

(No Model.)

E. F. WILLIAMS.

VALVE.

No. 350,650.

Patented Oct. 12, 1886.

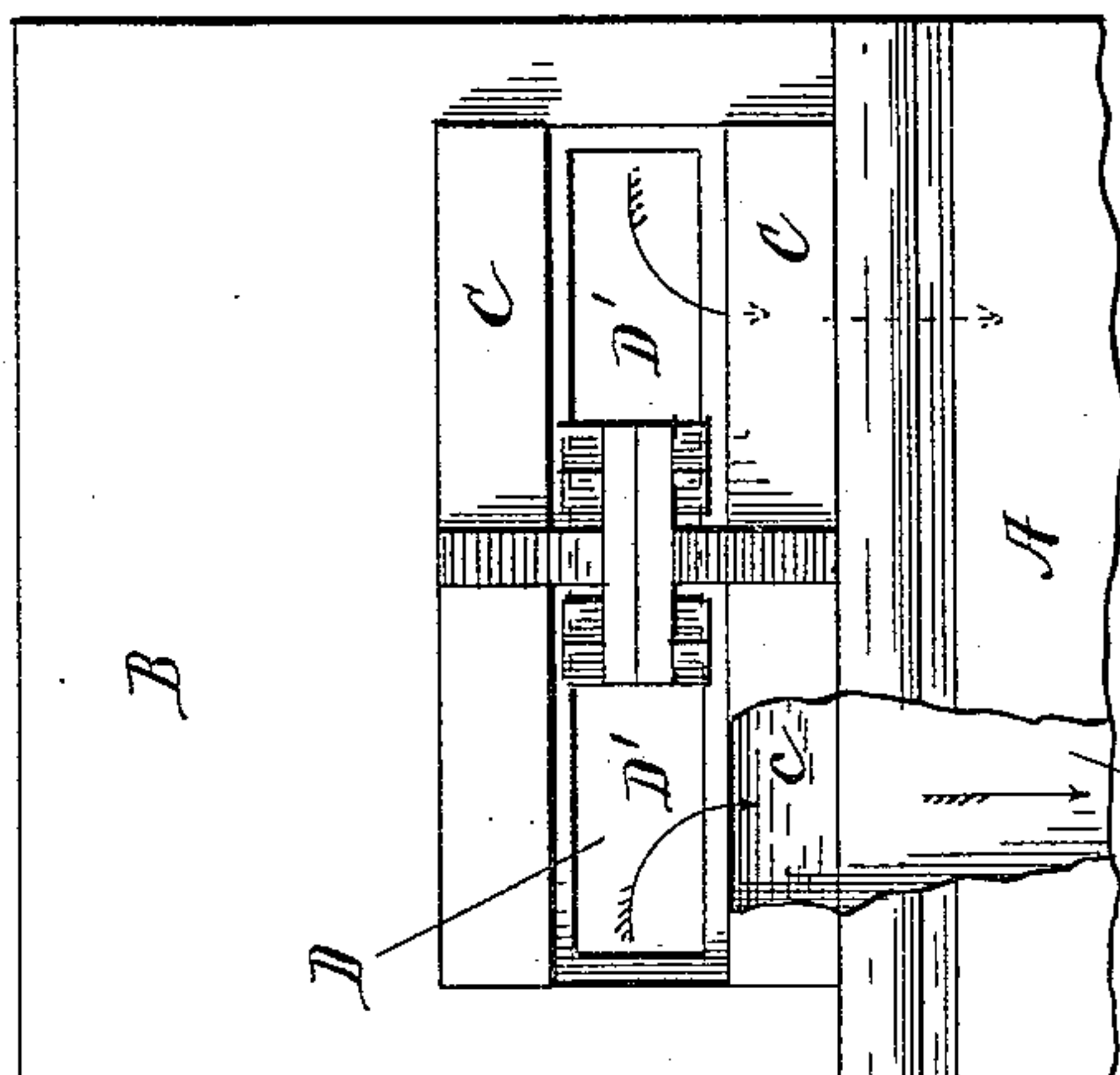


Fig 1

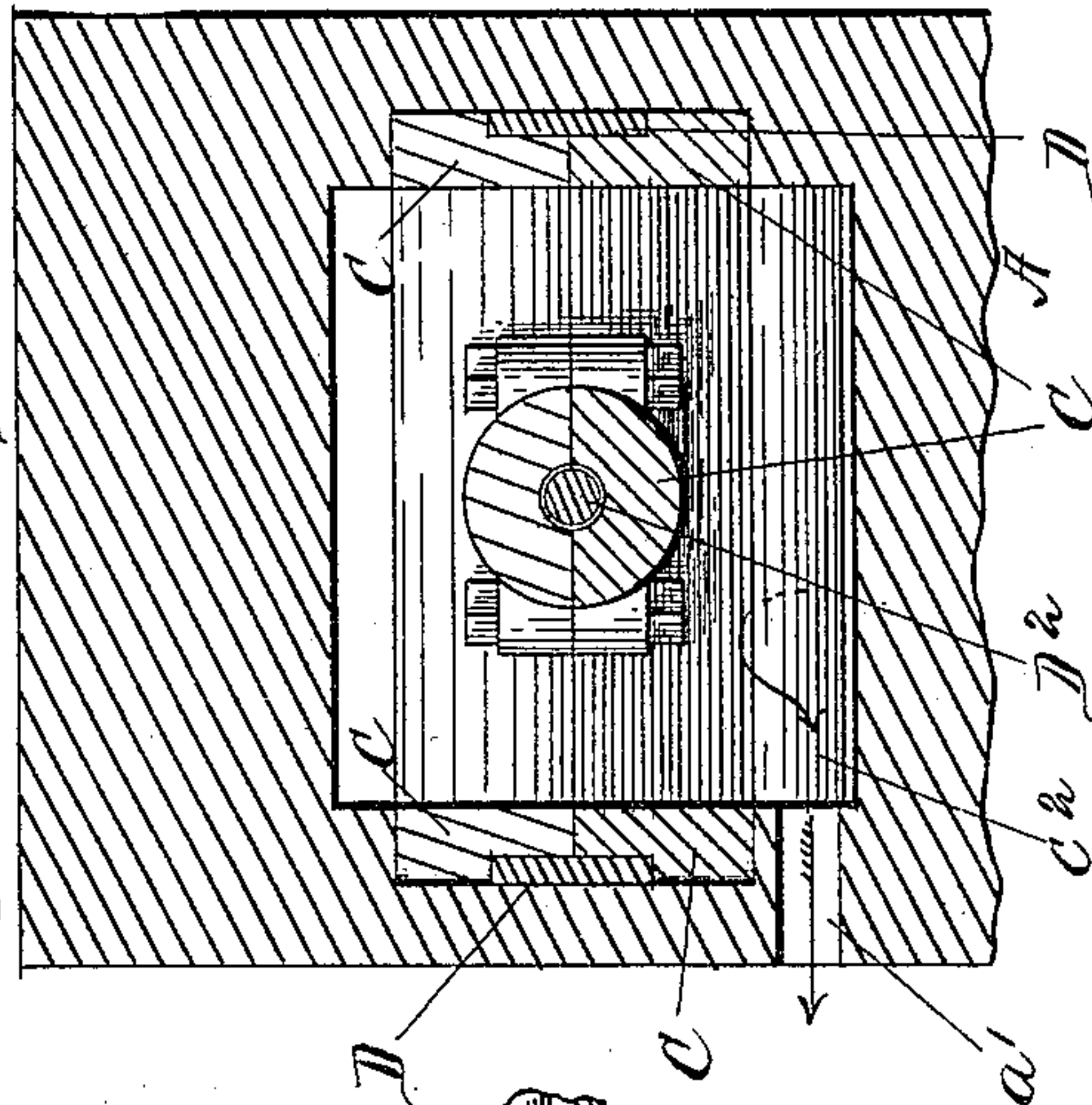


Fig 2

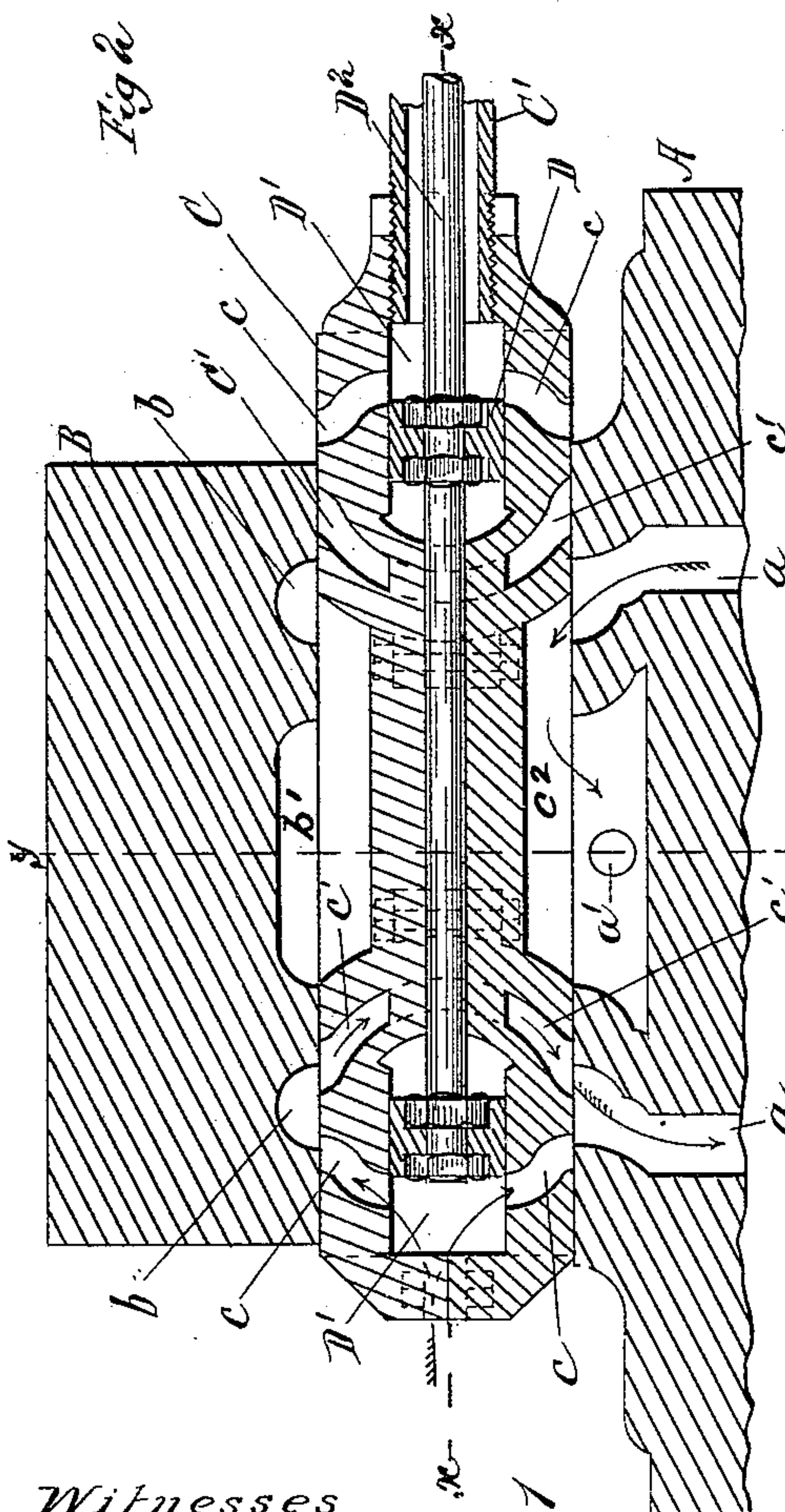


Fig 3

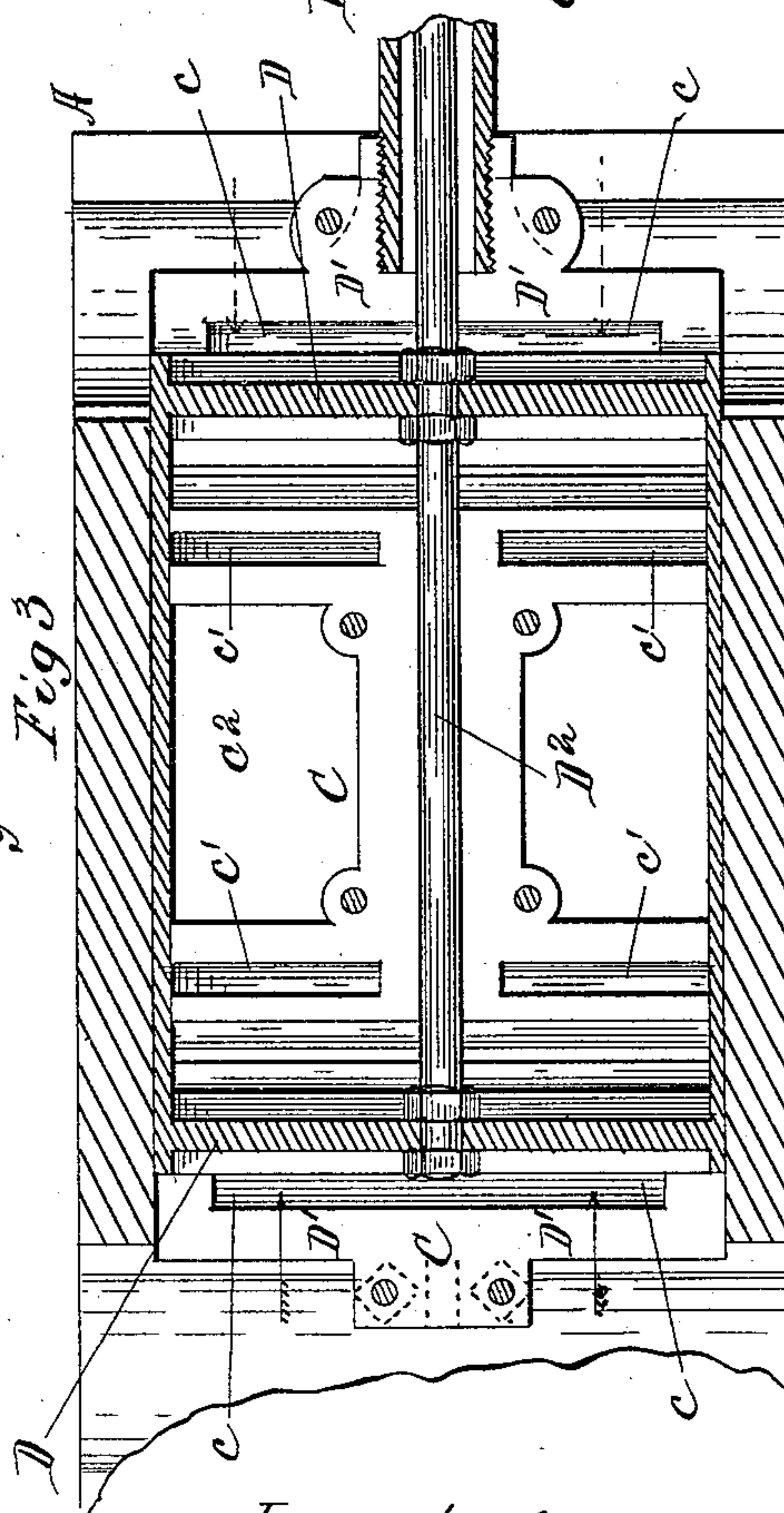


Fig 4

Witnesses  
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Fig 1

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# UNITED STATES PATENT OFFICE.

EDWIN F. WILLIAMS, OF CHICAGO, ILLINOIS.

## VALVE.

SPECIFICATION forming part of Letters Patent No. 350,650, dated October 12, 1886.

