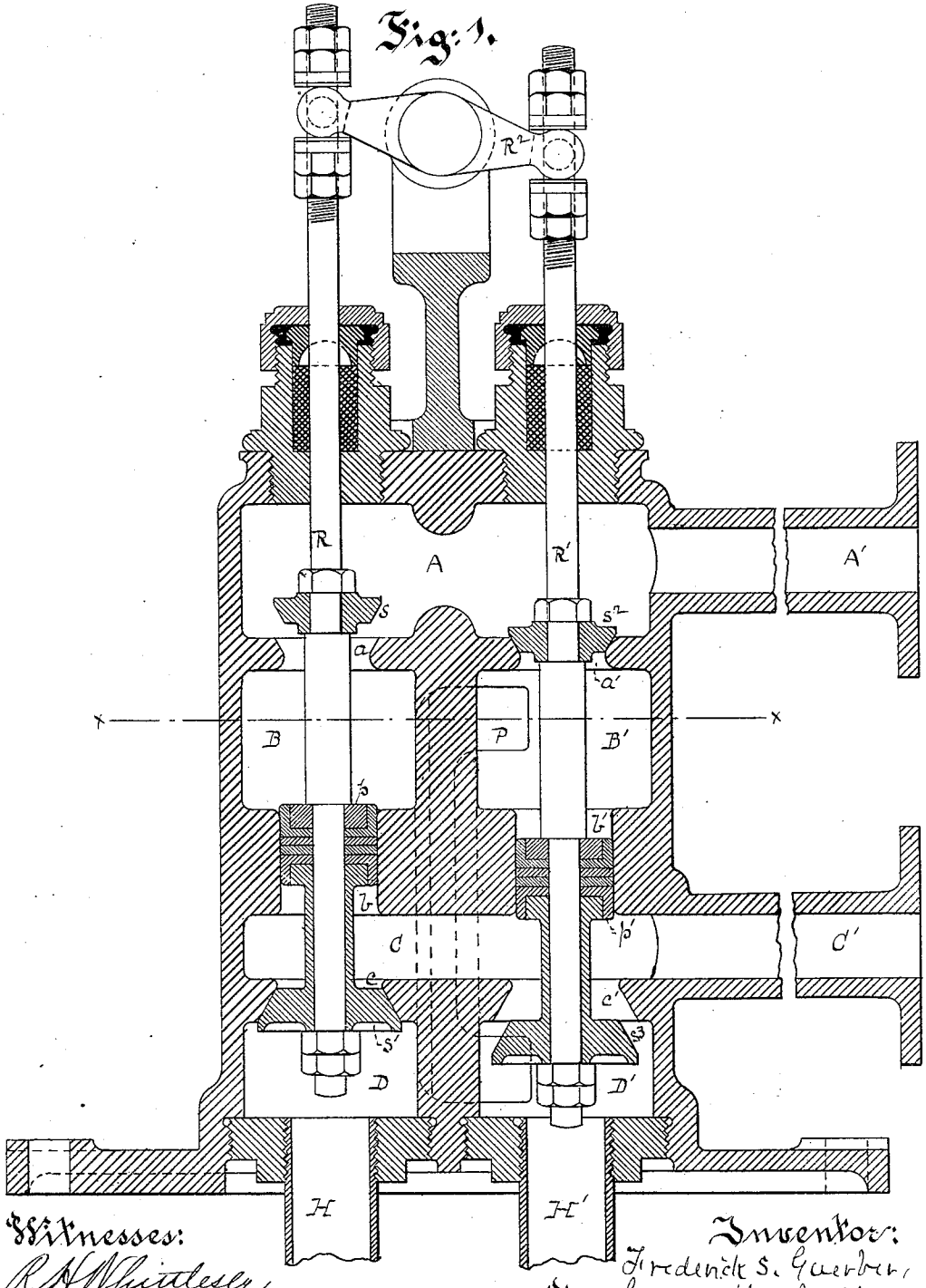
(No Model.) 2 Sheets—Sheet 1.

F. S. GUERBER.

VALVULAR APPARATUS.

No. 273,680. Patented Mar. 6, 1883.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

