W. HARGREAVES.

SAFETY VALVE.

APPLICATION FILED OCT. 30, 1919.

1,359,169.

Patented Nov. 16, 1920.

3 SHEETS—SHEET 1.

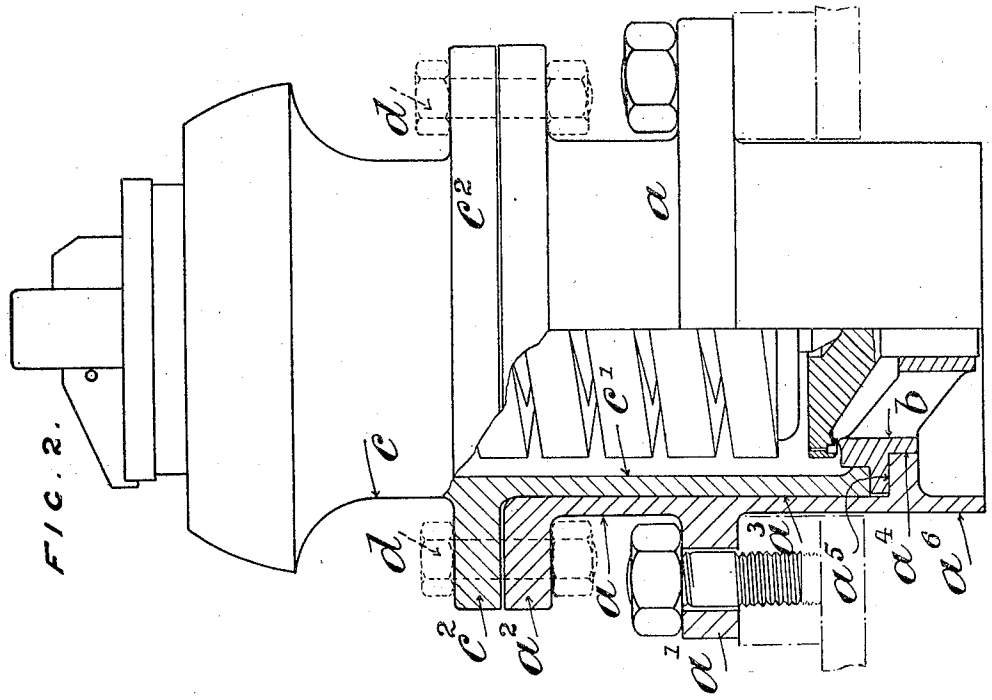


FIG. 2.

