

O. J. BYRUD.  
Slide-Valve for Steam-Engines.

No. 226,713.

Patented April 20, 1880.

Fig. 1.

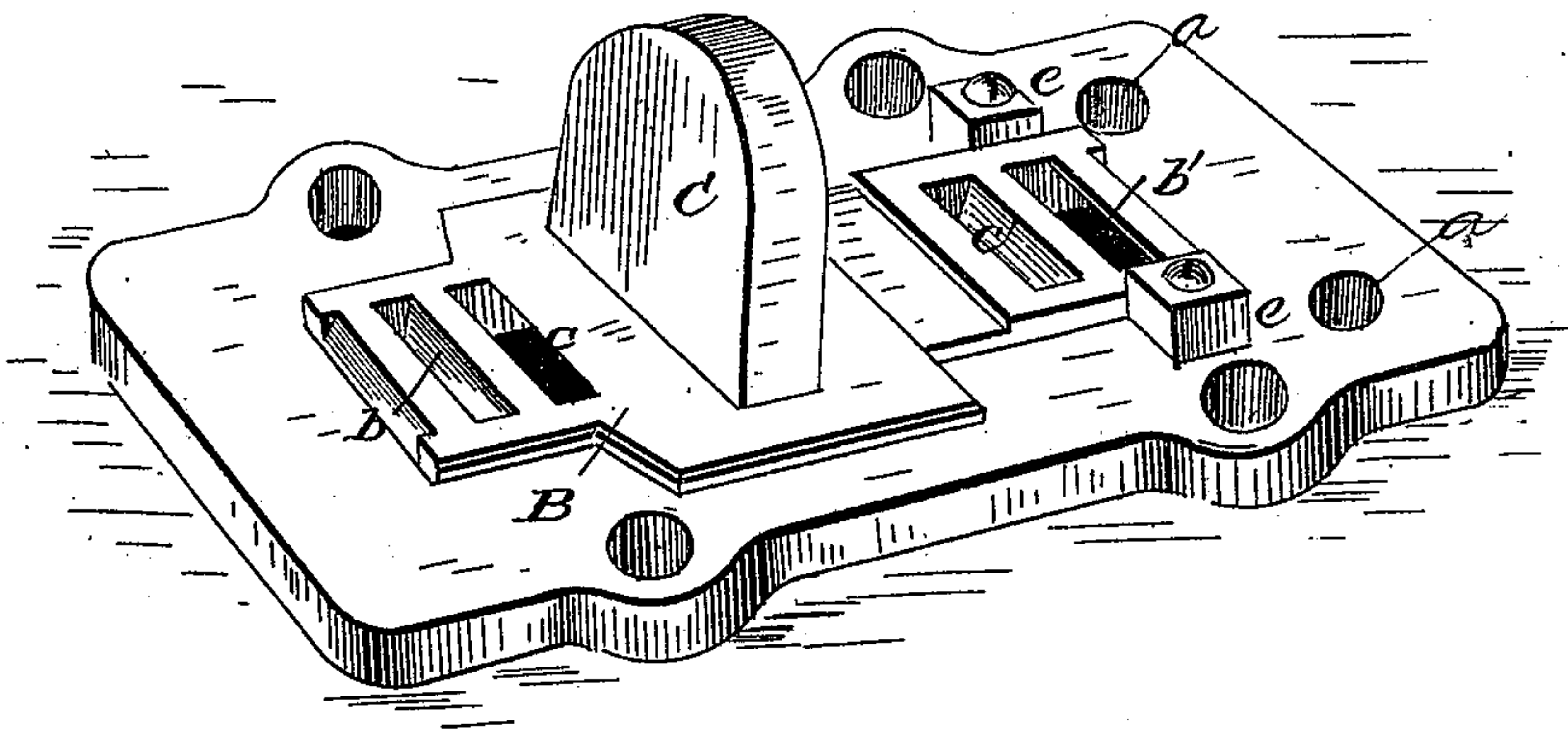


Fig. 2.

