May 11, 1943. H. W. GOETZ 2,318,773

VALVE

Filed Oct. 12, 1940

Fig. 1

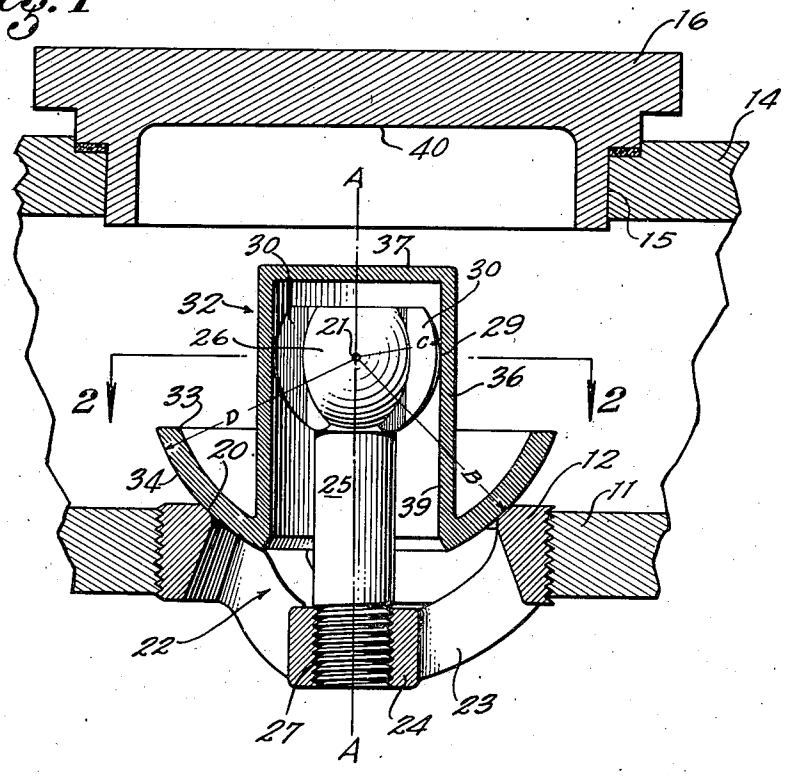
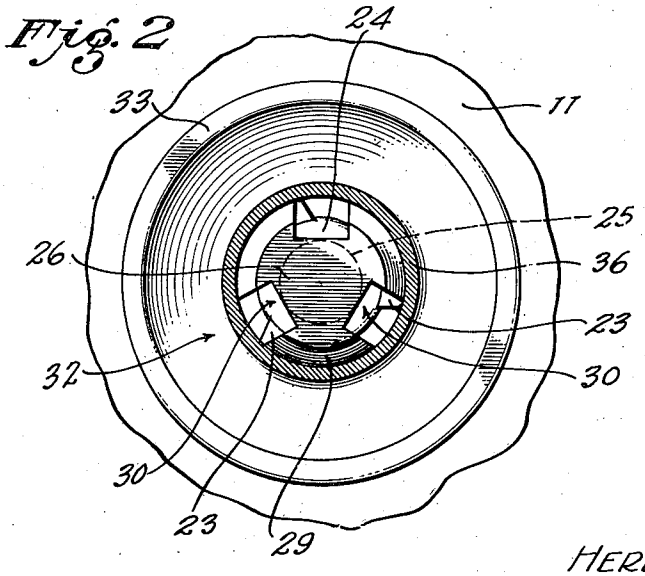


Fig. 2



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VALVE

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4 Claims. (Cl. 251—127)

My invention relates to a valve assembly of the type in which the valve member is capable of circumferential shifting and rotating so that at each closing of the valve a different contacting surface of the valve will engage the seat. Such type of valve is shown in the patent to Gerhard Meyer, entitled Pump valve, No. 1,939,128, issued December 12, 1933, the patent to John J. Ferlin and Herbert W. Goetz for Valve, No. 1,940,999, issued December 26, 1933, and the patent to John J. Ferlin and Herbert W. Goetz for Valve, No. 1,942,417, issued January 9, 1934.

