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 aligning 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.

Figure 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 cooperate with the usual steam ports 21 and exhaust ports 22 80 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 85 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 90 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 105 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 ex-
tend 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 ra-
dially with relation to the extension 3, which
will be allowed sufficient movement
vertically or horizontally to permit adjust-
ment of the piston. The collar or washer 11
is first placed in position against the in-
tegral collar 2, afterward the collar 12 is
arranged in position, the concaved faces of
both collars facing each other. After ap-
plying 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 spher-
cally 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 fur-
thermore the cost of repairs may be reduced
to a minimum, since the wear upon the con-
tacting 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 op-
opposite head members having axially aligned
openings, through which the valve carrying
end passes, the exterior opposite ends of
the head members having spherical con-
 vexed 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 carry-
ing 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 aligned
and having their adjacent faces spherically
concaved concentric with and cooperatively
engaging the spherical convexed portions of
the head members, the axially aligned open-
ings 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 ap-
proximate 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 ex-
tend from an approximate center of the
valve carrying end, a piston slide valve unit
having opposite axially aligned head ele-
ments, the outer end faces of which being
spherically convexed conforming concen-
trically to and operatively engaging the
spherical concaved faces of said collars,
thereby preventing axial movement of the
unit, said head members having axially
aligned 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 approxi-
mate center of the valve carrying end.

3. In a self-aligning piston valve, a re-
ciprocating rod having a valve carrying end,
spaced collars removable and opera-
tively mounted on said valve carrying end
and having adjacent spherically concaved
surfaces whose radii extend from an ap-
proximate center of the valve carrying end
of the rod, a piston slide valve unit on the
valve carrying end between the spaced col-

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 op-
opposite head members having axially aligned
openings, through which the valve carrying
end passes, the exterior opposite ends of
the head members having spherical con-
 vexed 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 carry-
ing 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,