

(No Model.)

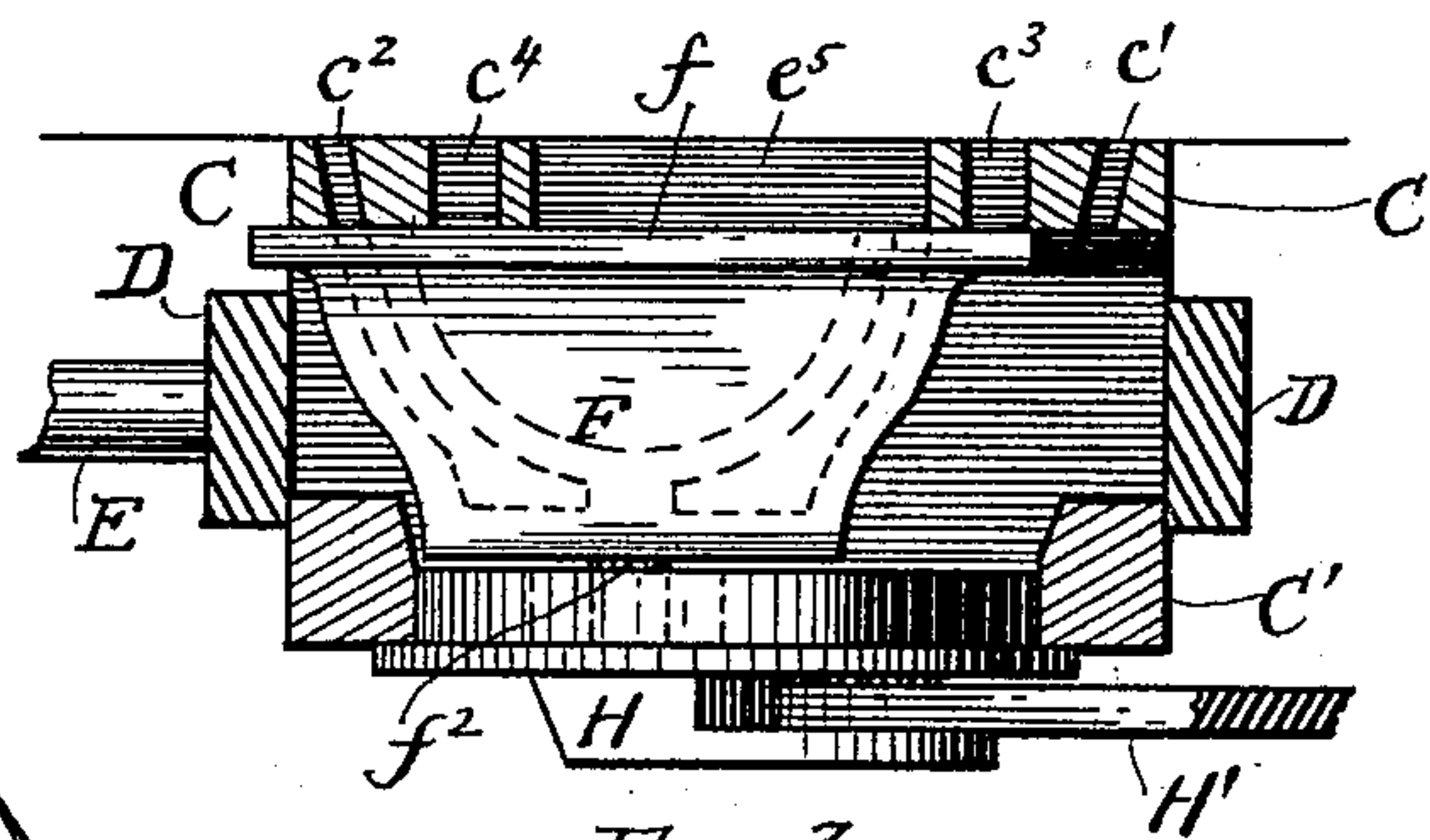
