

(No Model.)

C. W. VANDERHEYDEN & G. POWELL.
BALANCED VALVE.

No. 360,628.

Patented Apr. 5, 1887.

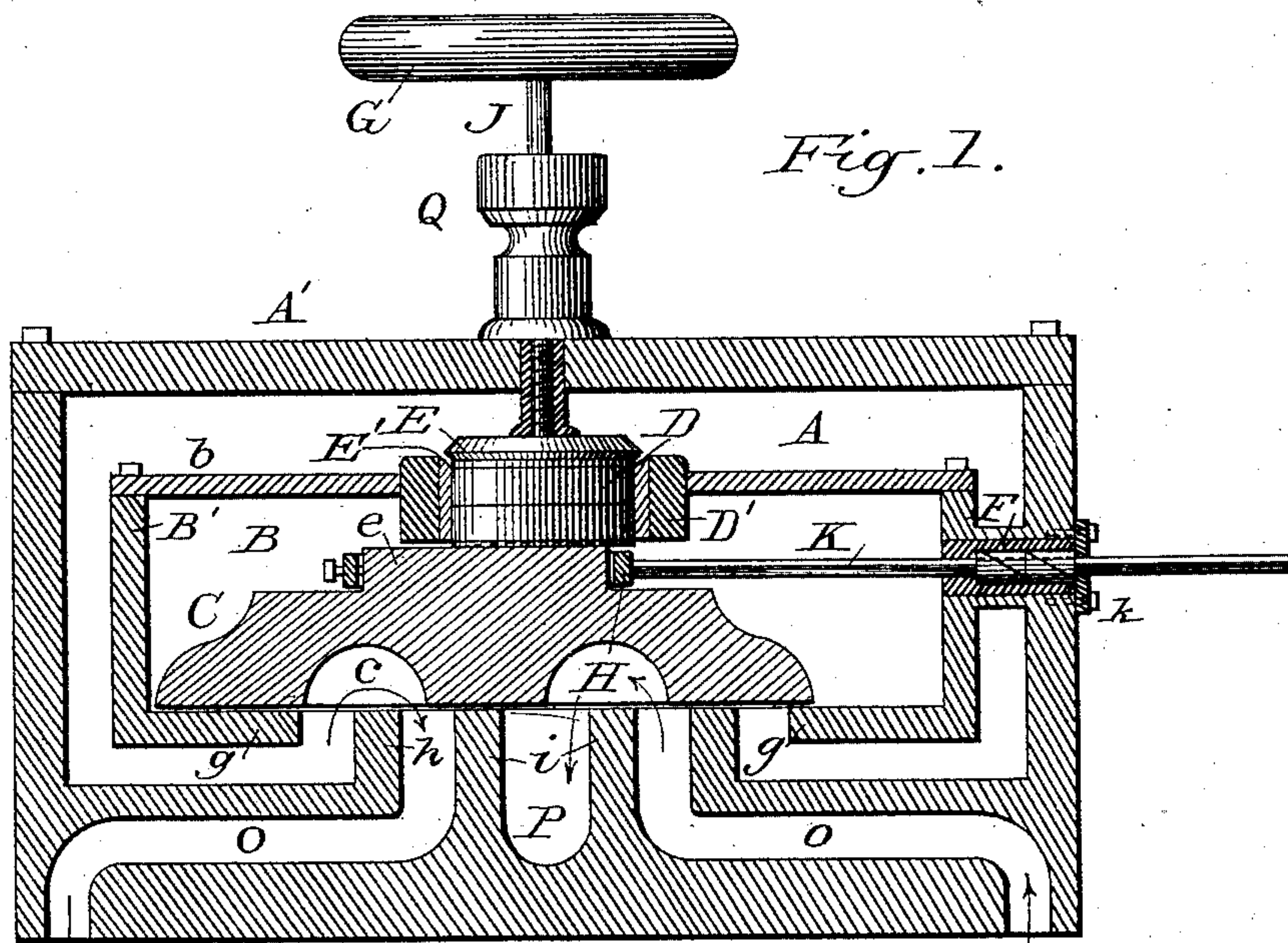


Fig. 1.

