup which is engage by a central projection on the button upon which it is free to rock. The water which works upwardly from the valve opening between the feather and the external guiding member of the valve casing comes in contact not only with the bottom of the spring within the cup, but by splashing keeps the entire spring moistened. The water which it is necessary to use in steam plants in various parts of the country has a strong corrosive effect, particularly with the various boiler compounds with which it is treated, and corrosion of the springs in many localities is so rapid that they last but a few months, when it becomes necessary to lay up the locomotive for repairs to the safety valve.

A further difficulty is due to the accumulation of sediment in the cup at the top of the valve. This sediment tends to fill the cup and clog the lower portion of the spring rendering it practically solid so that the effective length of the spring is reduced, with a corresponding reduction in the opening of the valve, reducing its capacity and regulating effect and correspondingly increasing the time required to exhaust sufficient steam from the boiler to give the required degree of regulation. This loss of capacity has various harmful effects too numerous to mention.

The object of the invention is to overcome this difficulty by protecting the spring from the action of the water and other corrosive agencies carried thereby and to prevent the accumulation or deposit of sediment around the spring, particularly the lower portion, as above outlined, with consequent interference with and reduction of the resiliency of the spring and loss of capacity of the valve.

To this end the spring has been completely

enclosed and access of the water thereto prevented; the casing may be variously formed, constructed and supported. In the preferred form the lower spring button has been developed and extended to provide such a spring casing which is integral with the button and slides up and down in a spring chamber corresponding to the spring chamber formerly provided in such safety valve casings. The sliding of the spring casing in the spring chamber provides for the normal motion of the valve in opening and the corresponding motion of the lower button.

In the accompanying drawings I have illustrated a locomotive safety valve embodying the inventive features in the preferred form.

In the drawings:

Figure 1 is a vertical central section through the valve casing and valve, spring casing and button.

Figure 2 is a horizontal section on the line 2-2 of Figure 1.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the illustration comprises a locomotive safety valve casing 1, closely resembling the type in general use having a dome 2, spring chamber 3, upper valve guide 4, lower valve guide 5, valve seat 6, valve 7, and an upper cylindrical feather or cuplike guiding member 8 and lower guiding member 9.

The disclosure also includes valve spring 10, the upper spring button 11, which serves as a top abutment for the spring, the same being positioned from above by the adjusting screw 12 and the lower button 14 by which the spring pressure is transmitted to the valve 7.

The top guiding member or feather 8 of the valve is shown in the form of an upwardly projecting cylindrical wall which, in accordance with the usual practice, has an outwardly disposed guiding surface cooperating with the upper valve guide 4. This gives the top of the valve a cuplike formation on the bottom of which the lower spring button 14 is supported in a central positioning socket 16

which is engaged by a downward central projection or protuberance 17 of the button.

To protect the valve spring against the action of the water and other corrosive elements contained therein and from the accumulation of sediment, the valve spring 10 is enclosed in a spring casing 20 which permits of considerable variety in form and arrangement. In the form of the invention shown, this consists of a vertical cylindrical wall extending upwardly from the outer peripheral top edge of the button nearly to the top of the spring chamber 3 and sufficiently spaced therefrom to provide for the upward motion of the valve 7 in opening. This casing 20 has a free sliding fit in the chamber 3, there being clearance enough to prevent clogging and binding of the casing in the operation of the valve. To provide for the release of any water which may be blown upwardly between the valve guide 4 and the feather or valve guiding member 8, and which tends to work upwardly between the inner wall of the valve chamber 3 and the valve casing 20, the walls of the chamber are apertured radially at 21 and the outer wall of the guide at the top is grooved at 22 to impound the water and lead it to the releasing apertures 21.

In the operation of the safety valve when the boiler pressure is sufficient to raise the valve by causing the pressure on the lower surface of the valve to compress slightly the spring 10, the steam which is to be released for purposes of regulation passes between the seat 6 and the seating surface 13 of the valve and through the huddling chamber 23 of the usual type. At this point the escaping steam reacts against the downwardly disposed peripheral surfaces 23' of the valve, tending to hold the valve open until regulation has been fully accomplished. From this point the steam moves upwardly through the steam passage 24 to the dome 2 whence it is released to the atmosphere through the perforations 25. When the pressure exerted upon the lower surface of the valve drops through the low point of regulation, the valve is closed by the spring 10 and the flow of steam stops. This motion of the valve in opening and closing against and in response to the pressure of the spring 10 results in a corresponding motion of the lower button 14 and the casing 20 which, in the preferred form of the invention is integral therewith. The casing is thus caused to slide back and forth in the spring chamber 3, throwing the groove 22 into and out of registration with the apertures 21 whereby any water which works between the casing and the chamber walls having been accumulated in the groove 22 is released by way of the aperture 21.

The spring is thus completely protected from the action of the water and other corrosive elements and from the accumulation of

scale and other sediment about the spring whereby the lower portion of such springs has been clogged, and the length of the effective resilient portion reduced.

The protection of the spring from the water and other corrosive agencies greatly increases the life of the spring correspondingly increasing the periods between replacements and reducing the number of such replacements and the loss of service of the locomotive on account of repairs to the safety valve.

The elimination of clogging of the portion of the spring in the cup tends to keep the operations, i. e., the valve opening and capacity of the valve constant, obviating the necessity for frequent regulation or cleaning, etc., and reducing the number of periods of loss of service of the locomotive for adjustment or repairs.

I have thus described specifically and in detail a safety valve embodying the features of my invention in the preferred form in order that the manner of constructing, operating and using the same and the manner of applying the invention may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claim.

What I claim as new and desire to secure by Letters Patent is:

The combination in a locomotive safety valve of a valve member having a top guide forming a cup, a valve spring, a top abutment for the valve spring, a bottom abutment for the spring in the form of a spring button bearing on the valve near the center of the cup, said spring button having upright cylindrical walls forming a spring casing, enclosing and protecting the spring, the valve structure comprising a correspondingly cylindrical spring chamber in which said casing slides freely, said chamber having release openings near the top and the casing having corresponding grooves to impound the water and conduct it to said release openings.

Signed by me at Baltimore, Maryland, this 16th day of December, 1929.

BARTHOLOMEW J. MORRISON.