Application filed December 17, 1885. Serial No. 186,005. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN F. WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Valves, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a central longitudinal sectional view through the main and cut-off valves and their seat; Fig. 2, a front end elevation, a portion of the main valve and its seat being broken away to show the construction; Fig. 3, a longitudinal plan section taken on the line *x x*, Fig. 1, and Fig. 4 a transverse sectional view taken on the line *y y* of Fig. 1.

Like letters refer to like parts in all the figures of the drawings.

My invention relates to valves for steam-engines, and more particularly to that class known as "balanced" valves, provided with cut-off valves, its object being to provide a valve especially adapted for use in conjunction with high-speed engines, wherein the steam may have a free and unobstructed passage through the valve to the cylinder, while at the same time the cut-off valve shall be arranged so as to act with the maximum efficiency.

I will now proceed to describe a construction in which I have practically carried out my invention in one form, and will then point out particularly in the claims those features which I deem to be new and desire to protect by Letters Patent.

In the drawings, A represents the valve-seat, provided, as usual, with the steam-channels *a*, leading to the cylinder ends, and with the exhaust-passage *a'*, arranged centrally between the two. Supporting-pieces A' arise from each side of the seat, and have arranged upon them, in any approved manner, the pressure-plate B. This pressure-plate is provided on its under side, near each end, with channels *b*, corresponding to the channels *a* of the seat A, and with a central channel, *b'*, corresponding with the exhaust-passage A'.

