

G. M. WEINMAN.
Piston-Valves for Steam-Engines.

No. 137,986.

Patented April 15, 1873.

Fig. 1.

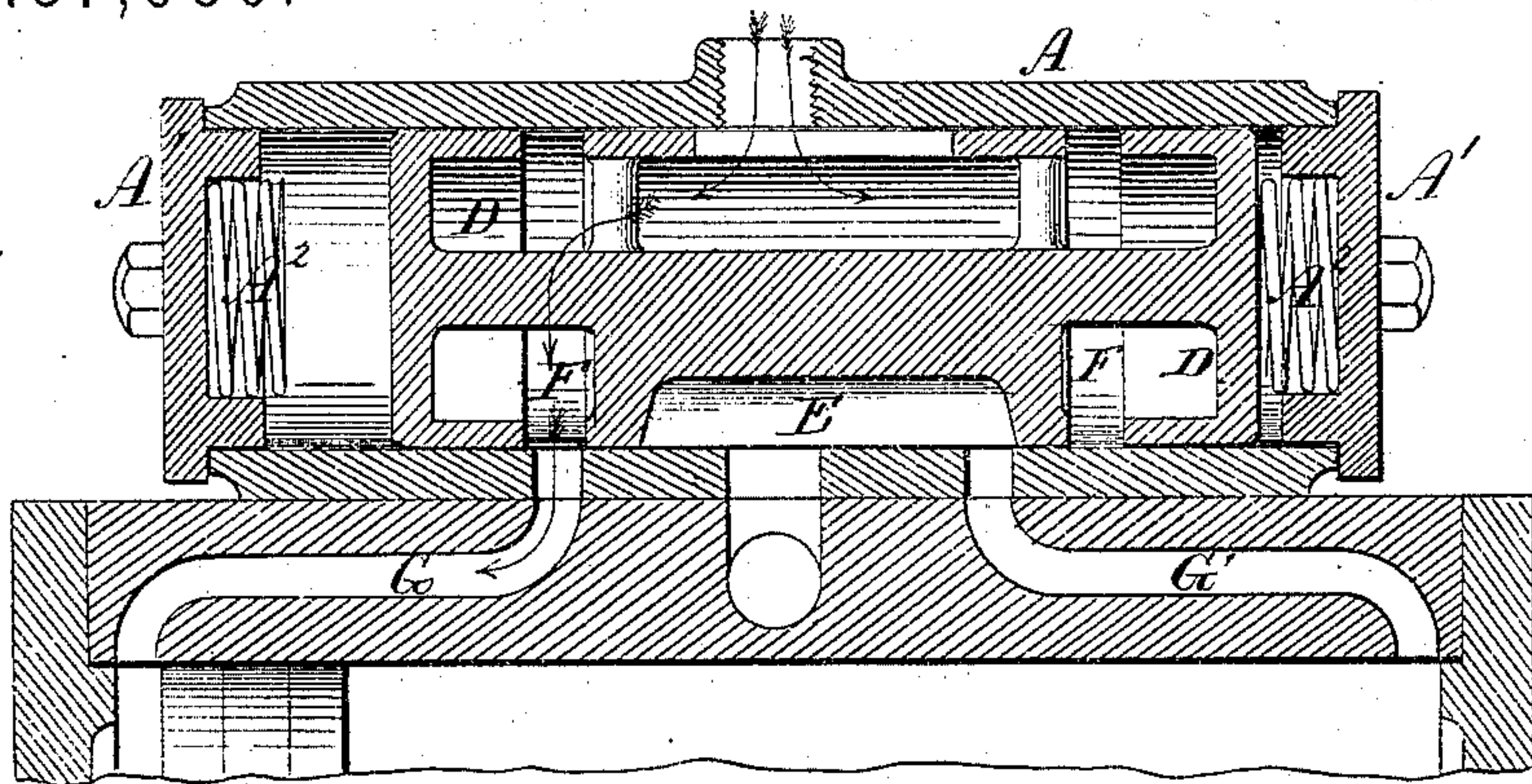


Fig. 2.

