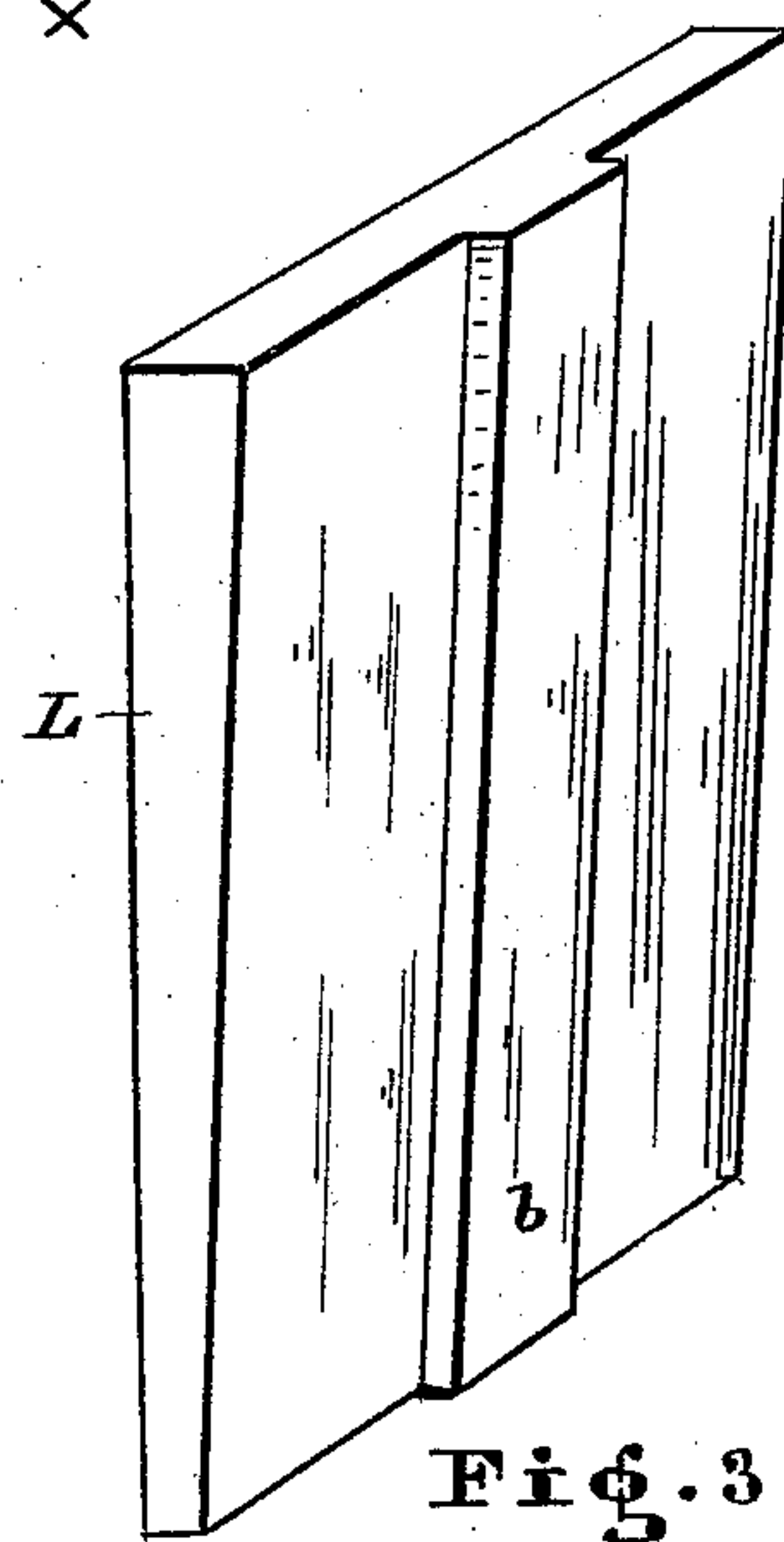