It is an object of my invention to provide a valve assembly of the general character disclosed in the patents mentioned above in which the guiding and centralizing means for the valve cooperates between the valve and the seat so that it is unnecessary to have any parts of the pump in which my invention is installed, specially designed or prepared for the reception of the valve of my invention.

It is a further object of my invention to provide a valve structure in which the valve is provided with a guide sleeve which is closed at the top and opens downwardly through the bottom of the valve and in which there is positioned within the guide sleeve a centralizing ball which is carried by a support which extends upwardly into the guide sleeve. In the preferred form of my invention, the centralizing ball is supported on a stem which is carried by a spider formed on the seat.

It is a further object of my invention to provide a valve assembly having the features and advantages set forth above, which is of simple and sturdy construction, which is economical to construct, and which may be easily installed in a pump without danger of misplacement or misalignment of any of the parts.

Other objects and advantages of my invention are contained in the details of construction of the preferred form of my invention and will be pointed out during the course of the following detailed description.

Referring to the accompanying drawing in which the preferred form of my invention is illustrated:

Fig. 1 is a sectional view through the valve of my invention, the valve being illustrated in position within a pump.

Fig. 2 is a fragmentary view partly in section taken on the line 2—2 of Fig. 1.

Referring to the drawing in detail, Fig. 1 shows a valve chest having a wall 11 which supports a seat 12, the seat 12 being threadedly or otherwise secured in place. In an outer wall 14 of the pump there is an entrance opening 15 through which the valve assembly may be inserted and removed, this opening 15 being closed by a suitable cover 16.

Referring now more particularly to the valve assembly of my invention, the seat 12 is provided with an arcuate seat surface 20 which is preferably semi-spherical and is preferably generated around a point 21 which in turn is preferably located on the axis A—A of the seat opening 22. Supported in the seat 12 is a spider consisting of arms 23 and a central hub 24. Carried by the hub 24 is a stem or support 25 having a centralizing ball or spherical guide element 26 supported at its upper end. The stem 25 is preferably removably supported by the hub 24 by threaded engagement 27, as illustrated. The centralizing ball 26 has an arcuate surface 29 which is preferably semi-spherical in shape and is preferably generated around the point 21. The ball 26 is provided with drainage slots 30.

The valve 32 of my invention has a valve part 33 which provides an arcuate valve surface 34 which is preferably semi-spherical and is preferably formed on a radius of the same length as the radius on which the valve surface 20 is formed, so that when the valve 32 is in seated position with the valve surface 34, contacting the seat surface 20, as shown in Fig. 1, the point around which the valve surface 34 is formed will coincide with the point 21. When the valve is in a seated position as shown, the radiuses B, C, and D all project from the point 21.

The valve 32 provides a guide means in the form of a sleeve 36 closed at its top by an end wall 37. The inside of the sleeve 36 provides a cavity which is closed at its top but which opens downwardly through the bottom of the valve part 34. The sleeve 36 provides an inner guide surface 39 which is preferably cylindrical and is preferably of a diameter twice the radius C so that there will be a relatively accurate aligning cooperation between the ball 26 and sleeve 36. It is possible to make the cross-sectional shape of the sleeve 36 other than cylindrical and still obtain the action between the sleeve and ball which will be pointed out hereinafter. It appears desirable under such alternative construction to have opposing walls parallel to each other and spaced equally on opposite sides of the center line of the valve 32.

In operation the valve engages the seat when in closed position with the arcuate surfaces 20 and 34 in contact with each other. When the

valve is opened, the valve moves upwardly and the upper end of the sleeve 36 or the end wall 37 may engage a wall 40 of the cover 16, thus limiting the upward movement of the valve. It will be seen that the cooperation between the sleeve and ball allows the valve to move upwardly or downwardly along the axis A—A, allows the valve to rotate, and, furthermore, allows the valve to oscillate or shift circumferentially. The arrangement provided permits gyratory motion of the valve but the parts are so constructed and arranged that regardless of the shifted position of the valve when the valve moves downwardly and is in a position to engage the seat 12, the center of the arcuate surface 34 will be on the axis A—A and the point around which the surface 34 is generated will coincide with the point 21 around which the surface 20 is generated.