Fig. 5.

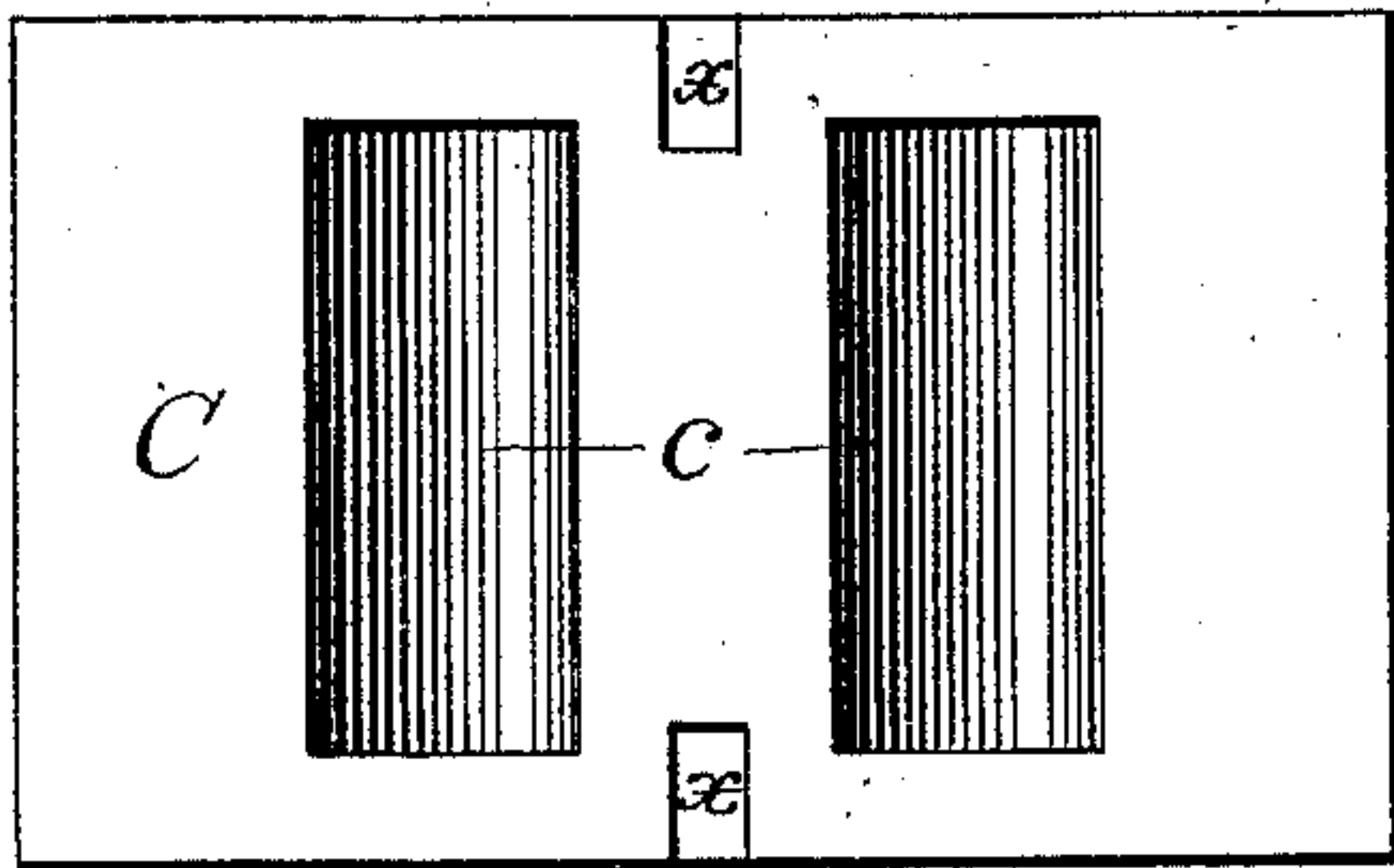


Fig. 2.

