

(No Model.)

2 Sheets—Sheet 1.

T. H. WARD.

PUMP.

No. 266,566.

Patented Oct. 24, 1882.

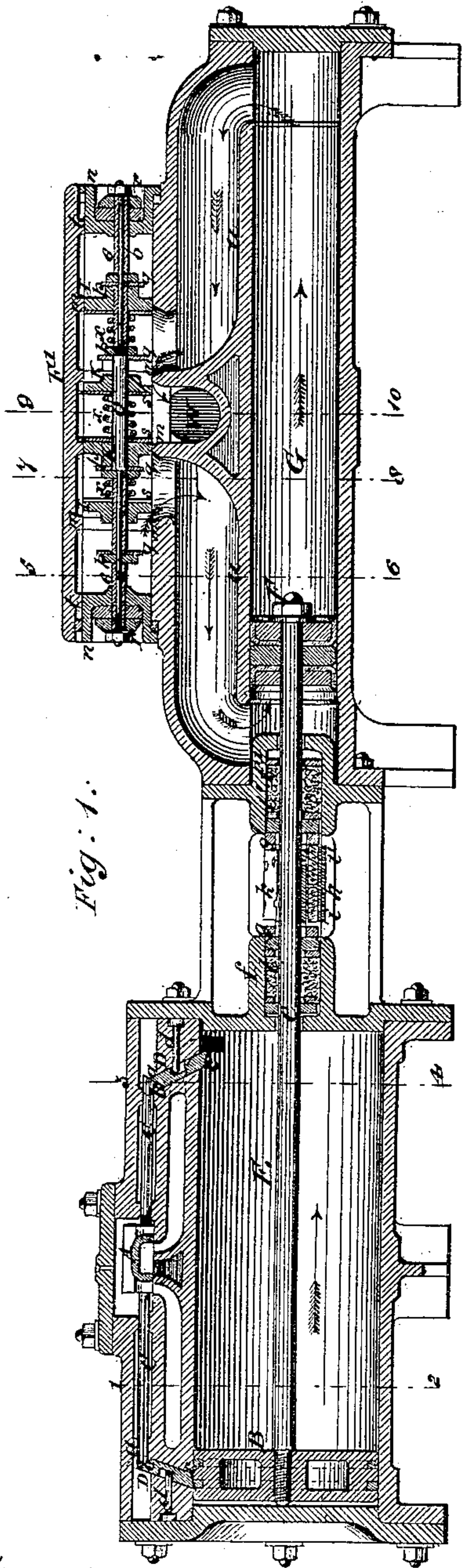


Fig. 1.

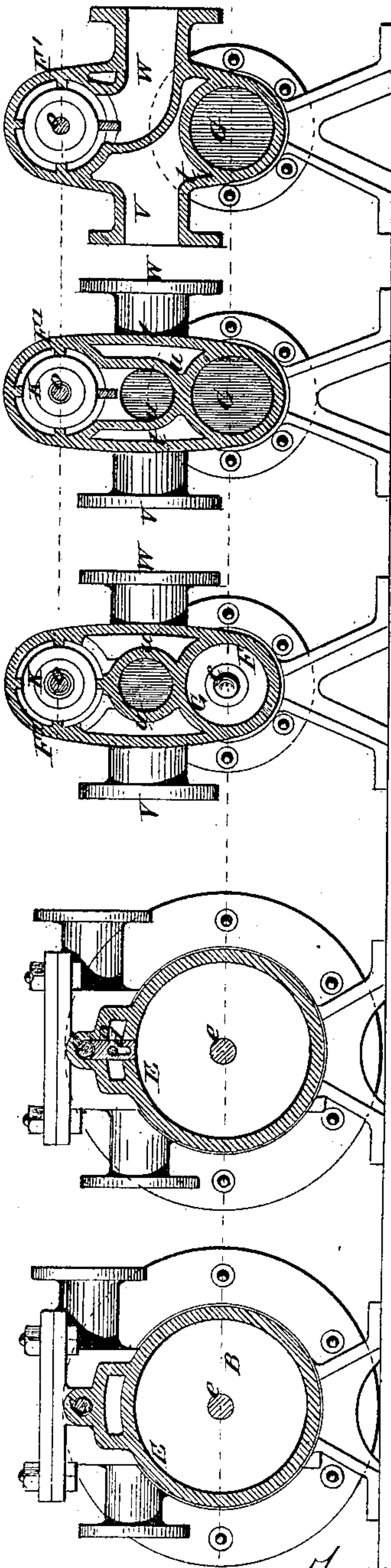


Fig. 6.

Fig. 5.

Fig. 4.

Fig. 3.

Fig. 2.

Witnesses,  
Harry Drury  
Harry Smith

Inventor:  
T. H. Ward,  
by his attys  
Howell and Jones

(No Model.)

