

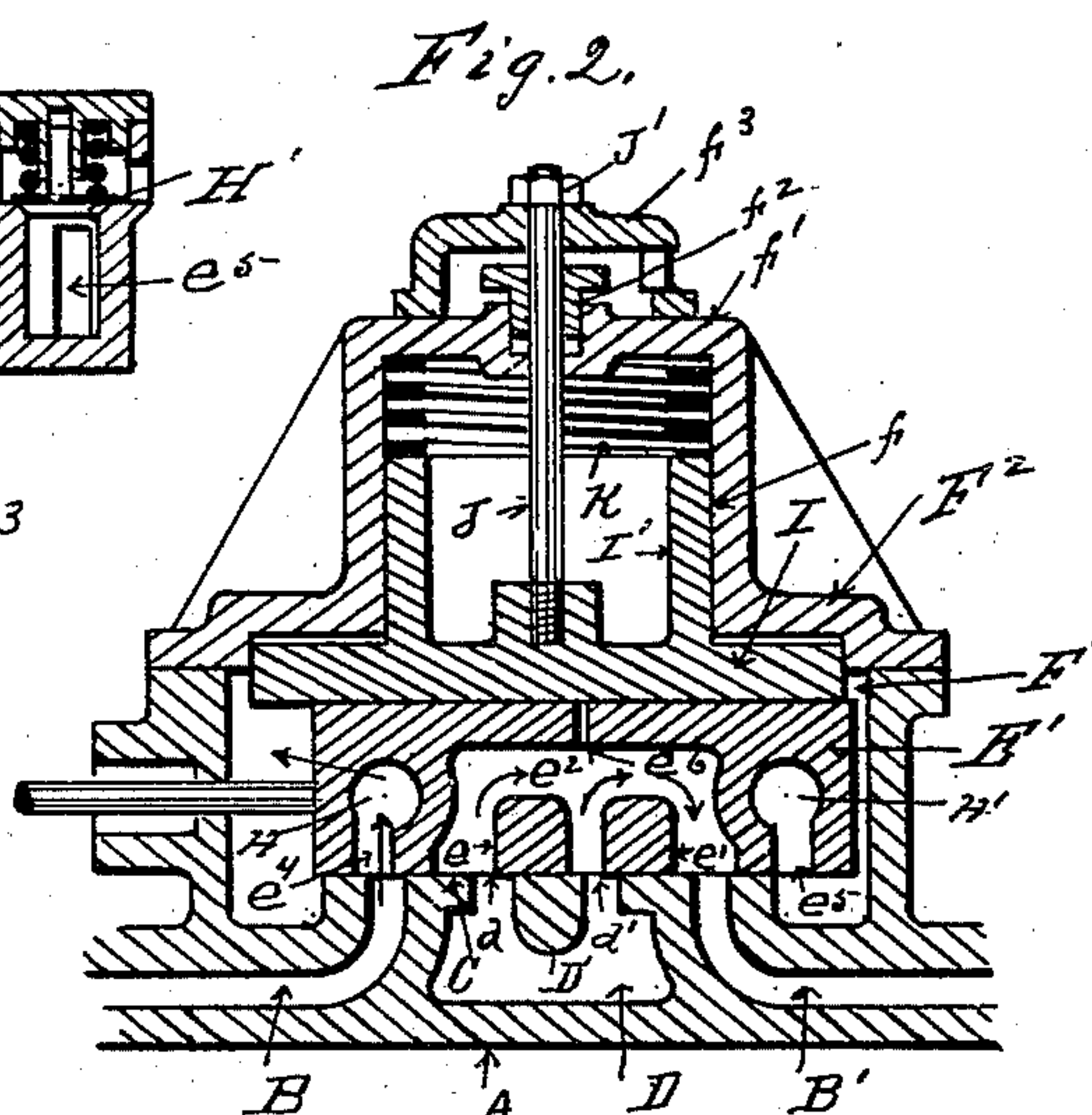