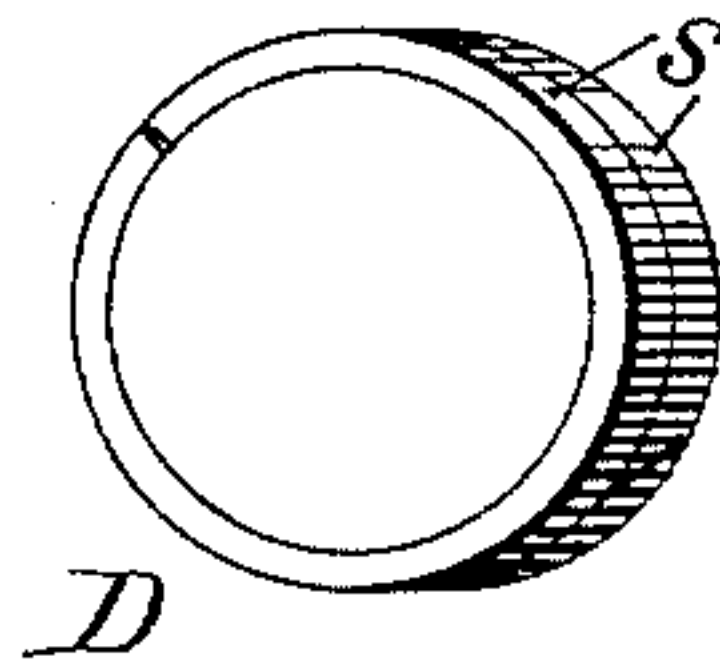


Fig. 3.

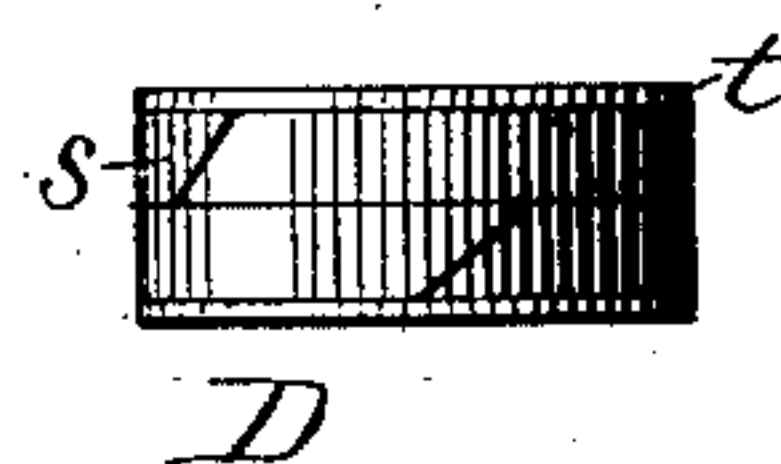


Fig. 4.