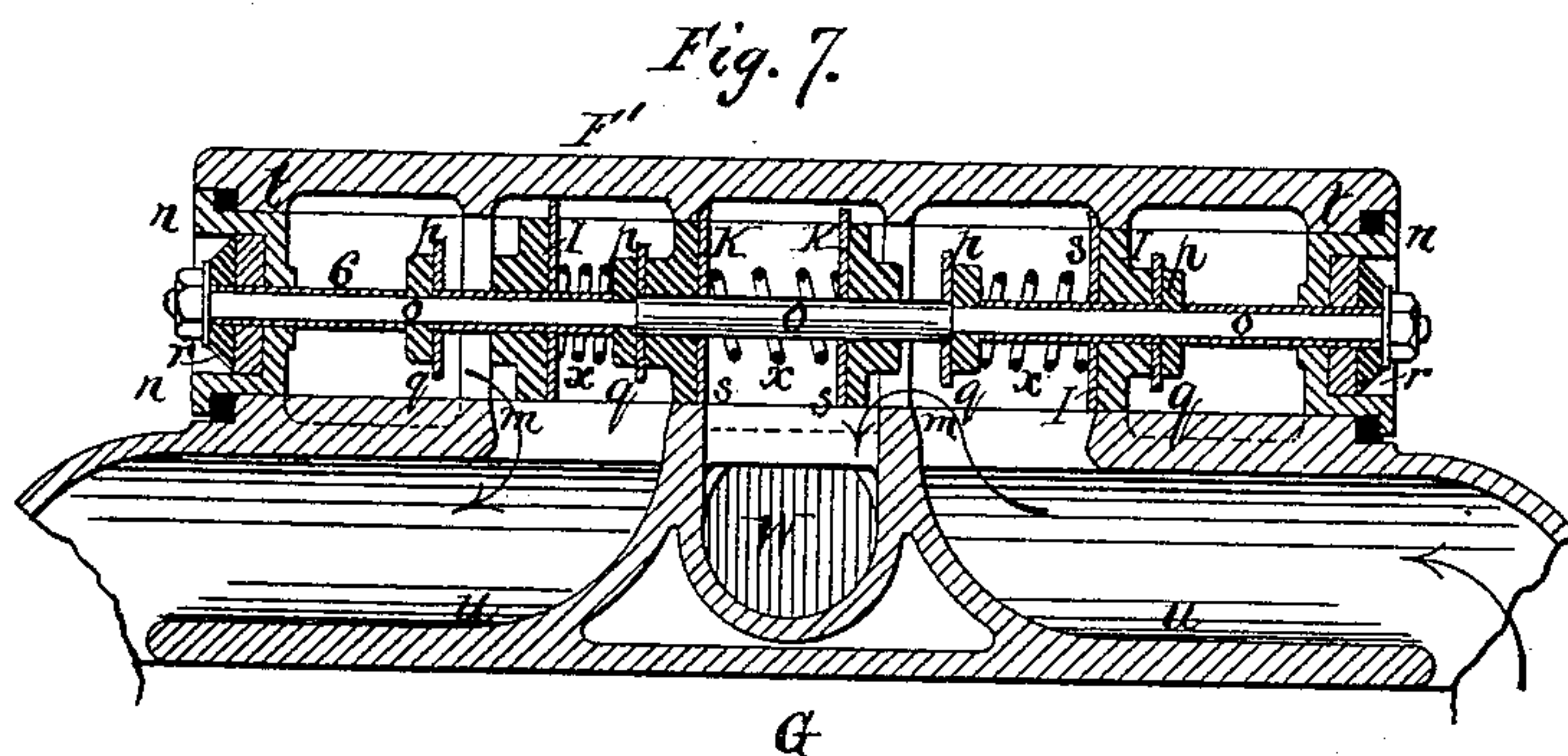
2 Sheets—Sheet 2.

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WITNESSES:

Harry Drury  
James F. Tobins

INVENTOR:

Thomas Henry Ward  
by his Attorneys,  
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# UNITED STATES PATENT OFFICE.

THOMAS H. WARD, OF TIPTON, COUNTY OF STAFFORD, ENGLAND.

## PUMP.

SPECIFICATION forming part of Letters Patent No. 266,566, dated October 24, 1882.

Application filed November 14, 1881. (No model.) Patented in England April 14, 1881, No. 1,650.

*To all whom it may concern:*

Be it known that I, THOMAS HENRY WARD, of the firm of Howl, Ward & Howl, a subject of the Queen of Great Britain, and a resident of Tipton, in the county of Stafford, England, have invented certain Improvements in Pumps, (for which I have obtained British Letters Patent No. 1,650, dated April 14, 1881,) of which the following is a specification.

My invention relates to improvements in the valves and valve-boxes of pump-cylinders, more especially of the water-cylinders of steam-pumps; and my invention consists in certain improvements in the construction of these valves and boxes, as more fully described hereinafter.