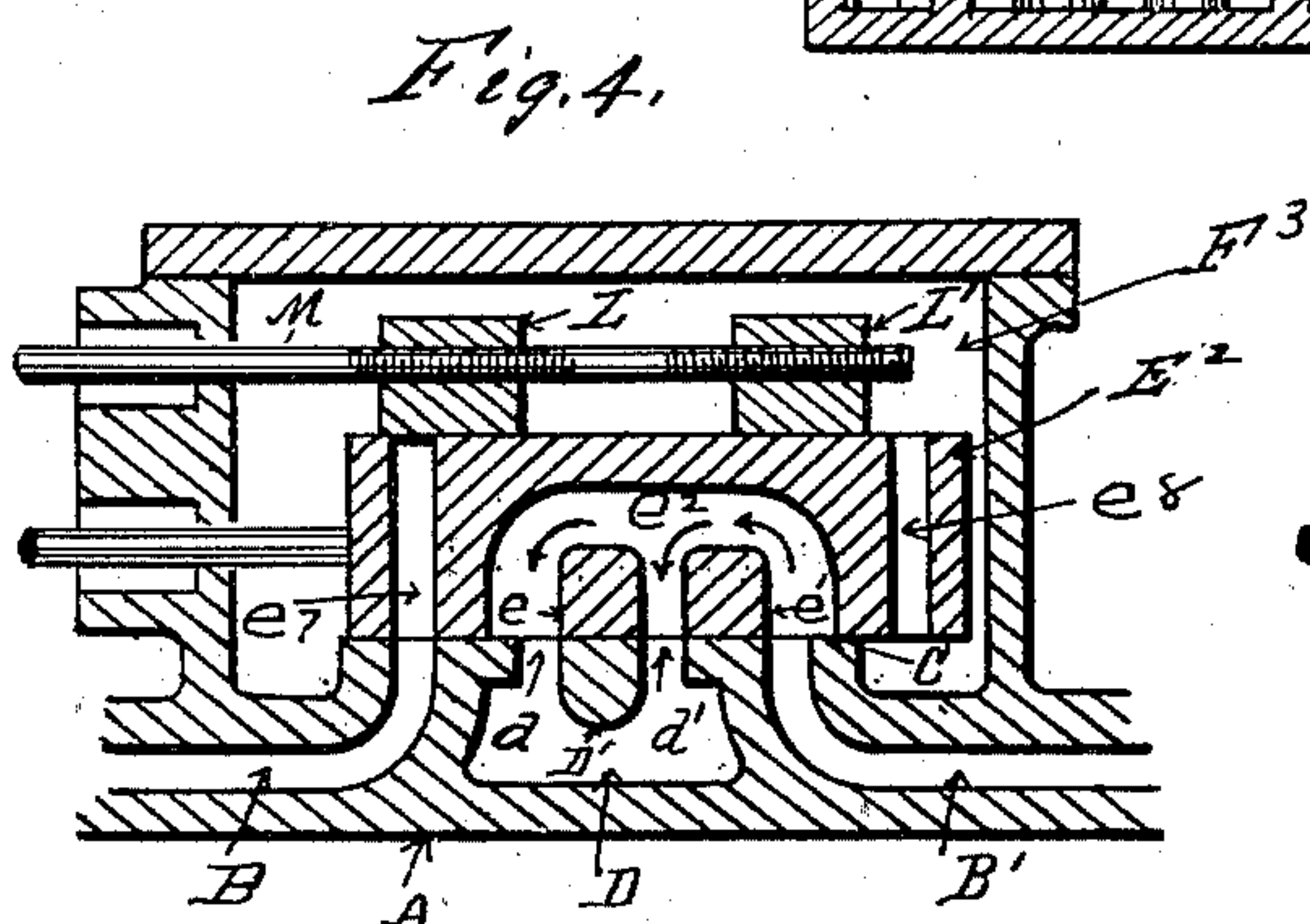
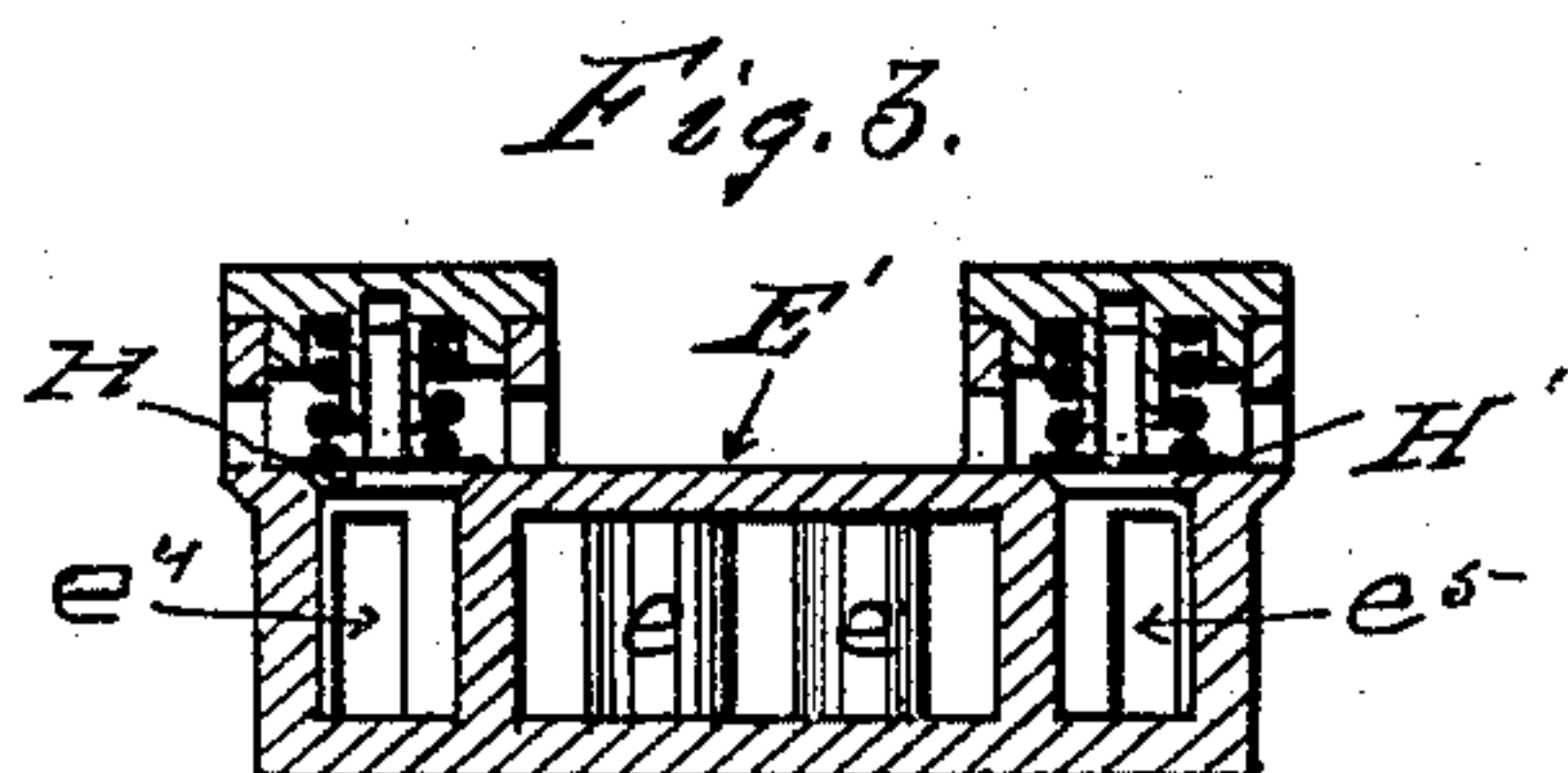
