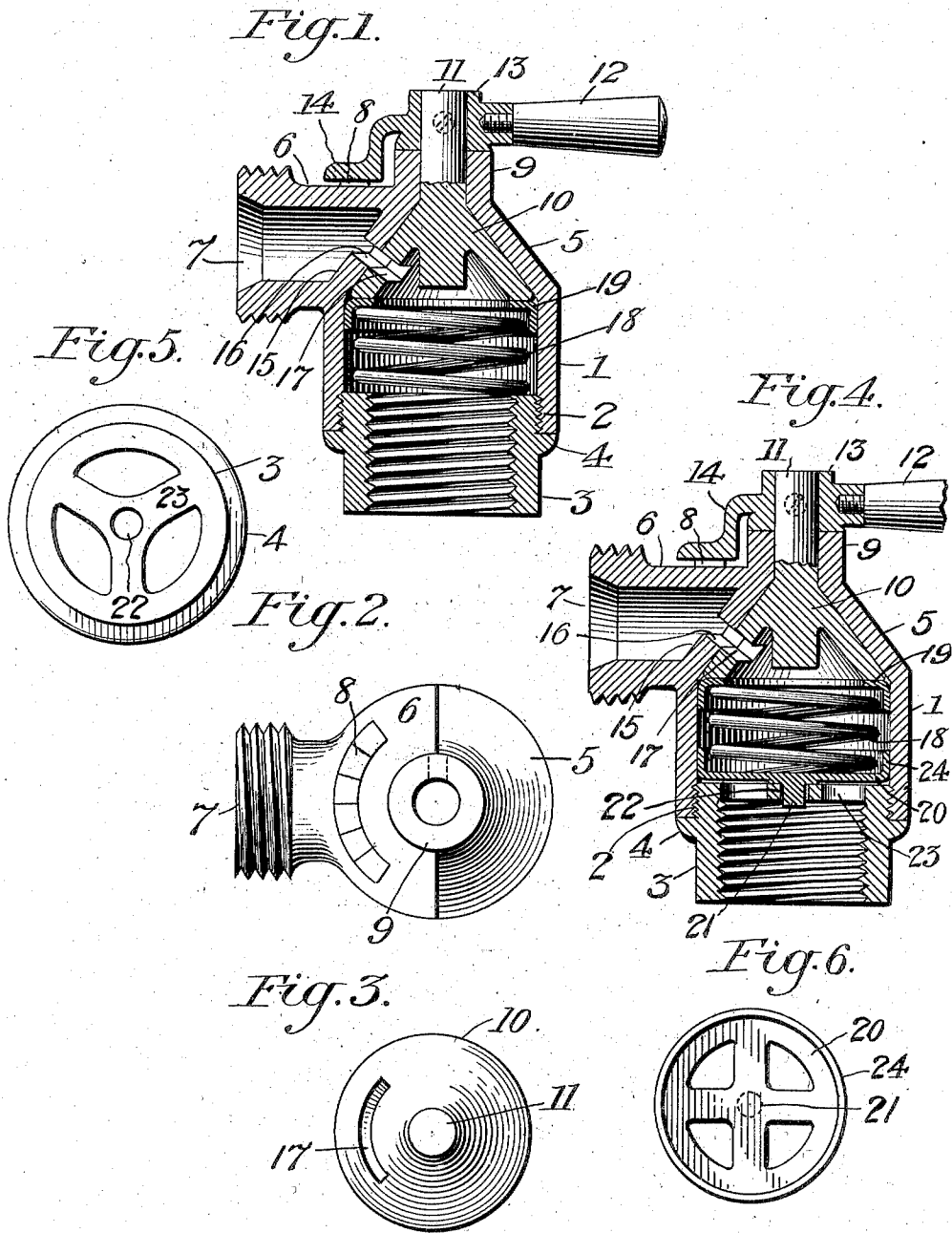


C. S. FRISHMUTH.
 PACKLESS VALVE.
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967,009.

Patented Aug. 9, 1910.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES S. FRISHMUTH, OF PHILADELPHIA, PENNSYLVANIA.

PACKLESS VALVE.

967,009.

Specification of Letters Patent.

Patented Aug. 9, 1910.

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To all whom it may concern:

Be it known that I, CHARLES S. FRISHMUTH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Packless Valves, of which the following is a full, clear, and exact description.

