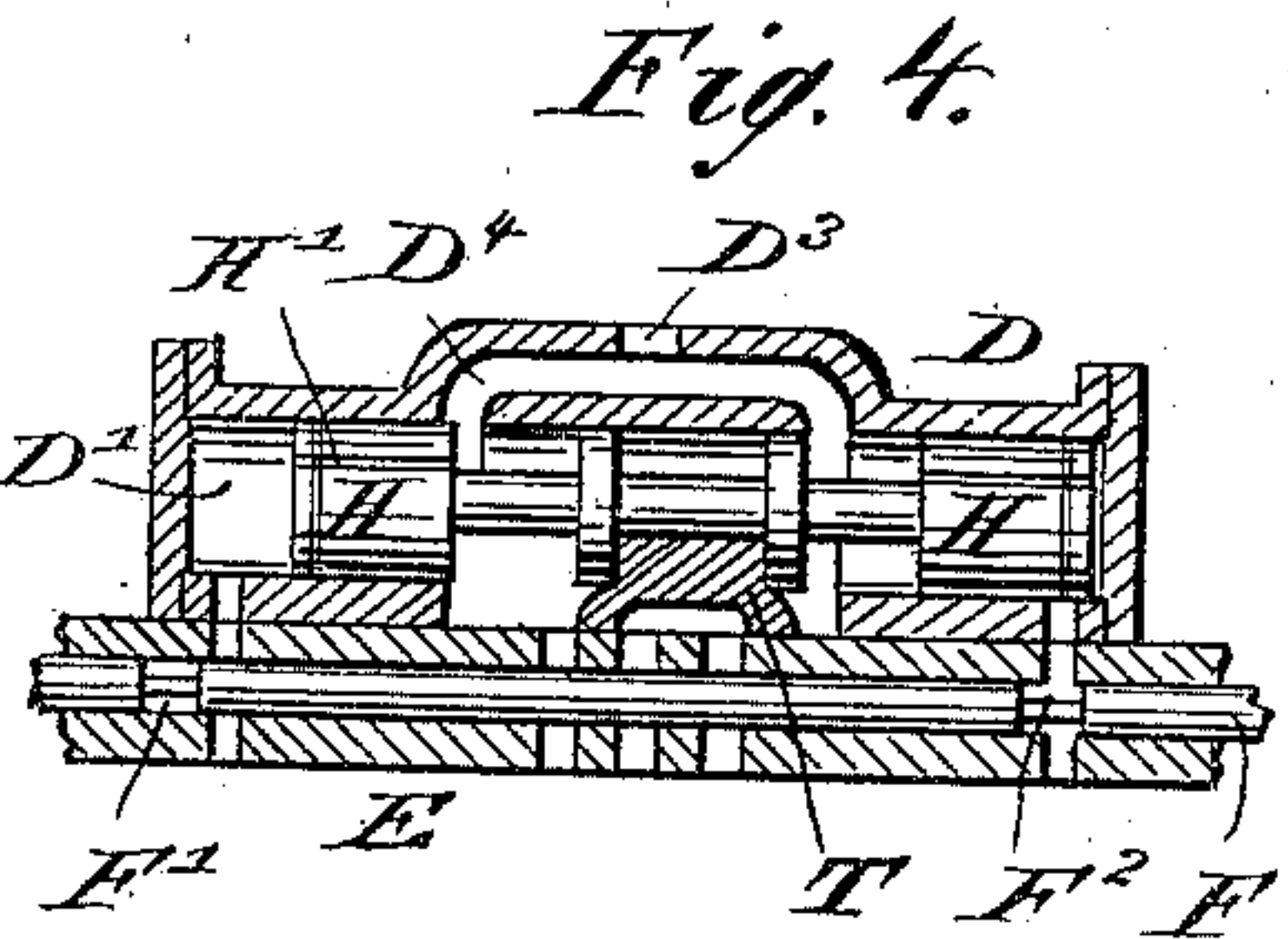
