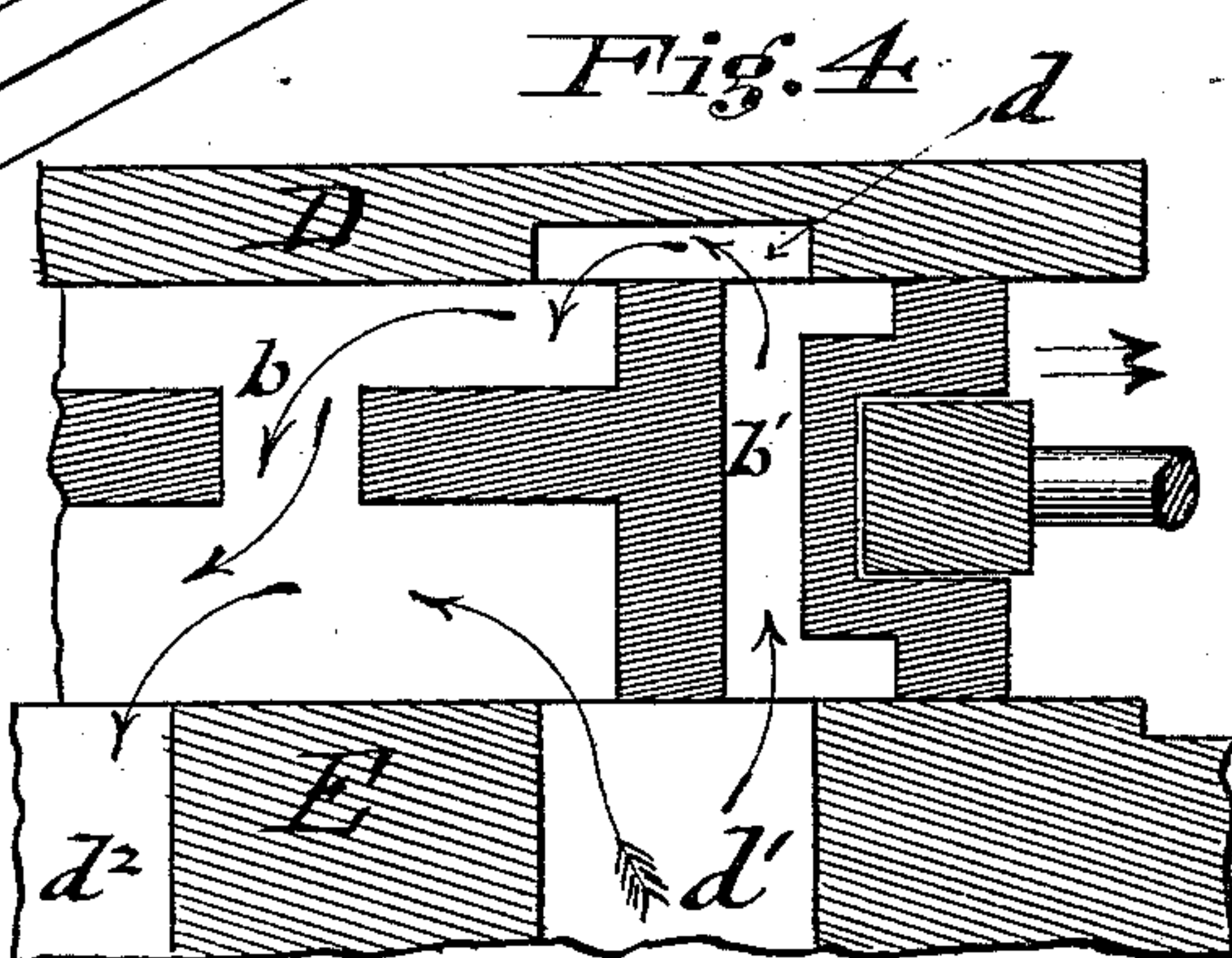
