R. J. GOULD & M. E. CAMPFIELD.

Valves for Pumps.

No. 144,844. Patented Nov. 25, 1873.

Fig. 1.

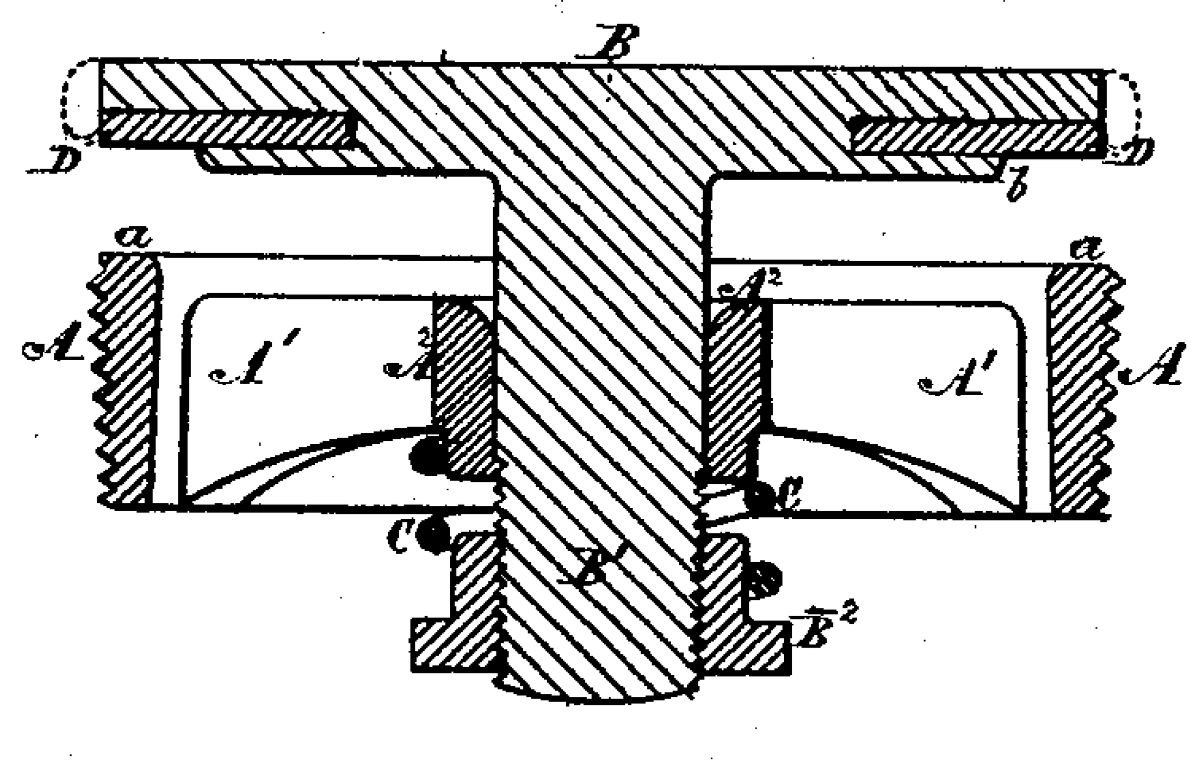


Fig. 2.