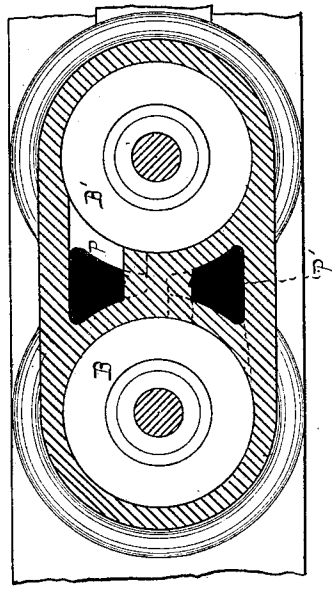
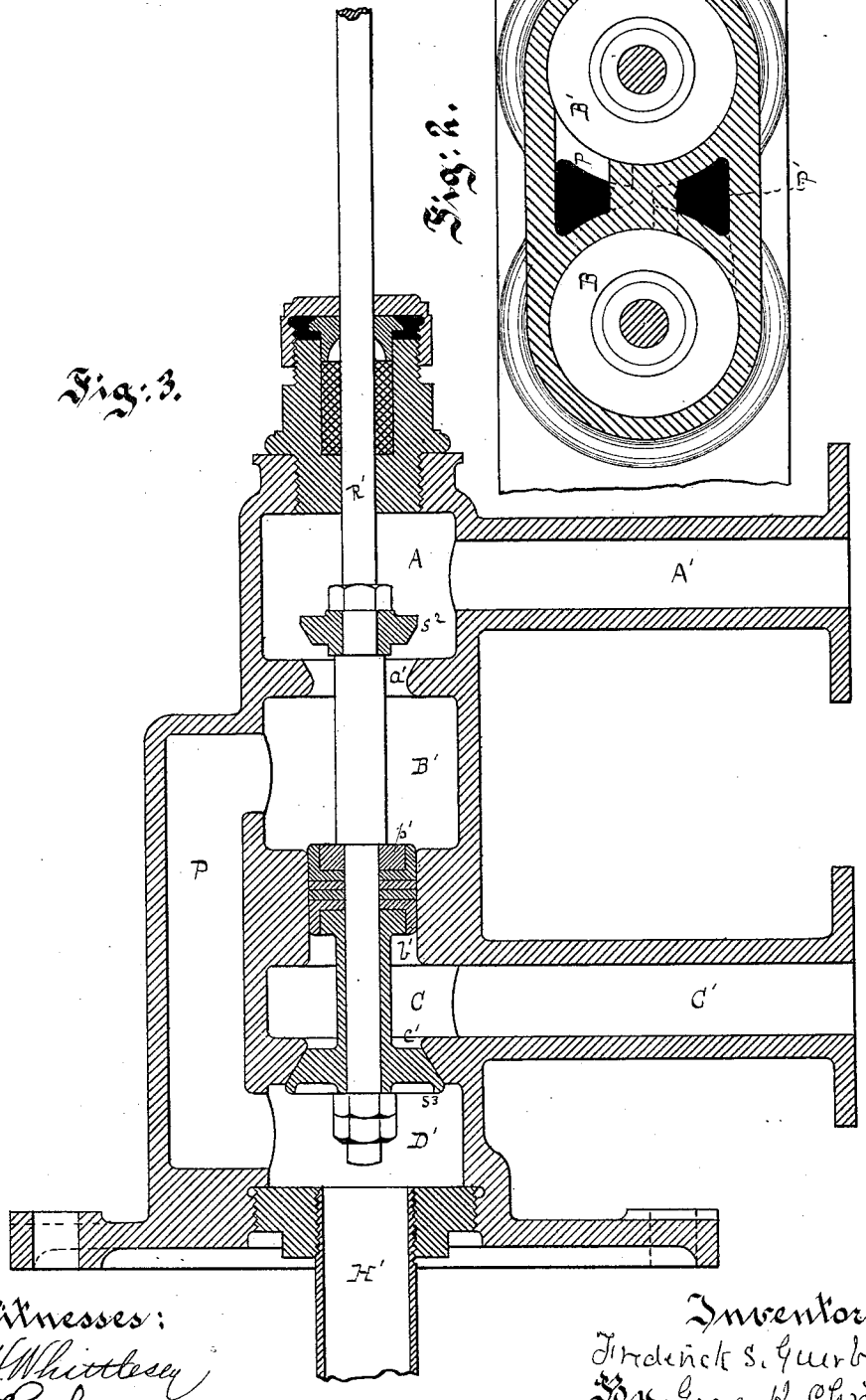


Fig. 3.



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UNITED STATES PATENT OFFICE.

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VALVULAR APPARATUS.

SPECIFICATION forming part of Letters Patent No. 273,680, dated March 6, 1883.

Application filed November 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. GUERBER, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Valvular Apparatus; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, represents a vertical sectional elevation of my improved valve device. Fig. 2, Sheet 2, is a sectional view in the plane of the line *x x* of Fig. 1, and Fig. 3 shows in sectional elevation my improvement as used with a single pair of valves.

