

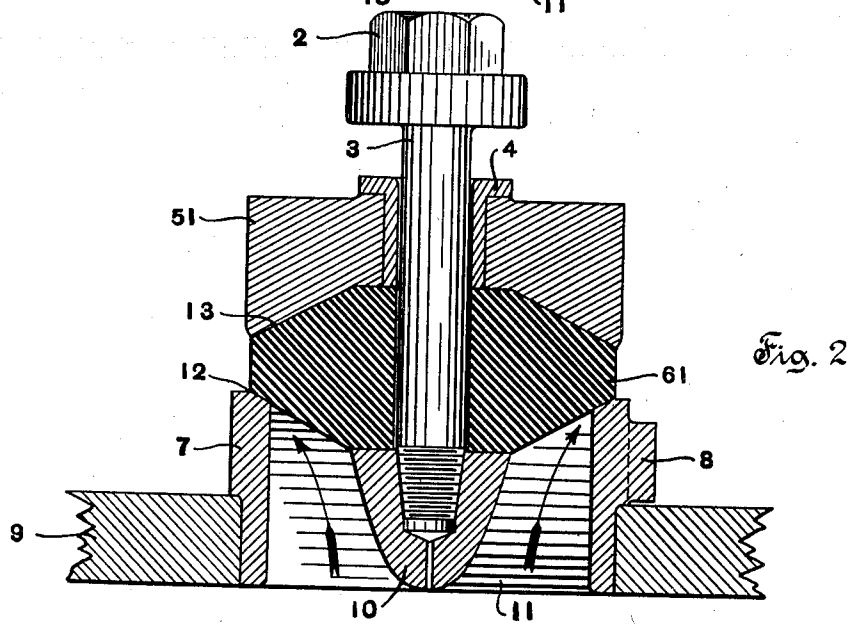
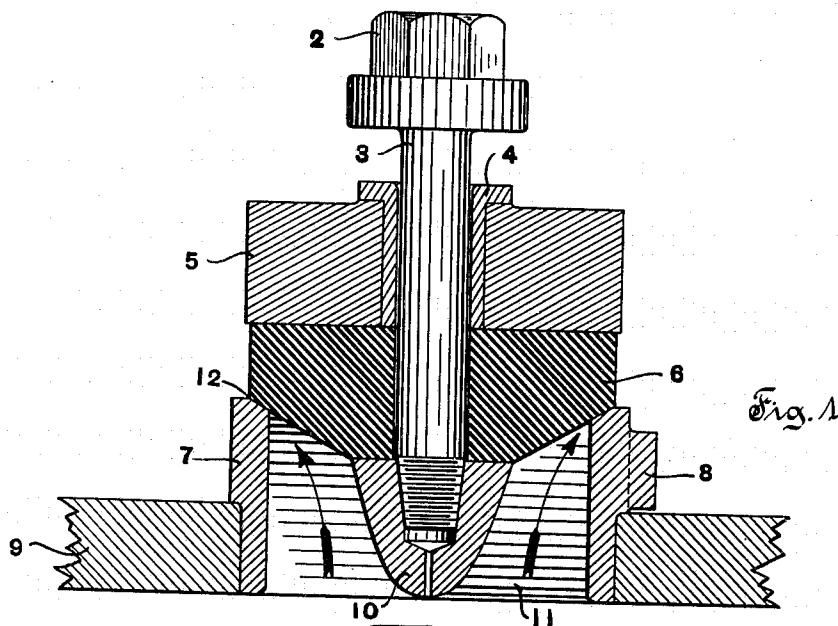
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G. L. KOLLBERG

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PUMP VALVE

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Inventor
G. L. Kollberg
by G. J. DeWain
Attorney

UNITED STATES PATENT OFFICE.

GUSTAF L. KOLLBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE.

PUMP VALVE.

Application filed November 1, 1919. Serial No. 335,526.

To all whom it may concern:

Be it known that GUSTAF L. KOLLBERG, a citizen of the United States of America, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, has invented a certain new and useful Improvement in Pump Valves, of which the following is a specification.

This invention relates in general to improvements in the art of pumping liquids and relates specifically to improvements in the construction of valves for hydraulic pumps.

An object of the invention is to provide a pump valve which is simple in construction and efficient in operation. Another object is to provide a simple and efficient rubber disk valve structure.

It has heretofore been customary to employ india rubber or like material in the construction of disk valves for hydraulic pumps. These disk valves have invariably been formed of a circular disk or ring of india rubber of uniform thickness, having a plane surface coactable with the adjacent valve seat. Such prior valves have proven objectionable for a number of different reasons, the more important of which being first, that the uniformity in thickness of the valves provides insufficient strength of material at the center thereof, and second, that the liquid in order to pass the valve seat is compelled to abruptly change its direction of flow through an angle of ninety degrees.

The present invention contemplates the provision of an improved valve structure in which these and other objectionable features are eliminated. It is further contemplated by the present invention to provide a valve which may be readily reversed in order to prolong its life. The invention further contemplates various improvements in pump valve construction which will reduce to a minimum the cost of construction of the pump and which will increase to a maximum the efficiency thereof.

The term "india rubber" as employed throughout this specification is intended to cover any material having characteristics similar to those of caoutchouc. Other specific terms are employed herein merely for the sake of clearness and should be given their broadest possible interpretation.