C represents the main valve, which is supported and guided by the valve seat and support A in an obvious manner. This valve is provided at each end with duplicate ports *c* and *c'*, extending from top to bottom of the

valve, the former being open at the end, in order to connect it with the interior of the steam-chest. In addition to these duplicate ports at each end the valve is provided with a central exhaust passage or port, *c''*, extending from top to bottom.

D indicates the cut-off valve, which is arranged within and inclosed by the main valve. In the present instance this valve is shown as consisting of a rectangular frame, composed of two cross-bars, *d*, of sufficient size to close the ports *c* in the main valve when in proper position, these cross-bars being arranged in recesses D' in the main valve, as clearly shown in Fig. 1 of the drawings. These cross-bars *d* are connected by side bars, *d'*, and also by means of the cut-off valve-rod D<sup>2</sup>, which passes through the hollow main valve-rod C', as shown in Fig. 1. When this form of cut-off valve, constructed in a single piece, is employed, the main valve is constructed in two parts, divided horizontally at or near its center, in order to enable the cut-off valve to be placed in position within it, the two parts being secured by bolts *e*.

The operation of my improved valve is as follows: When the valve is in the position shown in the several figures of the drawings, the steam entering the space D' through the open front end of the main valve will travel in the direction of the arrows, as shown in the several figures. A portion of the steam will pass down through the forward port, *c*, into the steam-channel *a*, direct communication between the two being established through the lower opening of the said port *c*. The steam will also pass through the upper opening of the port *c* into the channel *b* in the pressure-plate, and through this channel it will pass into the port *c'*, and down through the said port into the steam-channel *a*, as indicated by the arrows in Fig. 1. It will be observed that the steam thus has a double passage through the valve into the steam-channel both from above and below, thus admitting a larger amount of steam than would be possible if a single port were only used. At the same time the exhaust steam passes up through the rear channel, *a*, into the space *c''* in the valve, and thence out at the exhaust-passage *a'*, as indicated by the arrows in Figs. 1 and 4. In addition to this direct passage of the exhaust-



steam it also, at the beginning of the stroke, passes up through the rear port,  $c'$ , into the rear channel,  $b$ , in the pressure-plate, and thence through the passage  $c^2$  into the exhaust-  
 5 passage  $a'$ , thus providing a double passage through the valve for the exhaust also. The cut-off valve will operate to close the ports of the main valve, through which steam is admitted to the cylinder, in an obvious manner,  
 10 it being operated by the usual cut-off eccentric to stop the flow of steam at the proper moment by moving in such a manner as to cause one of the cross-bars  $d$  to close the port  $c$ , through which steam is passing at the time.  
 15 It will be seen that while double passages are left at each end of the valve to admit and exhaust the steam, the arrangement is nevertheless compact and simple, the cut-off valve being so located as to take up but little space,  
 20 and, in fact, no additional space.

It is obvious that various mechanical modifications in the details of construction may be made without departing from the principle of my invention. For instance, although I have  
 25 shown the main valve as constructed in two parts to receive the cut-off valve, which latter is constructed in a single piece, it is obvious that this arrangement may be reversed—*i. e.*, the main valve may be made in a single piece,  
 30 while the cut-off valve is so constructed that the cross-bars  $d$  are independent, and may be slipped into place and subsequently connected by through-bolts.

Various other modifications may be em-

ployed, and I therefore do not wish to be understood as limiting myself strictly to the precise details of construction hereinbefore described, and shown in the drawings.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a slide-valve for steam-engines, the combination, with the valve-seat and its steam and exhaust channels, of the pressure-plate provided with corresponding channels, the  
 45 main valve provided with duplicate ports at each end, and the cut off valve arranged within the main valve, substantially as and for the purposes specified.

2. The combination, with the valve-seat and  
 50 pressure-plate provided with steam-channels, as described, of the main valve provided with ports  $c$  and  $c'$  at each end, and the cut off valve D, arranged within the main valve and adapted to close the ports  $c$  alternately, substantially  
 55 as and for the purposes specified.

3. The combination, with the valve-seat A, provided with steam-channels  $a$  and exhaust-passage  $a'$ , of the pressure-plate provided with channels  $b$  and  $b'$ , the main valve provided at  
 50 each end with ports  $c$  and  $c'$ , and central passage,  $c^2$ , and the cut-off valve D, arranged within the spaces  $D'$  in the main valve, substantially as and for the purposes specified.

EDWIN F. WILLIAMS.

Witnesses:

IRVINE MILLER,  
 ADELLE L. PHARE.