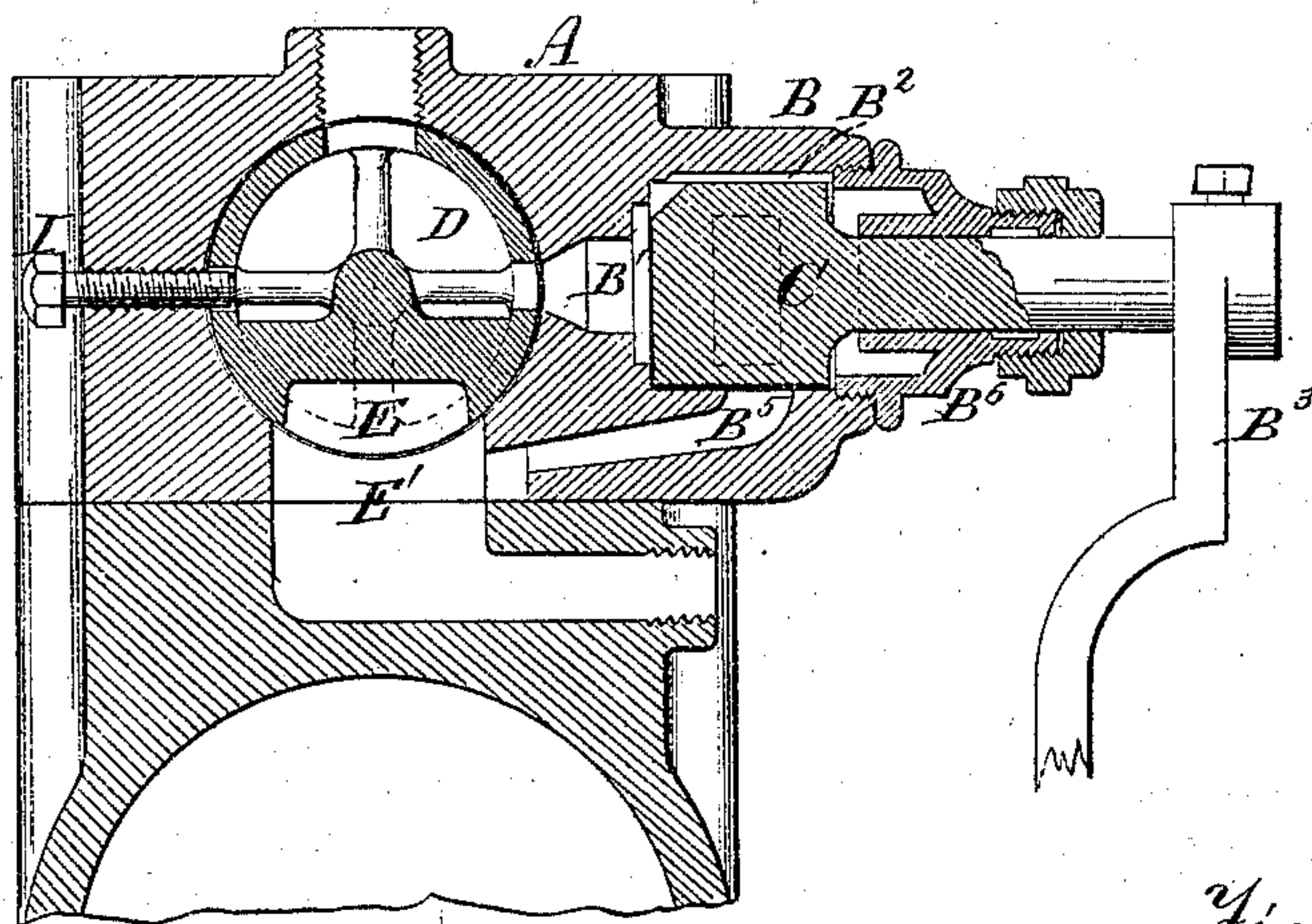


Fig. 3.

