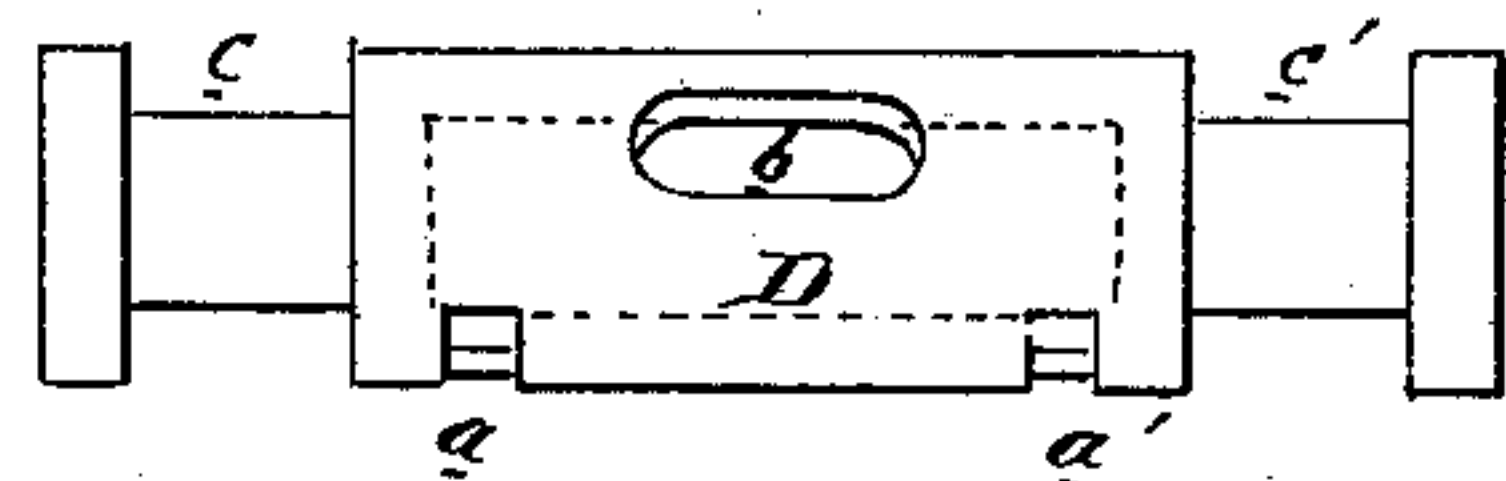
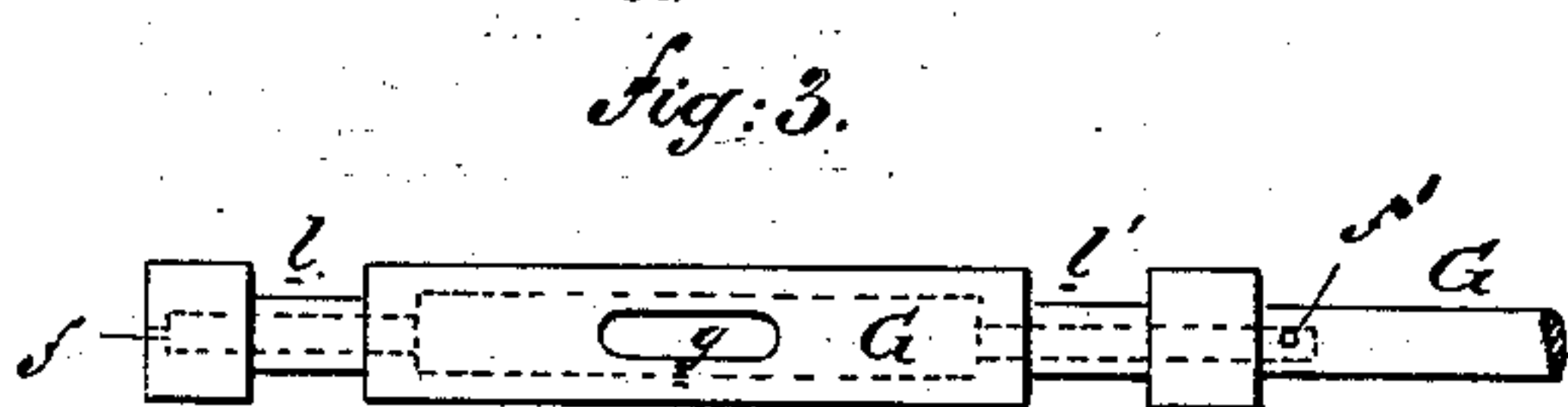