In the accompanying drawings, Figure 1 is a longitudinal section of a steam-pump containing my improvements; Figs. 2, 3, 4, 5, and 6, transverse sections on the lines 1 2, 3 4, 5 6, 7 8, and 9 10, respectively, Fig. 1; and Fig. 7, Sheet 2, an enlarged sectional view of my improved valve.

The valve-box  $F'$ , which is preferably cylindrical, contains all the valves common to the pump—for example, two suction-valves,  $I I$ , and two delivery-valves,  $K K$ , in a double-action pump. This box is open at both ends. The valves are of the type known as "piston-valves," allowing the water to flow round their peripheries when open. Annular projections  $m$  are cast in this box and bored out, so that when its valves are closed they fit inside the same. At each end of this valve-box a lid,  $n$ , is provided, by preference situate and bedded in a recess. These two lids are tied together by means of a central bolt,  $o$ , which bolt serves also as a guide to the several piston-valves  $I I K K$ . All four of these valves, when in their normal positions, bear against nuts or collars  $p$ , fixed on the central bolt, preferably provided with intervening cushions,  $q$ , of rubber or other suitable material, and the pressure of the water on these valves is thereby transmitted to and carried by the outer covers,  $n$ , which are tied together by the bolt  $o$ . India-rubber or other suitable cushions,  $r$ , may also be provided between these covers and the nuts on the opposite ends of the bolt. In the pump shown in the drawings the collars  $p$  are fixed on the bolt  $o$  by means of intervening tubes,  $6$ , and springs  $x x$  are provided for returning the

valves to their normal positions. Flaps  $s$ , of leather, rubber, or other suitable material, are secured to the back of these valves, so as to overlap the joints between the valves and their annular projections, as shown in Fig. 7, in order to prevent excessive leakage, so that the valves and the openings through which they pass may fit easily and need not touch, and consequently facing or grinding of the valves and seats is dispensed with, since the leathers complete the closure and are comparatively noiseless in work.

The valve-box is, by preference, cast together with the ports and cylinder, in one neat and symmetrical casting, as shown in Figs. 1, 4, 5, and 6, in which case the distance between the outer casing or walls,  $t$ , and the walls  $u$  of the cylinder  $G$  and ports serves as a suction-chamber. Through this chamber the water is drawn from the passage  $V$  into the valve-box  $F'$ , passing through the suction-valves  $I I$  alternately into the cylinder, and at the return-stroke out of the cylinder again through the delivery-valves  $K K$  alternately into the rising or delivery main  $W$ .

The valve-boxes may be cast separate from the piston or plunger pumps, whether single or double action, and may be cast open at one end only, instead of at both ends, if desired.

By means of the arrangement hereinbefore described the central bolt serves as a guide to the valves, as a tie-rod to the cover or covers, and as a tension-rod carrying the loads of all four of the valves.

Any desired construction of steam cylinder, engine, or other mechanism may be employed to operate the piston of the water-cylinder. In Figs. 1, 2, and 3 I have illustrated one form which may be used, and which may be briefly described as follows:

$A$  is an ordinary slide-valve, which is actuated by the piston  $B$  at each end of its stroke in the cylinder  $E$  in the following manner, viz: From the slide-valve  $A$  extend slide-bolts  $C C$  at opposite ends to the respective ends of the cylinder. The extreme ends of these bolts are beveled off on the inside, as shown at  $a a$ , and at each of these ends a small sliding bolt,  $D$ , is arranged at or about right angles to the bolt  $C$ , and consequently to the path of the piston, the said bolts  $D$  having corresponding bevels,  $b c$ , at their opposite ends, and also be-



ing provided on the side of each bolt with a slot, into which enters a pin, *d*, for the purpose of preventing the bolt from dropping out. Assuming the piston to be traveling in the direction indicated by the arrow in Fig. 1, on its arrival at the opposite end of the cylinder it acts upon the bevel *c* of the sliding bolt D at the end, and thus forces that bolt out of its path. The bolt D, by acting with its bevel *b* upon the bevel *a* of the bolt C, forces back that bolt, which carries the valve A with it, the valve in its turn impelling the other bolt C and forcing down the corresponding small bolt D at the other end, ready for its being acted on by the piston at the return-stroke. I wish it to be understood, however, that I do not desire to claim this steam-cylinder valve-gear, as it will form the subject of a separate application, as will also the construction of stuffing-boxes shown in Fig. 1, and which therefore need not now be described.

I claim as my invention—

1. The combination of the valve-box, covers, and set of piston-valves having overlapping flaps *s*, with annular projections *m* and a longitudinal rod connecting said covers and guiding the valves, substantially as described. 25

2. The combination of the valve-box, covers, and set of piston-valves with rod *o*, tubes 6, and collars *p*. 30

3. The combination of the valve-box, covers, and set of piston-valves with valve-seats, a longitudinal rod connecting said covers and guiding the valves, and springs for the valves and cushions *r*, substantially as described. 35

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS HENRY WARD.

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