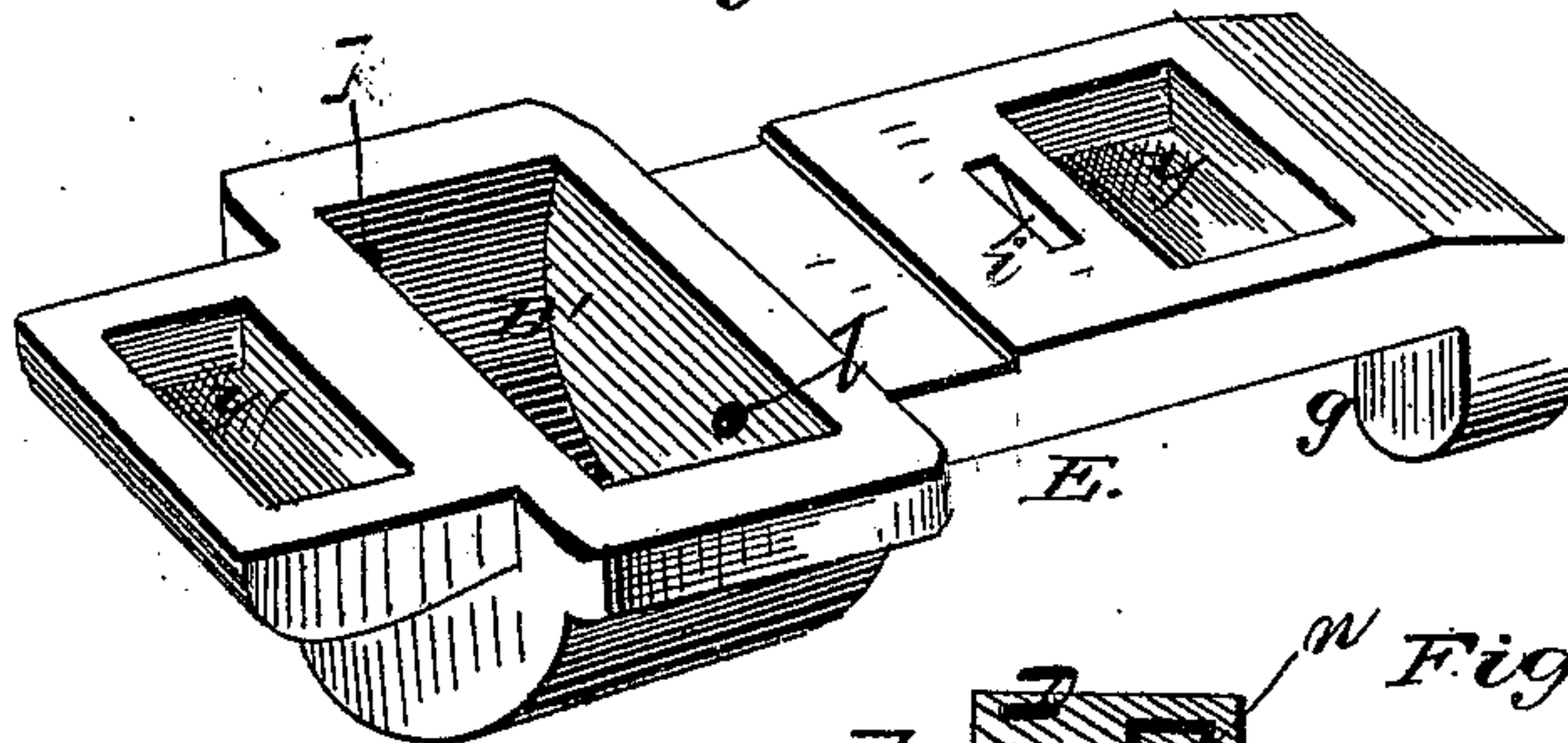


Fig. 3.