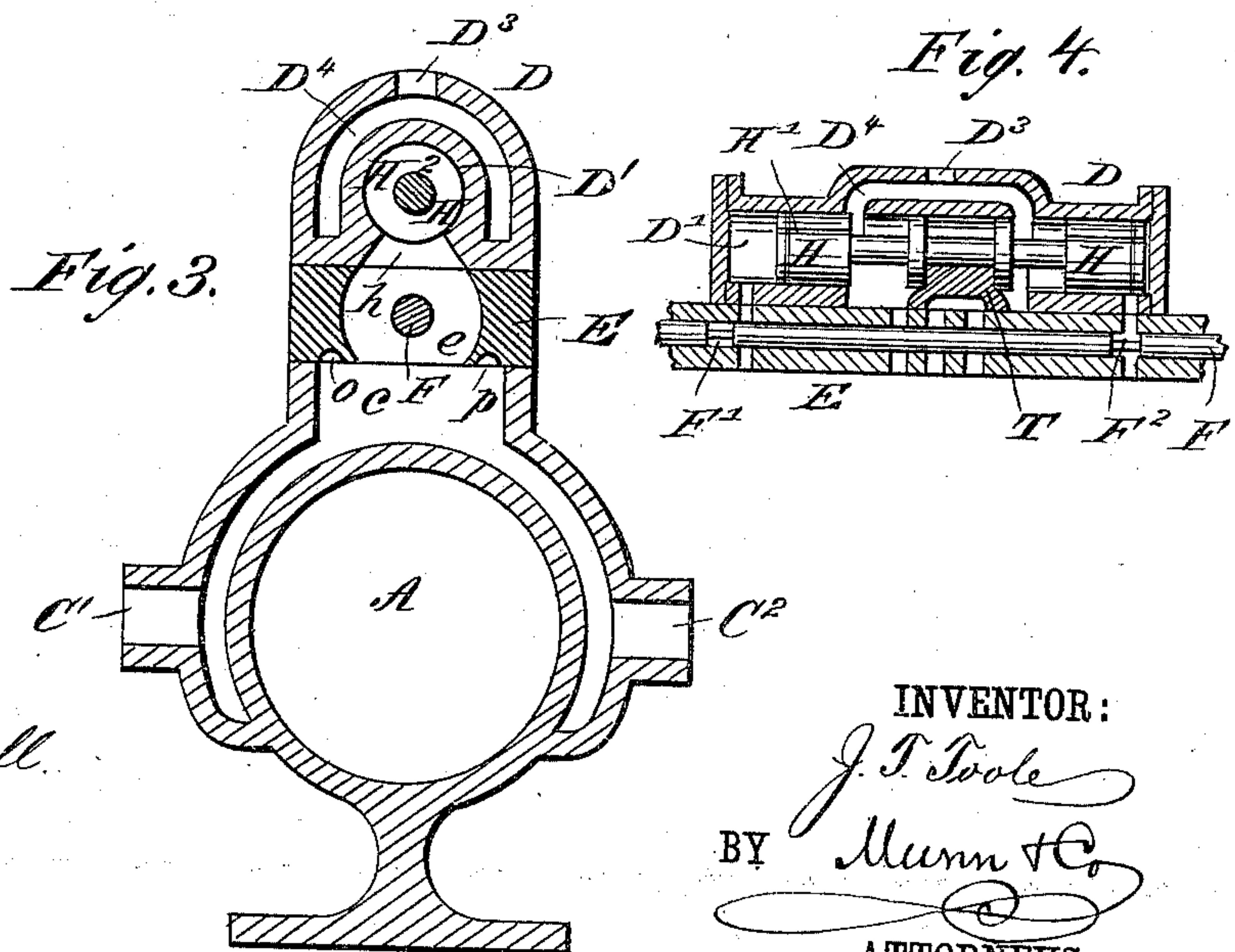
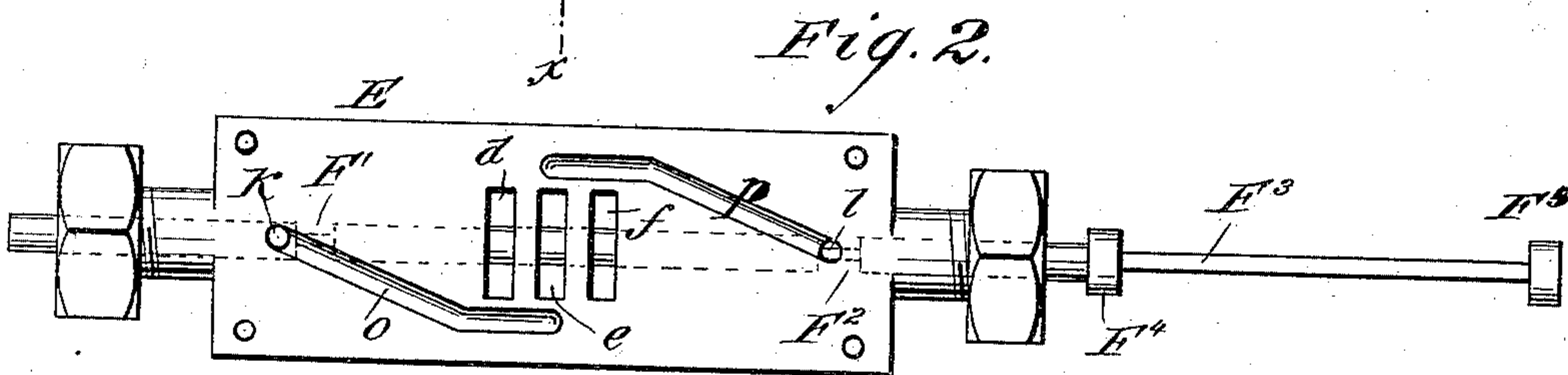