My present invention relates to certain improvements in the class of valves referred to in Patent No. 229,341, granted June 29, 1880, to Harvey Tilden and myself. This Tilden and Guerber valve, when properly constructed, performs well all the functions assigned to it; but it has been found in practical use that, apparently on account of expansions and contractions, the two lower valves do not always come to their seats exactly at the same time, or, in other words, that sometimes when one of said two lower valves is seated the other will stand a little clear of its seat, so that leakage results or frequent readjustment is necessary. This difficulty I have overcome by making the middle valve of the three of the Tilden and Guerber device in the form or of the construction of a piston in the present device, and arrange it in a tubular seat or case of such length that it will always keep the port or chamber in which it works closed, but will perform the balancing function desired; and I have also changed the arrangement of ports or passages, so as to enable the valve thus made to perform the work desired in admitting and releasing fluid-pressure, or in providing for the passage of fluids. As this valve is chiefly designed for use as a part of a hydraulic railway switch or signal apparatus, I will, for convenience, so describe it; but in doing so I do not mean to limit myself in the uses to which hereunder I may apply it.

The valve-case, Figs. 1 and 2, is made with six chambers, A, B, B′, C, D, and D′, separated from each other by interior diaphragms, as shown, but with a port, *a*, leading from A to B, a port, *a′*, leading from A to B′, a tubular piston-case, *b*, between B and C, and a like case, *b′*, between B′ and C, and ports *c c′*, leading, respectively, from C to D and C to D′; also, a side port or passage, P, made in the wall or shell of the valve-case, or exterior thereto, leads, as indicated by dotted lines, from the chamber B′ to D′, and a like side port or passage, P′, Fig. 2, made preferably in the opposite or front wall of the shell, connects the chambers B and D. This passage is not shown in Fig. 1; but it is the duplicate of P, except that it is made in another part of the shell, as illustrated in Fig. 2, and connects B and D, as stated. Operative fluid-pressure is admitted from any suitable head, reservoir, or accumulator by the pipe A′, and discharge is made through waste-pipe C′. H and H′ are pipe-connections, which may lead to the cylinders of different signals, so as to actuate them by fluid-pressure. The valve-stem R carries a valve, *s*, to open and close the port *a*, and a piston, *p*, packed as against pressure above and below, which piston, working in the tubular case *b*, prevents communication from B to C, or the reverse, and the walls of *b* are made long enough, so that the piston *p* shall always keep it closed; and the stem R also carries a valve, *s′*, which opens and closes the port *c*. The other valve-stem, R′, carries like valves, s^2 s^3, and piston *p′*, all of which sustain a like relation to the ports *a′ c′* and case *b′*, respectively. The two valve-stems are connected by a vibratory arm, R^2, so that both are moved simultaneously, but in opposite directions.

With the devices in the position shown fluid-pressure entering at A′ will pass through A, port *a*, chamber B, passage P′, into chamber D, and thence by pipe H to clear one signal or set of signals. The valve s^2 being closed, fluid-pressure by the other line of ports is shut off; but the valve s^3 being opened, the fluid-pressure previously used in H′ is free to escape through chamber D′ and port *c′* into chamber C, and thence by C′ to the waste, and the signal or signals previously actuated through H′

will go to "danger;" or the pipes H H′ may go to the opposite ends of a switch-moving cylinder, so that fluid-pressure may be applied to one side of the piston thereof through H, and be allowed to escape from the other side thereof through H′. On the reversal of the position of the valves pressure will be applied through port *a′*, chamber B′, port P, chamber D′, and pipe H′ to the thing or object to be moved, the waste being cut off by the closing of valve s^2, and the pressure through the other line of ports will be cut off by the closing of valve *s;* but H will be open to the waste by the unseating of valve *s′*. In this organization it will be observed that expansion and contraction can have little or no effect in producing leakage, and that all fluid-pressure brought to bear on the valves is practically balanced by a counter-pressure on the pistons. Hence the apparatus is but little, if at all, subject to derangement when in use, after being once properly constructed and adjusted.

In Fig. 3, I have shown the same improvement as embodied in the construction of a single pair of valves. Here the same letters are used as in the right half of Fig. 1, and otherwise of the same construction. This device is designed for use with a single-throw cylinder and piston, or one in which fluid-pressure is applied on one side of a piston to impart to it motion in one direction, and the pressure is released or discharged to permit motion in the other direction.

Either pipe A′ or C′ may be the supply and the other the waste, (which also is true of Fig. 1;) but preferably A′ is the supply-pipe and C′ the waste or discharge.

The direction of the flow will, in the device of Fig. 3, be readily understood from the drawings, in connection with the previous description.

I claim herein as my invention—

1. A valve-stem, R′, having thereon valves s^2 s^3, arranged to seat alternately on their respective ports, in combination with a single interposed balancing-piston, *p′*, working in a close piston-case, substantially as set forth.

2. A valve-case having chambers A, B, B′, C, D, and D′, connected together, and having supply and waste ports, substantially as described, in combination with valve-stems R R′, each having a pair of valves adapted to close and open their respective ports by movements in opposite directions, and intermediate balancing-pistons, *p p′*, working in close cases, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FREDERICK S. GUERBER.

Witnesses:

R. H. WHITTLESEY,

W. P. POTTER.