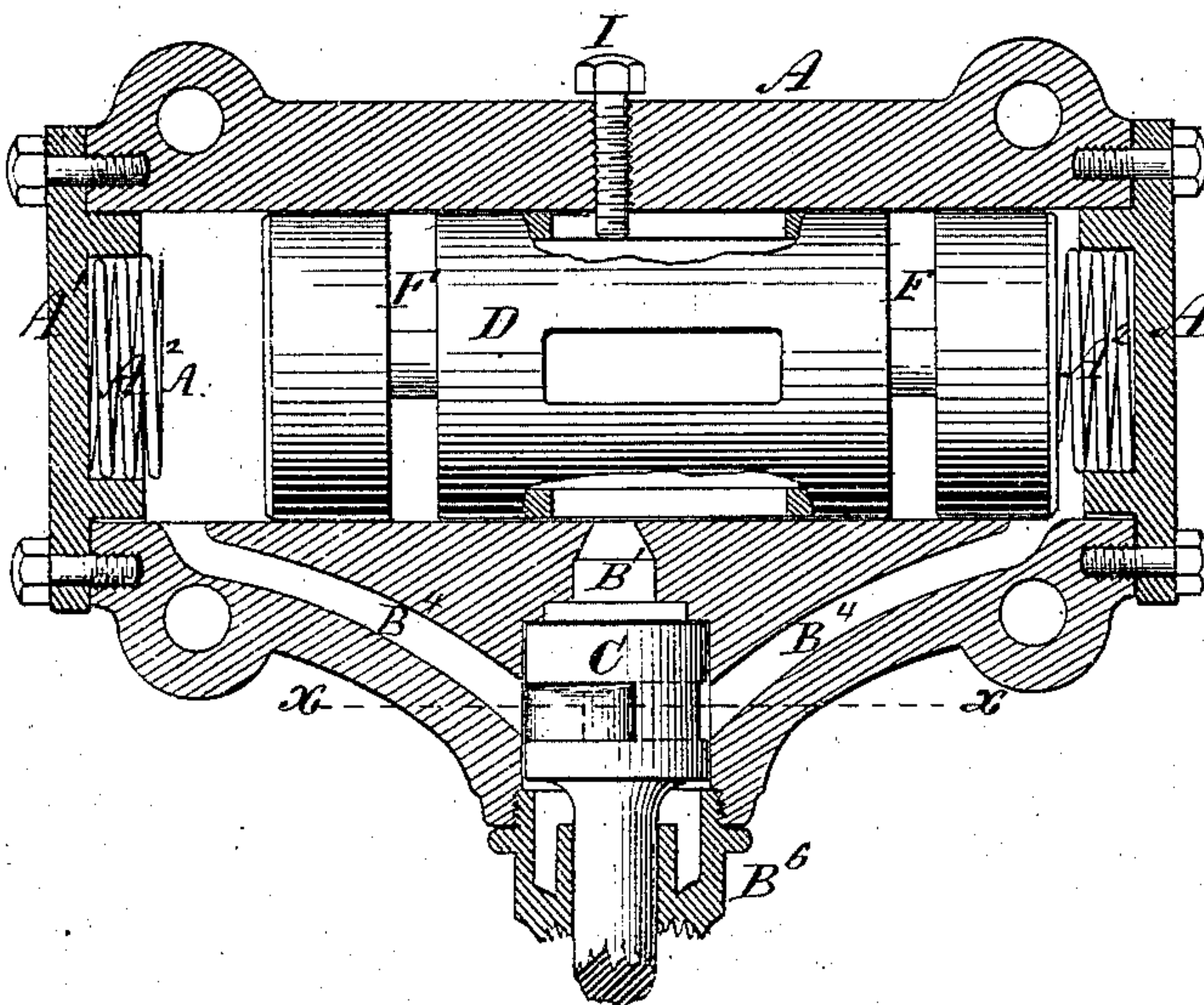