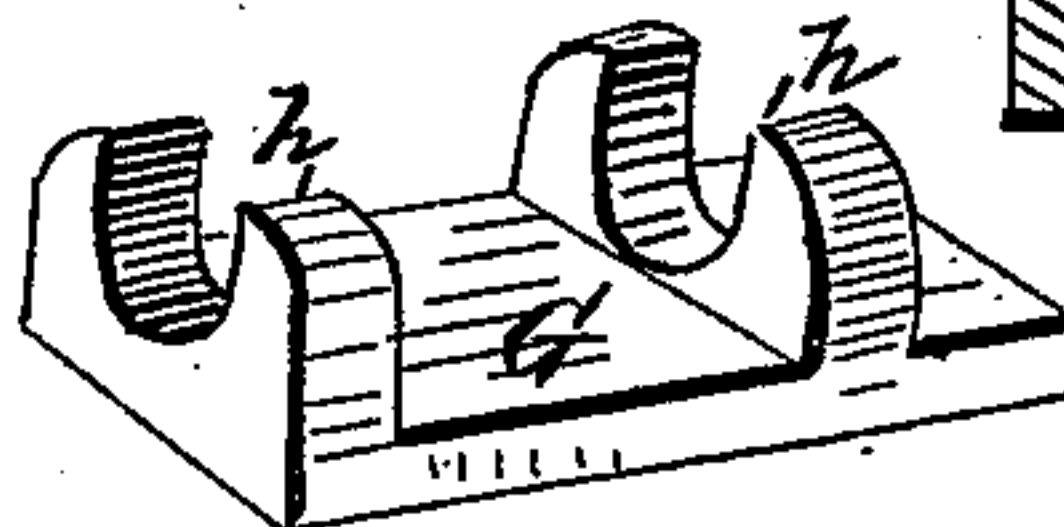
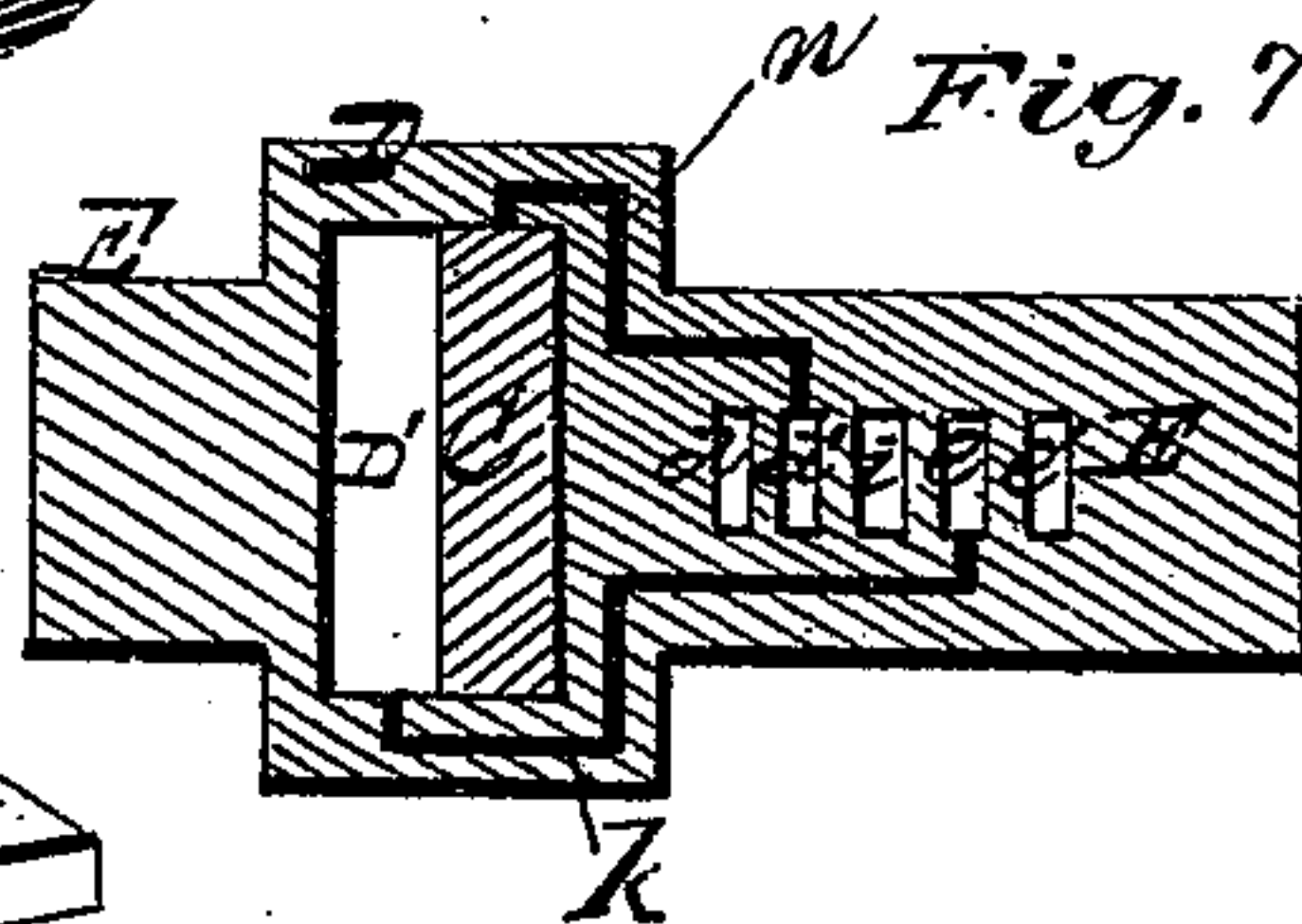


Fig. 7.