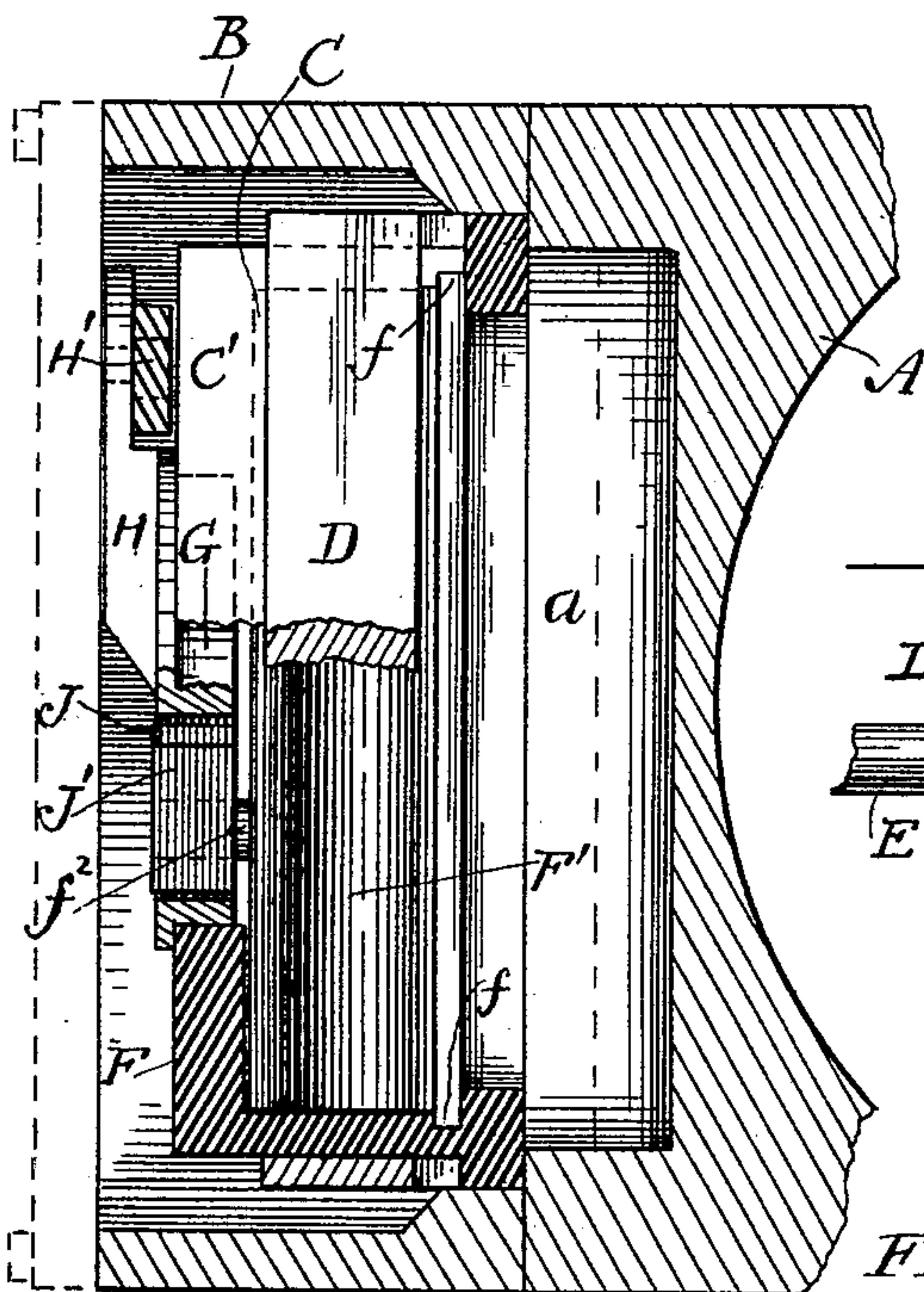