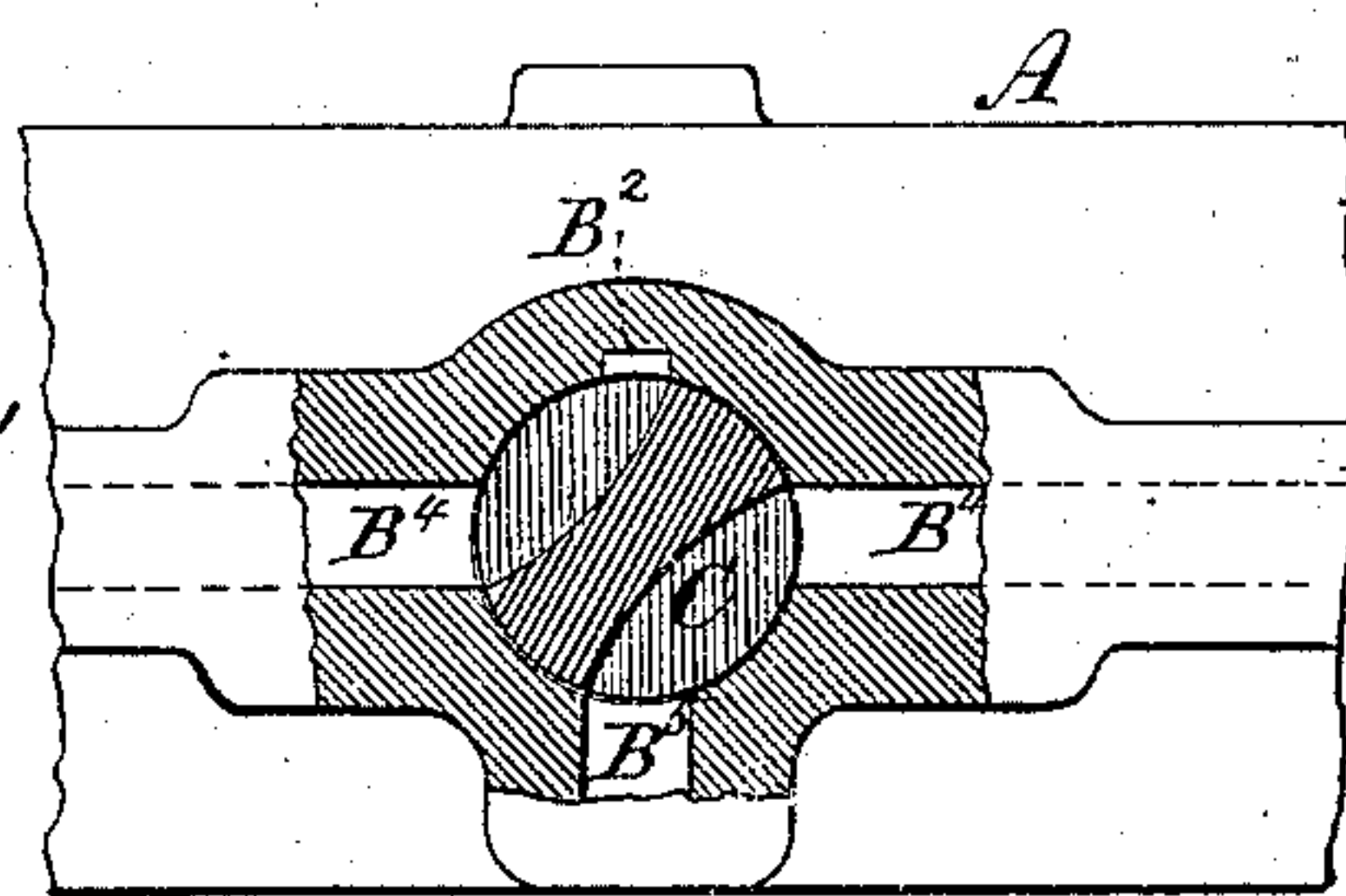