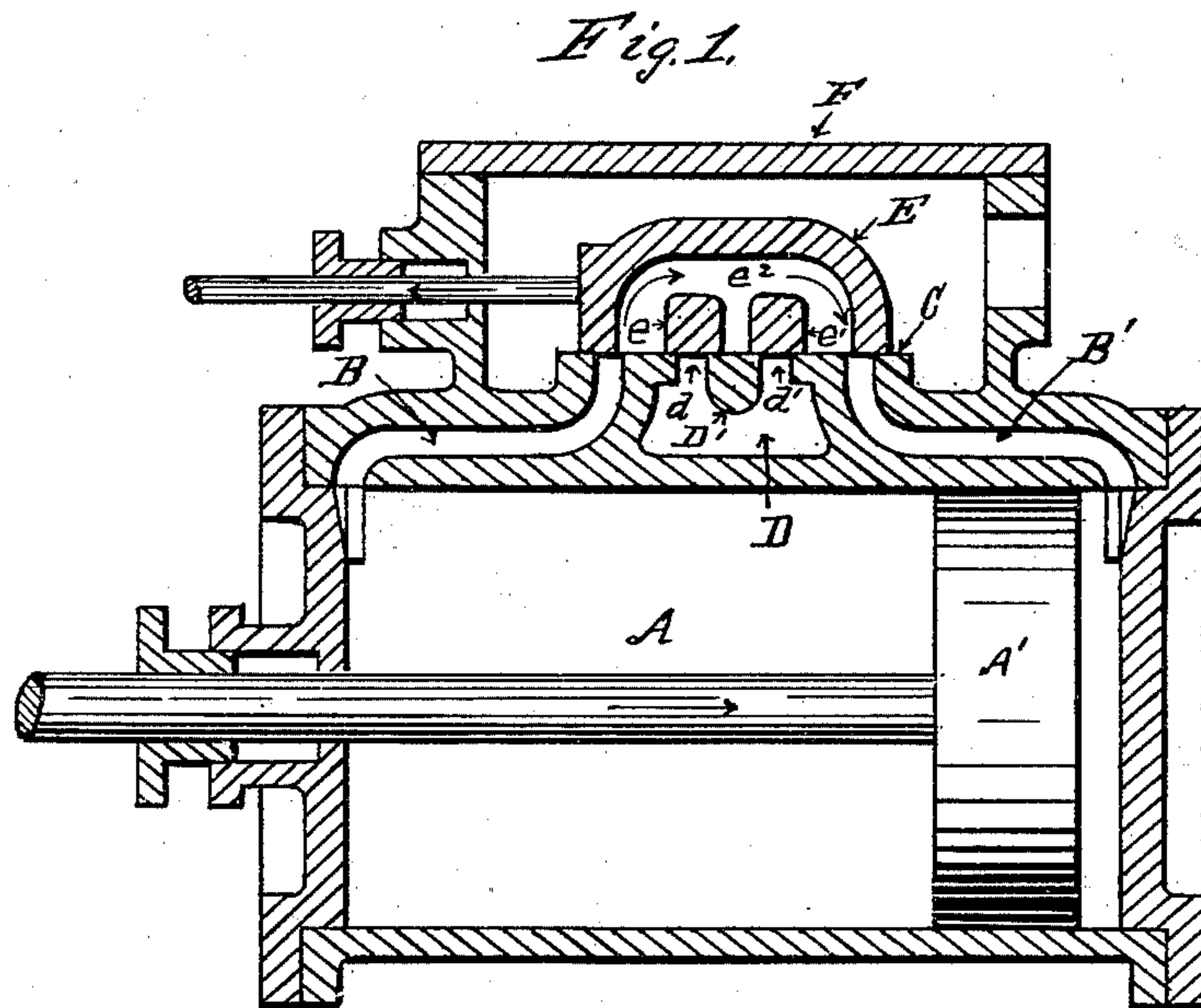
No. 612,950.