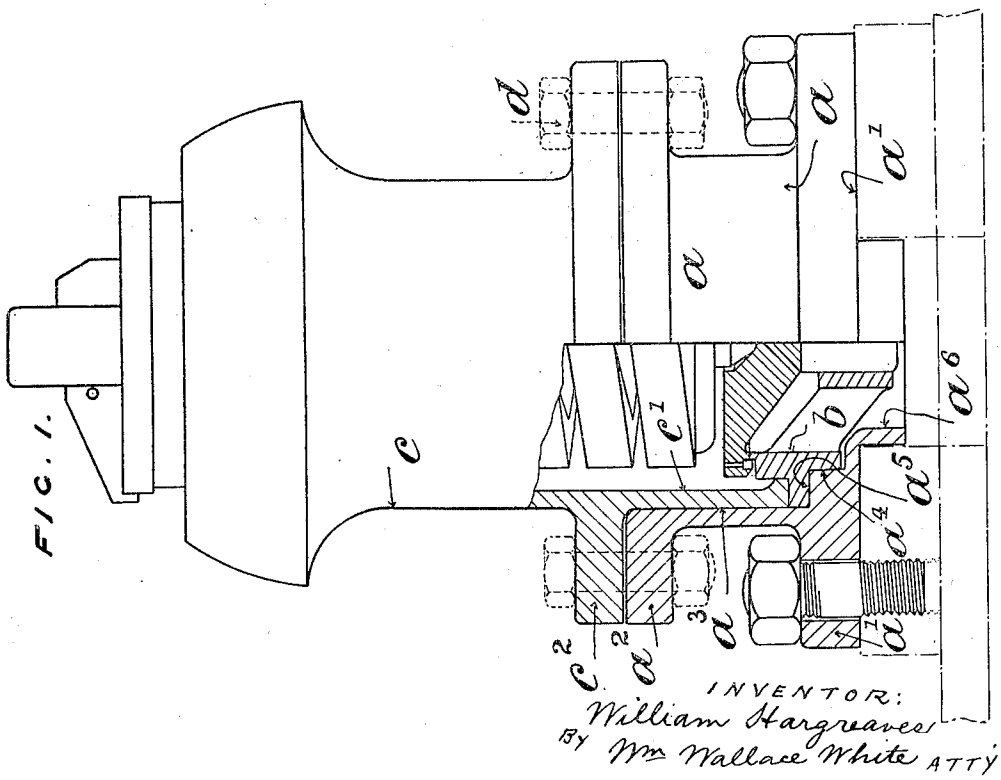


FIG. 1.

INVENTOR:
William Hargreaves
By Wm Wallace White ATTY.

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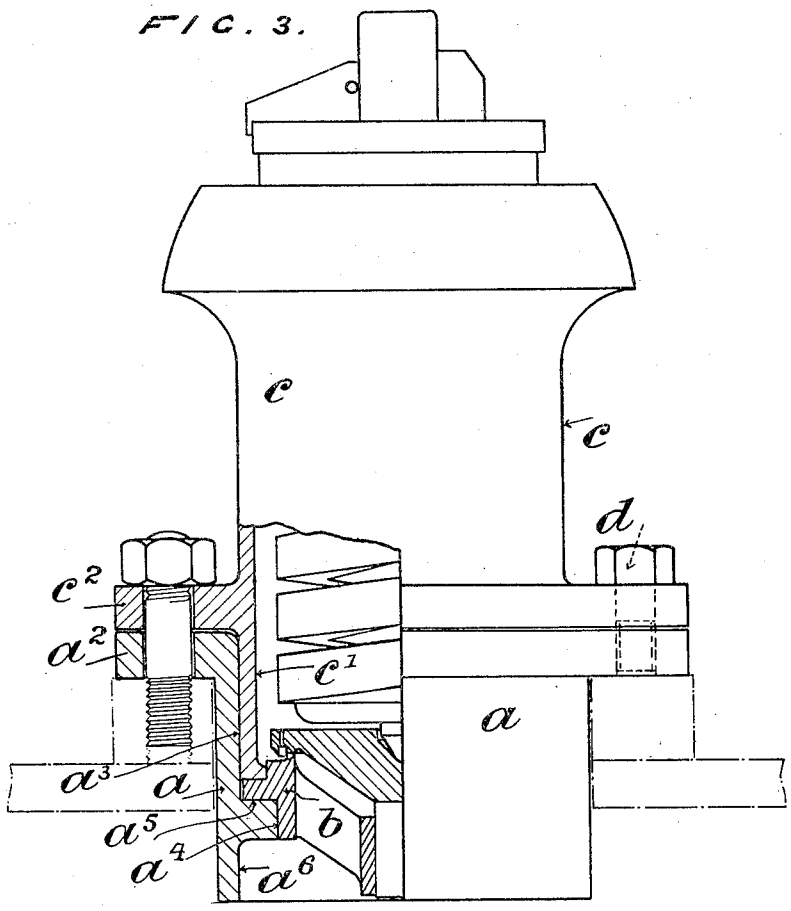
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3 SHEETS—SHEET 2.

FIG. 3.



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3 SHEETS—SHEET 3.

FIG. 5.