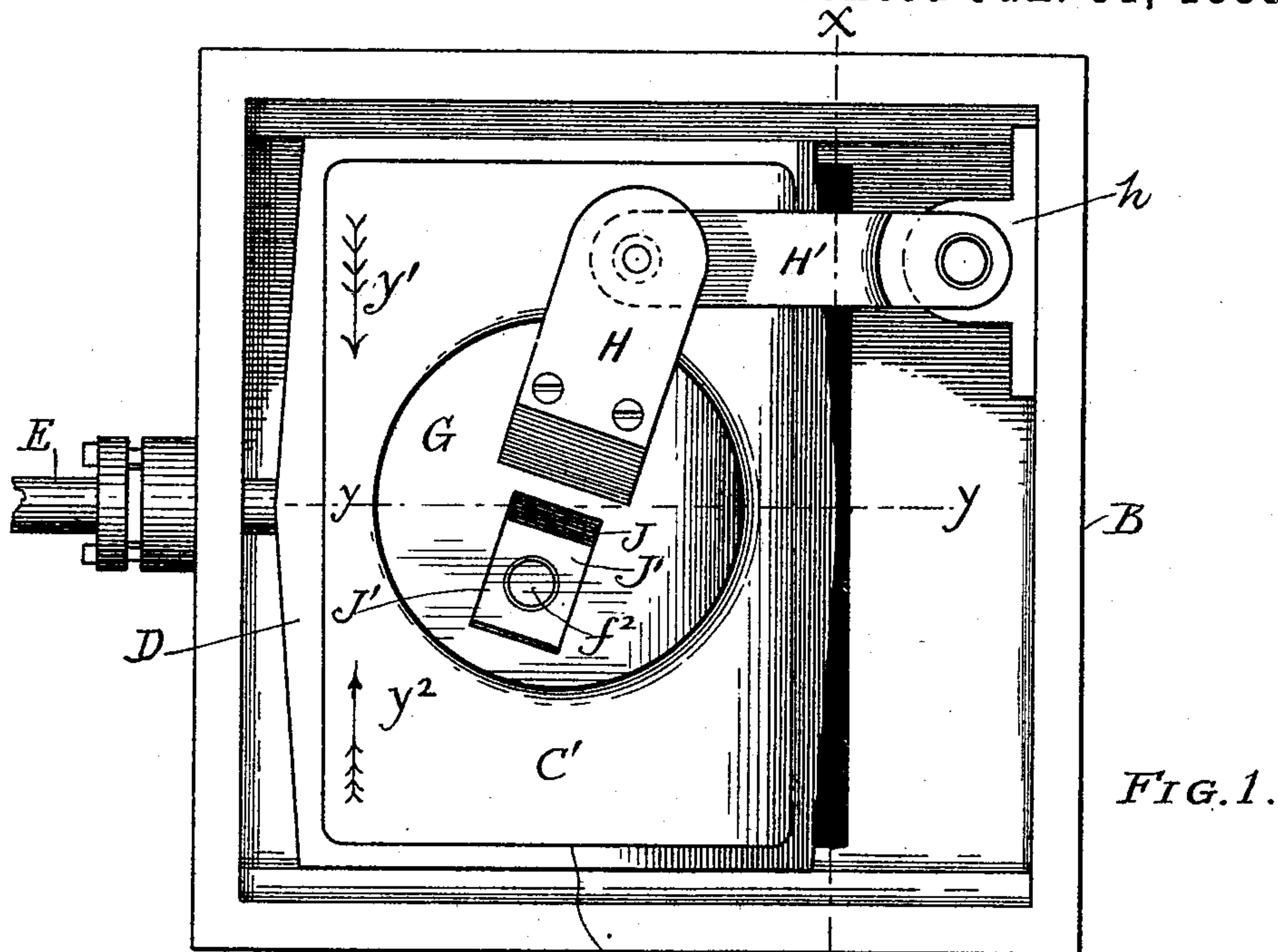
2 Sheets—Sheet 1.