The object of this invention is to provide a so-called "packless" valve; that is to say, a valve requiring no stuffing box or gland or packing otherwise placed, to render it fluid tight, and which, while of general utility is specially applicable to steam-heating systems.

It is desirable to regulate with considerable nicety the admission of steam to the radiators in steam heating systems. One system uses only one valve on each radiator, with a drain pipe at the opposite end of the radiator from that at which the valve is located. When this valve is fully opened sufficient steam is admitted to fill the entire radiator before condensation begins, and then by turning the valve to more or less completely close it the quantity of steam admitted is reduced, so that any number of coils, sections, loops or manifolds composing the radiator less than the whole number, may be filled, and so the temperature of the room be affected. The valve under the consequent variations in temperature is subjected to extremes of contraction and expansion, and consequently it is difficult to keep it leak-tight and readily operable, and prevent it from sticking.

It is sought by this invention to provide a valve that will adequately meet these conditions.

The invention consists of a packless valve having a conical valve seat, a plug fitted to said seat, a stem on said valve which does not come into contact with its seat, said valve preferably held to its seat by a spring internally applied, and an indicator showing the position of the ports, or, in other words, the extent to which the valve is open and admitting steam, all as I will proceed now particularly to describe and claim.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a longitudinal section of one embodiment of the invention. Fig. 2 is a top plan view of the casing or shell. Fig. 3 is

a top plan view of the plug detached. Fig. 4 is a longitudinal section of a valve showing the spring mounted upon a spider pivoted in a cross-bar in the tail-piece or connection. Fig. 5 is a top plan view of the connection. Fig. 6 is a top plan view of the spider.

The valve casing or shell in the construction shown, has a cylindrical body 1, with a screwthread 2 in one end to receive the screwthreaded tail-piece or connection 3, one of the functions of which is to connect the valve with a steam supplying medium. This connection has a lateral flange 4 to limit the extent of insertion of the connection into the shell and to make a slightly external finish. The upper end of the shell is made frusto-conical at 5, with a substantial horizontal shelf or offset 6, merging into the lateral connection 7, and bearing the indicator marks or scale 8. The connection 7 is designed to permit connection with the radiator or coil, in any usual way. The conical portion 5 has a cylindrical hub 9. The interior of the frusto-conical part of the shell is ground to afford a valve seat for the correspondingly-shaped plug 10. This plug is made hollow, and has a cylindrical stem 11 rising from its conical apex and fitted in the bore of the hub 9, so as to have free play therein, and thus forestall all expansion difficulties. Outside of the shell the stem is provided with a handle or other form of turning device 12, and the hub 13 of this turning device and the adjacent end of the hub 9 are machined or otherwise accurately fitted, so that by properly adjusting the turning device on the stem and fixing it thus by the set screw indicated by dotted lines in Figs. 1 and 4, the plug may be drawn up to its seat and held there; and, further, this accurate fitting of these two parts insures against the weight of the turning device tilting the plug on its seat; and still further, by reason of the fact that the stem is no part of the seating or active face of the plug, but rises as a cylinder from the conical valve face of the plug, there is little if any liability of leakage about the stem.

The handle hub 13 is made or provided with an indicator finger 14, working over the indicator scale 8.

The connection 7 is separated from the interior of the shell by a wall 15 having a segmental port 16. This wall is a part of the conical valve seat. The plug 10 likewise has a complementary segmental port 17

registering with the port 16 in the shell. By turning the plug, any desired port opening may be secured, and the extent of opening will be shown by the position of the finger 14 on the scale 8, so that the operator may know at a glance the relative quantity of steam entering the valve.

The plug is held to its seat by a coiled or other spring 18, resting on the upper edge of the connection 3 and bearing against the lower edge of the plug, preferably through an interposed angle wear-plate or ring-shield 19. The tension of the spring may be regulated by the extent to which the connection 3 is screwed into the shell, under limitation of the flange 4, or by the thickness, or presence or absence of the wear-plate or ring-shield 19.

As shown in Figs. 4, 5 and 6, the spring may be supported upon a rotary spider 20 having a central pivot-lug 21 seated in a hole 22 in the cross-bar 23 of the tail-piece or connection 3; and this spider also has a rim-flange 24 to confine the spring, and like the part 19 to serve as a shield for it. The mounting of the spring in this spider obviously admits of the adjustment of parts without liability of twisting the spring, since there is no strain on the spring. In these constructions, the truly cylindrical stem, rising from the frusto-conical plug compels the seat to take the pressure off of the stem and thus, as stated, forestalls the sticking of the valve under expansion. The plug has a considerable spread or wide angle, and a corresponding seat, and the plug is kept in contact with its extended seat by the spring. In case of expansion or contraction, the spring operates automatically directly upon the plug and maintains it seated and tight at all times, and so insures additionally against leakage around the stem.