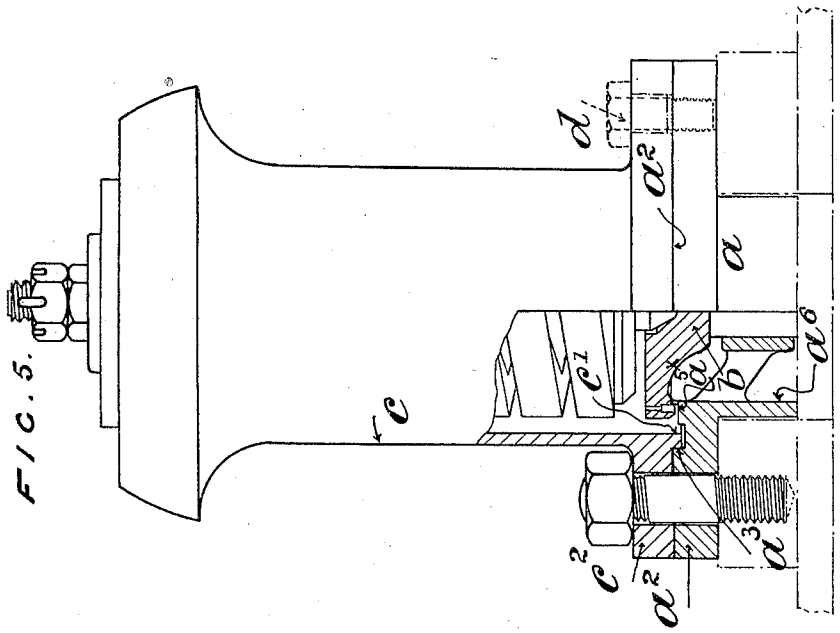
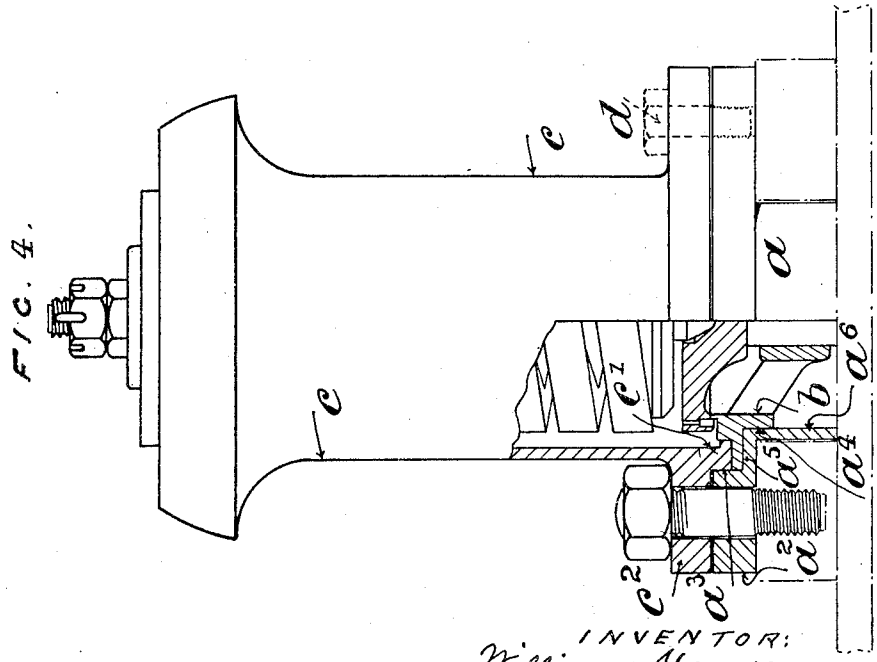


FIG. 4.



INVENTOR:
William Hargreaves
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UNITED STATES PATENT OFFICE.

WILLIAM HARGREAVES, OF MANCHESTER, ENGLAND, ASSIGNOR OF ONE-HALF TO R. L. ROSS AND COMPANY LIMITED, OF STOCKPORT, ENGLAND.

SAFETY-VALVE.

1,359,169. Specification of Letters Patent. Patented Nov. 16, 1920.

Application filed October 30, 1919. Serial No. 334,618.

To all whom it may concern:

Be it known that I, WILLIAM HARGREAVES, a subject of the King of Great Britain and Ireland, residing at Chorlton-cum-Hardy, Manchester, in the county of Lancaster, England, have invented new and useful Improvements in or Connected with Safety-Valves, of which the following is a specification.

This invention relates to safety valves and in particular to muffled pop safety valves of the "Ross" type.

In such valves a liftable secondary area or its equivalent is used, in which holes are drilled, and, over such, a rotatable plate with corresponding holes drilled therein is fitted, adjustment of such rotatable plate opening or diminishing steam passage way through said holes.

The primary object of the invention is to produce more compact valves which shall not stand so high and whereby valves of the "Ross" type, and possessing all the advantages inherent to such valves, can be used on modern locomotives having high fire-boxes or on other boilers and the like where head room is restricted.

Under this invention I can considerably reduce the over-all height of such valves so that when applied to a locomotive the valve shall be below or clear of the loading gage.

Further objects of my invention aim at producing a cheaper construction and also a safety valve in which the assembly can be made and the safety valve tested with the valve seat in position, and the safety valve thereafter removed and applied without in any way disturbing any of the elements. Thus, the setting obtained at the test or trial, is assured and the complete valve can be delivered in perfect order and no skill in fitting or applying is called for.

