P. H. STEINER.

SELF ALINING PISTON VALVE.

APPLICATION FILED DEC. 17, 1919.

1,374,405. Patented Apr. 12, 1921.

Fig. 1.

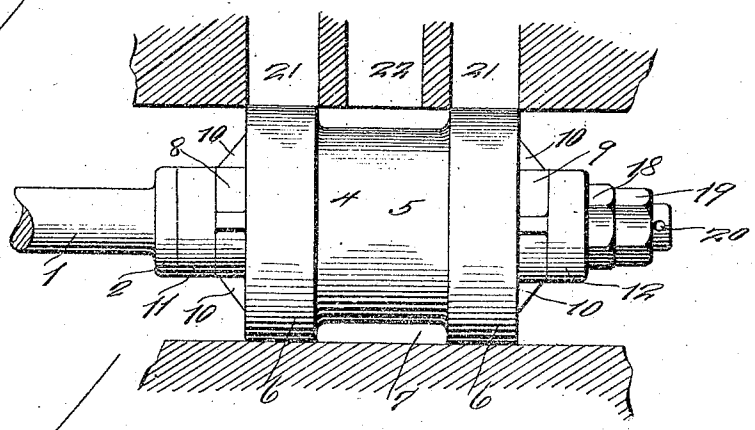
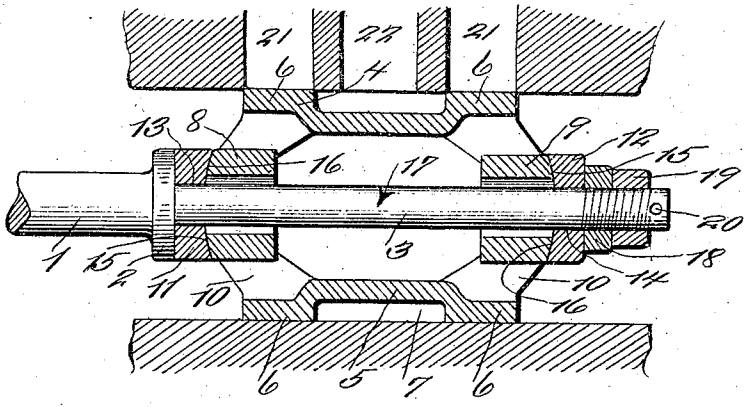


Fig. 2.



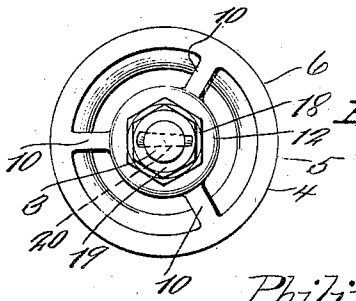


Fig. 3.

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SELF-ALINING PISTON-VALVE.

1,374,405. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed December 17, 1919. Serial No. 345,562.

To all whom it may concern:

Be it known that I, PHILIP HENRY STEINER, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Self-Alining Piston-Valves, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improved piston valve and an object of the invention is to provide a device of this kind which is very simple and practical in construction and which is capable of alining itself during its operations with relation to the interior of the valve chest.

Another object of the invention is to provide a piston valve, so mounted upon the valve rod that it is capable to movements relatively to the rod, so that it may easily aline itself with the wall of the chamber, in which it reciprocates, there being means mounted upon the rod to prevent axial movement of the valve.

A further object of the invention is to provide a piston valve structure, particularly adapted to eliminate all uneven wear on the working surface of the valve, that is to say, the working surface of the valves and the wall of the steam chamber in which the valve operates and also to provide a specific novel construction, whereby the valve may accurately aline itself, in order to reduce the wear to a minimum.

While the design and construction at present illustrated and set forth is deemed preferable, it is obvious that as a result of a reduction of the invention to a more practical form for commercial purposes, the invention may be susceptible to changes, and the right to these changes is claimed, provided they are comprehended within the scope of what is claimed.

The invention comprises further features and combination of parts, as will be hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a view in side elevation of the improved piston valve constructed in accordance with the invention, showing the same engaging the walls of the chamber in which the valve operates.

Fig. 2 is a longitudinal sectional view through the piston valve, more clearly showing the detail construction of the same and the mounting of the valve on the rod whereby the valve may aline itself with the wall of the chamber.

Fig. 3 is an end view of the valve.

Referring more especially to the drawings, 1 designates a valve rod which may be of any suitable construction, but constructed preferably of steel, though not necessarily. The valve rod has an integral collar 2 and an extension 3, which extends beyond the collar, and is of smaller diameter than the valve rod, the piston valve 4 is mounted upon the extension 3 and is preferably constructed as shown, though not necessarily. In the present form of construction the piston valve comprises a body 5, which is hollow and is provided exteriorly with cylindrical enlargements 6. In fact the greater portion of the center of the body 5 is of less diameter than the enlargements 6, so as to provide a steam exhaust space 7 between the enlargements, whereby as the enlargements coöperate with the usual steam ports 21 and exhaust ports 22 of the steam chamber (not shown) steam will be allowed to enter the cylinder, so as to enter the piston chamber of the steam cylinder (not shown).