Fig. 4.



Witnesses.
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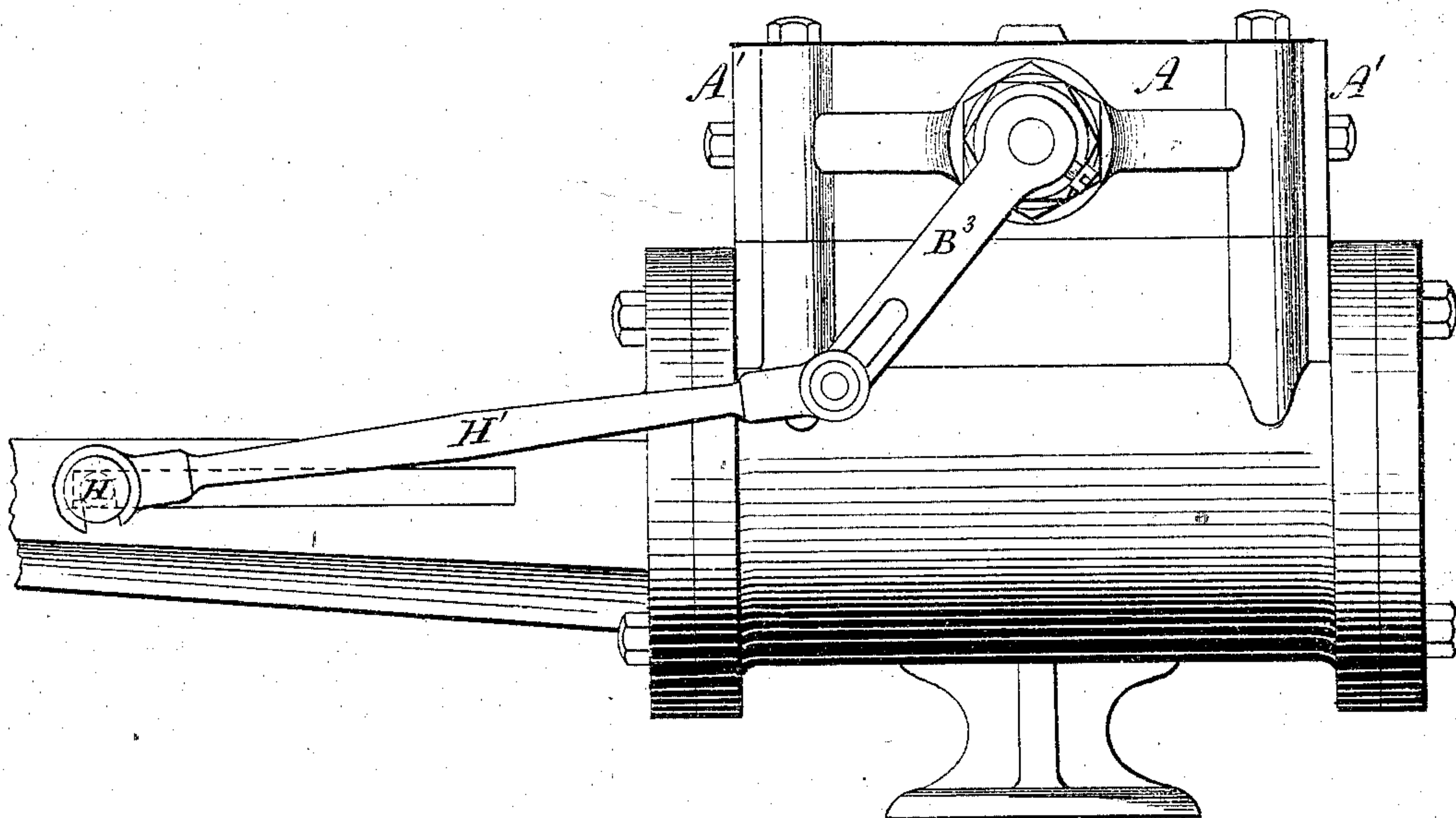
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Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE M. WEINMAN, OF COLUMBUS, OHIO.

IMPROVEMENT IN PISTON-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **137,986**, dated April 15, 1873; application filed January 21, 1873.

To all whom it may concern:

Be it known that I, GEO. M. WEINMAN, of Columbus, in the county of Franklin and State of Ohio, have invented certain Improvements in the Valves of Steam-Engines, of which the following is a specification:

Figure I is an elevation of a portion of a steam-engine and steam-chest, showing my improved method of arresting the movements of the main valve, the construction of said valve, and the steam induction and eduction ports. Fig. II is a vertical transverse section, showing the main valve in position and the auxiliary valve with its induction and eduction ports. Fig. III is a longitudinal section, showing the main valve, its arresting-springs, the chest in which it moves, the auxiliary valve, and the means of holding the same in position. Fig. IV is a section on line *x x* of Fig. III, showing the auxiliary valve with its steam-passages; and Fig. V is an elevation, showing an engine with my improvement attached thereto, and one method of operating the auxiliary valve.

Corresponding letters refer to corresponding parts in the several figures.

This invention relates to that class of valves and valve gear which are peculiarly adapted for use upon direct-acting engines, but which is also applicable to other forms; and it consists in the construction, combination, and arrangement of some of the parts, as will be more fully described hereinafter.

In constructing devices of this character I use a steam-chest, A, which may consist of a rectangular box with open ends, it having a cylindrical aperture through it in which a valve slides, it also having the requisite steam-ports for the induction and eduction of steam. Upon the ends of this chest heads A¹ A¹ are bolted in such a manner as to make a steam-tight joint between them and the ends of the chest. In the interior surfaces of these heads a recess is formed for the reception of springs A², which serve to arrest the movement of the valve as it passes from one end of said chest to the other, they being arranged for that purpose, as shown in Figs. I and III. Upon one side of the chest there is a projection formed, as shown at B in Fig. II, which has a recess in it for the reception of the auxiliary valve C. This recess com-