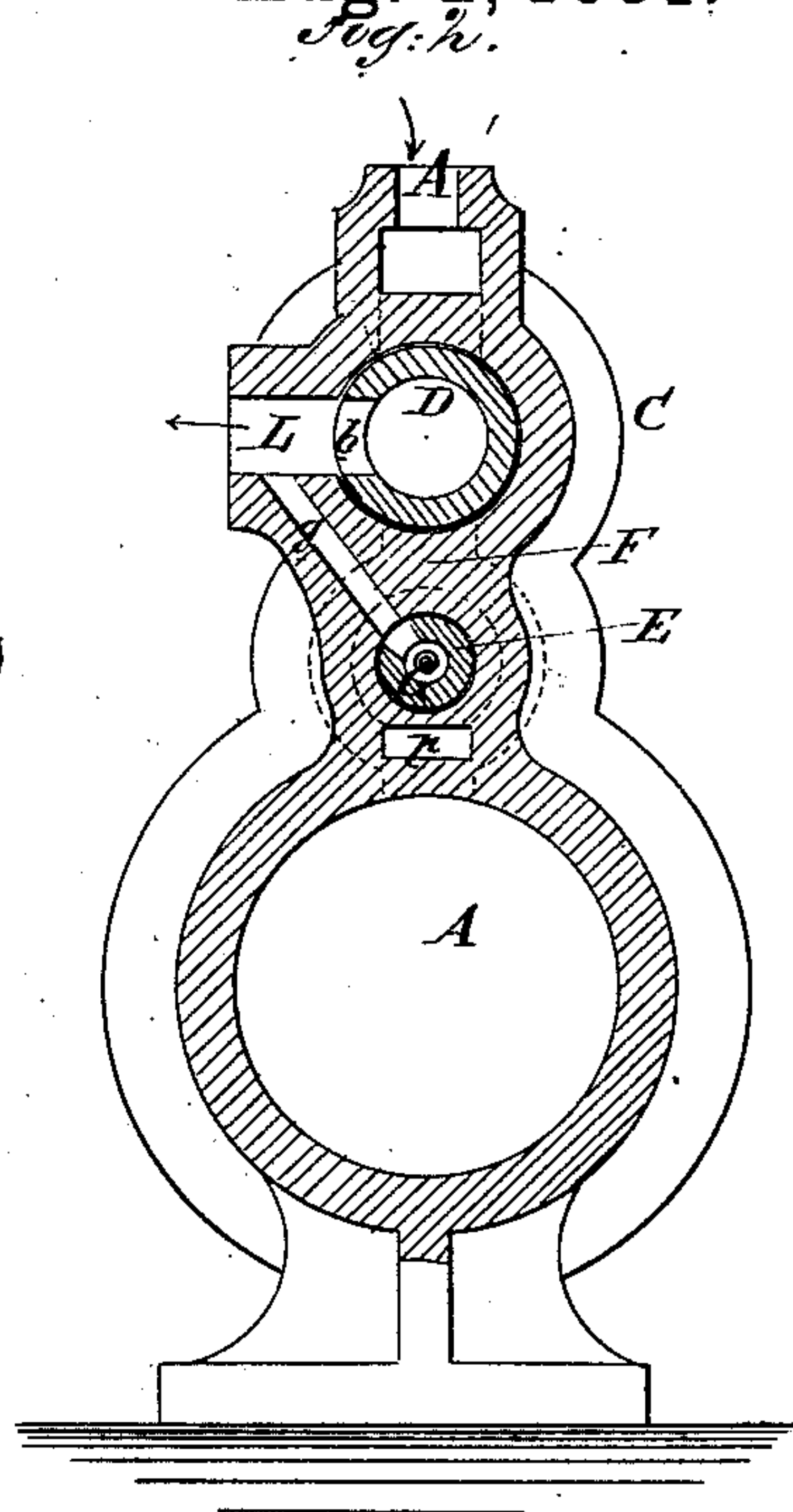
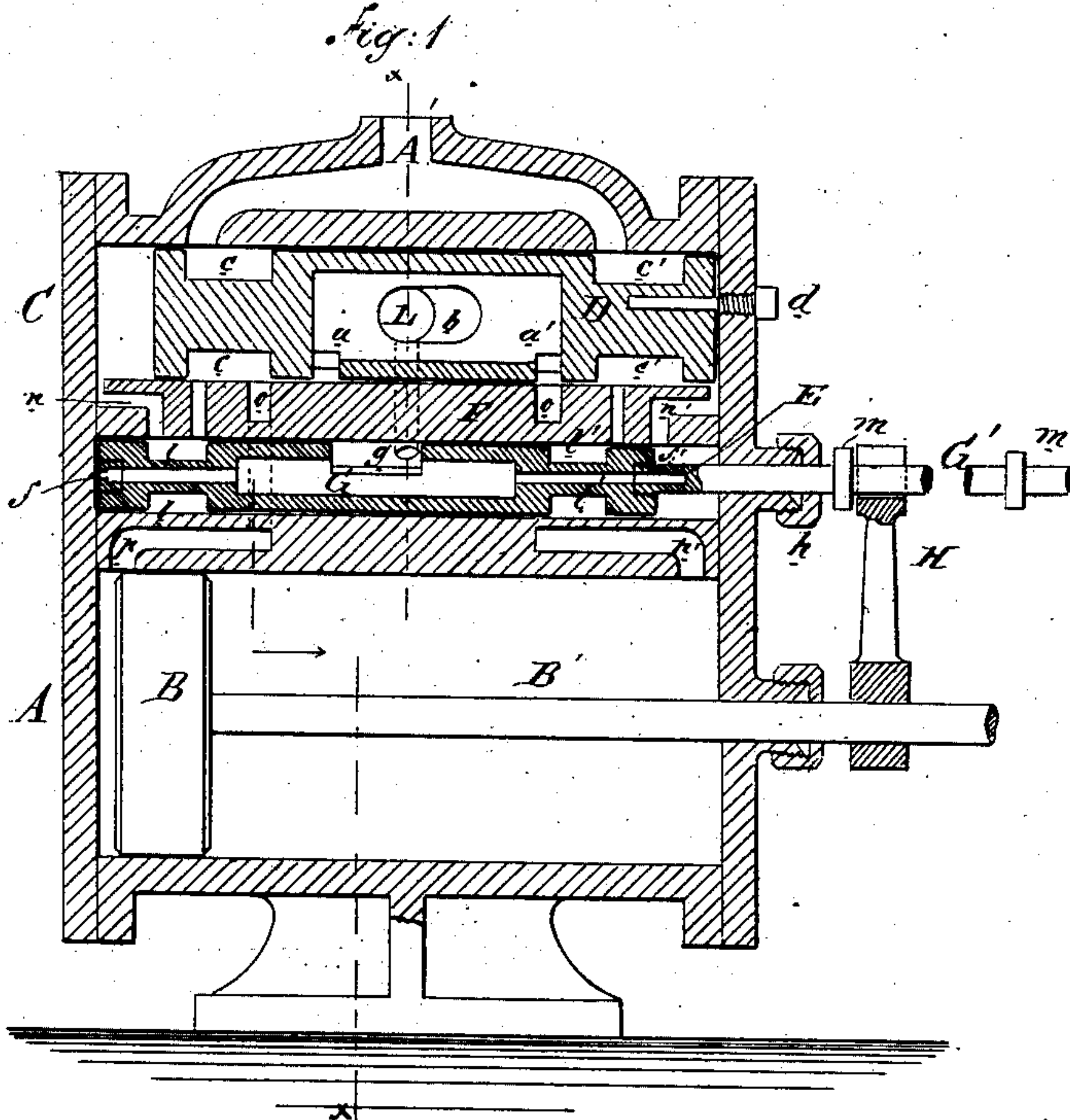


