

June 7, 1932.

A. WINTERHOFF
CASING FOR BALL VALVES
Filed Jan. 23, 1929

1,861,674

Fig. 1

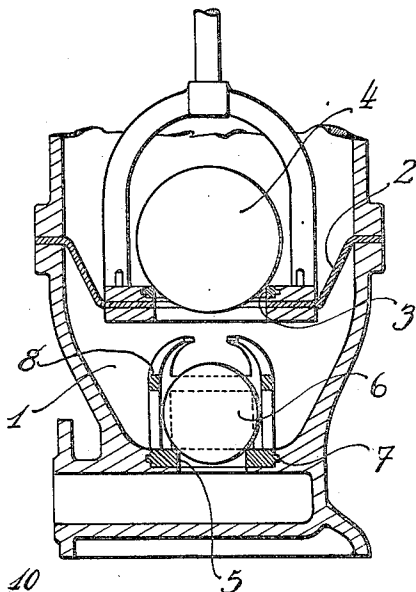
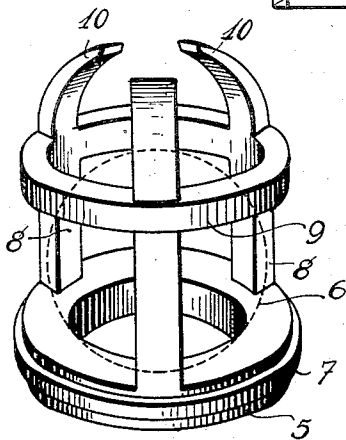


Fig. 2

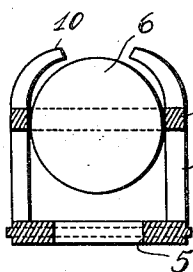


Fig. 3

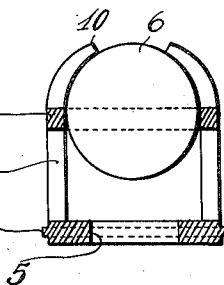


Fig. 4

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UNITED STATES PATENT OFFICE

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CASING FOR BALL VALVES

Application filed January 23, 1929, Serial No. 334,481, and in Germany February 1, 1928.

My invention relates to ball valves for pumps, and in particular to the casings of such valves, by which the ball is movably held above its seat and is returned to its seat when the piston descends.

The object of my invention is to provide a ball casing which enables the ball to be easily removed when sludge or other tough, fibrous or solid bodies contained in the liquid to be pumped have settled in the ball valve.

A further object of my invention is to provide a resilient casing, made of indiarubber or like material, hereinafter simply referred to as "indiarubber," which throws the ball back on to its seat.

Yet another object of my invention is to provide a ball casing which is cheap to manufacture, does not need to be machined, and is not attacked by mechanical and chemical influences.

Although my casing can be used in pumps of any kind, it is particularly suitable for those pumps with which sludge, dirty water, soap suds, and other liquids containing tough, fibrous or solid bodies are pumped, and which contain a diaphragm instead of a piston. My invention is hereinafter described in connection with such a pump and is illustrated in the accompanying drawing:—

Figure 1 is a sectional elevation of a diaphragm pump embodying a device according to my invention,

Figure 2 is a perspective view of the valve casing, and Figures 3 and 4 show diagrammatically the rebound of the ball from the claws of the valve casing.

Figure 1 shows a hopper-shaped suction chamber 1 of a diaphragm pump. By 2 is denoted the diaphragm, and by 3 the seat for a diaphragm valve 4. The device for moving the diaphragm 2 up and down may be of any desired kind and may be driven either by hand or mechanically. Since it does not form part of my invention it has not been illustrated in the drawing. At the bottom of the suction chamber 1 is arranged a seat 5 for the suction valve, which consists of a ball 6. The valve seat 5 consists of an indiarubber ring, which is forced with a bead 7

on its outer edge into a groove turned in the aperture in the bottom of the suction chamber. The indiarubber ring 5 might alternatively be secured by means of a flange ring screwed on above it. On the ring 5 are arranged a plurality of ribs 8, normally three in number, which consist of a resilient material, preferably also indiarubber, and which may advantageously be integral with the ring 5. The internal diameter of the cage formed by the ribs corresponds rather accurately to the diameter of the ball 6, so that the latter is guided vertically and has only sufficient clearance space to avoid jamming between the ribs. At about three-quarters of the height of the ball the ribs 8 are connected with one another by an indiarubber ring 9, as a result of which the casing as a whole receives sufficient stability. Above the ring 9 the ribs 8 are bent inwards to form claws 10, whereby the ball is reliably protected against being thrown out of the casing. It would also be admissible to unite the ribs at the upper end so as to form a completely closed casing, but it is preferable to leave a small opening here, since the ball can then be more easily withdrawn through the seat 3 of the diaphragm valve. The ribs have sufficient elasticity to permit of such a withdrawal. If the casing is completely closed at the upper end, the introduction and withdrawal of the ball is effected from the side, by bending the ribs 8 and the ring 9 away from one another.

The claws 10, as shown in Figure 3, have a smaller radius of curvature than the ball, so that the latter, when its ascent is stopped at the highest point of its lift, bends the claws upward slightly under the pressure of the liquid flowing against it, as shown in Figure 4. When the flow ceases, the claws return to their previous form, and impart to the ball an acceleration, so that the latter falls back on to its seat very quickly. The prompt return of the ball to the valve seat enables the pump to be run at a higher speed than would otherwise be possible, as a result of which its output is increased by about 30 per cent. Since the ball, at its highest position, bears completely against the claws, the latter are not

affected by the flow of the liquid, so that no fibrous materials or the like can settle on them.

My ball casing is cheap to manufacture, since the indiarubber body, after being moulded and vulcanized, has smooth surfaces throughout and does not need any further treatment. Moreover it is not necessary to form screw threads on the casing and on the aperture in which it is secured, since the casing, being resilient, can be pressed into the aperture with its bead 7 and held securely in position therein by the said bead.

What I claim is:—

1. A casing for ball valves, comprising a number of ribs arranged round the ball, a valve seat, a ring connecting the ribs with one another at about three-quarters of their height, and claw-shaped parts of the ribs projecting beyond the ring and being bent inwards to a radius of curvature less than that of the ball, all these parts consisting of indiarubber.

2. A casing for ball valves of pumps for liquids containing solid substances, comprising a seating ring for the valve ball, a number of ribs standing upon this ring and surrounding the ball, a ring connecting these ribs with one another, and springs standing out from this ring and bent inwards, the said springs being adapted to retain the ball when the valve is in use but to allow the ball to be withdrawn when required and to spring back automatically.

3. A casing for ball valves of pumps for liquids containing solid substances, comprising a seating ring for the valve ball, a number of springs standing upon this ring and surrounding the ball, capable of being bent radially and tangentially away from one another and adapted to spring back again automatically, inwardly bent ends on these springs, adapted to yield and spring back in a similar manner, and a ring connecting the springs with one another below the curved ends.

4. A casing for ball valves of pumps for liquids containing solid substances, comprising a seating ring for the valve ball, a number of springs standing upon this ring and surrounding the ball, capable of being bent radially and tangentially away from one another and adapted to spring back again automatically, inwardly bent ends on these springs, adapted to yield and spring back in a similar manner, and a ring connecting the springs with one another below the inwardly bent ends, the whole consisting of indiarubber.

In testimony whereof I have signed my name to this specification.

A. WINTERHOFF.