A further feature of importance is, that I can locate the valve seat low down or almost level with the boiler plates thus insuring a compact arrangement and permitting a reduction in over-all height.

The attached drawings illustrate my improvements applied to muffled pop safety valves of the kind indicated.

Figure 1 shows an elevation, partly in section, one construction of my improved safety valve.

Fig. 2 illustrates a modification of the construction shown in Fig. 1.

Fig. 3 is an elevation partly in section and shows a modification.

Fig. 4 shows an elevation, partly in section, of another construction embodying my features of novelty.

Fig. 5 is an elevation, partly in section, showing a further modification.

Referring in the first place to Figs. 1 to 3. In the examples, Figs. 1 and 2, I use a base ring a of gun metal or such like to support the valve body or casing and this base ring a is formed with two flanges a^1 a^2 for ready attachment of the valve body or casing thereto. This flanged base ring a is bored to two diameters a^3, a^4, and a seating a^5 is cut or fashioned, which, by way of example stands below the level of the top of the flange a^2, thus bringing such seating as low as possible with relation to the flanged base ring a and consequently effecting a considerable reduction in the required over-all height of the valve.

I may make the valve seat b separate, and such valve seat is shaped to the required form in accordance with valve seats of the Ross type, and the same has, or may have, a downwardly projecting extension which with the object of effecting a saving in height projects down toward the bottom face of the base ring. A ring or ferrule a^6 applied to the bottom of the base ring, or fashioned therewith as shown, affords protection to the valve seat during transit and fits the aperture or opening in the boiler plates or on the usual safety valve seating of whatever form to which the safety valve is applied. The form of the valve seating and its exact location near the bottom of the flanged base ring a can be varied.

To hold the valve seat in place, the main body or casing c of the safety valve may have a cylindrical or tube-like extension c' so that when the flange c^2 of said main body or casing c rests on the upper flange a^2 of the base ring, and the said flanges a^2, c^2 are bolted together, as shown, the valve seat b is immovably held. Instead of the cylindrical extension c', a separate sleeve may be used or projecting distance pieces or other means by which the valve seat b can be held down. In the modification Fig. 2 the construction is very similar to what

is illustrated by Fig. 1, but in this case the flanged base ring is extended downward producing a sleeve reaching into the steam space, and the extension c' on the valve casing is necessarily longer. Similar letters of reference indicate like parts on Fig. 2 to those in Fig. 1.

From the above, it is seen that the valve seating b is located and held in the flanged base ring a and so almost at the very base of the complete safety valve and that proper provision is made to reach down to and hold said valve seat without the taking up of any space in the main valve body or casing.

In the modification illustrated in Fig. 3, I dispense with the base ring a formed with two flanges and use in lieu thereof a gun metal or other base ring or casting a which has a flange a^2 which provides for bedding direct onto the boiler plates, seating, or the like. This casting is formed with a cylindrical downward extension a^6 of some length and is bored to two diameters a^3, a^4 so that an internal flange or shoulder a^5 is produced toward the bottom of the cylindrical extension. On this lower internal flange I dispose the valve seat b. This is shown as made separate and is turned with a flange approximately mid-way in its length such flange being seated on the lower internal flange a^5 which is part of the casting a.

The valve seat is of the "Ross" or approved type. Such valve seat is held in place by a downwardly projecting extension or sleeve c' or distance pieces or the like from the main-body or casting c of the valve. The main-body casting c of the safety valve has a flange c^2 which rests on the flange a^2 of the lower casting a and is bolted or otherwise secured thereto to complete the connection of the two elements, the pressure exerted by the studs, bolts or the like fastening means also pressing the valve seat b on to the lower flange a^5 so as to insure a joint as is obvious. The studs, bolts, or the like, also serve to bolt the complete safety valve device to the boiler plates or the seating as is indicated. The valve seat may be formed integral with the lower casting or be applied thereto in a different fashion from that indicated.

The bolts and studs marked d, Figs. 1, 2 and 3, are used to hold the valve casing to the base ring a and to secure complete assembly ready for fixing the complete valve as is hereafter more fully explained.