(Model.)

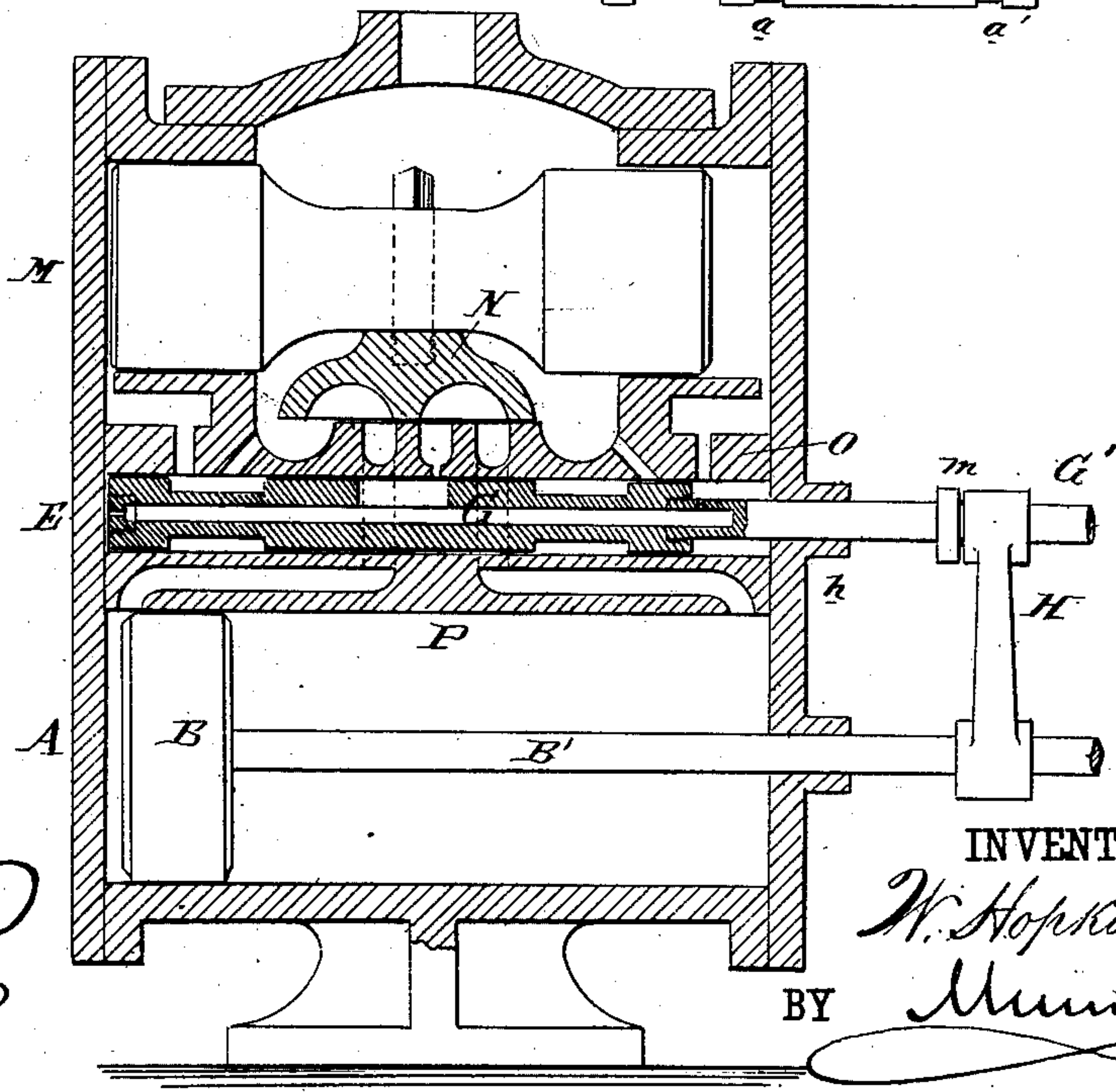
W. HOPKINS.  
STEAM ENGINE VALVE.

