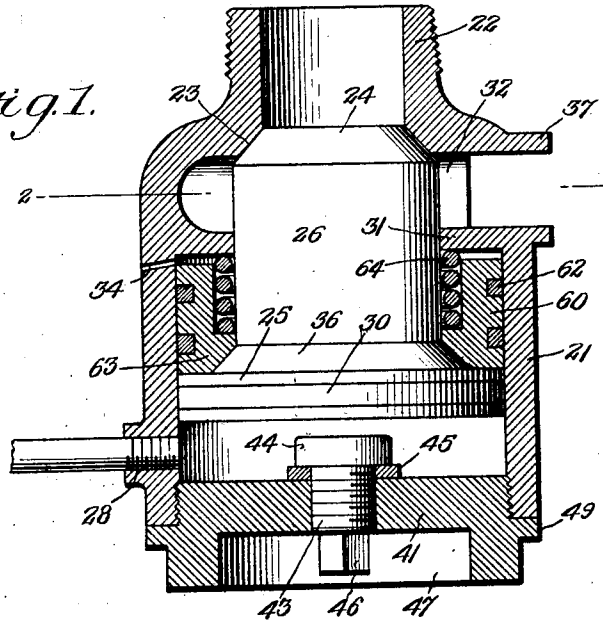
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M. R. FEELEY ET AL

SAFETY CYLINDER COCK

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Fig. 1.



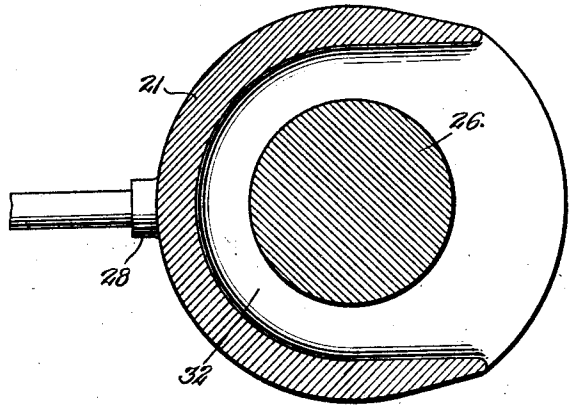
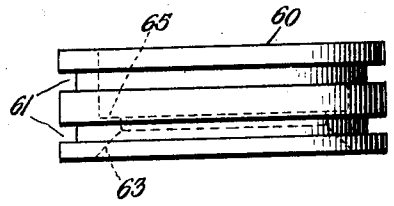


Fig. 2.

Fig. 3.



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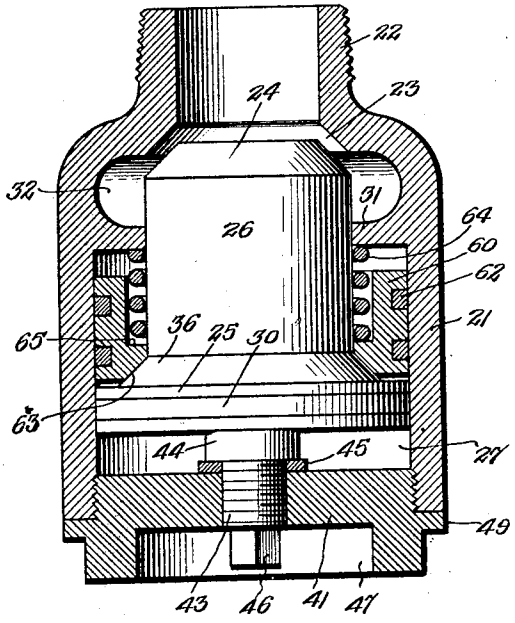
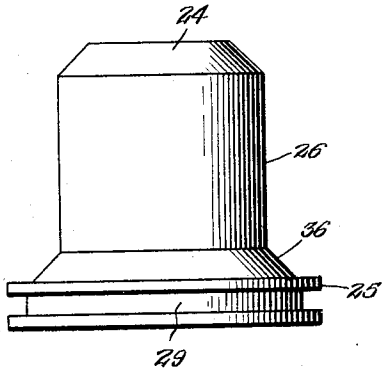


Fig. 4.