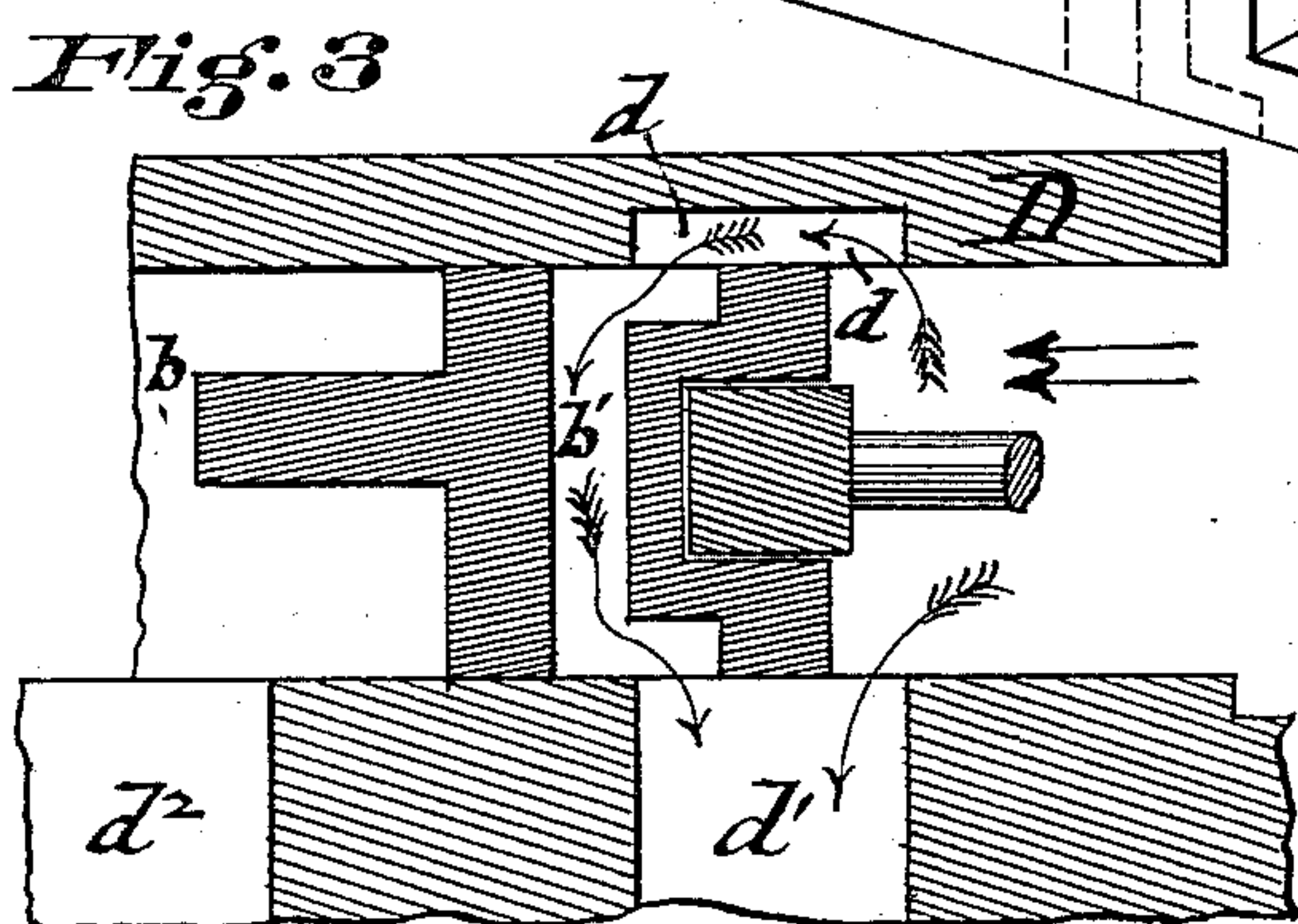
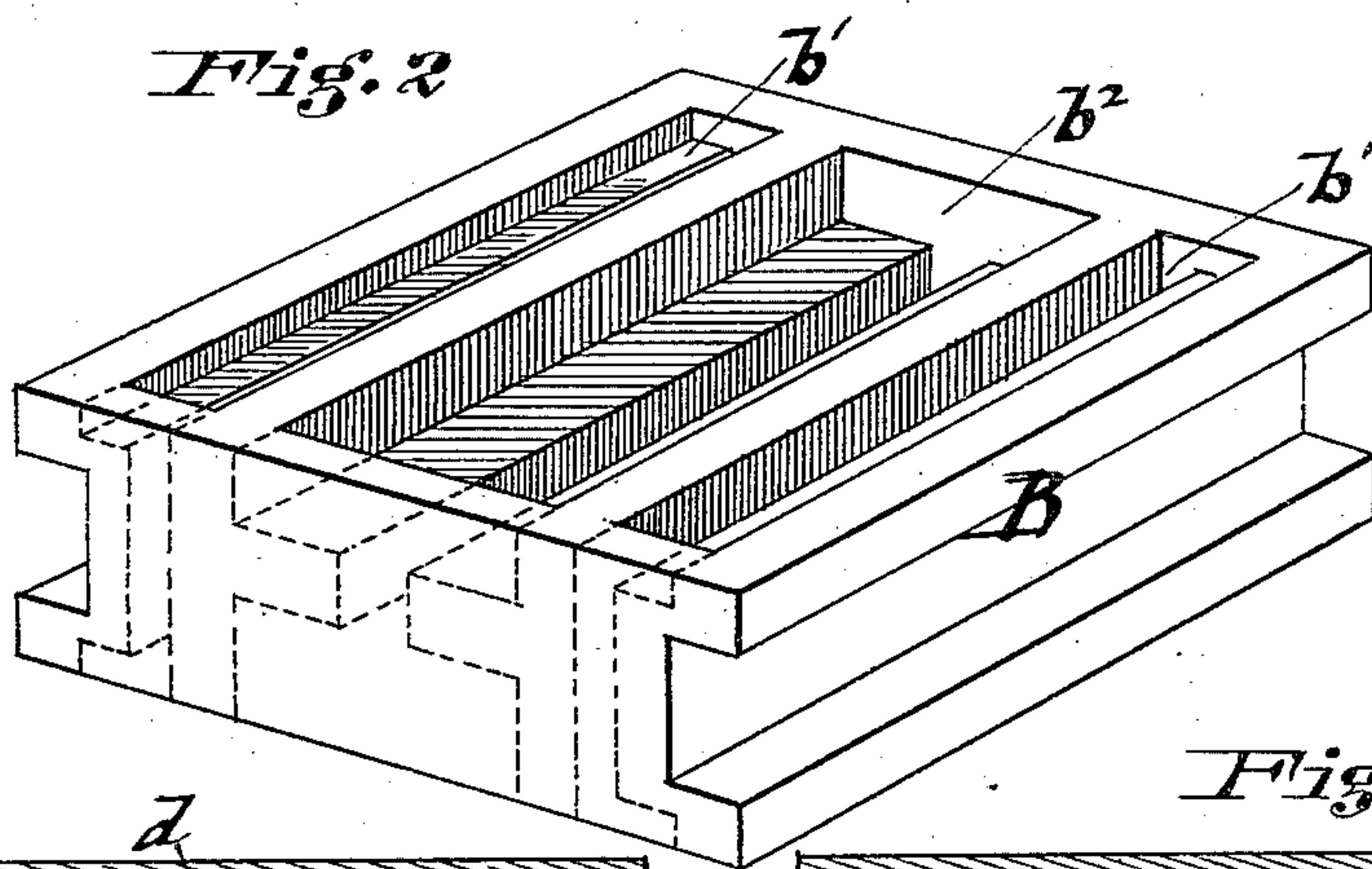
