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SAFETY VALVE

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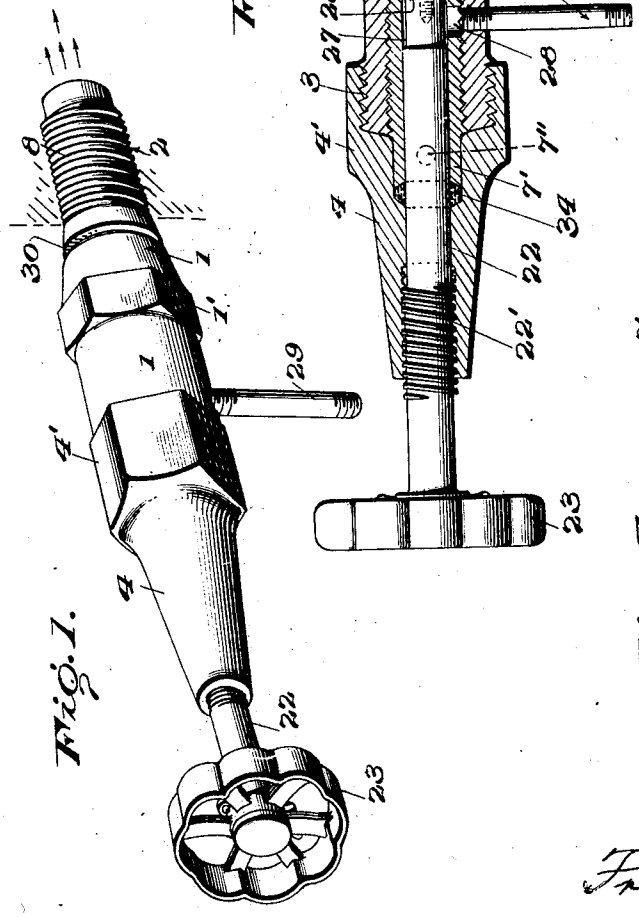


Fig. 1.

Fig. 2.

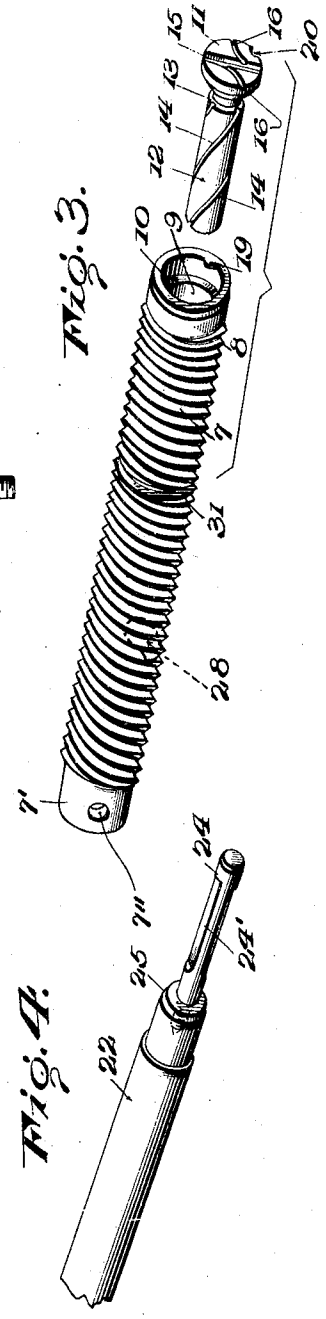


Fig. 3.

Fig. 4.

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SAFETY VALVE.

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This invention relates to safety valves of the kind that are usually mounted in boiler connections and the like to prevent the escape of steam or hot water in case the connections are broken.

The locomotive boiler is provided with a variety of connections leading to gages, blow-offs, etc., and in case breaking of these connections occurs, through wrecking of the locomotive or otherwise, the escaping steam or hot water from the boiler will be liable to scald the trainmen unless means are provided to prevent such escape of the steam and hot water.

The primary object of the present invention is to provide a safety valve for such connections that will be automatically closed by the fluid pressure of the boiler in case such connections are thus accidentally broken off.

A further object of the invention is to provide a valve of this character which may be readily cleaned under the requirements of the Interstate Commerce Commission without breaking the boiler connection.

A still further object is to provide a construction wherein all of the parts may be readily removed without the breaking of such connections, thus facilitating the cleaning of the parts, grinding of the valve seat, etc.

Finally, the invention has for its object to provide a simple construction of this character, composed of a few number of parts and which may be assembled or dissembled with a minimum amount of work.

The inventive idea is capable of receiving a variety of expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings—

Fig. 1 is a perspective view of a valve embodying the invention;

Fig. 2 is a longitudinal section thereof, the parts being shown in elevation;

Fig. 3 is a perspective view of the valve-carrying bushing; and

Fig. 4 is a broken detail of the valve stem.