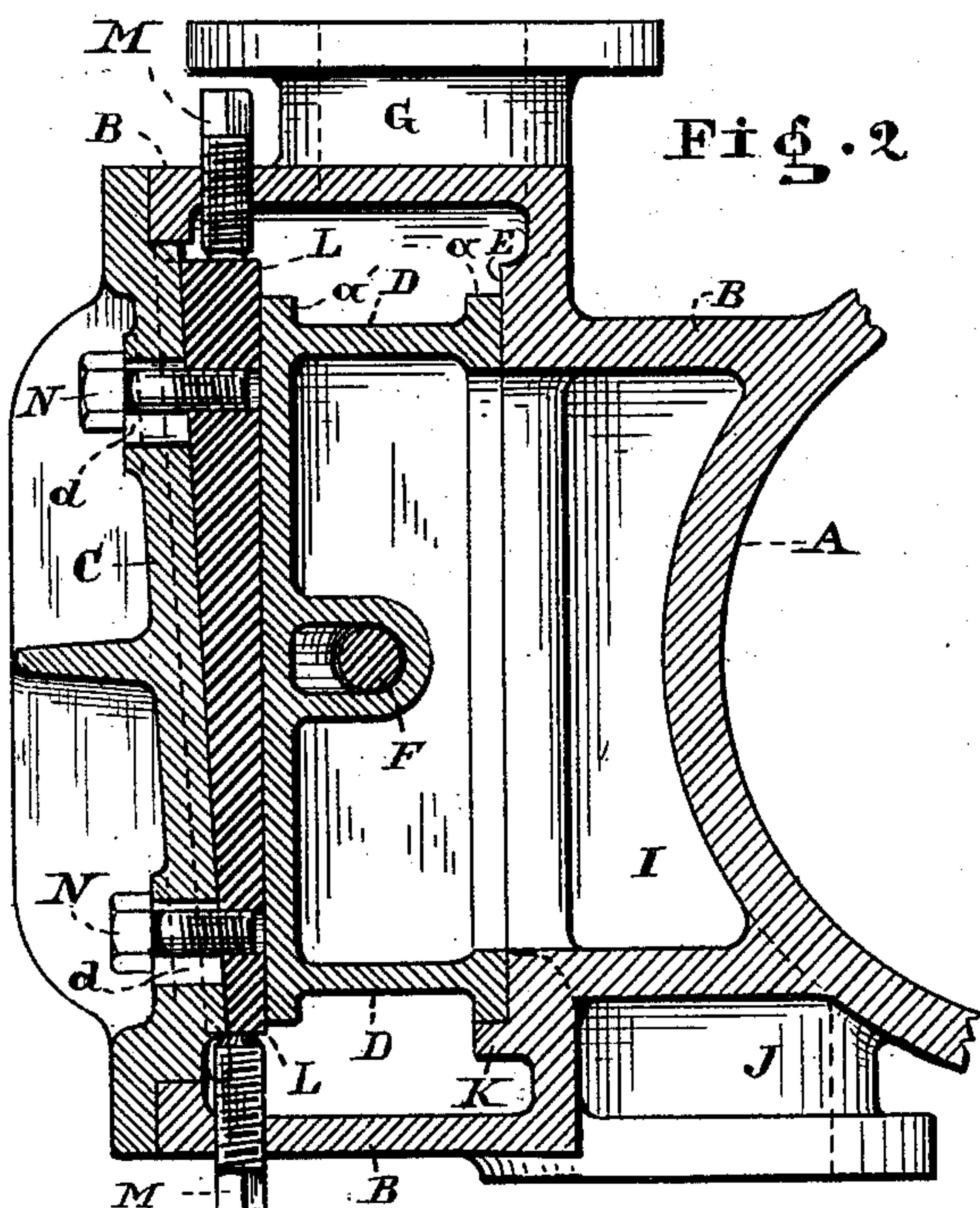