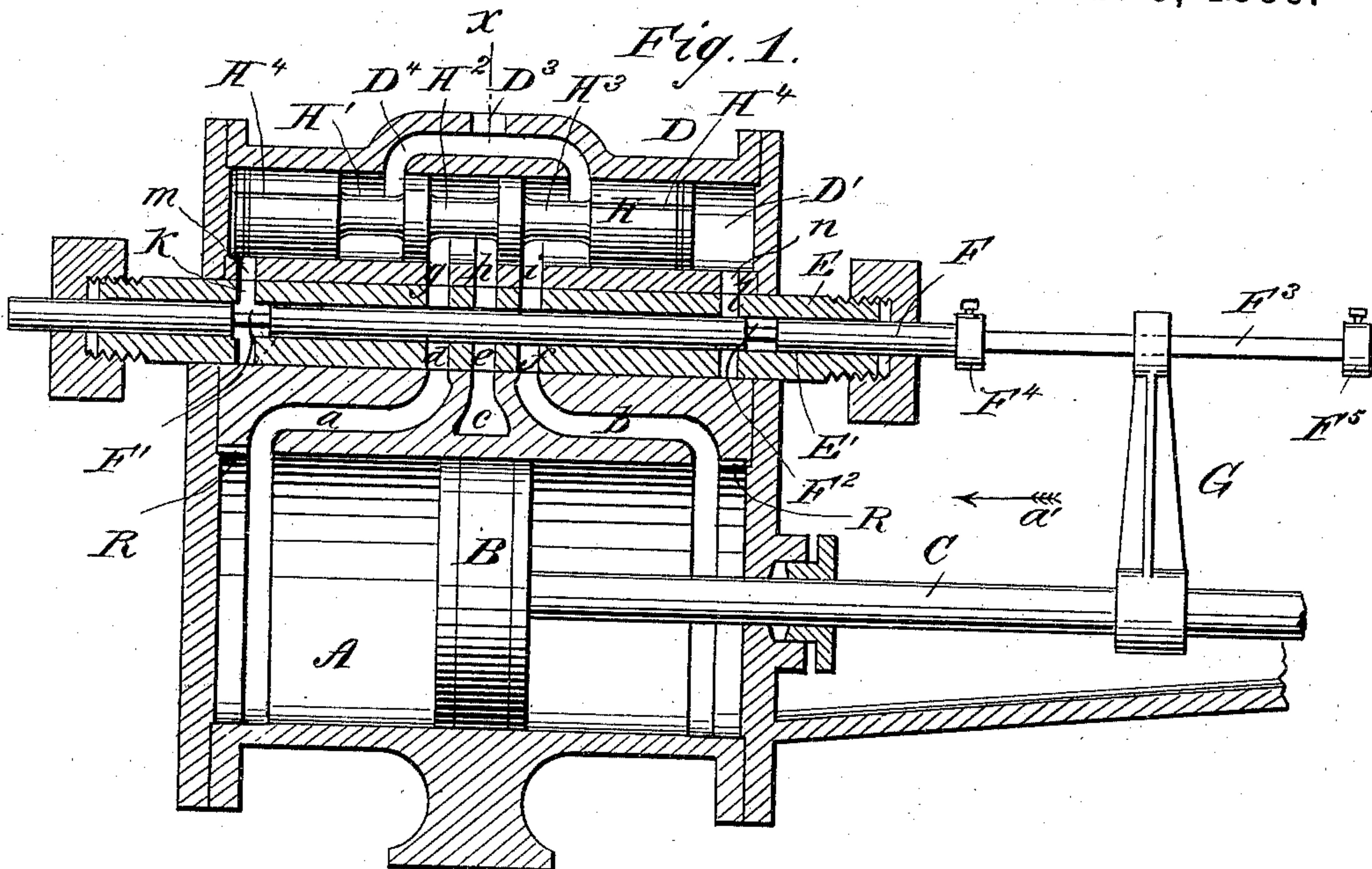