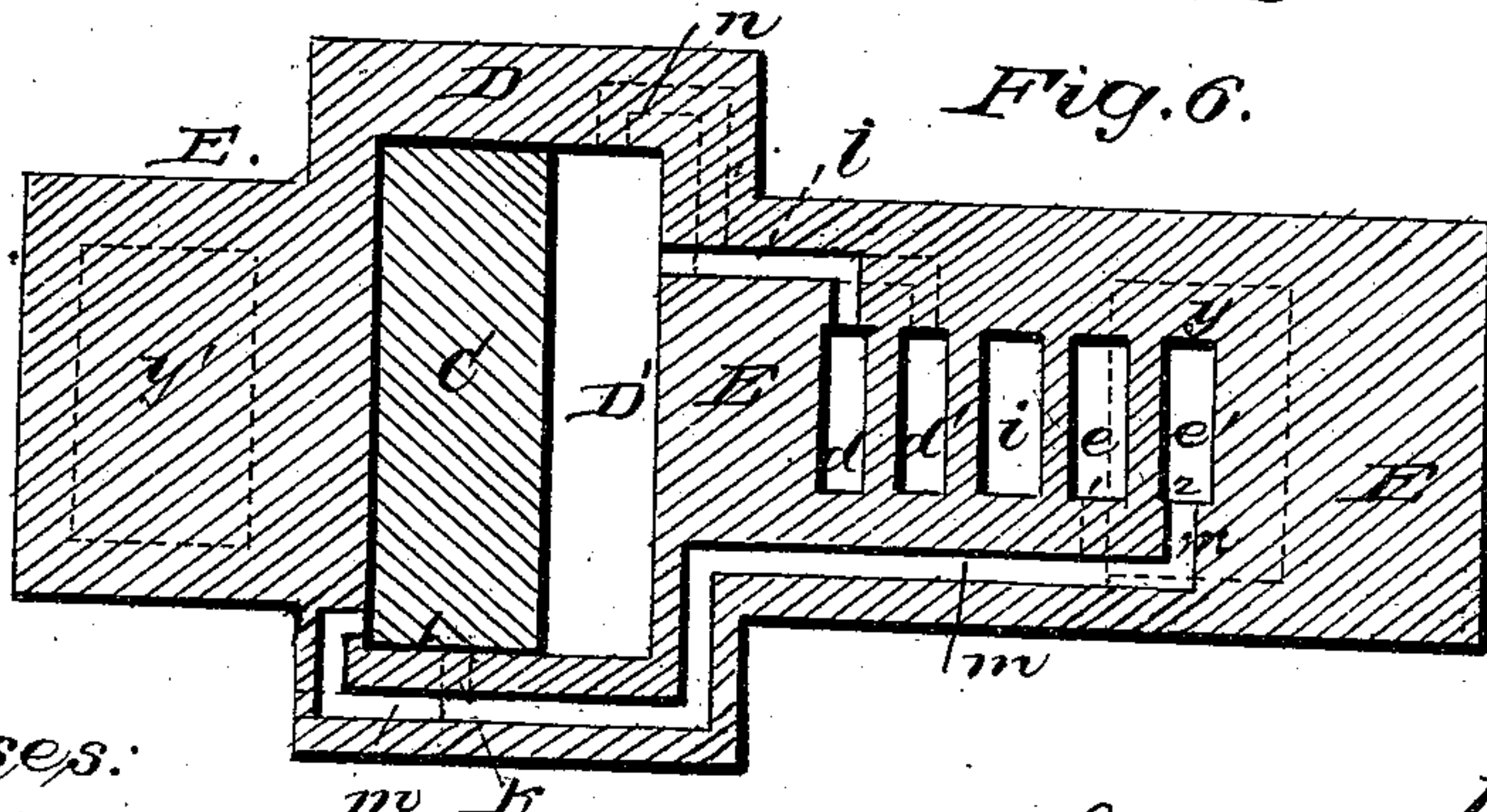
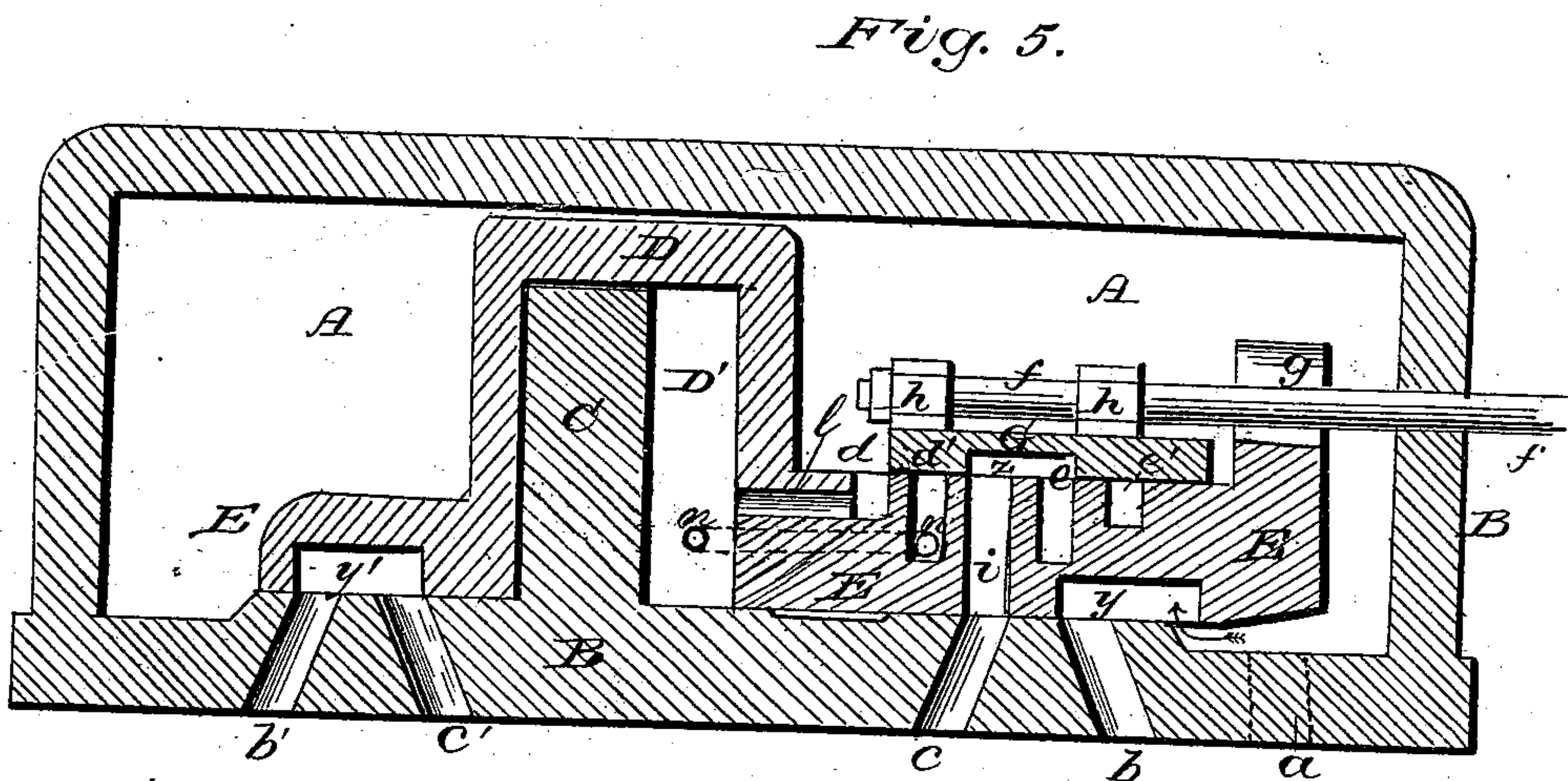