So far as I am aware, valves of this general character now in common use have ground seats, and have to be so perfectly machined and delicately adjusted that if the service is continuous or for long periods, their easy and effective operation is but short-lived. In all ground plug cocks, the seat part is almost cylindrical. In use these valves readily oxidize or corrode in contact with the fluid, and when there is a variation in temperature, changes result which interfere with the easy operation of the valve or cock. In my construction, the plug is held in place with the pressure and requires no force to push back against the pressure, since it has only rotary movement, and because of this it remains fixed in its position on the seat; and being held to its seat by the spring and the pressure beneath, it will remain in the same position notwithstanding variations in temperature. The plug and its seat being accurately ground in the first instance, and the plug fitted to rotate contin-

uously in one plane, no difficulties will occur by reason of any inequality of surface; in fact, the continued movement of the plug on its seat keeps the plane of contact smooth and regular.

Other forms of indicators may be used.

The invention is not limited to the precise construction and arrangement of springs, but the constructions shown are preferred, because of the compensation for the effects of variations in temperature.

It is important, also, that the handle be secured to the stem of the plug in a fixed manner, so that the plug may not be drawn too tightly to its seat. It has been found that the use of a nut on a screwthreaded end of the valve-stem, arranged above the handle, is likely to result in such excessive tightness, because most workmen are disposed to turn down a nut hard. On the other hand, if the nut be loosely applied, it is apt to be run off in operating the valve. I have shown the handle fixed to the stem by a set-screw laterally applied, and this insures against the objections named to the use of a nut, and not only so, but fixes the handle securely to the stem and to its rest upon the hub. As distinguishing from a nut, which is unstable and movable in the use of the valve, and a set-screw or other fixed fastening, which is stable and immovable, I herein refer in the claims to the latter as a stable and immovable fastening.

By means of the constructions described, the purpose and object of the invention are accomplished in a simple and efficient manner, and by a durable device. There is no need for packing of any sort to render the valve fluid-tight, and the valve may be operated easily.

Although the invention is shown as embodied in a shell having a cylindrical body, it is obviously within my invention to use a body of any desired or appropriate contour.

What I claim is:—

1. A valve, having a shell provided with a body containing a frusto-conical valve seat having a segmental port, a lateral discharge connection opposite said port, a cylindrical hub rising from said seat, and a supply connection, combined with a frusto-conical hollow plug of wide spread fitted to said seat and ported complementally and provided with an integral stem arranged in said hub, said seat and plug accurately fitted, and the plug having a handle secured in place in a stable and immovable manner, a spring interposed between the base of the plug and the supply connection and maintaining said plug on its seat, and an angle wear plate interposed between the spring and base of the plug, whereby the valve is rendered and maintained leak-tight without requiring packing.

2. A valve, having a shell provided with a

body containing a frusto-conical valve seat having a segmental port, a lateral discharge connection opposite said port, a cylindrical hub rising from said seat, and a supply connection, combined with a frusto-conical hollow plug of wide spread fitted to said seat and ported complementally and provided with an integral stem arranged in said hub, said seat and plug accurately fitted, and the plug having a handle secured in place in a stable and immovable manner, a spring interposed between the base of the plug and the supply connection and maintaining said plug on its seat, an angle wear plate interposed between the spring and base of the plug, whereby the valve is rendered and maintained leak-tight without requiring packing, and whereby the supply of fluid passing through the valve is nicely regulated, and means to indicate the quantity of such fluid so passing.

3. A packless valve, having a shell provided with a body terminating in a frusto-conical and ported valve seat, a cylindrical hub for the stem, a frusto-conical ported plug fitted to said seat and having a cylindrical stem loosely fitted in said hub, and a handle on said stem, combined with a spring arranged to press the plug to its seat, a wear-plate interposed between the spring and plug, an adjustable connection fitted to the body of the shell beneath the spring, and a rotatable spider interposed between the spring and said connection.

In testimony whereof I have hereunto set my hand this seventeenth day of April A. D. 1909.

CHARLES S. FRISHMUTH.

Witnesses:

HENRY ASBURY RAND,
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