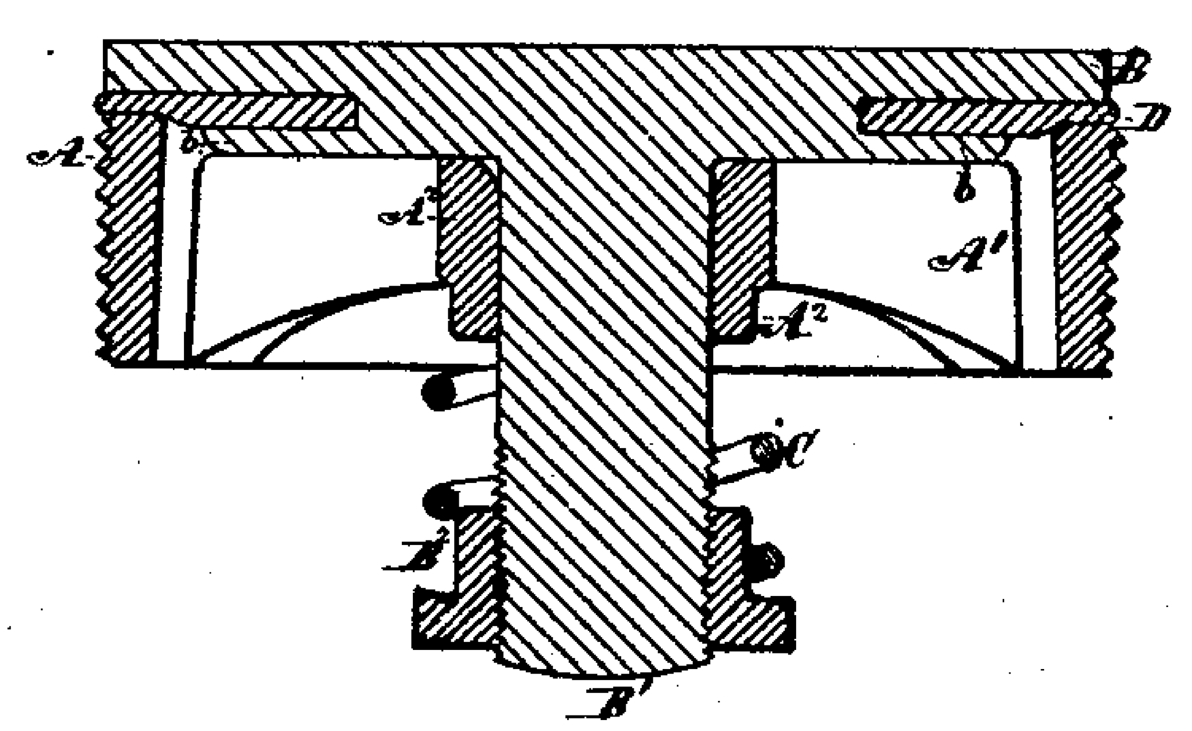


Fig. 3.

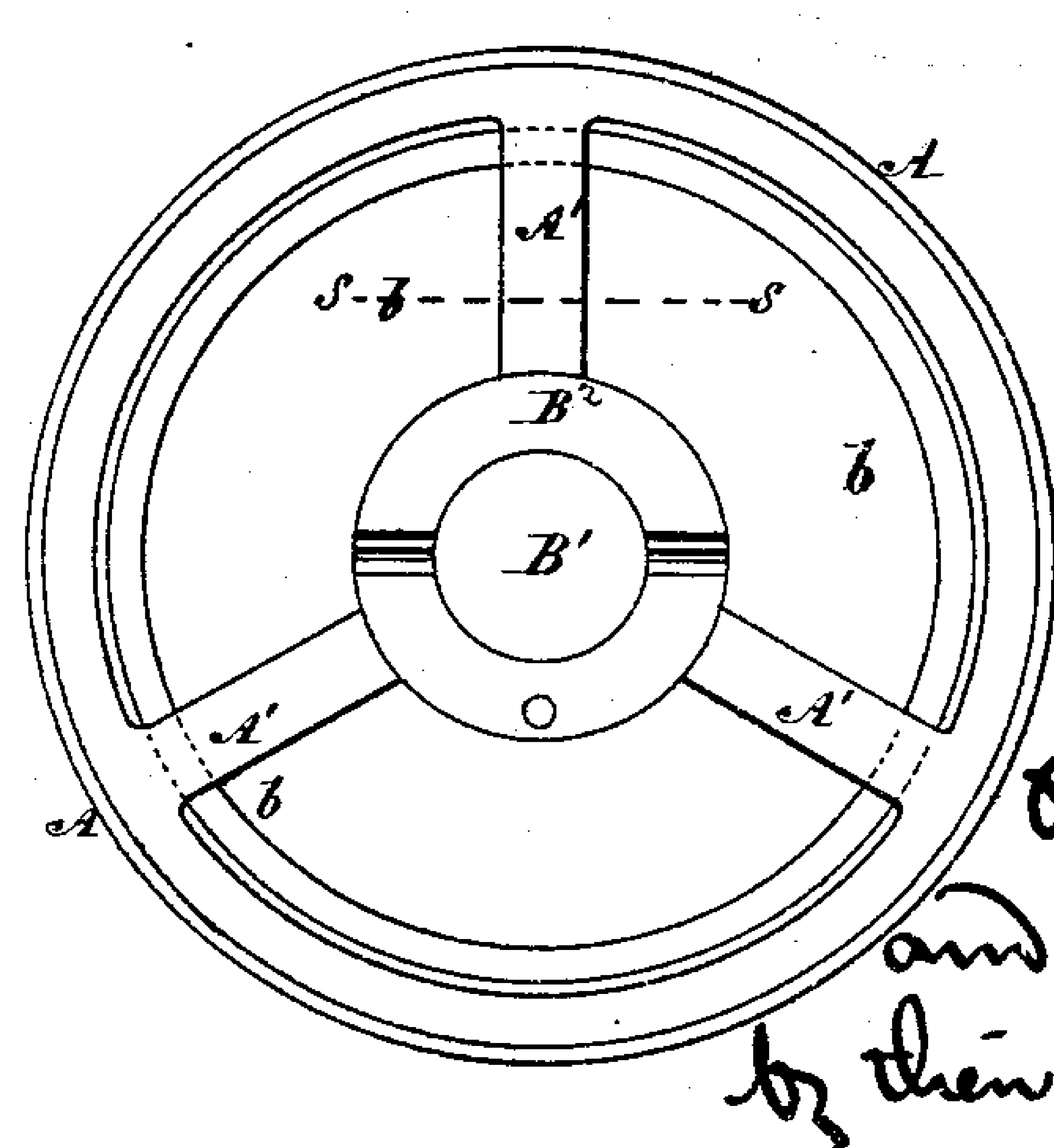
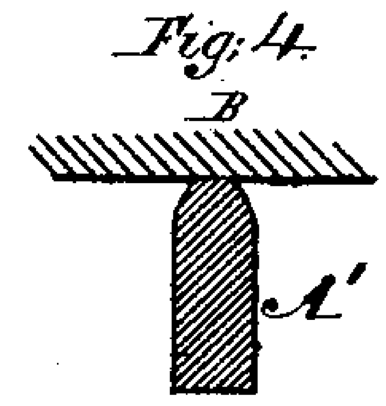