(No Model.)

J. T. TOOLE.
STEAM ACTUATED VALVE.

No. 335,855.

Patented Feb. 9, 1886.



WITNESSES:

Donn Twitchell.
C. Sedgwick

INVENTOR:

J. T. Toole
BY Munn & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN T. TOOLE, OF EAST SAGINAW, MICHIGAN.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 335,855, dated February 9, 1886.

Application filed November 12, 1885. Serial No. 182,567. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. TOOLE, of East Saginaw, in the county of Saginaw and State of Michigan, have invented a new and Improved Steam-Actuated Valve for Steam-Pumps, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved valve-gear for steam-pumps, which permits the starting or stopping of the pump without leaving it on the dead-center, and which allows the pump to work with regularity.

The invention consists in the construction and arrangement of parts, as will be hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal vertical section of my improvement attached to the steam-cylinder. Fig. 2 is an inverted plan view of the auxiliary steam-chest. Fig. 3 is a vertical cross-section on the lines *x x* of Fig. 1, and Fig. 4 represents a modification.

The steam-cylinder A, having the main ports *a* and *b* and the exhaust-port *c*, is provided with the piston B, to which is attached the piston-rod C. The steam-chest D is provided with the cylindrical valve-seat D', in which moves the main valve H. Between the steam-chest D and the cylinder A is placed the auxiliary steam-chest E, having the cylindrical valve-seat E', in which works the auxiliary valve or piston F, provided with the annular recesses F' and F². The auxiliary valve F is provided on the outside of the auxiliary steam-chest E with the stem F³, on which are fastened, by means of set-screws, the collars F⁴ F⁵, placed at suitable distances apart, and between which slides the upper end of the arm G, fastened to the piston-rod C. The auxiliary steam-chest E is also provided with the three ports *d*, *e*, and *f*, which correspond with the upper ends of the ports *a*, *b*, and *c* of the steam-cylinder A, and with the similar ports, *g*, *h*, and *i*, leading to the valve-seat E' of the steam-chest D. The auxiliary steam-chest E is also provided with the ports *k* and *l*, the upper ends of which connect with similar ports *m* and *n*, leading to the ends of the valve-seat