Fig. 5.



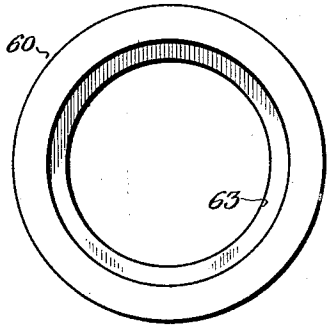


Fig. 7.

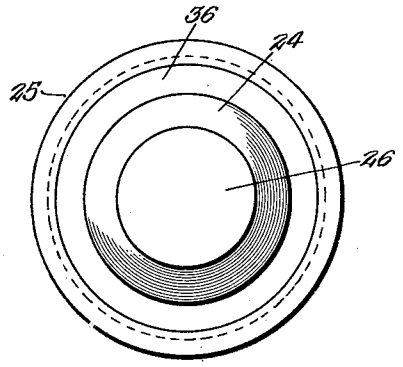


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SAFETY CYLINDER COCK.

Application filed January 21, 1926. Serial No. 82,817.

The present invention relates to improvements in safety cylinder cocks and consists in certain improvements in the device shown and described in our prior similarly entitled application, filed November 7, 1925, Serial No. 67,642.

The objects of both inventions are to provide for the automatic release and evacuation of the water trapped in the locomotive cylinders to prevent the blowing out of the cylinder heads from this cause.

The present invention, in addition to possessing the same advantages as that described in our co-pending application aforesaid, secures the further new result that the valve is cushioned in its movement to avoid its seating violently attented with considerable noise.

A further object of the invention lies in providing a new and improved construction to render the device more secure against the leakage of the compressed air which is used to seat the valve and keep it normally seated except when the water pressure in the locomotive cylinder exceeds the air pressure.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a longitudinal section taken through the improved device with the valve seated.

Figure 2 is a section taken on the line 2—2 in Figure 1.

Figure 3 is a side view of the cushioned auxiliary plunger.

Figure 4 is a vertical section taken at substantially right angles to Figure 1 and showing the parts in the lower position.

Figure 5 is a side view of the piston valve.

Figure 6 is a top plan view of the same, and

Figure 7 is a bottom plan view of the cushioned auxiliary plunger.

Referring more particularly to the drawings, 21 designates the casing or shell which may be of the generally cylindrical form shown having the contracted hollow neck 22 at its upper end provided with the external pipe thread to screw into an opening in the bottom of the locomotive cylinder.

At the base of the hollow neck 22 and interiorly of the casing is a seat 23, preferably a frusto-conical seat which may be conveniently and accurately ground for the tight seating thereagainst of the conical valve seat 24 on the movable piston valve 25. The piston valve is illustrated removed from the casing in Figures 5 and 6, and it is made with an upper reduced part forming a stem 26 carrying the cone valve seat 24 at its upper end. Above this cone valve seat 24 is an area of relatively small diameter exposed through the hollow neck 22 to the pressure within the locomotive cylinder. The lower larger piston portion 25 is mounted to reciprocate in the cylinder 27 of the casing and the bottom of the piston 25 presents a much larger area than that of the top above the valve seat 24. Air, steam or other pressure is admitted through the lateral port 28 to the bottom of the piston 25 serving to hold the piston in the raised position shown in Figure 1. The port 28 may connect by a pipe, as indicated in Figures 1 and 2, with a suitable source of pressure medium supply, for instance, the train air line.

The piston 25, according to the present invention, is narrow in a vertical sense at its lower larger area and is provided with only a single groove 29 for receiving the single packing ring 30, which has a tight fit in the wall of the cylinder 27 and prevents the escape of the pressure medium above the piston.

