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2,559,659

PUMP VALVE

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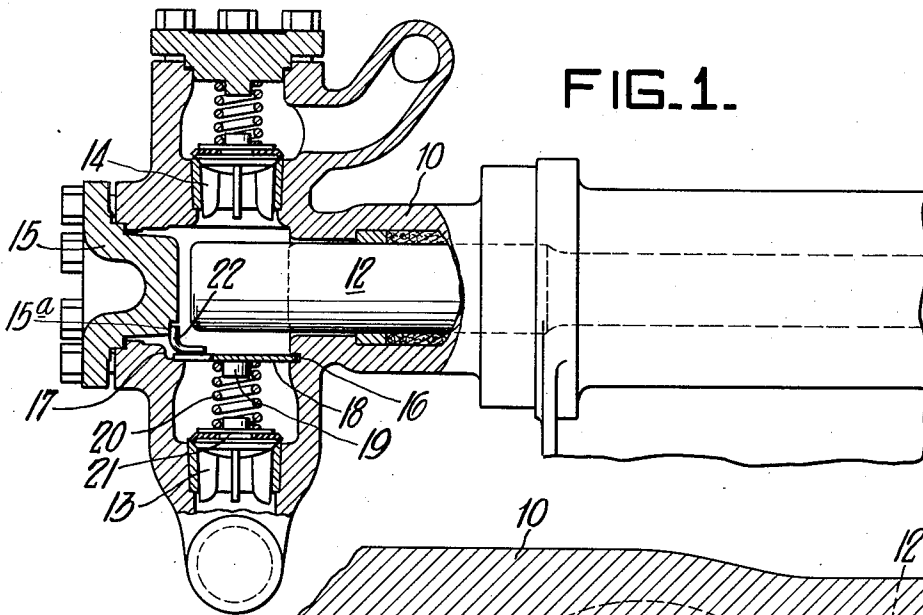


FIG. 2.

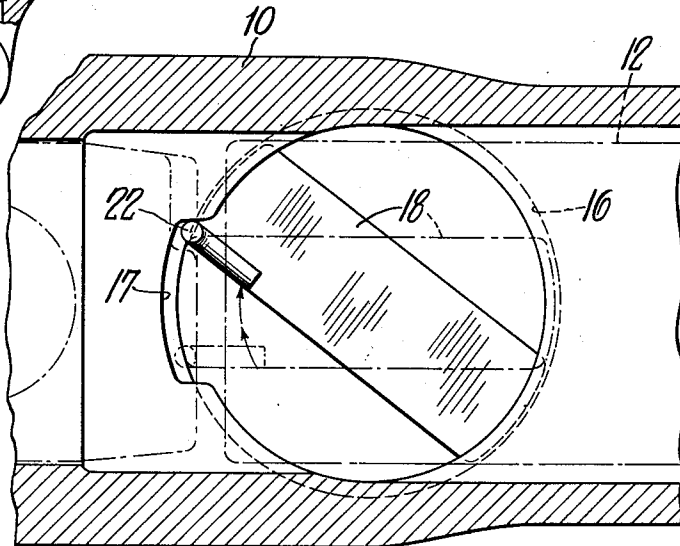


FIG. 3.

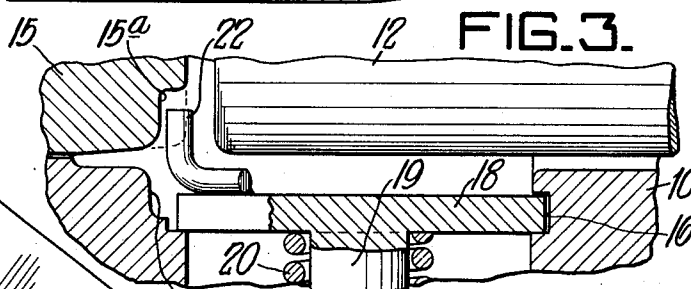
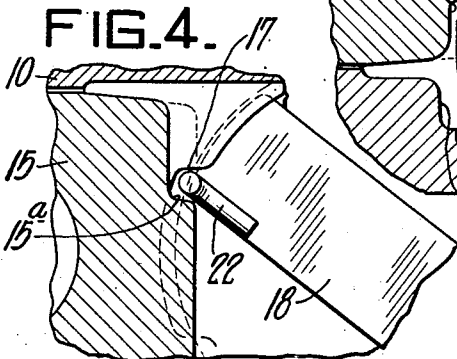


FIG. 4.



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UNITED STATES PATENT OFFICE

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PUMP VALVE

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3 Claims. (Cl. 103—153)

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This invention relates to valves for pumps of the reciprocating type and particularly to improved bumper means for the intake valve.

The present invention is applicable to reciprocating pumps in which the reciprocating element and the intake valve parts are assembled and dismantled through the end of the cylinder on removal of the cylinder head. The main advantages of such pumps are that pressure resistant seals are needed only for the cylinder head and the discharge valve cap, and yet both the plunger and the intake valve parts are readily assembled or dismantled, and that the parts of both the discharge valve and the intake valve can be identical.

An object of the present invention is to provide improved bumper means for intake valves which preserves the advantages of pumps of the foregoing type and yet conserves longitudinal space, which is at a premium, particularly in portable pumps, high pressure pumps and pumps handling volatile liquids.

A further object of the invention is to provide improved bumper means for intake valves which comprises a bumper plate supported by the cylinder wall out of the path of the reciprocating element so that the stroke of this element can extend substantially to the face of the cylinder head, thus conserving longitudinal space without reducing the stroke.