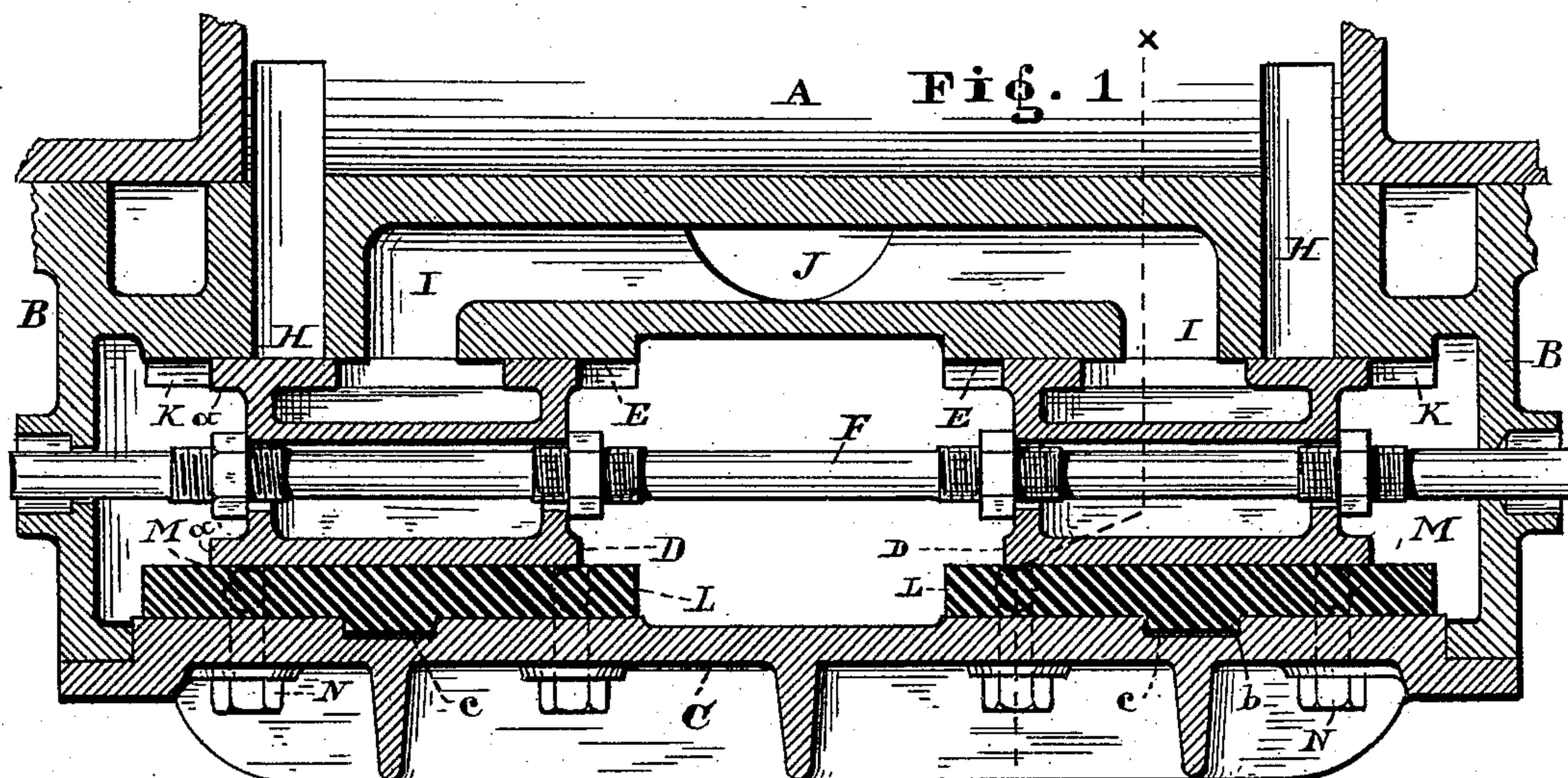