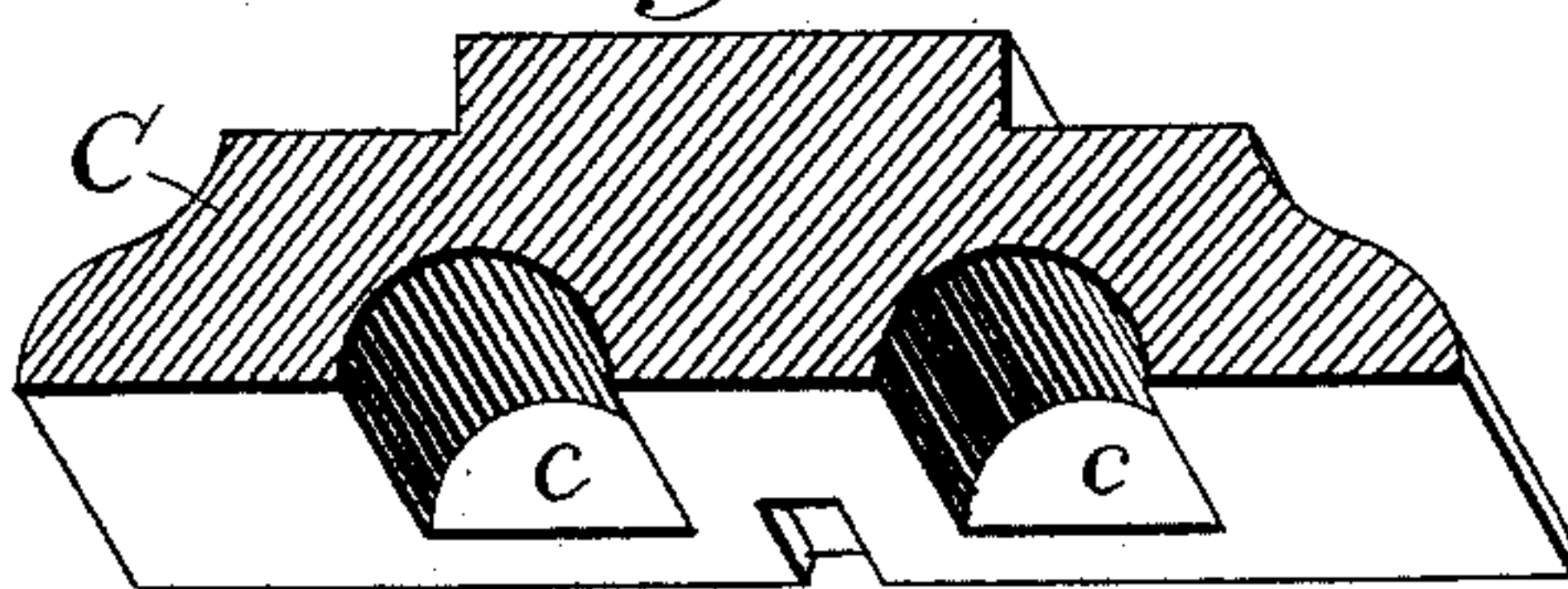


Fig. 7.