The piston valve at its opposite ends is provided with head members 8 and 9, which are preferably cylindrical, though not necessarily and are connected to the inner portions of the enlargements 6 of the valve by the radial parts 10. In fact the heads 8 and 9 together with the radial parts 10 constitute head webs for the valve. It is to be noted that while the extension 3 passes through the head members 8 and 9, there is considerable looseness or play, so as to permit the piston valve to move or rock relatively to the extension 3.

Mounted upon the extension 3 are adjustable collars or washers 11 and 12. The washer or collar 11 is arranged adjacent the collar 2 which is integral with the valve rod. It will be noted that the openings 13 and 14 of the collars or washers 11 and 12 are of sufficient diameters, to neatly fit the extension 3, so as to prevent any movement of the collars 11 and 12 relatively to the extension, and the extension 3 is allowed sufficient movement, vertically or horizontally to permit adjustment of the piston.

The adjacent faces of the collars 11 and 12 are concaved spherically so as to provide curved bearings 15. The opposite ends of

the head 8 and 9 of the piston valve are convexed spherically, as shown at 16. These concaved and convexed engaging faces are constructed on a radius equal to one-half of the total distance between the outer faces of the outer spherical convexed faces of the heads 8 and 9. For instance, the radius of the spherical ends of the heads 8 and 9 extend from the center 17 of the piston valve. The adjustable collars or washers 11 and 12 have their openings of such diameters as to permit the collars to pass over the extension 3, and yet allowed to neatly fit the extension so as to prevent movement of the collars radially with relation to the extension 3, which will be allowed sufficient movement vertically or horizontally to permit adjustment of the piston. The collar or washer 11 is first placed in position against the integral collar 2, afterward the collar 12 is arranged in position, the concaved faces of both collars facing each other. After applying the collar or washer 12 a nut 18 is threaded to the extension 3, afterward a lock nut 19 is threaded on the extension, and having a transverse pin 20 to hold the nut 19 in place.

It will be noted that while the piston valve is in its reciprocating movements, the valve is capable of rocking between the spherically concaved faces of the collars 11 and 12, whereby the valve may aline itself to the walls of the chamber in which the valve operates, thereby reducing the wear upon the inter-engaging parts of the valve and the wall of the chamber.

A piston valve constructed along these lines may have a prolonged life, and furthermore the cost of repairs may be reduced to a minimum, since the wear upon the contacting part of the valve, is considerably reduced.

The invention having been set forth, what is claimed as new is:

1. In a device as set forth, a reciprocating rod having a piston valve carrying end, a slide piston valve unit provided with opposite head members having axially alined openings, through which the valve carrying end passes, the exterior opposite ends of the head members having spherical convexed portions concentric with the center of the piston valve, said rod having a collar integral with one end of the valve carrying end, a removable collar on the valve carrying end adjacent said integral collar, a second removable collar on the opposite end of the valve carrying end of the rod, means for holding the second collar in position, said removable collars being axially alined and having their adjacent faces spherically concaved concentric with and coöperatively engaging the spherical convexed portions of the head members, the axially alined openings of the head members being of diameters larger relatively to the diameter of the valve carrying end, whereby the valve is capable of rocking movements at right angles to the valve carrying end on a radius from an approximate center of the valve carrying end.

2. The combination with a reciprocating rod having a valve carrying end, of spaced collars removable and operatively mounted on said valve carrying end having adjacent spherically concaved faces whose radii extend from an approximate center of the valve carrying end, a piston slide valve unit having opposite axially alined head elements, the outer end faces of which being spherically convexed conforming concentrically to and operatively engaging the spherical concaved faces of said collars, thereby preventing axial movement of the unit, said head members having axially alined openings through which the valve carrying end passes, said openings being larger in diameter relatively than the valve carrying end, thereby permitting the unit to rock in a plane at right angles to the valve carrying end on a radius from said approximate center of the valve carrying end.

3. In a self-alining piston valve, a reciprocating rod having a valve carrying end, spaced collars removably and operatively mounted on said valve carrying end and having adjacent spherically concaved surfaces whose radii extend from an approximate center of the valve carrying end of the rod, a piston slide valve unit on the valve carrying end between the spaced collars which act to prevent axial movement of the unit, said slide valve unit having opposite axially alined head elements having axially alined openings of larger diameters than the valve carrying end of the rod and through which the rod passes, in combination with the remote outer end faces of the head elements being spherically convexed conforming concentrically to and operatively engaging the spherical concaved faces of the collar whereby the unit may rock upon planes at right angles to the valve carrying end on a radius from said approximate center of the valve carrying end of the rod.

In testimony whereof I hereunto affix my signature.

PHILIP HENRY STEINER.