No. 245,169.

Patented Aug. 2, 1881.



*Fig. 5.*



WITNESSES:

*Chas. N. Alden*  
*A. Sedgwick*

INVENTOR:

*W. Hopkins*  
*Munn & Co*

BY

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

WILLIAM HOPKINS, OF DUBUQUE, IOWA.

## STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 245,169, dated August 2, 1881.

Application filed December 13, 1880. (Model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HOPKINS, of Dubuque, in the county of Dubuque and State of Iowa, have invented a new and Improved Steam-Engine Valve, of which the following is a full, clear, and exact description.

This invention relates to that class of valves known as "steam-actuated steam-valves," that are operated by steam and not by mechanical attachments.

The invention consists of the combination, with a hollow cylindrical piston-valve, of an auxiliary hollow cylindrical valve operated in a separate steam-chamber by outward connection with the piston-rod, an arm on the piston-rod sliding on the rod of the auxiliary valve between collars, whereby at the strokes of the piston said auxiliary valve is longitudinally reciprocated, so as to admit steam to one end of the piston-valve while it lets steam exhaust from the other end thereof, and so that said piston-valve is moved solely by steam.

Figure 1 is a longitudinal vertical section, showing my improved device applied to an engine-cylinder. Fig. 2 is a sectional end elevation of the same on line *x x*, Fig. 1. Fig. 3 is a longitudinal elevation of the auxiliary valve. Fig. 4 is a longitudinal elevation of the steam-actuated steam-valve. Fig. 5 is a longitudinal vertical sectional elevation, showing the application of the auxiliary valve to an ordinary slide-valve.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents a steam-cylinder.

