Dec. 2, 1924. 1,517,489

L. J. BARWOOD

PUMP PISTON

Filed June 30, 1924

Fig.1.

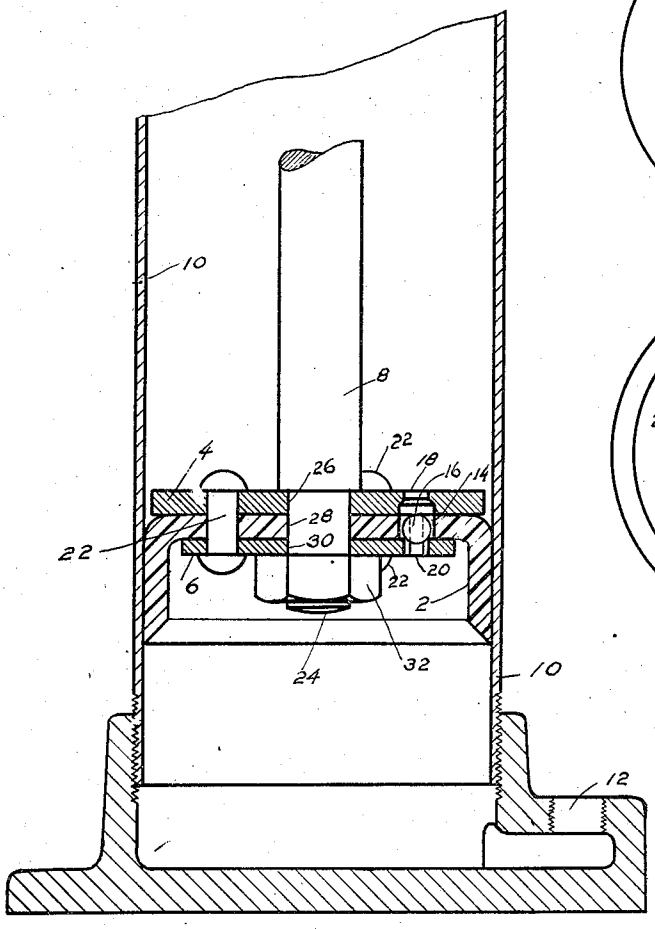



Fig.2.

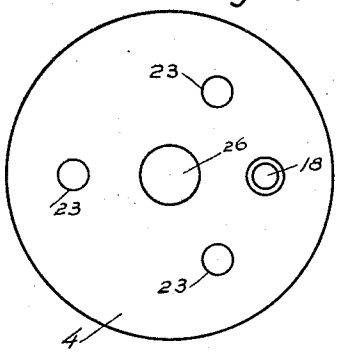



Fig.3.

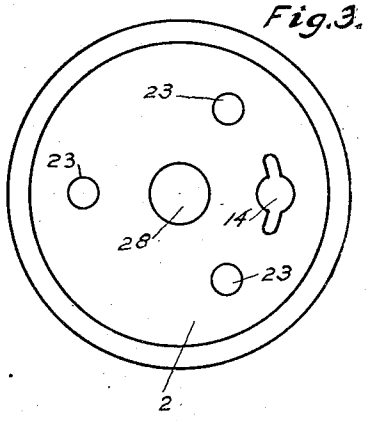
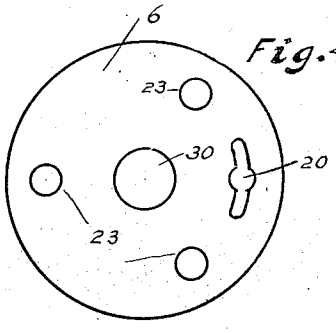



Fig.4.




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# UNITED STATES PATENT OFFICE.

LEON J. BARWOOD, OF ALLSTON, MASSACHUSETTS.

## PUMP PISTON.

Application filed June 30, 1924. Serial No. 723,273.

*To all whom it may concern:*

Be it known that I, LEON J. BARWOOD, a citizen of the United States, and a resident of Allston, in the county of Suffolk and Commonwealth of Massachusetts, have invented new and useful Improvements in Pump Pistons, of which the following is a specification.

The present invention relates to pumps, and has for its object to provide a new and improved pump piston that shall be cheap to construct, easy to manipulate, and very efficient in operation.

The invention will be more fully explained in connection with the accompanying drawings, in which Fig. 1 is a longitudinal sectional view of a conventional pump, showing a preferred embodiment of the present invention; and Figs. 2, 3 and 4 are views respectively of the upper plate or washer, the cup and the lower plate or washer of the preferred pump piston shown in section in Fig. 1.

Air pumps of ordinary construction comprise a disk or cup 2 of leather or similar material confined between metal plates or washers 4 and 6, and mounted upon a piston rod 8. On the pumping or downward stroke, the leather 2 theoretically binds against the walls of a cylinder 10 in which it is confined, forcing air under pressure through a discharge opening 12. On the return or upward stroke of the piston, the leather 2 theoretically releases its hold on the walls of the cylinder 10, permitting air to leak between it and the cylinder walls, from the upper portion of the cylinder into the lower portion of the cylinder. The leather thus vibrates into and out of engagement with the cylinder walls. This theoretical operation is very seldom approximated in practice. The leather, in order that it may vibrate as above explained, is necessarily made very thin and flexible, but after a very short period of use, it becomes dried up and loses its flexibility, with the result that it will not hug the cylinder walls on the pumping stroke. It has therefore been proposed to provide an additional means for artificially maintaining the sides of the leather cup in continual engagement with the cylinder walls, both on the up and the down strokes, and to permit the escape of the air on the up stroke through a valve provided upon the pump piston. The proposals heretofore suggested, however, have been too costly and clumsy to be practicable, so that the old-time pumps, with all their disadvantages, are still in universal use by preference.