Referring to the example Fig. 4, I make use of a stout base ring a of gun metal or such like, the bore of which is of different diameters at different parts thereof, as shown at a^3, a^4 for application of the valve seat. The valve seat consists of a turned sleeve b with an approximately central outer flange. The stout base ring a is or may be slightly reduced to provide a proper seating for the lower face of the outer central flange of the valve seat b and the lower spigot of said valve seat device fits the bore a^4 of the stout base ring a. The main safety valve body c has a strong base flange c^2 and is bored as to its lower extremity c' for the upper spigot of the valve seat to fit same, the annular central outer flange of the valve seat b being clamped between the stout base ring a and the lower flange or extension c' on the safety valve body. The other elements of the safety valve including the actual valve are disposed in the main body c as will be understood.

In assembling, the valve seat b is placed in position and the main body is held down on the stout base ring by the application of studs d, bolts, or screws, or such like, which insures the assembly and permits the valve to leave the workman's hands fully assembled.

The valve can then be tested in the shop, other holes being bored through the flange c^2 and stout base ring a for the fixing of the complete valve on the testing plate, and for fixing the tested valve to the boiler, as by the application of studs, bolts or the like as shown.

Referring now to Fig. 5, instead of making the valve seat separate, the valve seat may be fashioned integral with the stout base ring a, as is illustrated in said Fig. 5, where the valve seat is marked $a^{5\times}$ or the valve seat might even be fashioned along with the main safety valve body; or separately fixed to either element. In such case, provision is made for insuring a good joint between the stout base ring a and the face or bottom of the safety valve body c. The elements c and a are in such cases held together on assembly by studs or the like d, and, the complete safety valve is secured by studs, bolts or the like as indicated to the boiler plates or mounting as is obvious. The valve casing c, Fig. 5, is shown with a short cylindrical extension or annular lower lip or ledge c^1.

With my constructions, the holding down studs or bolts, or the like, are not requisite for insuring the proper disposition of the assembly, the complete safety valve being sent out in exact condition as tested and approved, and the holding down studs or bolts afterward applied serve no other function than that of securing the completely assembled valve in place when fixed to the boiler or mounting.

The arrangement not only insures a reduction in over-all height, but simplifies the construction and facilitates testing and offers conveniences in transit and fixing.

Under the above described constructions the valve seating is located and held in the

base ring or casting and so almost at the very bottom of the complete safety valve and proper provision is made for reaching down to and holding the valve seat without taking up any space in the main valve body or casing. The valve retaining springs are thus kept above and out of the steam space.

The manner of locating and holding the valve seat enables the height of the indicated type of safety valves to be reduced by some inches without having to dispose any movable parts below the base line of the valve.

The valve, valve spindle, spring, ball and socket joints and secondary area, and other features found in the "Ross" type of safety valve, can all be accommodated in a safety valve of diminished height following the present invention.

I declare that what I claim is.

1. A safety valve, comprising a flanged base ring having a bore of different diameters at different parts thereof thereby to form a shoulder; a valve seat having a flange for engagement with said shoulder, and a valve casing having a flange adapted to rest on the flange of the base ring and a cylindrical extension fitting within the bore of said ring and resting on the flange of said valve seat.

2. A safety valve having a flanged base ring, a downwardly projecting extension from such ring, said base ring having a vertically disposed bore, a valve seat, a valve fitting same, a valve casing provided with a flange adjacent to the base of said casing, a cylindrical extension from the base of said casing fitting the bore in said base ring, means for fixing the casing flange to the base ring, and means for fixing the complete valve to the boiler seating all for the purposes herein set forth.

3. A safety valve comprising a flanged base ring, an extension therefrom, a flange about the base of said base ring, a safety valve casing, a flange on such casing, a cylindrical extension from said casing, means for fixing the casing and base ring together, and independent holding down devices passing through the base ring to fix the valve to its seat, all whereby the over-all height of the valve can be reduced as set forth.

4. A safety valve, comprising an independent flanged base ring, a tubular extension therefrom below its lowermost flange, a seating flange within said base ring, a valve casing having an exterior flange and an inner cylindrical extension below said flange, a valve seat resting on said seating flange and adapted to be clamped between the flange and the inner cylindrical extension, and means for securing the flanges of the casing and ring together thereby to hold the valve seat on said seating flange.

5. A safety valve having a base ring, a flange thereon, a downwardly projecting tubular extension therefrom, a valve seating on said base ring, a bored cavity in said ring, a valve casing, a flange on said casing, a cylindrical extension at the base of the casing, means for connecting the base ring flange and the valve casing flange and means for fixing the completely assembled valve to its seating as set forth.

In testimony whereof I have signed my name to this specification.

WILLIAM HARGREAVES.