In installing the valve assembly of my invention the valve and seat and guide means constitute a unitary structure which is entirely independent of all other parts of the pump structure in which the valve may be employed. Obviously, if desired, only the valve need be replaced or if the ball 26 has become worn it can be replaced by unscrewing it from the hub 24.

In the foregoing description I have described the preferred form of my invention. It should be understood, however, that various alterations and modifications may be made without departing from the spirit and scope of my invention, as set forth in the statement of invention and appended claims.

I claim as my invention:

1. For use in a valve opening in a pump of the character described, a valve structure comprising the combination of: a combined ring shaped valve seat member and valve guiding member, a valve member having a spherical face and a tubular guiding element closed at its upper end, the valve seat surface of said valve seat being formed as an annular portion of a sphere formed in the ring shaped valve seat member, a spider supported by said ring shaped member to lie below the zone of said valve seat ring, said guiding member extending vertically from said spider and carrying a spherical guiding element at its upper end, said spherical valve seat surface, valve face and guiding element being formed about a common center when the valve is seated.

2. For use in a valve opening in a pump of the character described, a valve structure comprising the combination of: a combined ring shaped valve seat member and valve guiding member, a valve member having a spherical face and a tubular guiding element closed at its upper end, the valve seat surface of said valve seat being formed as an annular portion of a sphere formed in the ring shaped valve seat member, a spider supported by said ring shaped member to lie below the zone of said valve seat ring, said guiding member extending vertically from said spider and carrying a spherical guiding element at its upper end of segmental form, spaces being left between said segments to provide drainage channels of relatively large size, said spherical valve seat surface, valve face and guiding element being formed about a common center when the valve is seated.

3. In a valve construction, the combination of: a valve member comprising a valve having a seating surface of spherical form and a tubular upwardly projecting guide element closed at its upper end, carried by said valve; and a valve seat and guiding unit comprising a ring shaped part having a spherically formed valve seat and carrying a downwardly projecting spider, an upwardly projecting stem mounted on said downwardly projecting spider and projecting into said tubular element carried by the valve member, and carrying a spherical guiding surface at its upper end, said spherical guiding surface and inner wall of said tubular element acting to guide said valve, and draining channels of large area formed in said spherical guiding surface, said spherical surfaces being formed with a common center when said valve is seated, said valve member, valve seat and guiding stem forming a self-contained unit adapted to replace a conventional valve construction.

4. For use in a valve opening in a pump of the character described, a valve structure comprising the combination of: an annular valve seat member having a valve seat face formed as an annular portion of a sphere centered on the axis of the valve seat member; an open work supporting structure rigidly carried by said valve seat member and having a central support displaced along said axis with respect to said valve seat face in a direction opposite from said center of said sphere; a frame member rigidly secured to and extending from said support toward said center; a spherical guide element carried by said frame member having a spherical guide surface centered on said center; a valve closure ring for said valve seat having a valve face in the form of a spherical annulus centered on said center when seated on said valve seat face and loosely encircling said frame member; and a tubular guide element of an internal diameter to cooperate with said spherical guide surface and secured to and extending from said valve closure in a direction to encircle said spherical guide member, said tubular guide element providing a fluid tight chamber in fluid tight relation with said valve closure, said chamber having an annular opening around said frame member and being of a length to clear said spherical guide element when said valve closure is in seated position, whereby said valve closure may have a rocking movement about said center in all directions at all spacings from said valve seat thereby bringing said valve face into engagement with said valve seat face at varying angles of the axis of said tubular guide element to the axis of said valve seat, said rocking movement being limited by engagement of said frame member with the tubular guiding element to ensure engagement of said valve seat face with a spherical annular portion of said valve face of varying eccentricity to the axis of said valve closure, and said spherical and tubular guide elements being formed to establish a communicating passage between the two end portions of said chamber separated by said spherical guide element.

HERBERT W. GOETZ.