D. O'B. LADD.

SLIDE VALVE.

No. 377,078.

Patented Jan. 31, 1888.



Witnesses:
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David Strong.

Inventor:
Dennis O. B. Ladd,
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his Attys.

(No Model.)

2 Sheets—Sheet 2.

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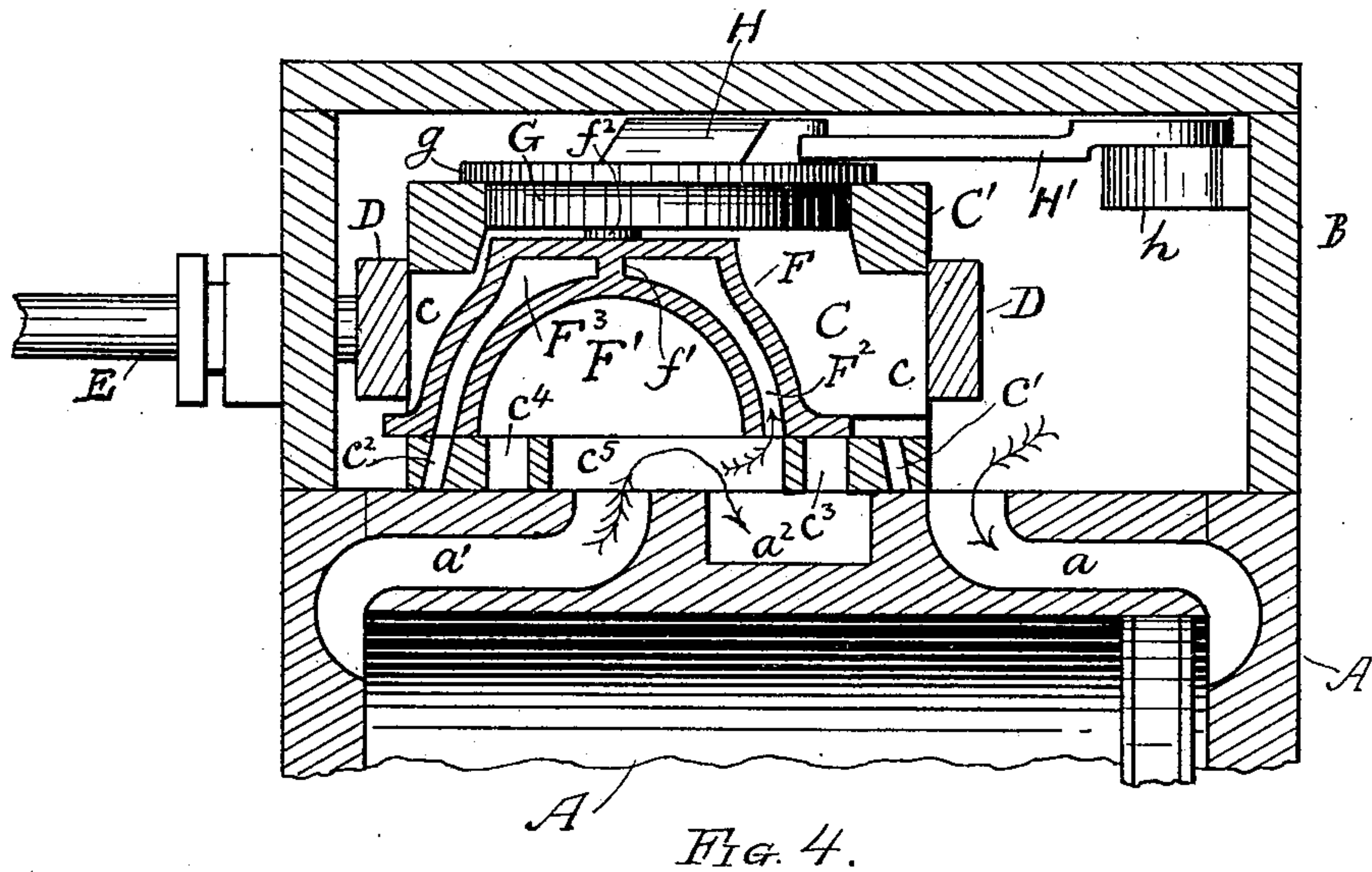


Fig. 4.