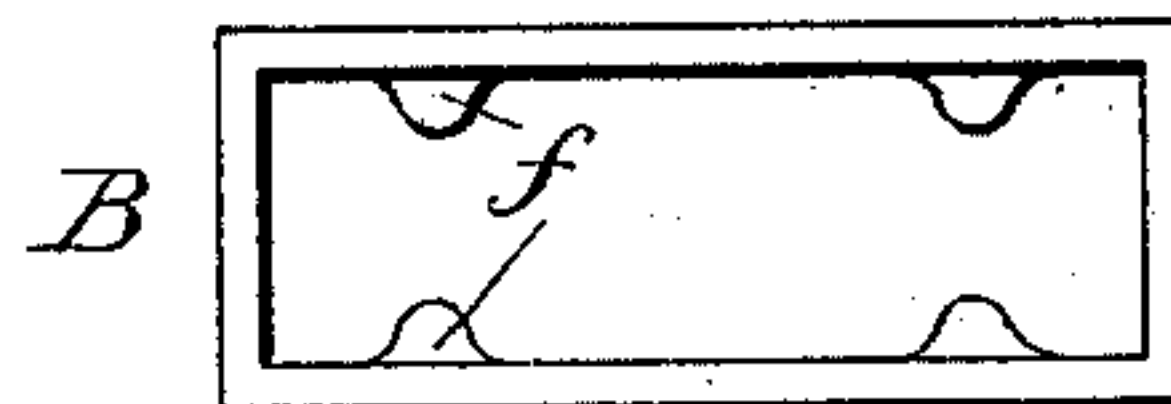
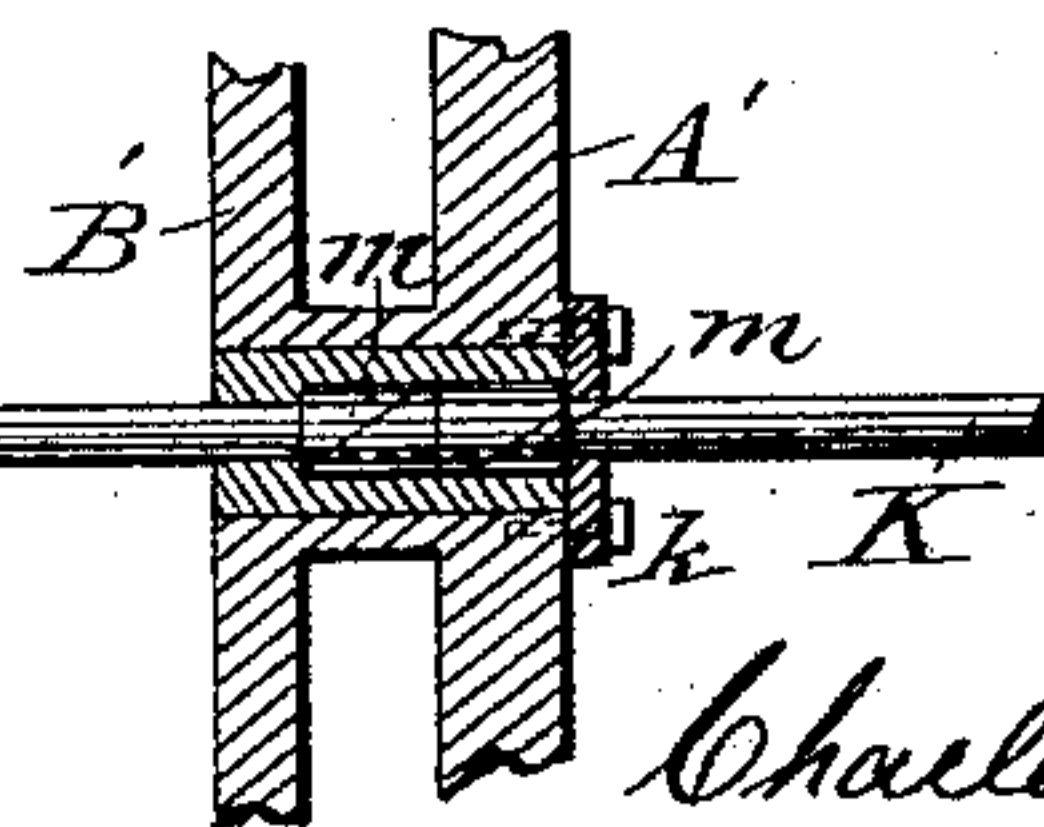


Fig. 6.



Witnesses:

Geo. R. Reeves,

Charles B. Antrim

Inventor:

Charles W. Vanderheyden,

Gerrard Powell

per J. J. Willey Attorney

UNITED STATES PATENT OFFICE.

CHARLES W. VANDERHEYDEN AND GOMMERT POWELL, OF GRAND HAVEN, MICHIGAN.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 360,628, dated April 5, 1887.

Application filed September 6, 1886. Serial No. 213,011. (No model.)

To all whom it may concern:

Be it known that we, CHARLES W. VANDERHEYDEN and GOMMERT POWELL, citizens of the United States, residing at Grand Haven, in the county of Ottawa and State of Michigan, have invented a new and useful Improvement in Balanced Valves for Steam-Engines, of which the following is a specification.