Fig. 4.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ROSCOE J. GOULD AND MATTHEW E. CAMPFIELD, OF NEWARK, NEW JERSEY, ASSIGNORS TO ROSCOE J. GOULD, OF SAME PLACE.

IMPROVEMENT IN VALVES FOR PUMPS.

Specification forming part of Letters Patent No. **144,844**, dated November 25, 1873; application filed June 28, 1873.

To all whom it may concern:

Be it known that we, R. J. GOULD and MATTHEW E. CAMPFIELD, both of Newark, Essex county, in the State of New Jersey, have invented certain Improvements in Valves for Pumps and analogous apparatus, of which the following is a specification:

The invention applies to puppet-valves guided by a central stem, like the example in the accompanying illustration, and to all valves, of whatever form, which lift or move directly away from their seats, instead of sliding thereon. The valves may be hinged or guided in any other manner, and they may be self-acting or operated by machinery. The invention is, however, more particularly useful in self-acting valves, as will appear more fully below.

We equip the bearing surface or surfaces with rubber or analogous elastic material adapted to apply tightly and be compressed upon the seat or seats; and we provide a metal bearing, which receives the force of the valve, and affords a further means of resisting the pressure of the fluid when the elastic material has been compressed to a certain degree. Our invention allows the valve to be made thin and light, and at the same time enables it to bear an immense pressure of water without being destroyed or deformed by the force, and without yielding by bending or bellying into the opening or openings which it closes.

Our experience with powerful quick-acting machines causes us to highly appreciate this point. Steam fire-engines lose a very appreciable part of their efficiency by the backward movement of the water into the seat of the valve, by the crushing backward of the rubber valves usually employed. Our present invention is now in course of experimental trial on a number of steam fire-engines, and sensibly increases the range to which streams can be thrown.

The following is a description of what we consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a central vertical section with the valve raised. Fig. 2 is a corresponding section with the valve forcibly pressed down upon its seat. In this condition the rubber of the valve is compressed upon the bearing-ring *a*, with which it is important that it shall make a tight contact, and the valve is further supported, so soon as the rubber is compressed sufficiently by the striking of the metallic under face *b*, upon the central boss A^2, and upon the radial arms A^1. Fig. 3 is a plan view from below. Fig. 4 is a vertical section through a portion, showing how the surfaces below the valve are narrowed, so as to afford a firm support, and allow the water to obtain access to nearly the whole under surface of the valve in the act of raising it. The section is on the short line S S in Fig. 3.

Similar letters of reference indicate like parts in all the figures.