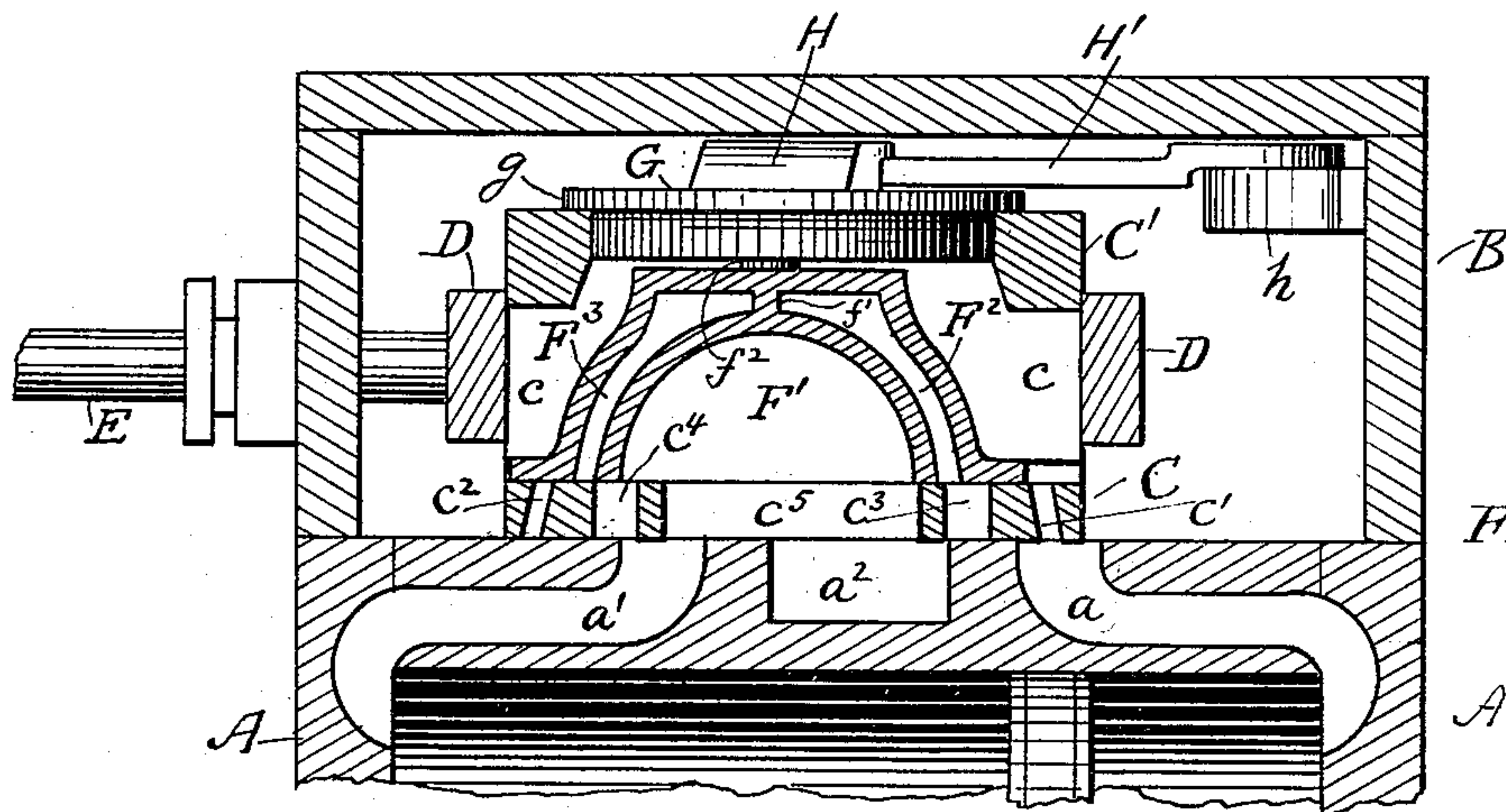


Fig. 5.