Our invention relates to improvements in that class of steam-engines in which slide-valves are used for the purpose of opening and closing the "ports" in the steam-chest for the passage of the steam to and from the cylinder; and the objects of our invention are, first, to provide a perfectly-balanced steam-valve for engines; second, to obviate the necessity of using a packing-box and packing to prevent the steam from escaping round the valve-rod from the steam-chest either to the valve-chamber provided in our invention or to the outer atmosphere; and, third, to allow the steam to enter the ports leading to the cylinder under the valve without entering the chamber in which the valve works, thus dispensing with the direct action of the steam upon the back of the valve. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of the steam-chest and cylinder of a steam-engine, cut away to show the relative positions of the several parts of our invention. Fig. 2 is an adjusting or balancing piston. Fig. 3 is a side view of the same, showing the position of rings, followers, &c. Fig. 4 is a side view of the steam-valve, cut away to show position of ports. Fig. 5 is a face view of the same. Fig. 6 shows the valve-rod connections, and Fig. 7 shows the form of lugs cast upon the walls of the steam-chest for the purpose of securing the cap *b* to the valve-chamber.

Similar letters refer to similar parts throughout the several views.

The steam-chest A, the ports O O, and the cistern P are constructed similar to those in use on all ordinary slide-valve engines. The inner wall, B', the valve-chamber B, the overlapping valve C, the regulating-piston D, the regulating-valve E, the "anti-packing" box F, and the projecting walls *g g*, *h h*, and *i i*, constitute the main features of our invention.

The walls B' B' between the steam-chamber A and the valve-chamber B are cast with or securely attached to the walls of the steam-chest and extend across the entire width of the same. They are provided at their outer ends with a cap, *b*, which is bolted on in the manner of an ordinary steam-chest cap by means of lugs cast upon the face of the walls of the steam-chest, and is fitted to form a perfect steam-joint. The opposite ends of these walls turn in at right angles and terminate at *g g*, and are fitted on their inner surface to form a portion of the valve seat.

The cap *b* of the valve-chamber is provided with an aperture, D', for the reception of the regulating-piston D, and has a projection upon its inner surface, which is so arranged as to allow of the free passage of the valve C between the same and the valve-seats, and upon the opposite surface with a valve-seat, E', for the reception of the regulating-valve E.

The steam-valve C is made of sufficient length to overlap the projections *g g* of the walls of the valve-chamber, as shown in Fig. 1, is provided upon its face with two ports or passage-ways for steam, and is forced up in the ordinary manner to form a perfect steam-joint upon the valve-seat *g g h h i i*. Upon the opposite side of this valve is a projection, *e*, which is dressed to a proper thickness to allow the free passage of the steam-valve C between the projection D' and the valve-seat, and to form a perfect working bearing for the regulating-piston D. The walls between the steam chest and ports turn out at right angles at *h h*, and the walls *i i* between the ports O O and the cistern P extend forward into the steam-chest to and in perfect line with the inner surface of the projections *g g* on the walls of the valve-chamber, all being dressed in a proper manner to form a perfect "seat" or bearing for the valve C.

The regulating-piston or balancing-valve D is constructed with a head, follower, rings, springs, &c., like an ordinary engine-piston, of the proper form and size to form a perfect steam-joint in the aperture D' in the cap *b*, and to receive a proper pressure of steam upon its outer surface to overcome and perfectly balance the pressure of steam upon the face of the steam-valve C when in operation. The

inner end of this piston is fitted to form a perfect working bearing upon the surface of the projection *e* on the steam-valve, and may be made slightly concave to prevent rocking.

5 The rings *s s*, follower *t*, &c., are attached in the ordinary manner.

The regulating-valve *E* is fitted in the valve-seat *E'* to form a steam-joint when closed, and has a stem, *J*, which is provided with a screw
10 and a hand-wheel, *G*, for the purpose of opening and closing the valve *E E'*, and works in the packing-box *Q* in the manner of an ordinary globe-valve stem. To regulate the steam or balance valve *C*, open the regulating-valve
15 *E E'* by turning the hand-wheel *G* until a sufficient pressure of steam is brought to bear upon the face of the regulating-piston *D* to overcome the pressure on the face of the steam or balance valve *C* at the ports *c* when the en-
20 gine is in operation.