The guide stem 26 of the piston valve slides in the annular valve guide 31 formed in the interior of the hollow casing 21 above the cylinder 27 and just below the annular chamber 32. In fact the lower wall of the annular chamber 32 is constituted by the annular valve guide 31. A sliding fit is made between the valve guide and the valve stem 26 for two purposes, first, to cause the valve and piston to move in a true axial line, whereby the valve may seat accurately at its upper end; and secondly, to prevent the passage, as much as possible, of the water and steam down to the upper part of the cylin-

der 27. Should such steam escape to this point, however, it will be received in the upper part of the cylinder 27 at which point a lateral drain port 34 provides for the escape of same to the outside of the casing 21.

The frusto-conical auxiliary valve seat 36 is made at a lower point on the plunger valve than according to our prior invention in order to provide ample space in the cylinder 27 above the plunger 25 for receiving the auxiliary plunger 60, shown more particularly in Figures 3 and 7. This plunger is of an external diameter to fit the cylinder wall 27, while it is of ring shape with hollow interior to fit loosely about the stem 26 of the valve plunger. On its outside wall the auxiliary piston 60 is provided with one or more annular grooves 61 for receiving the packing rings 62 for the purpose of preventing leakage above or below the auxiliary piston 60 and thus preventing the water and steam from above getting into the air chamber below the piston 25 or the air from escaping upwardly. This leakage is further avoided by the internal frusto-conical seat 63 made upon the inner lower edge of the ring shaped auxiliary plunger 61. The seat 63 is made to conform to the auxiliary valve seat 36 on the plunger valve and these conical surfaces form the point of contact between the piston valve and the auxiliary cushioned piston 60. Leakage is thus avoided by this seat and these parts are kept seated at all times by the action of a coil spring 64 wound about the stem 26 and having its upper end disposed against the annular guide 31, which forms an abutment for this upper end of the spring. The lower end of the spring fits against a shoulder 65 made upon an inwardly projecting lower portion of the ring 60. Above this shoulder 65 the ring is of greater diameter to permit the coil spring 64 to pass freely therethrough. The force of the coil spring 64 devolves upon the shoulder 65 and inasmuch as this shoulder 65 is directly opposite the conical valve seat 63 a tight seating is always had, the force of the spring being expended in a direct line to cause this seating. Moreover the spring acts at the shortest diameter of the cone thus being more efficacious in action. The parts are preferably so arranged and designed that the upper end of the auxiliary cushioned plunger 60 is spaced below the guide 31 and preferably below the lateral vent 34 in the uppermost position of the plunger valve.

The bottom of the cylinder 27 is provided with internal screw threads to receive the threads provided upon the cap 41. The cap is perforated centrally to receive the threaded stop pin 43 the head 44 of which is disposed within the cylinder 27 to be engaged by the bottom of the plunger 25 in the fully open position of the parts. A packing or washer 45 is placed about the shank of the stop pin and compressed by the head 44 against the inner surface of the cap 41. This washer will avoid leakage. The stop pin projects outwardly beyond the cap 41 where it is provided with a square end 46 to take a wrench or other tool for the purpose of rotating the stop pin. The exposed projecting end 46 of the stop pin is housed within the cavity 47 in the cap and the cap is provided with a flange 49 for taking against the bottom edge of the casing 21. The cap may be provided with a hexagonal nut portion below the flange 49 for facilitating its removal and replacement.

The operation of the device is as follows:—

The plunger 30, which reciprocates in the cylinder 21 is in one piece with, or attached fixedly to, the valve 24 whereby the two move in unison. The diameter of the plunger 30 is greatly in excess of the diameter of the valve 24 and consequently a light air pressure beneath the plunger 30 will serve to keep the valve 24 closed against the greater steam pressure within the cylinder which has access at all times to the upper face of the valve 24. The air pressure received in the lower part of cylinder 21 through the pipe connected at 28 may originate from the locomotive reservoir or from any other suitable source of air pressure. When water accumulates sufficiently in the locomotive cylinder to which the neck 22 is connected, the pressure on top of the valve 24 will exceed the air pressure beneath the plunger causing the valve to open. Figure 4 shows the fully open position where the locomotive cylinder is evacuated, the water and steam having access to the annular chamber 32 and this chamber, as shown in Figure 1, is provided with the lateral cut away portion or exhaust port 37. Any water or steam getting down past the guide 31 will be evacuated through the vent 34.