A clear conception of several embodiments of the invention and of the operation of

valves constructed in accordance therewith, may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a central vertical section through a vertically disposed rubber pump valve and the structure cooperating therewith.

Fig. 2 is a central vertical section through a reversible vertically disposed rubber pump valve and the structure cooperating therewith.

Referring specifically to Fig. 1, the circular metallic valve seat 7 has screw thread coaction with the pump casing 9, and is provided with a central circular downwardly converging boss 10 to which is secured a vertical guide rod 3 having a hexagonal end 2. The rod 3 may be unscrewed from the boss 10 by applying a wrench to the hexagonal end 2 thereof. The seat 7 is provided with peripheral lugs 8 for permitting removal of the seat from the casing 9 with the aid of a wrench. The central boss 10 of the seat 7 is connected with the peripheral portion of the seat by means of a series of radial ribs 11 which are slightly inclined in a generally helical direction approaching the valve 6. Mounted upon and concentrically with the guide rod 3 is an india rubber circular disk valve 6 having a downwardly converging seating surface 12 which coacts with the adjacent similarly formed surface of the seat 7 and ribs 11. A circular weight 5 which rests upon the upper plane surface of the valve 6 is provided with a central wearing sleeve 4 which embraces the guide rod 3. The downwardly converging or beveled seating surface 12 is thereby formed on what may be termed a stubby portion of the valve 6 lying between the seating surface and the peripheral bounding surface extending lengthwise of the bore. Sufficient clearance is permitted between the sleeve 4 and valve 6 and the rod 3 to permit free vertical sliding of these elements along the rod.

Referring specifically to the modified form of valve shown in Fig. 2, all of the elements are of the same general construction as those in the embodiment of Fig. 1 except the valve 61 and the weight 51. In the modified form the valve 61 instead of having an upper plane surface is formed with an upwardly converging surface 13 which is similar in

form to the lower seating surface 12 of the valve. The weight 51 is provided with a lower tapered surface which is adapted to fit either the surface 13 or the surface 12 of the valve, thereby making the valve 61 reversible.

During the normal operation of the pump, the liquid is forced through the passages between the radial ribs 11 which due to their angular setting impart a slightly swirling motion to the passing liquid. As the pressure on the lower side of a valve 6, 61 becomes sufficient to overcome that on top, the valve is raised by the fluid which is discharged between the seat 7 and the adjacent valve surface 12, to the space surrounding the weight 5, 51. Due to the upwardly flaring formation of the lower surface 12 of the valve 6, 61 and the angularity of the ribs 11, the direction of the swirling fluid is gradually changed from a vertical direction of flow to flow in a direction parallel to the seating surface. The slight swirl imparted to the liquid passing the valve 6, 61 produces intermittent rotation of the valve thereby causing the valve to assume a new position upon its seat after each discharge of fluid from the pump.

It will be noted that by forming the seating surface 12 of the valve 6, 61 downwardly converging or beveled instead of as a plane surface and forming the upper surface either plane or upwardly converging, the valve is considerably thickened at its medial portion. This formation produces a valve of cantilever cross section with the thickest portion adjacent its axis, which will more readily withstand the pressures to which it is subjected. The relatively thick and heavy valve 6, 61 produced by thickening the center thereof may also be formed of softer material without danger of distortion thereof, thereby reducing the noise resulting from utilizing a harder thicker valve or a heavier valve composed of relatively hard material.

While the invention has been disclosed as applied to a vertical valve, it will be obvious that the same is clearly applicable to valves disposed with their axes horizontal or otherwise directed. In horizontally disposed valves it is preferable to extend the wearing sleeves 4 through the rubber valves 6, 61 as well as through the weights 5, 51. Such structure is unnecessary in a vertical valve as there is very little wear between the ver-

tically movable valves and the vertical rod 3. The valve 61 disclosed in Fig. 2 may be readily reversed when worn along its lower surface 12 so as to permit coaction between the surface 13 thereof and the valve seat 7. It will also be observed that the valve 6, 61 besides coacting with the upper surfaces of the boss 10 and with the annular tapered seating portion of the seat 7, coacts directly with the upper extremities of the ribs 11, thereby producing maximum seating contact between the valve and the seat and preventing distortion of the valve by the pressures on the upper surfaces thereof. It will also be obvious that the valve 6, 61 may be provided with a spring or other means instead of the weight 5, 51, for urging the same toward its seat, this being a modification well known to those skilled in the art and requiring no detailed disclosure.

It should be understood that it is not desired to limit the invention to the exact details of construction herein shown and described for various modifications may occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. An article of manufacture comprising an india rubber pump valve having a central bore, a plane seating surface perpendicular to and intersecting said bore, a peripheral bounding surface extending lengthwise of said bore, and a beveled seating surface intersecting said plane and said peripheral surfaces to form obtuse angled edges only.

2. In combination, a rubber valve, a weight on said valve, a plane central seating surface on said valve, said valve between the outer edges of said weight and seating surface forming a stubby portion having a beveled seating surface, and plane and beveled seats for said surfaces.

3. In combination, a hydraulically operated rubber valve, central guiding means and a beveled seat therefor, and a weight in contact with the upper side of said valve and extending over said seat, said valve having between the outer edge of said weight and the inner edge of said seat when the valve is seated a stubby portion formed with a seating surface.

In testimony whereof, the signature of the inventor is affixed hereto.

GUSTAF L. KOLLBERG.