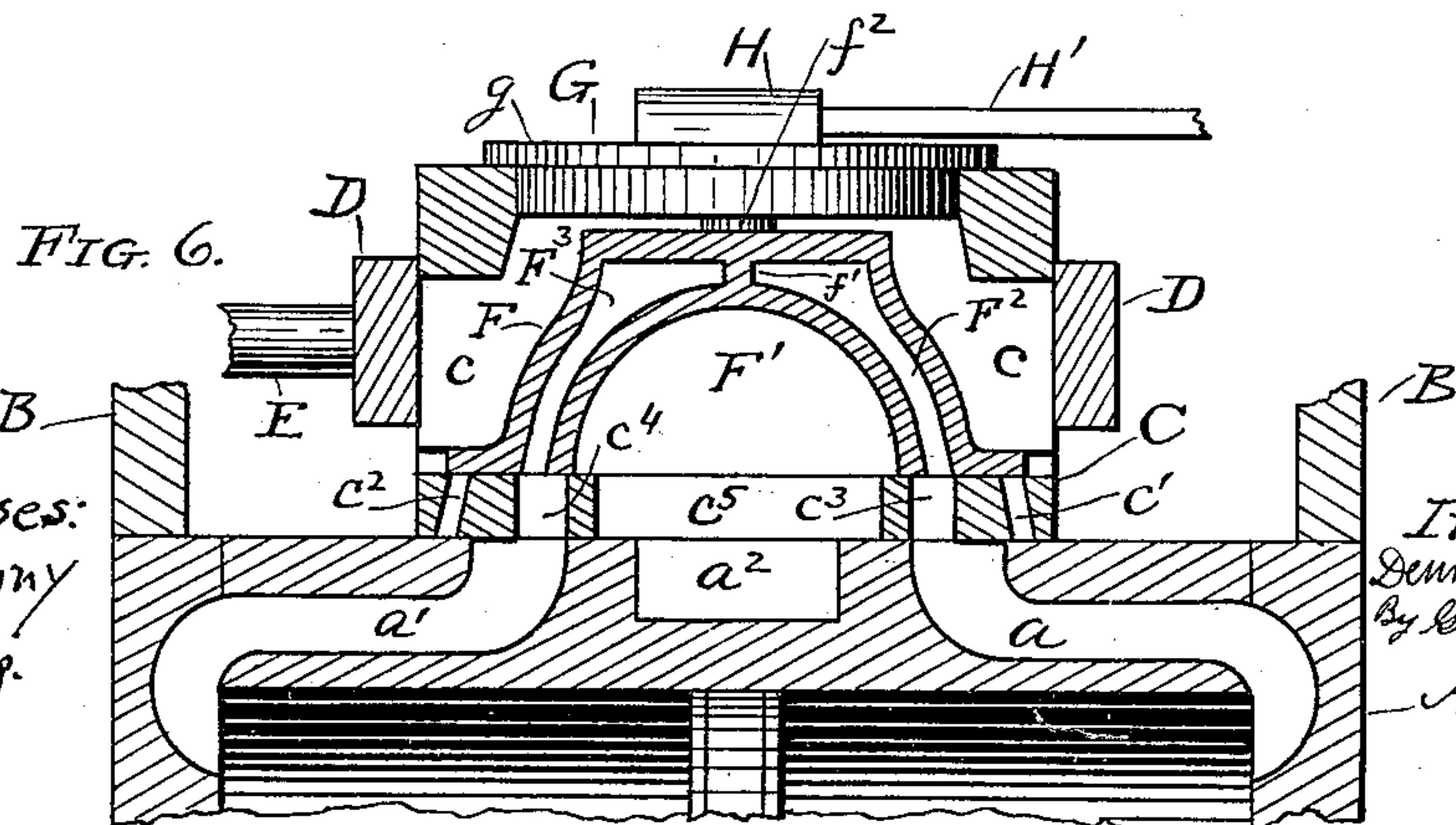


FIG. 6.

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UNITED STATES PATENT OFFICE.

DENNIS O'B. LADD, OF CHICAGO, ILLINOIS.

SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 377,078, dated January 31, 1888.

Application filed August 12, 1887. Serial No. 246,757. (No model.)

To all whom it may concern:

Be it known that I, DENNIS O'B. LADD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Slide-Valves, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a face view of said valve and
10 steam-chest, the cap being removed from the latter. Fig. 2 is a transverse sectional view of the same and a part of the cylinder upon the line $x x$, Fig. 1, viewed in the direction of the arrow there shown. Fig. 3 is a transverse sectional view of the valve upon the line $y y$, Fig. 1, viewed in the direction of the arrow Y' .
15 Fig. 4 is a transverse sectional view of the valve and steam-chest in connection with the cylinder and piston, as viewed in the direction of the arrow Y^2 , the admission-port being fully open and the piston at the beginning of the stroke. Fig. 5 is a like view showing the position of the valve at one-quarter stroke, and Fig. 6 is a like view showing the position at one-half
20 stroke.

Like letters of reference indicate like parts in the different figures.

The object of my invention is to so construct a slide-valve as to utilize the expansion of the
30 steam as well as the compression in balancing the valve and helping to actuate it, while at the same time a high initial pressure may be given to the piston at the beginning of the stroke. I accomplish said objects substantially
35 in the manner hereinafter shown, described, and claimed.