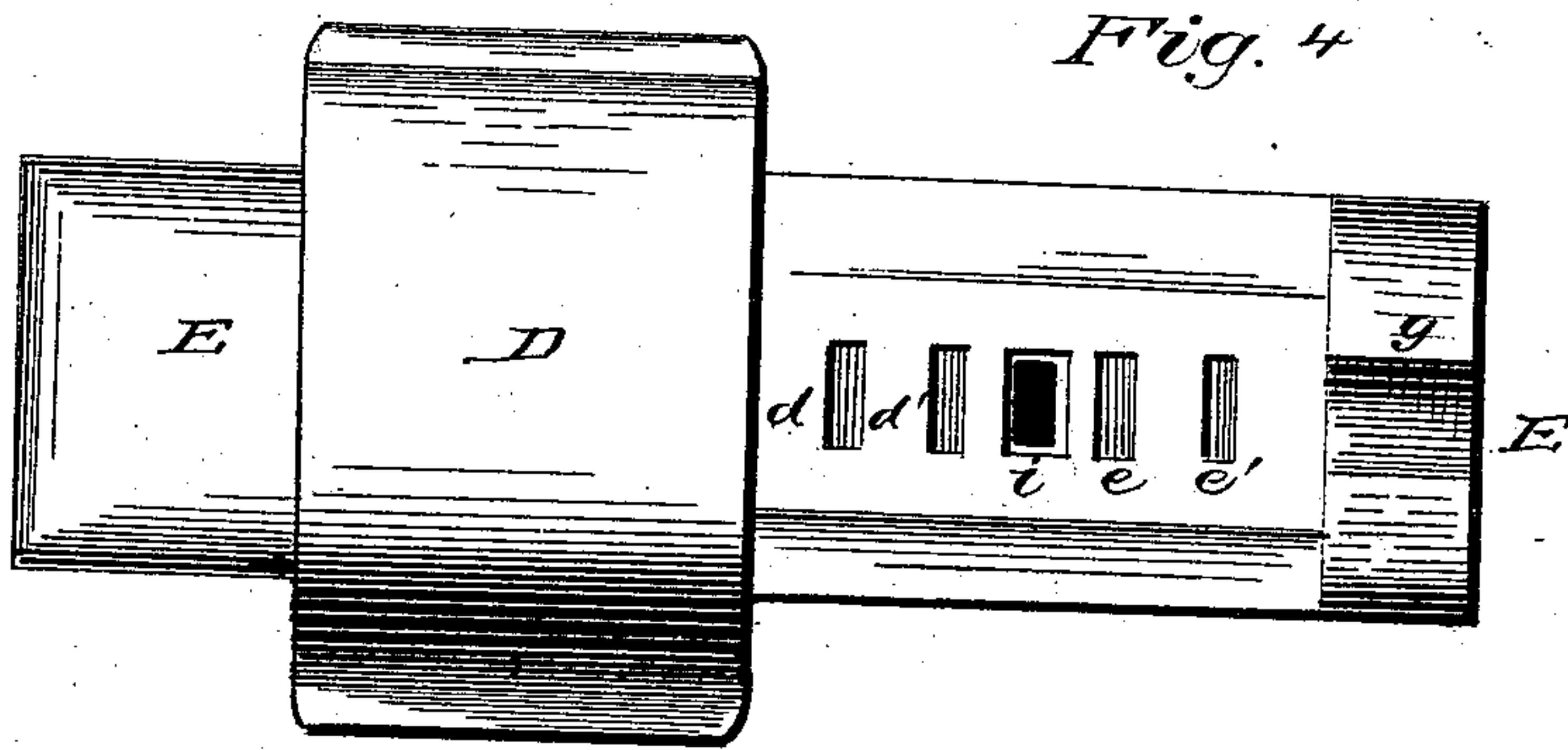
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# UNITED STATES PATENT OFFICE.