(No Model.)

F. I. FREEMAN.
BALANCED SLIDE VALVE.

No. 420,495.

Patented Feb. 4, 1890.



WITNESSES
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FRANCIS I. FREEMAN, OF WARREN, OHIO.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 420,495, dated February 4, 1890.

Application filed December 26, 1888. Serial No. 294,593. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS I. FREEMAN, a resident of Warren, in the county of Trumbull and State of Ohio, a citizen of the United States, have invented a certain new and Improved Balance Slide-Valve for Steam-Engines; and I do hereby declare that the following is a full, clear, and complete description thereof.

My improvement relates to means employed for relieving the valve-seat of steam-engines from the steam-pressure while the valve is in operation, there being in connection therewith an adjusting wedge-shaped plate interposed between the slide valve or valves and the cover of the steam-chest for arranging the valve or valves in position with reference to the valve-seat.

That the invention may be fully seen and understood, the following specification and accompanying drawings will be referred to, in which—

Figure 1 is a central horizontal section of a steam-chest slide-valve and part of a steam-cylinder provided with the improvement above referred to. Fig. 2 is a vertical section of the same on line *x x*, Fig. 1. Fig. 3 is a detached perspective view of the said adjusting wedge-shaped plate.

Like letters of reference refer to like parts in the drawings and specification.

The invention as illustrated is applied to a double-valve engine having the steam-chest located at the side thereof, the results obtained therefrom, however, being the same in any construction or design of slide-valve engine.

A represents a part of the steam-cylinder; B, the steam-chest; C the cover; D D, the slide-valves, and E E the valve-seats.

The valves D D are adjustably secured to the valve-rod F, as seen in Fig. 1, which rod is guided in either end of said chest and reciprocated by an eccentric or other means for the operation of said valves.

Through the pipe G the steam is induced to the interior of the steam-chest B, and through the ports H H it is alternately admitted to and exhausted from the steam-cylinder—that is, the valves D D are alternately in open relation with the ports H H I I for

the induction to and exhausting steam from the cylinder.

The steam-chest B, as above stated, is preferably located at the side of the cylinder. Thus the valves are in upright position, as seen in Fig. 2, and supported by means of the flanges K K, which extend out from the lower side of the valve-seats E E, as seen in Figs. 1 and 2.

Between the outer face side of the valves D and the inner side of the cover C are arranged the adjusting-plates L, which plates are tapering or wedge-shaped, and having a central rib, as seen in Figs. 2 and 3, corresponding to the inclination of the inner cover-face and the outer valve-face—that is, by means of said plates the valves D D can be held up steam-tight against their respective seats E E, excluding the steam from acting upon said valves, the pressure of which would otherwise cause a great amount of friction of the valves upon their seats and require as a consequence a corresponding amount of steam-power to move said valves.

By the arrangement of the adjusting-plates L, however, no steam-pressure can be exerted in the line of the valve-seats, except that acting upon the surrounding flanges *a*; but this pressure is compensated by the pressure acting upon the flanges *a'* in an opposite direction. The valves D D are thus entirely relieved from the existing pressure within the steam-chest. Each of the plates L L has a rib *b* extending over the rear side thereof, which rib engages in a groove *c* in the cover C to prevent the plate from being moved out of place by the frictional resistance of said plates and the valves. The set-screws M are for the purpose of adjusting the plates L in the required position to insure a steam-tight contact of the valves between their seats and the said plates L. By means of the bolts N the plates are securely united with the cover after once being set by means of said screws M. The holes *d* for the bolts N are elongated in a vertical direction, as seen in Fig. 2, to allow of the adjustment of the plates L upon the cover C. To set or arrange the adjusting-plates L in place, live steam is first admitted into the steam-chest to expand the plates to an extent commensurate with its expansion

induced by the steam-heat of the engine when in running order, to enable an accurate adjustment of said plates to be made in relation to said valves and cover. The plates when
5 once properly set will retain the valves in steam-tight operation for comparatively a long time; hence it is designed that the set-screws M should be removed after having the valves set and be replaced by plug-screws
10 which will not reach them, inasmuch as a competent person should adjust said plates when the wearing-surfaces begin to allow leakage of steam past the valve-seats.

By arranging the wedge in combination
15 with the removable cover the invention is embodied in simple and convenient form, as the incline can be accurately and easily finished and the wedge can be easily positioned or removed. It will be noticed, also, that the
20 wedges are arranged transversely to the direction in which the valve moves, and their position is therefore not affected by the reciprocation of the valves.

What I claim as my invention, and desire
25 to secure by Letters Patent, is—

1. In combination, the chest B, the valve D, the removable cover C, having an inclined inner face, and the wedge-plate between said inner face and the valve D, the said cover having elongated openings *d*, the screw-bolts
30 passing through said openings and secured to the wedge-plate, and means for adjusting the wedge-plate, substantially as described.

2. In combination, the chest B, the valve, the wedge-plate, said wedge-plate being in-
35 serted to bear upon the valve and being arranged transversely to the stroke of the valve, substantially as described.

3. In combination, the chest B, having a groove in one side, the valve, and the wedge-
40 plate interposed between said valve and the side of the chest, said wedge having a rib adapted to the groove in the chest, substantially as described.

In testimony whereof I affix my signature in
45 presence of two witnesses.

FRANCIS I. FREEMAN.

Witnesses:

J. P. ABBOTT,

W. H. BURRIDGE.