Patented Oct. 25, 1898.

H. E. LUDWIG.
VALVE MECHANISM.

(Application filed Jan. 3, 1898.)

(No Model.)



Witnesses.
Fred Einfeldt
F. J. Barrett

Inventor.
Henry E. Ludwig
By A. Sturgeon
att'y.

UNITED STATES PATENT OFFICE.

HENRY E. LUDWIG, OF ERIE, PENNSYLVANIA.

VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 612,950, dated October 25, 1898.

Application filed January 3, 1898. Serial No. 665,429. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. LUDWIG, a citizen of Switzerland, residing at the city of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Valve Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention relates to improvements in valve mechanism for steam-engines and gas pumps or compressors; and it consists, substantially, in constructing the ports of the cylinder so that the central port, which in a steam-engine is the exhaust-port and in a gas pump or compressor the suction-port, has two openings in the valve-seat, and the valve operating thereover is provided within the chamber thereof with two bridges adapted to simultaneously open and close said openings in the valve-seat forming the central port.

The objects of this construction are, first, in a steam-engine to provide a double opening for the exhaust and in a gas-pump a like double opening for the suction, and, second, to equalize the pressure in the cylinder on both sides of the piston in a steam-engine as it nears the end of its stroke and in a gas pump or compressor as it begins its return stroke, this being accomplished by my improved construction of the valve-seat and valve and the adjustment thereof. These and other features of my invention are hereinafter set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a steam-engine or gas-pump cylinder, its ports and valve-seat, together with a valve-chest and valve embodying my invention. Fig. 2 is a like longitudinal section of a portion of a cylinder, its ports and valve-seat, together with a modified construction of valve-chest and valve, showing a pressure-plate mechanism operating on the back of the valve. Fig. 3 is a horizontal vertical section of the valve shown in Fig. 2, on the line xx therein. Fig. 4 is a longitudinal section of a portion of a

cylinder, its ports and valve-seat, together with a modified construction of valve mechanism embodying my invention.

In the several constructions of this invention thus illustrated the cylinder A, piston A', and the ports B B' are of ordinary construction, opening in the usual manner through the valve-seat C near the ends thereof. The central port D, however is provided with two openings $d d'$ through the valve-seat, separated by a bridge D'.