In said drawings, in which like reference numerals designate like parts throughout the several views, 1 is a casing provided on its interior end with screw-threads 2, whereby it may be screw-threaded into a boiler and on the exterior end with left hand screw-threads 3, to the end that the valve bonnet 4 may be screwed thereto. This casing 1 has a central port or opening 5 leading into the boiler, which port is surrounded by an annular shoulder 6. Within the casing 1, a bushing 7 is screw-threaded as at 8, such screw-threads being formed at the inner end of the bushing and if desired throughout the length of the bushing, as shown.

The inner end of the bushing is provided with a valve chamber 9 which, near its inner end, has a valve seat 10, and a valve 11 having a stem portion 12 is mounted in the valve chamber 9 so that the valve 11 can play between the shoulder 6 and the valve seat 10. The size of the valve 11 is such that, when it is slightly raised off of its seat and out of contact with the shoulder 6, steam may pass around the valve and gain access to a groove 13, Fig. 3, exterior to the valve 11 and formed about the stem 12. A plurality of spiral grooves 14 extend from the groove 13 around the stem 12 to the outer end thereof. The inner face of the valve 11 has a tranverse groove 15 formed thereon, from which reversely curved grooves 16, 16 extend to the periphery of the valve. The outer end of the stem 12 is provided with a centrally disposed concavity 17 for the reception of the beveled end of the valve operating stem 18 hereinafter to be described.

The valve 11, together with its valve stem 12, illustrated to the right in Fig. 3, is inserted in the valve chamber 9 of the bushing, which chamber has an inwardly projecting lug 19, Fig. 3, while the valve is provided with a corresponding groove 20. When the valve is inserted within the bushing, the groove 20 is brought opposite the lug 19 to the end that the valve may readily pass into the bushing and then given a slight turn, whereupon the lug 19 prevents the valve from dropping out, the valve and its stem nevertheless being left free to rotate within the valve chamber in the bushing. By reason of the spiral grooves 14 on the stem of the valve and the grooves 15 and 16 on the face of the valve, steam passing outwardly from the boiler serves to rotate the valve, thus keeping the valve and valve receiving chamber free from any accumulation of scale or dirt. The bush-

ing 7 at its exterior end 7′ fits snugly within an interior chamber of the bonnet 4. The valve-operating stem 22 is screw-threaded at 22′ into the exterior end of the bonnet 4 and is provided with the usual or any suitable operating handle 23. Preferably the screw-threads on the screw 22 are left hand threads. This valve-operating stem 22 has, at its interior end, an extension 24 of smaller diameter than the main valve-operating stem 22 and of considerably less diameter than the interior of the bushing 7 at that point, to the end that the stem that passes around the valve 11 from the boiler may pass around the valve extension 24. Preferably this extension 24 is screw-threaded to the interior end of the valve-operating stem, of which it forms a part, and for the purpose of enabling the same to be screwed into or unscrewed from said stem, the same is provided with flattened faces 24′, as clearly shown in Fig. 4. At the point where the valve-operating stem unites with extension 24, said stem is provided with a valve 25, here shown as preferably formed by the suitably shaped end of said valve-operating stem and seats on a valve seat 26, and when seated prevents the outward passage of steam.

The valve-operating stem 22 is slightly reduced at 27, so that there is an annular space surrounding the stem opposite an opening 28 leading into the interior of the bushing. A pipe 29 is secured into or otherwise connected to the casing 1, and when the parts are assembled, the port or opening 28 is opposite the open end of the pipe 29, which pipe leads to the gage cock or other connection. Preferably the opening 28 is larger than that of the end opening of the pipe 29, in order to insure perfect registration without the necessity of exercising undue care in that regard when the parts are assembled.

The casing 1 is formed for the reception of a wrench to screw the same into a boiler, and the bonnet 4 is likewise formed for the reception of a wrench for the purpose of screwing the same onto the casing.

For the purpose of enabling the bushing 7 to be screw-threaded into the casing 1, openings 7″ are provided in the outer end of the bushing, through which a rod may be passed for this purpose. An external annular groove 30, Figs. 1 and 2, is formed around the casing opposite the point where the part 24 of the valve-operating stem bears upon the valve stem 12, and immediately opposite this groove 30 in the casing is formed an annular groove 31 around the bushing. These two grooves serve to weaken the casing and the bushing at this point, and in case the structure becomes broken at any place the break will occur at this weakened point, in which case the steam from the boiler passing outward through the port 5 forces the valve 11 onto the valve seat 10, thus effectively preventing the escape of steam or water from the boiler.

In assembling the parts, the casing is screw-threaded into the boiler in the absence of any steam therein, the valve 11 is dropt into the inner end of the bushing, bringing the groove 20 opposite the lug 19 for this purpose, and then given a slight turn and held therein as previously described. The bushing is then screw-threaded into the casing, the threads uniting the two parts being such that when the bushing is screwed home so that the inner end of the bushing contacts with the shoulder 6, the port 28 comes opposite the opening of the pipe 29.