OLE JOHNSEN BYRUD, OF CHICAGO, ILLINOIS.

## SLIDE-VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 226,713, dated April 20, 1880.

Application filed February 14, 1880.

*To all whom it may concern:*

Be it known that I, OLE JOHNSEN BYRUD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Slide-Valves for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the bottom or valve-seat of a steam-chest. Fig. 2 is a perspective view of the main valve inverted. Fig. 3 is a perspective top view of the auxiliary valve detached. Fig. 4 is a plan or top view of the main valve without its auxiliary valve. Fig. 5 is a central longitudinal section of the steam-chest and valves, and Fig. 6 is a horizontal section of the main valve. Fig. 7 is a reduced sectional view, showing in particular the passages *n k* in full lines.

Similar letters of reference indicate corresponding parts in all the figures.

My invention contemplates improvements in slide-valves for steam-engines; and it consists in an improved construction and combination of operative parts, having for its object to produce a valve that shall be strong and durable, work with a minimum of friction, and be simple in its construction, so that it will wear well and shall not be liable to get out of order.

In the drawings, *a a*, Figs. 1 and 5, denote the parts through which steam is admitted into the steam-chest or valve-box A. The bottom or valve-seat B of this chest has two live-steam ports, *b b'*, and two converging exhaust-ports, *c c'*. Between the exhausts *c c'* is a vertical diaphragm or stationary piston, C, which is cast in one piece with or firmly secured upon valve-seat B, fitting steam-tight into a recess or chamber, D', formed upon the sliding main valve E by an enlargement or jacket, D.

The main valve E is guided upon its seat B by two projecting studs, *e e*, and is provided with a slotted projection, *g*, at one end, through which the valve-rod *f* of the auxiliary valve G works. It is further provided upon its under side with two flat or shallow chambers or recesses, denoted by *y y'*, one on each side of its

central chamber, D', and with an aperture or steam-port, *i*, located between the steam-chamber D' and *y*, as clearly shown in Figs. 2 and 5 of the drawings. On its flat upper face, between the jacket D and projection *g*, the main valve E has a series of recesses or depressions, as shown by the letters *d d' e e'*, located on each side of the port or channel *i*. The recess *e'* communicates by a channel or passage, *m*, bored through the body of valve E, and the chamber D', which surrounds the stationary diaphragm or piston C. The recess *d* communicates with said chamber in like manner through a channel or passage *l*, the mouths of channels *m l* being, however, on opposite ends or faces of chamber D', as shown in Fig. 6 of the drawings. A channel, *n*, leads from the recess marked *d'* to one side of chamber D', and a fourth channel, *k*, partly seen also in Fig. 2, leads from the fourth recess, *e*, through the body of the valve and the wall of its jacket D to the side of its chamber D', obliquely opposite to the mouth of channel *n*.

Admission of steam to the port *i* and recesses *d d' e e'*, with their respective channels or conduits *l, n, k*, and *m*, is governed by the auxiliary valve G, which slides upon a seat upon the main valve E, between its jacket D and projection *g*. This auxiliary valve has a recess, *z*, in its under side facing its seat, and is provided with two perforated or slotted ears or projections, *h h*, for the attachment of its operating-stem or valve-rod *f*, as may be seen in Fig. 5.

From the foregoing description, taken in connection with the drawings, the operation of my improved valve will be readily understood. Supposing the several parts to be in their relative positions shown in Fig. 5, steam entering the steam-chest A through its ports *a* will find its way through the recess *d* and its conduit or channel *l* in the main valve E into the chamber D', causing said valve (by the steam working against the stationary diaphragm or partition C) to assume the position indicated in the drawings, the conduit *n* and its mouth or recess *d'* being closed by the auxiliary valve G. Meanwhile steam enters the cylinder by way of the chamber *y* in main valve E and port *b*, the exhaust passing out through port *b'*, chamber *y'*, and the exhaust-port *c'*.



By the next move of valve G the opening *d* and its conduit *l* will be closed, opening the recess *c'* with its conduit or channel *m*, through which steam now enters from the steam-chest A, moving valve E in the opposite direction upon its seat B, the steam contained in chamber D' on the other side of the diaphragm or piston C exhausting through the channel *n*, recess *d'*, chamber *z* in valve G, steam-port *i* in valve E, and exhaust-port *c*. This new position of the main valve shuts off live steam from port *b*, but opens communication between *b* and *c* by way of chamber *y*, and live steam now enters the cylinder at its opposite end by way of chamber *y'* and port *b'*, the exhaust passing through *b y c*. The next stroke of the valve-rod *f* again reverses the position of the auxiliary valve G to the position shown in Fig. 5, with its attendant results, and so on during the operation of the engine.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with the steam-chest or valve-box A, having seat B, provided with the stationary diaphragm C, set at a right angle thereto, live-steam ports *b b'*, and exhausts *c c'*, of the main valve E, provided with the chambers *y D' y'*, steam-port *i*, and channels *d l, d' n, c' m*, and *e k*, and the auxiliary valve G, substantially as set forth. 25

2. The combination, with the main slide-valve E, constructed with the chambers *y D' y'*, steam-port *i*, and channels *d l, d' n, c' m*, and *e k*, of the auxiliary valve G, operated by the valve-rod *f*, and provided with the chamber *z*, and the stationary piston C, substantially as set forth. 35

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses. 40

OLE JOHNSEN BYRUD.

Witnesses:

WILHELM HAARLIN,  
ANDREAS NYQUEST.