According to the present invention, the intermediately disposed leather or other member 2 is made quite thick. Being, therefore, somewhat inflexible, it will retain its original shape and dimensions, so as to engage the cylinder walls very tightly without the necessity of using any additional means for confining the sides of the cup against the cylinder walls. The comparatively large thickness of the member 2 serves another purpose, in that, through the provision of an opening 14 therein, it may itself, serve as the cage for a ball or other valve member 16 that is freely movable towards and from the plates 4 and 6. Great simplification of structure is thereby attained. The plates 4 and 6 are provided with openings 18 and 20, respectively, that are in alinement with the opening 14. Air is thus adapted to escape, on the upward stroke of the piston, from the upper portion of the cylinder 10 into the lower portion, through the openings 18, 14 and 20. On such upward stroke, the ball 16 rests against the walls of the opening 20, and in order that it may not interfere with the passage of the air through the opening 20, it is made elongated, as shown more particularly in Fig. 4, where the longer dimension of the opening 20 is shown greater than the diameter of the ball 16. The shorter dimension of the opening 20 is, however, smaller than the diameter of the ball 16, so as to prevent the ball escaping from its cage. An intermediate portion of the opening 20 is shown rounded to permit the ball to become seated therein on the upward stroke of the piston. The opening 14 is provided with extensions, shown more particularly in Fig. 3, alining with the extensions on each side of the rounded portion of the opening 20, to permit the air free access through the extensions to the opening 18.

On the downward stroke of the piston, the ball will seat tightly in the opening 18. The opening 18 is round, and of smaller diameter than the diameter of the ball 16, so as to become tightly closed by the ball, and prevent the escape of air therethrough, during the pumping stroke.

The bottom of the cup-shaped member 2 and the plates 4 and 6 are permanently se-

cured together, in face-to-face contact, as shown in Fig. 1, with the ball 16 imprisoned in the opening 14 by the plates, by rivets 22 extending through openings 23 in the plates and the cup. A unitary, self-contained structure is thereby produced, that may be placed upon, or removed from, the piston rod, by merely inserting the threaded, reduced end 24 of the piston rod through central, alined openings 26, 28 and 30 in the plate 4, the cup 2 and the plate 6, respectively, and applying a tightening nut 32. The structure is as cheap as it is simple and effective,—so cheap, in fact, that it is found to be less expensive to throw the whole piston away, and to substitute another therefor, than to replace the leather cup when it wears out.

The invention is obviously susceptible of considerable modifications by persons skilled in the art without in any way departing from its spirit and scope, and such modifications are considered to be embraced within the invention, as defined in the appended claims.

What is claimed is:

1. A pump piston comprising two plates and a cup-shaped member having a bottom disposed between the plates, the bottom of the cup and the plates being secured together in face-to-face contact, and each provided with an opening, the openings being in alinement, and a ball freely mounted in the opening of the cup-shaped member so as to move freely towards and from the openings in the plates, the opening in one of the plates being substantially circular, with its diameter smaller than the diameter of the ball, and the opening in the other plate being elongated, with its smaller dimensions smaller than the said diameter and its longer dimension greater than the said diameter, whereby the ball is adapted to close the circular opening and not to close the elongated opening, the ball being imprisoned in the opening of the cup-shaped member by the plates.

2. A pump piston comprising two plates and a cup-shaped member having a bottom disposed between the plates, the bottom of the cup and the plates being secured together in face-to-face contact, and each provided with an opening, the openings being in alinement, and a ball freely mounted in the opening of the cup-shaped member so as to move freely towards and from the openings in the plates, the opening in one of the plates being substantially circular, with its diameter smaller than the diameter of the ball, and the opening in the other plate being elongated, with its smaller dimensions smaller than the said diameter and its longer dimension greater than the said diameter, whereby the ball is adapted to close the circular opening and not to close the elongated opening, the ball being imprisoned in the opening of the cup-shaped member by the plates, the plates and the bottom of the cup-shaped member being provided with additional alined openings, and a piston rod mounted in the additional openings.

3. A pump piston comprising two plates and a cup-shaped member having a botton disposed between the plates, the cup-shaped member being constituted of relatively thick material, the bottom of the cup and the plates being secured together in face-to-face contact, and each provided with an opening, the openings being in alinement, the sides of the cup-shaped member being unconfined and adapted to contact with the walls of a pump cylinder, and a valve element freely mounted in the opening of the cup-shaped member so as to move freely towards and from the openings in the plates, the opening in one of the plates being smaller throughout than the diameter of the valve element, and the opening in the other plate being smaller than the valve element in some directions and greater than the valve element in other directions, whereby the valve element is adapted to close the opening in the said one plate and not to close the opening in the said other plate, the valve element being imprisoned in the opening of the cup-shaped member by the plates.

In testimony whereof, I have hereunto subscribed my name this 27th day of June, 1924

LEON J. BARWOOD.