B is the piston of the cylinder A, and B' the piston-rod.

C represents the steam-chest, containing the steam-actuated hollow valve D, of general cylindrical shape, having in its under side slots *a a'* for the passage of exhaust-steam into its interior, and having lateral openings *b b* for the escape of the exhaust therefrom, and having near either end peripheral annular grooves *c c'*, that serve as passages for the supply-steam to the cylinder A. Said valve D is prevented from turning by a stud or guide, *d*, which is entered into its end above its longitudinal axis through the end of the steam-chest C.

In a chamber, E, beneath the valve-seat F of the valve D, is the hollow auxiliary valve G,

of general cylindrical shape, having small passages *f f'* for the entrance of exhaust-steam into its interior, and a lateral opening, *g*, for the escape of the exhaust-steam therefrom, said openings *f f'* being made small to prevent the too sudden escape of exhaust from the ends of the steam-chest C, and so that the valve D shall be steam-cushioned at its ends, and be thereby prevented from too quick motion and from thumping; and said valve G is also provided with peripheral annular grooves *ll'*, near each end, that serve alternately as steam-passages to the ends of valve D. The rod G' of this auxiliary valve G extends outward through a suitable stuffing-box (represented at *h*) and through the upper end of an arm, H, that is secured on the piston-rod B', while on said rod G', at suitable distances on either side of the arm H, are fixed the collars *m m*, against which the said arm H strikes alternately with each stroke of the piston B, and thereby imparts an intermitting longitudinally-reciprocating motion to the auxiliary valve G.

In Fig. 1 the parts are in the position they assume when the piston B is at its extreme left-hand throw.

The operation of the device is as follows: The steam is admitted through the supply-port A', and passes down through the left-hand passage into the steam-chest C, about the left annular groove *c* of the valve D, through the corresponding port *o* in the valve-seat F, and through the corresponding steam-passage *p*, into the cylinder A in the rear of the piston B. In this position the auxiliary valve G is at the extreme left, and the exhaust from the chamber E has escaped through the passage *f* in the valve G, into said valve G, and out through the opening *g* into the exhaust-pipe L. Now, the left-hand grooves *l* of the auxiliary valve G register with the port *n* of the valve-seat F, and the steam passes through them into the valve-chamber C at the left of the valve D, and moves said valve D to the right. At the same time the exhaust from the valve-chamber C escapes at the right hand of the valve D, through the port *n'*, into the passage *f'* of the auxiliary valve G, and thence out through the lateral opening *g* to the exhaust-pipe L. By this movement the groove *c* of the valve D registers with the port *o* of the valve-seat F and the port *p* of the cylinder A, and live steam is



thereby admitted to the left of the piston B, moving the said piston B to the right, and causing the arm H to strike against the outer collar, *m*, and move the auxiliary valve G to the right; but while the piston B is thus moving, and before the valve G has completed its movement to the right, the exhaust-steam on the right of the piston B escapes through ports *p'* *o'* into the center of valve D, through slot *a'*, and thence out through exhaust L. Then the steam admitted through the supply-pipe A' passes down through the right-hand passage into the steam-chest C, about the groove *c'* of the valve D, through corresponding port *o'* in valve-seat F and corresponding steam-passage *p'* in cylinder A, to the right of the piston B, which will move said piston B and valves D G to their primary positions, as shown in Fig. 1.

In Fig. 5 the auxiliary valve G is shown applied to an ordinary slide-valve, wherein M represents the steam-chest; N, the slide-valve; O, the valve-seat, provided with suitable steam and exhaust passages; and P the seat of the valve G, provided with suitable ports opening into the steam-cylinder. In this case the valve G is operated in the same manner and with the same effect as hereinbefore described. It will

be seen that this auxiliary valve G admits steam to one end of the piston-valve D, while it lets steam exhaust from the other end thereof, so that said valve D is moved easily and without thumping.

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

1. The combination, with the hollow cylindrical piston-valve D, having slots *aa'*, lateral openings *b*, and peripheral grooves *c c'*, of the cylindrical hollow auxiliary valve G, provided with rod G' and collars *m m*, arranged and operated substantially as herein shown and described.

2. The combination, with the steam-cylinder A, piston and piston-rod B B', the latter provided with arm H, steam-chest C, and chamber E, of the cylindrical hollow valve D, valve-seat F, and hollow auxiliary valve G, provided with valve-rod G', having collars *m m*, substantially as herein shown and described.

WILLIAM HOPKINS.

Witnesses:

GEO. A. FIFIELD,  
J. McMURETY.