D' of the steam-chest D, and the lower ends of the said ports *k* and *l* connect with the exhaust-port *c* of the steam-cylinder A by means of the recesses *o* and *p*, cut in the under face of the auxiliary steam-chest E. The steam-chest D is provided on top with the steam-inlet D³, which connects with the steam-chamber D⁴, leading to the valve-seat D'. The main valve or piston H is provided with three annular grooves, H', H², and H³, of which the grooves H' and H³ alternately connect the steam-chamber D⁴ with the ports *g* and *i*, and the groove H² connects alternately the ports *g* and *i* with the exhaust-port *h*. The valve H is provided with longitudinal grooves H⁴, so as to admit steam behind its ends to form a steam-cushion in the valve-seat D'. The cylinder A is also provided on each end with a small groove, R, which extends from the ports *a* and *b* to the cylinder-heads, so as to form a steam-cushion for the piston B, and also to start the piston B on its return-stroke in the opposite direction by admitting live steam through the small groove R to the back of the main piston B.

The operation is as follows: The piston and valves, as shown in Figs. 1 and 3, are in the position they occupy when in the center of the stroke. The steam enters through the inlet D², and passes from the chamber D⁴ around the annular groove H³ to the ports *i*, *f*, and *b*, and to the steam-cylinder A, thereby moving the piston B in the direction of the arrow *a'*. The steam on the other side of the piston B passes through the ports *a*, *d*, and *g* into the valve-seat D' around the annular groove H², and down through the ports *h* and *e* into the exhaust-port *c*, from which it can escape by the outlets *c'* and *c''*, formed on each side of the steam-cylinder A. When the piston B comes near the end of its stroke, the arm G strikes the collar F⁴ and moves the auxiliary valve F in the direction of the arrow *a'*, so that the ports F' and *k* are disconnected and the ports F² and *l* are put in communication with each other, so that the live steam exerting pressure against the valve H in the annular grooves H' and H³ moves the valve H' in the inverse direction of the arrow *a'*, thereby connecting the steam-chamber D⁴ with the port *g*, and placing the ports H², *h*, and *i* in communication with each other, so as to reverse the motion of the piston B. The same movements in

reverse order take place, as stated, until the arm G strikes the other collar, F⁵, whereby the movement of the piston is again reversed. The steam in the valve-seat D' behind the
 5 ends of the main valve H exhausts alternately through the ports *n*, F², and *l* into the groove *p* and through the ports *m*, *k*, and F' and the groove *o* into the exhaust-port *c*.

In the modification, as shown in Fig. 4, I
 10 attach to the main valve H a common slide-valve, T, which operates in precisely the same manner as the annular recess H² of the valve H, as before described.

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

The steam-valve gear herein described, the same consisting of the steam-cylinder A, having exhaust-port *c* and ports *a b* leading from the ends of the cylinder to the center of

the top, the piston B, the auxiliary steam- 20 chest E, resting on the cylinder A and having central ports, *d e f*, registering with the ports *a c b*, and end ports, *k l*, leading through passages *o p*, between the cylinder and chest, to the exhaust *c*, the auxiliary valve or piston F, 25 having annular spaces F' F², to register with ports *k l*, and intermittently operated from the piston B, the chest D on the chest E, having ports *g h i* in alignment with the ports *d e f a c b*, end ports, *m n*, in alignment with the ports 30 *k l*, inlet-port D³, and a sliding valve in the chest D, adapted to close the ports *m g h* on one stroke and open the ports *i l*, and vice versa, substantially as set forth.

JOHN T. TOOLE.

Witnesses:

PHILIP ACKER,
 GEO. E. HARTNELL.