The valve-rod bearing or box *F*, leading through the steam-chest into the valve-chamber, is so arranged by being cast or otherwise securely attached between the outer and inner
25 walls of the steam-chest that the escape of steam from the steam-chest by this source either to the valve-chamber or to the outer atmosphere is impossible; and the escape of steam from the steam-chest to and the direct
30 pressure of steam in the valve chamber are further provided against by means, first, of the steam-tight regulating-piston *D*; second, by means of the steam-valve *C* extending over the valve-seats *g g*, and, third, by means of the
35 slots *x x* in the steam-valve *C* communicating with the exhaust-port and allowing any steam that may be forced into the valve-chamber to escape freely with the exhaust-steam to the open atmosphere.

40 The valve-rod *K* may be attached to the valve *C* by means of a yoke, *H*, Fig. 6, passing round the projection *e* on the back of the valve, and provided with set-bolts and jam-nuts *I I I I* for regulating the position of the
45 valve; or it may pass through the projection *e* and be regulated by means of jam-nuts, &c., or in any other practicable manner. To provide against the danger of steam entering the valve-chamber by any means and escaping round
50 the valve-rod, we place expansion-rings *m m* upon the valve-rod and a thimble, *k*, in the wall of the steam-chest, fitted to form a perfect steam-joint and of sufficient length to allow a full stroke of the valve-rod without allowing the
55 escape of steam.

For the purpose of allowing the escape of any steam that may be forced into the valve-chamber while the engine is in operation, the steam-valve *C* is provided with slots *x x*,
60 formed in each side, as shown in Fig. 5, that open into the exhaust-port, thus allowing the steam to pass off with the exhaust and preventing a direct pressure of steam in the valve-chamber.

Steam may be carried into the steam-chest
65 *A* at any desired point, and, being confined in the outer or steam chamber, takes the course indicated by the arrows, Fig. 1, passing under the valve *C*, into and out of the cylinder, through the ports *O O* and the cistern *P*, the ports or
70 steamways in the valve *C* being adjusted to exactly open one set of steam-ports and one set of exhaust-ports at the same time.

We are aware that prior to our invention so-called "balance-valves" have been used upon
75 steam-engines. We therefore do not claim such an invention, broadly; but,

Having thus fully described our invention, what we do claim as new, and desire to secure by Letters Patent, is—
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1. The combination, in balanced valves for steam-engines, of the steam-chest *A*, having inner walls, *B' B'*, with cap *b*, projecting walls *g g*, valve-rod bearing *F*, regulating-piston *D*, and overlapping steam-valve *C*, forming the valve-chamber *B*, substantially as and for the purpose set forth.
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2. The combination, in a steam-engine, of the steam-chest *A*, the valve-chamber *B*, the steam-valve *C*, with steamways *c c*, the projecting walls *g g h h i i*, the regulating-piston *D*,
90 with rings *s s*, follower *t*, head and springs, the regulating-valve *E*, the valve-rod bearing *F*, the thimble *k*, and the rings *m m*, substantially as and for the purpose set forth.
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3. In a steam-engine, the steam-chest *A'*, in combination with the inner walls, *B' B'*, the cap *b*, the aperture *D'*, the valve-seat and valve *E*, the regulating-piston *D*, the lugs *f f*, the projecting walls *g g h h i i*, the overlapping
100 valve *C*, with ports or steamways *c c*, slots *x x*, and projecting head *e*, the valve-stem box or bearing *F*, the steam-chamber *A*, and the valve-chamber *B*, forming a balanced valve, substantially as and for the purpose set forth.

CHARLES W. VANDERHEYDEN.

GOMMERT POWELL.

Witnesses:

ADAM WEYMER,

DANIEL C. WACHS.