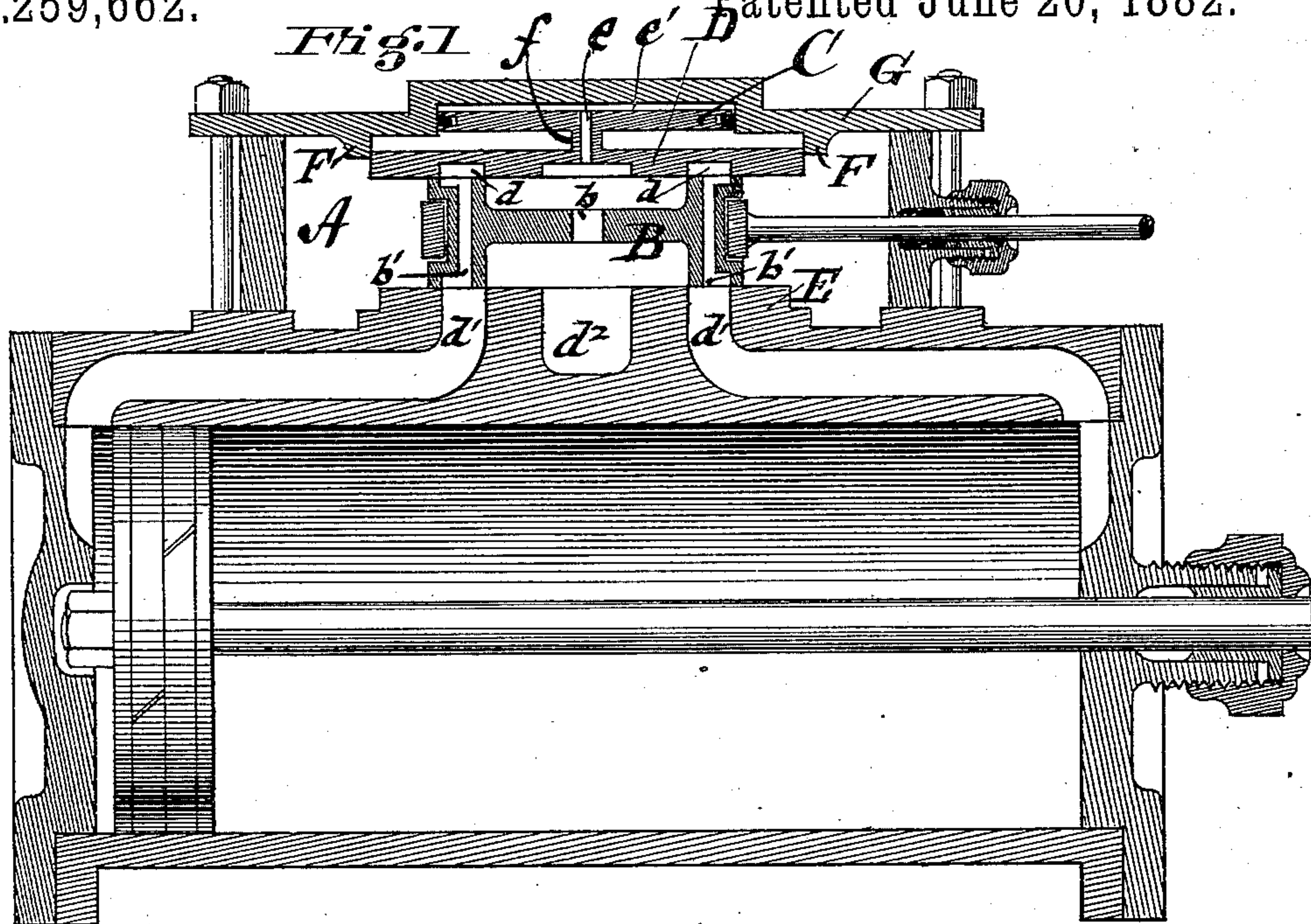