municates with the interior or steam-space of the chest A by means of a small aperture, B¹, which permits steam to pass from said chest to the recess in which the auxiliary valve is placed, and from thence past the beveled end of valve C, as shown in Fig. II, to the port B² formed in the recess, from which point its direction is controlled by the valve C, ports being formed in it, as shown in Figs. III and IV, they being so arranged that, as said valve is moved by its arm B³, steam will alternately be admitted to and discharged from the ends of the main steam-chest A through ports B⁴, B⁴, and B⁵, for the purpose of giving the requisite movements to the main valve D. The valve C is held in its seat by means of a cap, B⁶, which screws into or is bolted to the projection B, and has a recess formed in it for the reception of steam, which passes the valve C to said recess for the purpose of balancing said valve, a stuffing or packing box being placed upon the outer end of the valve-spindle for the purpose of preventing the escape of steam at that joint. The main valve D consists of a cylinder of metal or of a valve of any other suitable form, having in it grooves and apertures for the passage of steam. Upon the under side of this valve there is formed an eduction-opening, E, which registers with the passage E' in the lower side of the steam-chest A and in the upper portion of the steam-cylinder. It also has annular grooves F F, which serve as induction-passages for the steam on its passage to the cylinder, they being so arranged that when the main valve is in the position shown in Fig. I, steam will be allowed to pass from the interior of said valve to the left-hand side or end of the piston of the engine through port G, and at the same time be exhausted from the opposite end through the port G'. The central portion of this valve is made to contain steam, it flowing thereto through an opening in the steam-chest, as shown in Fig. I, the effect of which arrangement is to balance the valve and thus enable it to be moved with the least possible amount of friction and expenditure of power, any steam which may leak around valve C being utilized for that purpose.

As this valve controls the movements of the piston of the engine it is important that

provision be made for controlling its movements with reference to said piston. This effect is produced by attaching to the piston-rod an arm, H, as shown in Fig. V, to which a connecting-rod, H', is attached, its opposite end grasping a pin in the end of arm B³, and thus giving the requisite movement to the auxiliary valve C, which, as above described, directs steam alternately to the ends of the main valve, and thus controlling its movements with reference to the movements of the piston. The main valve is prevented from rotating in its seat by means of a screw, I, which is screwed through the side of the steam-chest, its inner end passing into a slot therein, which is of sufficient length to allow the valve to move the required distance. As this valve has no rigid connection with its moving mechanism it follows that when it has once been put in motion in either direction its tendency is to continue its movement even after the steam which moved it has been exhausted from its opposite end, owing to the fact that it had acquired a certain momentum in traveling through its allotted space, and hence the necessity of providing some means for arresting its movement, in order that it shall not force off the heads or caps of the chest, and so that it shall not travel over the steam-ports, and thus prevent steam from entering to start it on its return movement. This effect is produced by the springs A¹ above alluded to, they being of such a length as to cause the valve to come in contact with them, and have its movement arrested before the solid portion on the end of the valve shall have covered the ports in the steam-chest. These springs not only arrest the valve at the proper point, but they prevent any jar to the machinery by gradually stopping the valve and preventing it from coming in contact with any unyielding substance.

I am aware that two valves, the one an auxiliary to the other and both auxiliary to the piston, have heretofore been used; and I am also aware that it has been customary to cushion or arrest the movements of main valves at the terminations of the strokes. I do not therefore claim, broadly, the combination of two such valves; neither do I claim, broadly, cushioning or arresting the movements of the main valve; but

Having fully described the construction and operation of my improvements, what I do claim, and desire to secure by Letters Patent, is—

1. The valve D, when constructed in the form of a cylinder, and having in its central portion a chamber, into which the steam is admitted and from which it passes to the annular induction-ports F F, it also being provided with an exhaust-port, E, for the escape of steam from the cylinder.

2. The auxiliary valve C, when constructed with a beveled end and with steam-passages, substantially as and for the purpose set forth.

3. The combination and the arrangement of the auxiliary valve C, the steam-induction ports B¹ B² B⁴ B⁴, and exhaust-ports B⁵, substantially as and for the purpose set forth.

4. The combination of the cylindrical main valve D, auxiliary oscillating valve G, and steam-chest A, the parts being constructed and arranged substantially as and for the purpose set forth.

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

GEORGE M. WEINMAN.

Witnesses:

D. P. HOLLOWAY,
W. BRADFORD.