A is a metal seat, tapped into the plate or metal platform, in which the valve is mounted, and B is the valve. B^1 is a cylindrical stem, fixed to and forming a part of the valve, and by which it is guided by sliding through the central steadiment A^2, which is connected to the seat by slender radial arms A^1. B^2 is a nut adjustable on the threaded end of the valve-stem B^1. C is a coiled spring exerting a constant force, tending to draw the valve to its seat. The upper surfaces of the radial arms A^1 and central steadiment or boss A^2 are made narrow, or may be cross-grooved, so as to reduce the bearing of the valve thereon to a very contracted surface; but such bearing-surface is carefully finished to afford a fair bearing for the under face *b* of the central and main portion of the valve B. The upper or bearing surfaces of A^1 and A^2 are sunk just below the upper bearing of the seat proper, *a*, for purposes which will presently appear. D is a flat ring of vulcanized rubber, sprung into a groove in the valve B, and adapted to form a soft and yielding packing or working face for the valve. It is presented for contact with the seat *a*, and may have a thickness of one-eighth of an inch, more or less, sufficient to allow by its elastic yielding for all ordinary inequalities or wear of the seat *a*. The lower central portion of *b* of the valve B is of a little less diameter than the interior of the bearing or seat *a*, while the top or main body of the valve B has a diameter as great as the outer diameter of the seat *a*, or a little greater.

It will be understood that although the valve is here represented as opening by a directly vertical lift, it may be reversed in position so as to open downward, or it may open horizontally, or in various inclined directions. It may also be practical to use gutta-percha or various compounds in place of what I have termed the rubber ring D. For some situations leather may be used.

When the valve moves to its seat under the powerful force of a quick-acting engine, the rubber D meets the seat *a*, and is compressed thereon to a certain extent. Then the under face *b* strikes upon the central boss A^2, and also upon the several arms or webs A^1, and relieves the rubber from any further compression. The metal portion of the valve may be sufficiently strong with little thickness to resist the force of the water. As the valve rises again, the superior force of the water below is available on the entire surface of the valve within the bearing *a*, by reason of the small surface presented by the arms A^1 and central boss A^2. In other words, the valve is sustained by metal bearings of small area so distributed as to receive and support the strain after the elastic material D has been moderately compressed, and on rising again the water to lift it is allowed to act against the whole area *b*. In its descent it is arrested first gently by the rubber D, and afterward rigidly by the metal bearings. In its ascent it is lifted freely by reason of the force of the water being felt on practically the whole surface within the bearing-ring *a*.

In those forms of the valve where the valve is annular and is guided on a fixed central stem, there must, of course, be another bearing-ring, of rubber or analogous elastic material, and another bearing-seat around the central pin.

The periphery of the upper portion, B^1, may, if preferred, have a hanging lip which shall inclose the periphery of the rubber ring D, as indicated in dotted lines in Fig. 1.

The rubber ring should be drawn tightly into its place in the groove between the metal *b* and the body above. To attain this condition it should be manufactured with a central hole of less diameter, and be sprung into place, so as to be held in a somewhat distended condition. Thus mounted it holds itself stiffly in position, and serves its functions successfully.

The rubber should be thicker than here shown if the valve is to work in water liable to contain large masses of grit, or coal, or the like. The rubber should be always sufficiently thick to avoid its being cut through by foreign matters caught between it and the seat *a*.

The construction of the part B is such as to overhang or cover and protect the rubber D. The presence of the rigid material B over the elastic material D attains important ends in pressing the latter upon the seat *a* with just sufficient force. The striking of the rigid part B of the valve upon the internal supports A^1 A^2 holds the metal B from descending too low, and allows the rim or edge, by standing over the rubber, to insure a just sufficient pressure.

We claim as our invention—

1. The arrangement of the outer edges of the parts B and D, relatively to each other and to the seat *a*, in combination with the supports A^1 A^2, for receiving the rigid portion of the valve, and supporting it when sufficiently depressed, substantially as specified.

2. The construction of the metallic part of the valve B with a groove, in which the rubber or equivalent elastic material D may be retained by its elastic contraction, in combination with such elastic material, and arranged to allow its free portion to be compressed on the seat *a*, as herein specified.

3. In combination with a valve, B, lifted by the force of the fluid, the rigid bearings A^1, contracted at the bearing-points, as represented, so as to support the valve at those points without materially subtracting from the surface acted on by the water in lifting the valve.

In testimony whereof we have hereunto set our hands this 17th day of May, 1873, in the presence of two subscribing witnesses.

ROSCOE J. GOULD.
MATTHEW E. CAMPFIELD.

Witnesses:
AARON M. KING,
JAMES T. BOND.