(No Model.)

W. S. BREWER.
BALANCED SLIDE VALVE.

No. 259,662.

Patented June 20, 1882.



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UNITED STATES PATENT OFFICE.

WESLEY S. BREWER, OF RICHMOND, INDIANA.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 259,662, dated June 20, 1882.

Application filed December 24, 1881. (No model.)

To all whom it may concern:

Be it known that I, WESLEY S. BREWER, a citizen of the United States, residing at Richmond, Wayne county, Indiana, have invented new and useful Improvements in Balanced Slide-Valves of Steam-Engines, of which the following is a specification.

My invention relates to slide-valves of steam-engines, its object being to improve their construction and efficiency and produce a quick and free opening of the steam induction and exhaust ports with a limited travel of the valve.

To this end it consists in a double-faced valve having ports entirely through the same, arranged to operate between two seats, one of which contains the ordinary port-openings of the cylinder and the other shallow ports or recesses corresponding therewith, whereby the travel of the valve opens the ports and recesses simultaneously, thereby opening additional passages for steam or exhaust with a given movement of the valve.

The auxiliary valve-seat may be the top or cover of the valve-chest; or it may be an independent plate within the same, and in such case the construction offers great facilities for balancing the upper plate by steam-pressure, so that the steam-pressure upon the valve may be relieved and the friction and wear upon the surface thereby lessened, as will be hereinafter pointed out.