When the locomotive cylinder has been sufficiently evacuated, so that the pressure above the valve 24 drops below that of the pressure beneath the plunger 25, such plunger valve will tend to close. The spring 64 will cushion the closing movement of the valve and prevent the valve face 24 from striking the valve seat 23 and with great violence attended by loud noise. Where the valve is permitted to seat only slowly and lightly the pitting of the valve seat is prevented and a tight fit is insured. The coil spring 64 will become compressed as the valve approaches the closed position and will exert a progressively increased opposition to the closing movement. This will also at the same time preserve a tight joint at the valve seats 35 and 63.

Another important function subserved by the cushioned auxiliary plunger is the con-

servation of the air pressure below the piston 25. This train pressure is maintained only at considerable expense and the wasting of air pressure is intolerable. Moreover the bleeding of the air line is apt to cause actuation of other devices controlled thereby.

If desired steam pressure might be used beneath the piston 25 or other available pressure medium.

The great utility for the present device is that of protecting the cylinder heads against blowing out. This is a disastrous sequence of the accumulation of too much water, which is incompressible in the cylinders. This water is shoved by the piston against the cylinder head and results in the yielding of such cylinder head. In order to make the device particularly responsive in emergencies of this kind, the piston is made in two parts, namely, in the parts 30 and 60. As a consequence the piston 30 and its connected valve 24 are lighter in construction. Moreover the piston 30 is narrow vertically and carries only a single packing ring. Packing rings exert a frictional or dragging effect on the movement or action of the piston and consequently this dragging movement on the piston 30 is reduced to a minimum, at the same time preserving the tightness which will prevent the free escape of the very costly compressed air. At the same time an extremely effective packing is provided by the auxiliary piston 60 with its elongated vertical surface and two packing rings. This piston 60 is urged by the coil spring 64 against the piston 30 and acts for the most part as a unit with the piston 30. However, when excessive pressure builds up in the locomotive cylinder, this pressure may quickly force down the valve 24 and plunger 30 to permit escape of the accumulated water before the cylinder head gives away; this action taking place without the dragging effect of the auxiliary piston 60. This auxiliary piston will, however, quickly follow and by virtue of the valve seat 36 the main and auxiliary pistons will be again bound together in a united whole.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:—

1. An improved cylinder cock comprising a casing having connection to a locomotive cylinder and having an outlet for the steam and water with a valve seat between said outlet and the locomotive cylinder, a piston valve movably mounted in said casing and having a valve seat to close against said casing valve seat, means for supplying an elastic fluid under pressure to said casing and against said piston valve whereby to hold the piston valve yieldably closed, an auxiliary seat on said piston valve, and a yieldably urged auxiliary plunger having a seat for closing against the auxiliary seat on said piston valve.

2. An improved cylinder cock comprising a casing having connection to a locomotive cylinder and an outlet for the steam and water with a valve seat between the outlet and locomotive cylinder, a piston valve movably mounted in said casing and adapted to close against said casing seat, said piston valve having a reduced stem with a conical auxiliary valve seat at its base, an auxiliary plunger movably mounted in said casing and being of ring shape with a lower inwardly projecting portion having its lower edge formed complementary to said auxiliary valve seat of the piston valve, and a coil spring extending about said stem within the ring shaped auxiliary plunger for urging the latter and the piston valve downwardly.

3. An improved cylinder cock comprising a casing adapted to have connection to a locomotive cylinder and provided with an outlet for the steam and water with a valve seat between the locomotive cylinder and the outlet, a cylinder in said casing having communication at its lower portion with a source of compressed air supply and having a vent at its upper portion, a thin piston fitted to reciprocate in said cylinder and having small frictional resistance against the cylinder wall, said piston having a remote valve seat for closing against said casing valve seat and a proximate valve seat, an elongated auxiliary piston fitted to slide in said cylinder adjacent said thin piston, said auxiliary piston having an internal valve seat adapted to engage against the proximate valve seat of said piston, and yieldable means for urging said auxiliary piston toward said first mentioned piston.

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