A in the drawings represents the engine-cylinder; B, the steam-chest, and C the main slide-valve, which consists of a hollow box or shell
40 having openings $c c$, Figs. 4, 5, and 6, upon its front and rear sides, respectively. Said valve is reciprocated by means of a loose yoke, D, to which the valve-rod E is attached, substantially as shown. The lower part of the valve
45 C, or valve proper, is provided with double ports $c' c^2 c^3 c^4$, arranged to communicate with the steamways $a a$. Said valve is also provided with an exhaust-port, c^5 , in communication with an exhaust-way, a^2 . A removable
50 cap, C', is made to form a part of the valve C, and between said cap and the part of the valve which contains said ports I place a loose supple-

mental valve, F, which is preferably provided with flanges $f f$, Figs. 2 and 3, adapted to slide within grooves formed in the ends of the main
55 valve C. An arched chamber, F', is formed beneath the middle of said supplemental valve; and chambers F² F³, parallel with the admission-ports, are also formed upon the respective sides thereof and adjusted to communicate with
60 said ports, respectively, in the manner and for the purposes hereinafter stated, as the valve is actuated. Said chambers are separated from each other by means of a web or partition, f . A disk, G, provided with a flange, g , is loosely
65 mounted in a bearing in the cap C'. H is an arm rigidly attached to said disk, the end of which is connected by a link, H', to a lug, h , upon the side of the steam-chest.

J, Figs. 1 and 2, is a slot in the disk, in
70 which is loosely inserted a bushing, J'. A pin, f^2 , is rigidly attached to the top of the supplemental valve and passed through a perforation in the bushing J'. Upon actuating the main valve the disk G acts as an eccentric and re-
75 ciprocates the supplemental valve within the main valve at a rate of speed greater in proportion to the eccentricity of the pin f^2 .

It will be observed upon reference to Fig. 4, which indicates the relative positions of the
80 parts at the beginning of the piston-stroke, that the supplemental valve is so situated with reference to the steam-ports as to permit the exhaust steam to enter the chamber F², while at the same time it presses upwardly against
85 the chamber F'. As the piston advances, the live steam enters said chamber F², (see Fig. 6,) and, expanding, tends to resist the pressure upon the opposite side and to aid in pushing the valve forward. At the same time it is
90 evident that the compression is acting through the port c^4 within the chamber F³. Thus at no appreciable time is the valve free from a balancing force, the secondary or auxiliary ports $c^3 c^4$ permitting the steam to have con-
95 tinuous access to said chamber, while the exhaust through said ports is permitted to commence at an earlier stage than it would in the absence of said ports.

Having thus described my invention, I
100 claim—

1. The combination, with the steamways of a steam-cylinder, of a main slide-valve having a central exhaust-port and double ports near

the respective ends, one of said ports at each end being intended to admit steam in addition to that admitted at the ends of said valve, a supplemental valve having a central chamber and antechambers between that and its respective ends, and means for reciprocating said supplemental valve at a higher rate of speed than said main valve, substantially as shown and described.

2. A main slide-valve provided with double ports at or near its respective ends, in combination with a supplemental valve for opening and closing said ports, means, as an eccentric having a link-connection with the steam-chest, for imparting a higher relative speed to said supplemental valve, an exhaust-cavity beneath the latter, and separate chambers upon the respective sides of said exhaust-cavity, said chambers being adjusted to communicate in turn with said double ports and the exhaust-port of the main valve, substantially as shown and described.

3. The combination, with the steamways of a cylinder, of a main slide-valve arranged to admit steam to said ways at its respective ends, ports c' c^2 c^3 c^4 , a main exhaust-port, a supplemental valve arranged to open and close said double ports at the respective ends of the valve, an exhaust-cavity, chambers F^2 F^3 , and

means for imparting a quicker throw to said supplemental valve than to the main valve, substantially as shown and described.

4. The combination, with a cylinder having suitable steamways, of a main slide-valve having admission-ports near its respective ends in addition to a main and auxiliary exhaust-ports, a supplemental valve provided with an exhaust-chamber and having separate chambers upon the respective sides of said exhaust-chamber, said supplemental chambers being adapted to be brought coincident with said admission and exhaust ports, and means for reciprocating said supplemental valve with each stroke of the main valve, but with a quicker movement, substantially as shown and described.

5. The combination of the slide-valve C, having an exhaust-port and double ports near its ends, with a supplemental valve, chambered as described, and means, as the eccentric G, connected by an arm-and-link connection with the steam-chest, and pin f^2 , for actuating said supplemental valve, substantially as shown and described.

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