My invention is embodied in mechanism illustrated in the accompanying drawings, in which Figure 1 is a vertical longitudinal section of a valve-chest, valve-seats, and cylinder-ports, the auxiliary valve-seat being counter-balanced against the downward pressure of steam by a piston arranged to operate vertically in a cylindrical recess of the valve-chest cover. Fig. 2 is a perspective view of the valve detached, and Figs. 3 and 4 are partial sectional views of the valve and ports, exhibiting their relative positions when taking steam and exhausting, respectively.

Referring to the drawings in aid of the description, A designates the valve-chest, and B a rectangular "gridiron" valve, having three ports or openings extending entirely through its two parallel faces, which are dressed to travel steam-tight on and between two valve-seats. The lower valve-seat, E, is the usual valve-seat of the cylinder, having the central

exhaust, d^2 , and two induction-ports, $d' d'$. The upper valve-seat is a plate, D, within the valve-chest resting upon the upper face of the valve. It is free to move vertically between guides F F, depending from the inner face of the valve-chest cover G or between the two end walls of the valve-chest. In the present illustration of my invention the plate D is connected by a short neck, f , to a piston, C, operating steam-tight vertically in a shallow cylindrical cavity, e' , in the valve-chest cover. An aperture, e , extends through the neck f , and opens above through the piston C into the cavity e' of the cover and below through the plate D into the central port, b , of the valve. Two shallow depressions, $d d$, are arranged in the lower face of the plate D, corresponding in dimension and position with ports $d' d'$ of the lower valve-seat.

It will be readily understood that the piston C is of such area that the upward pressure of steam upon it will partly or wholly counter-balance the downward pressure of steam upon the plate D, and thus relieve the pressure upon the valve.

The operation of the valve is as follows: The valve being in the position shown in Fig. 3, traveling to the left, as shown by the double arrow, the edge of the valve opens simultaneously the cylinder-port d' and the cavity d in the auxiliary seat. The steam flows directly into the port d' in the ordinary manner, and at the same time passes above the valve into the cavity d of the auxiliary seat D, and thence by the port b' of the valve into the cylinder-port d , as indicated by the single arrows. Thus a given travel of the valve, producing a certain direct opening of the port d' , also gives an equal additional opening through the cavity d' of the upper seat and port b of the valve. The same operation occurs at the other end of the valve at the opposite limit of its travel. In exhausting, the valve being in the position shown in Fig. 4 and moving to the right, as indicated by the double arrows, the edge of its exhaust-cavity uncovers the port d' and the corresponding cavity, d , in like manner at the same instant, and the steam, besides passing directly into the exhaust-port d^2 in the usual manner, also passes through the port b' of the valve into cavity d , and thence over into the exhaust-port b , and thence to d^2 , thus giving a double re-

lease area for a given movement of the valve. It is obvious, therefore, that the actual port area opened both for the induction and education of steam by a given movement of the valve is double the ordinary amount, and that this result is accomplished without increasing the size of the valve, its seat, or the cylinder-ports—an advantage which is manifestly of great value in all slide-valve engines, and particularly in locomotive and other high-speed engines. In other cases, where high speed is not so necessary, the advantage may be made available by reducing the size of the valve and limiting its travel.

It is also obvious that the principles of my invention may be applied to engines of the Corliss type in the construction of single valves governing the ports independently. Thus a valve governing a single induction-port might be used with the same advantages of a quick opening and quick release of the port.

Having described my invention, I claim and desire to secure by Letters Patent—

1. The plate D and piston C, provided with a perforation, *e*, extending through both, in combination with the valve-chest cover G, provided with the cavity *e'*, substantially as and for the purpose specified.

2. The auxiliary balanced valve-seat D, in combination with the guide-lugs F of the valve-chest cover and the slide-valve, substantially as and for the purpose specified.

3. In combination with the valve and ordinary seat, the auxiliary seat D, piston C, and hollow neck *f*, connecting the seat and piston and establishing communication between the exhaust-cavity of the valve and the cylinder-cavity of the steam-chest cover, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WESLEY S. BREWER.

Witnesses:

M. DUNN,

EDWIN CORKAYNE.