In accomplishing these and other objects of the present invention I have provided improved details of structure, a preferred form of which is shown in the accompanying drawing, in which:

Figure 1 is a vertical sectional view of a pump cylinder equipped with an intake valve embodying features of the present invention;

Figure 2 is a top plan view of the bumper plate illustrating its relation to the valve compartment and the cylinder head; and

Figures 3 and 4 are enlarged vertical and horizontal sectional views further illustrating the details of this relation.

In the drawing there is shown a pump which comprises a cylinder 10, a reciprocable element 12, an intake valve 13, a discharge valve 14 and a cylinder head 15. In this example the reciprocable element is a plunger and the pump has suitable power mechanism, not shown, for reciprocating this plunger and thereby drawing fluid into the cylinder via the intake valve and forcing it out via the discharge valve. The positions of the plunger at the ends of its stroke are shown in full lines and dot-dash lines in Figure 1. The valve compartments are integral with the cylinder

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wall and preferably diametrically opposite each other. The discharge valve may be of any conventional construction.

The cylinder head is removable from the cylinder and the plunger and the intake valve parts are assembled or dismantled through this end of the cylinder. The seats, disks and springs of both the intake valve and the discharge valve can be identical and the pressure resistant seals are needed only at the joints between the cylinder and the cylinder head and between the discharge valve compartment and its cap.

In accordance with the present invention, the inner wall of the intake valve compartment has a circumferential groove 16 adjacent its juncture with the cylinder walls. This wall has a section cut away, as indicated at 17, to permit the valve bumper to be inserted into the groove, as hereinafter explained. The cut-away section extends from the groove to the interior of the cylinder and preferably is situated adjacent the end of the cylinder.

A valve bumper 18 is carried within groove 16. This valve bumper is a metal plate of substantially the same thickness as groove 16 and of substantially the same width as cut-away section 17, allowing for necessary working tolerances. In outline the plate has straight sides and rounded ends of the same curvature as the edges of groove 16, within which it fits. The underface of the plate has an integral boss 19 that anchors the intake valve spring 20, as well as functioning as a stop that limits inward movement of the intake valve disk 21. The other face of the plate carries an ear 22 which is welded to the plate at one corner. This ear fits between the cylinder head and the edge of the cut-away section and thus prevents the plate's rotating after the parts are assembled. The inner face of the cylinder head has a notch 15a for receiving the ear, as best shown in Figures 3 and 4.

In assembling a pump having an intake valve constructed according to the present invention, the plunger and the intake valve parts are inserted through the end of the cylinder. Plate 18 is aligned with cut-away section 17 and its far end inserted in groove 16, as indicated in dot-dash lines in Figure 2. The plate is then rotated clockwise until ear 22 abuts the edge of the cut-away section. Cylinder head 15 is then sealed over the end of the cylinder and abuts ear 22, which fits within notch 15a.

From the foregoing description it is seen that the intake valve bumper of the present invention is entirely out of the path of the reciprocable

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element. Therefore, the stroke can extend substantial to the face of the cylinder head, with a corresponding saving in the longitudinal dimension of the cylinder. There is a further advantage when this arrangement is used in pumps that handle volatile liquids, since the reduction in cylinder volume decreases the likelihood of the plunger's merely working back and forth against a gaseous head without developing sufficient pressure to open the discharge valve. The structure is simple and rugged and easily assembled or dismantled.

While I have illustrated only a single embodiment of the invention, it is apparent modifications may arise. For example valves of the present invention can be used in similar fashion on other types of reciprocating pumps, such as piston pumps. Therefore, I do not wish to be limited by the disclosure set forth, but only by the scope of the appended claims.

I claim:

1. In a reciprocating pump comprising a cylinder, a reciprocable element in said cylinder, intake and discharge valves on the walls of said cylinder, and a removable cylinder head closing the end of said cylinder, said reciprocable element and the parts of said intake valve being assembled and dismantled through the end of the cylinder on removal of said cylinder head, the inner wall of the intake valve compartment having a circumferential groove adjacent its juncture with the cylinder and the cut-away section extending from said groove into the cylinder, an intake valve bumper plate carried within said groove out of the part of said reciprocable element, said plate being insertable and removable through the end of said cylinder and insertable into said groove through said cut-away section.

2. In a reciprocating pump comprising a cylinder, a reciprocable element in said cylinder, intake and discharge valves having their compartments integral with the walls of said cylinder, and a removable cylinder head closing the end of said cylinder, said reciprocable element

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and the parts of said intake valve being assembled and dismantled through the end of the cylinder on removal of said cylinder head, the inner wall of the intake valve compartment having a circumferential groove adjacent its juncture with the cylinder and a cut-away section extending from said groove into the cylinder adjacent the end of the cylinder, an intake valve bumper plate carried within said groove out of the path of said reciprocable element, and means on said plate abutting the edge of said cut-away section and said cylinder head preventing rotation of said plate.

3. In a reciprocating pump comprising a cylinder, a reciprocable element in said cylinder, intake and discharge valves having their compartments integral with the walls of said cylinder and housing the valve seats, disks and springs, and a removable cylinder head closing the end of said cylinder, said reciprocable element and the parts of said intake valve being assembled and dismantled through the end of the cylinder on removal of said cylinder head, the inner wall of the intake valve compartment having a circumferential groove adjacent its juncture with the cylinder and a cut-away section extending from said groove into the cylinder adjacent the end of the cylinder, an intake valve bumper plate carried within said groove out of the path of said reciprocable element, an integral boss on said plate to which the intake valve spring is attached, and an ear on said plate abutting the edge of said cut-away section and said cylinder head preventing rotation of said plate.

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The following references are of record in the file of this patent:

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