The bonnet 4 is then screwed onto the exterior end of the bushing, the valve operating stem 22 first having preferably been screw-threaded into the outer end of the bonnet. The packing 34 surrounds the valve-operating stem 22 and is compressed between oppositely disposed annular concave shoulders in the bonnet 4 and on the end of the bushing.

With the parts thus assembled, the valve-operating stem 22 is screwed down through the operation of the handle 23 with the stem extension 24 resting in the concave socket 17 of the valve stem, until the valve 11 is slightly raised from its seat 10.

With the parts in this position steam passes through the port 5 around the valve 11 through the groove 14 and around the valve stem extension 24, and, the valve 25 being slightly raised from its seat 26, passes through the port 28 and into the pipe 29. By screwing the valve stem 22 in to a sufficient extent, the valve 25 may seat firmly on the seat 26, thus entirely preventing the escape of steam through the ports 28 and the pipe 29. This valve seat 26 is one that requires frequent grinding to cause it to function perfectly, and by unscrewing the bonnet 4 from the casing 1, said bonnet with the valve-operating stem and the valve 26, as well as the valve stem extension 24, are readily removed and the valve seat 26 exposed for grinding without removal of the parts from their connection with the boiler. Inasmuch as the pressure on the valve stem 12 has been withdrawn by reason of the withdrawal of the valve-operating stem 22, steam passing outwardly through the port 5 forces the valve 11 firmly on its seat 10, and thus the escape of steam is prevented and the grinding operation can be effected even though steam is carried in the boiler. Moreover, under the requirements of the Interstate Commerce Commission, the interior passages of these valves have to be inspected and cleaned at short intervals, and by thus removing the bonnet and the valve-operating stem, as just described, the interior passage of the bushing down to the valve stem 12 is open for cleaning by the passage of a rod

therethrough. In case there is no steam in the boiler, the bushing can be removed and the valve 11 with its stem 12 withdrawn from the bushing and the entire passage through the bushing can be readily cleaned with a suitable brush or rod without disconnecting the valve casing from the boiler. Preferably the valve unit is made of Monel metal, though this is not absolutely essential.

It will be observed that the valve constituting this invention is one of extremely simple construction, readily assembled and disassembled with few operations, and requiring no tools other than a wrench, and a rod to pass through the openings 7″ in the bushing.

While the valve shown in the drawings has been specifically described in detail, it is to be understood that the invention is not limited to such specific details and that the same may be varied within the limits of the appended claims without departing from the invention.

What is claimed is:

1. In a valve of the character described, the combination of the casing open at its inner end, a tubular bushing secured in the casing, a valve and valve-seat located in the inner end of the bushing, a bonnet secured to the outer end of the casing, a valve-operating stem screw-threaded into the bonnet and passing into the bushing and into operative relation with the valve in the inner end of the bushing, and a valve on said valve-stem and seating on a valve-seat within said bushing.

2. In a valve of the character described, the combination of the casing open at its inner end, a tubular bushing having two valve-seats formed therein, separate valves cooperating one with each seat, a bonnet screw-threaded on said casing, and a valve-stem screw-threaded in said bonnet for opening the inner valve and closing the outer valve when the inner valve is fully open, the inner valve adapted to be moved toward its seat by fluid pressure on retraction of the valve stem and outer valve.

3. In a valve of the character described, the combination of a casing having a port for communicating with a boiler, a bonnet secured to the outer end of the casing, a tubular bushing within the casing, a valve and valve-stem mounted in the inner end of said bushing, a valve-operating stem extending through said bonnet into the bushing and into operative relation with said valve-stem, said bushing and casing being weakened at a point approximately opposite the outer end of said valve-stem.

4. In a valve of the character described, the combination of a casing adapted to open into a boiler, and a steam connection leading from said casing, a tubular bushing in said casing having a port leading to said steam connection, a valve within the inner end of said bushing capable of being closed by pressure from the boiler, a valve-operating stem to open said valve against boiler pressure, and a valve on said valve-operating stem between the boiler and said steam connection.

5. In a valve of the character described, the combination of a casing and a bushing, a valve in said bushing closing under boiler pressure, said casing and bushing being provided with fracture lines exterior to said valve.

6. In a valve of the character described, the combination of a casing adapted to open into a boiler, and having a steam conveying conduit leading therefrom, a bushing secured at its inner end in said casing and removable through the outer end thereof, a safety valve mounted in the inner end of said bushing, a bonnet secured to the casing and, with the casing, enclosing said bushing, and a valve-operating stem adjustably mounted in said bonnet, whereby said valve, bushing, bonnet and stem may be removed without disturbing said casing or conduit.

7. In a valve of the character described, the combination of a casing open at its inner end, a bushing in said casing having a valve-receiving chamber with an inwardly projecting lug, and a revoluble valve in said chamber, said valve being provided with a peripheral recess capable of being brought into registry with said lug.

In testimony whereof I have signed this specification.

FRENCH E. GODSEY.