In Fig. 1 the valve E is of the D type, having therein a chamber e^2 and two bridges e and e' , adapted when the valve is in a central position to close the openings $d d'$ in the valve-seat, forming the central port D. When the valve is used in a steam-engine, it takes the steam from the steam-chest F into the inlet-ports B and B' and exhausts through the central port D in the usual manner. It will be observed that just after the exhaust-openings $d d'$ are closed by the bridges $e e'$ in the valve E as the piston A' has nearly completed its stroke there is for a brief time a passage from the partially-opened port B up through the chamber e^2 in the valve E and down through the partially-closed port B' into the opposite end of the cylinder A, whereby at that instant the pressure is equalized in both ends of the cylinder, and this action takes place in a steam-engine at nearly the end of each stroke of the piston A'. It will also be observed that when the valve moves so as that the exhaust-openings $d d'$ are opened both are opened simultaneously, allowing the exhaust-steam to pass off freely. When, however, this device is operated as a gas pump or compressor, the suction is then taken through the central port D and the compressed gas or air is discharged through the ports B and B' into the valve-chest F. In this case the valve is so adjusted that the equalization of pressure in the ends of the cylinder takes place just at the beginning of the stroke of the piston A.

In Figs. 2, 3, and 4 I show a modified construction of this valve which is particularly adapted to operate in a gas pump or compressor. In this construction the cylinder-ports B and B' and D, the valve-seat C, the port-openings, and the central port-openings d and d' therein, communicating with the central port D, are the same as have been

hereinbefore described. The valve E shown in Figs. 2 and 3 is provided with the central chamber e^2 and the bridges e and e' , as hereinbefore described, which parts also operate
 5 on the valve-seat, are the same in construction and operation as the like parts hereinbefore described. In the ends of this valve, however, there are two additional ports e^4 e^5 ,
 10 in the upper parts of which there are spring-actuated check-valves H H', through which the ports B and B' in the valve-seat C alternately discharge the contents of the cylinder A at each traverse of the piston A' therein. On the back of the valve E' there is also a
 15 plate I, adapted to relieve the pressure on the back of the valve E', and from the chamber e^2 there is a small opening e^6 , passing up through the top of the chamber e^2 to the bottom of the plate I. This plate I has on its
 20 upper side a cylindrical projection I', which passes up into a cylindrical chamber f in the valve-chest cover F'. The closed top of this chamber f' has a stuffing-box f^2 therein, through which a rod J passes down into the
 25 top of the plate I, which rod J passes up through a yoke f^3 on the top of the chamber f , where it is provided with a screw-threaded nut J', by means of which the plate I can be adjusted up and down as desired to regu-
 30 late the pressure thereof on the back of the valve E'. Between the upper end of the cylindrical projection I' on the valve and the top of the chamber f there is a spiral spring K, which operates on the pressure-plate I to
 35 hold it down in place on the back of the valve E'.

In Fig. 4 I show another modified form of valve E² embodying my invention. In this construction the ports in the cylinder, the
 40 valve-seat, the chamber e^2 in the valve, and the bridges e and e' therein are the same in construction and operation as in the valves hereinbefore described, and shown in Figs. 1, 2, and 3; but in this valve there are end
 45 ports e^7 and e^8 which extend entirely through the valve from its face to its back, through which ports, when used as a steam-engine valve, the steam passes alternately to ports B and B' in the valve-seat C. On the back
 50 of this valve E² there are two sliding valves L and L', operated by a separate valve-rod M, which passes through the valves L and L' and is screw-threaded therein, so that they can be adjusted back and forth on the valve-

rod M, as may be desired, the operation of these valves being to alternately close the upper ends of the ports e^7 and e^8 at each traverse of the piston.

Having thus described the construction and operation of my improved valve mechanism, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a cylinder, a valve-chest, a valve-seat having two outside ports communicating with the ends of the cylinder, and a central port having two openings through the valve-seat, with a slide-valve operating on said valve-seat, having an internal chamber therein and two bridges adapted to simultaneously open and close the openings in the valve-seat communicating with the central port, and two outside ports provided with check-valves, substantially as and for the purpose set forth.

2. The combination of a cylinder, a valve-chest, a valve-seat having two outside ports communicating with the ends of the cylinder, and a central port having two openings through the valve-seat, with a slide-valve operating on said valve-seat, having an internal chamber therein and two bridges adapted to simultaneously open and close the openings in the valve-seat communicating with the central port, and two outside ports provided with check-valves, with a pressure-plate operating on the back of the valve, substantially as and for the purpose set forth.

3. The combination of a cylinder, a valve-chest, a valve-seat having two outside ports communicating with the ends of the cylinder, and a central port having two openings through the valve-seat, a slide-valve operating on said valve-seat, having an internal chamber therein and two bridges adapted to simultaneously open and close the openings in the valve-seat communicating with the central port, and two outside ports having check-valves therein, with a pressure-plate operating on the back of the valve, and an adjustable rod supporting said pressure-plate, substantially as and for the purpose set forth.

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

HENRY E. LUDWIG.

Witnesses:

WM. G. CROSBY,
C. A. GAITHER.