

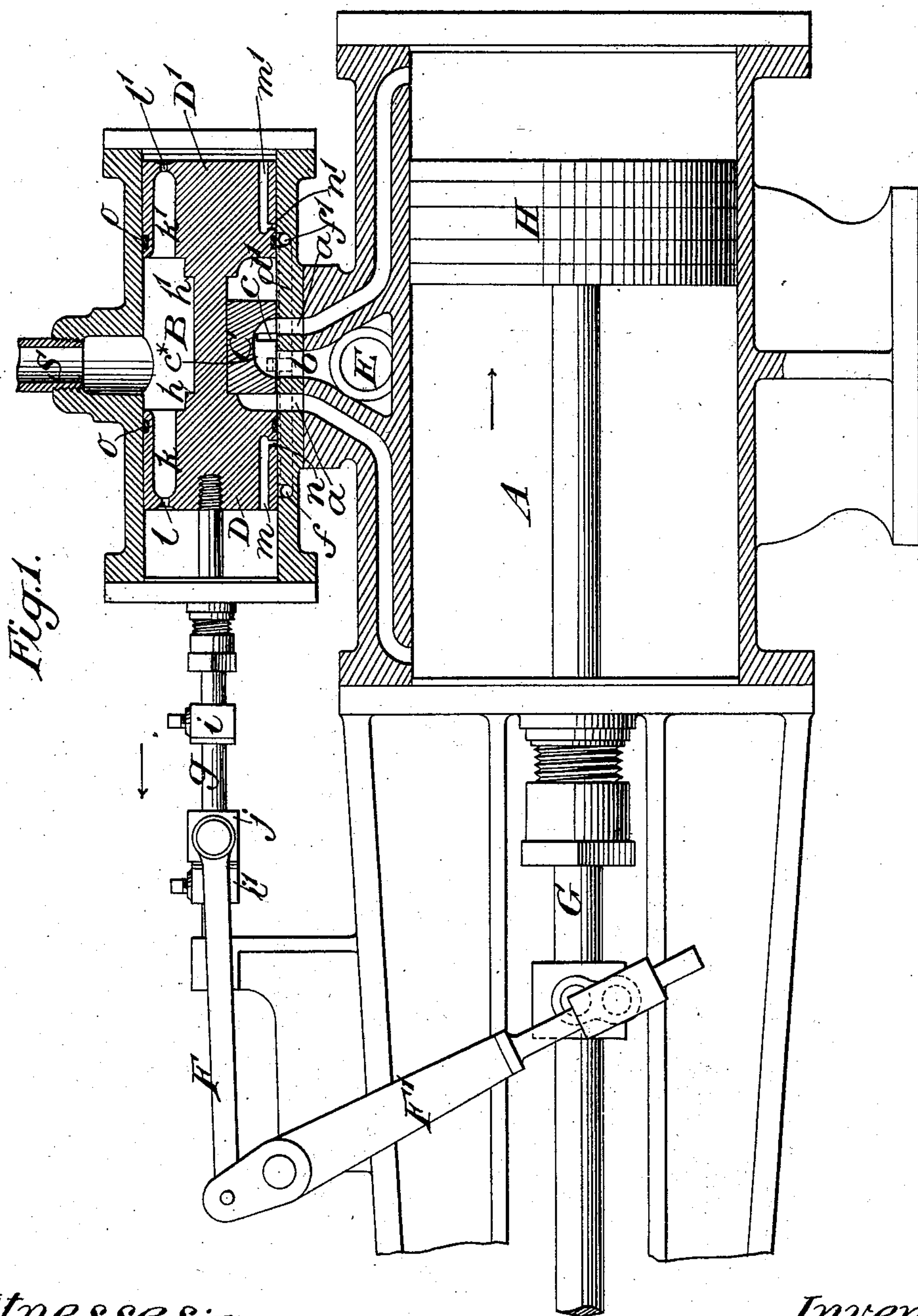
(No Model.)

2 Sheets—Sheet 1.

W. A. DREWETT.
VALVE OPERATING DEVICE.

No. 603,399.

Patented May 3, 1898.



Witnesses:-
George Barry Jr.
Fred Haynes

Inventor
William F. Drevett
by attorneys
Brown & Seaward

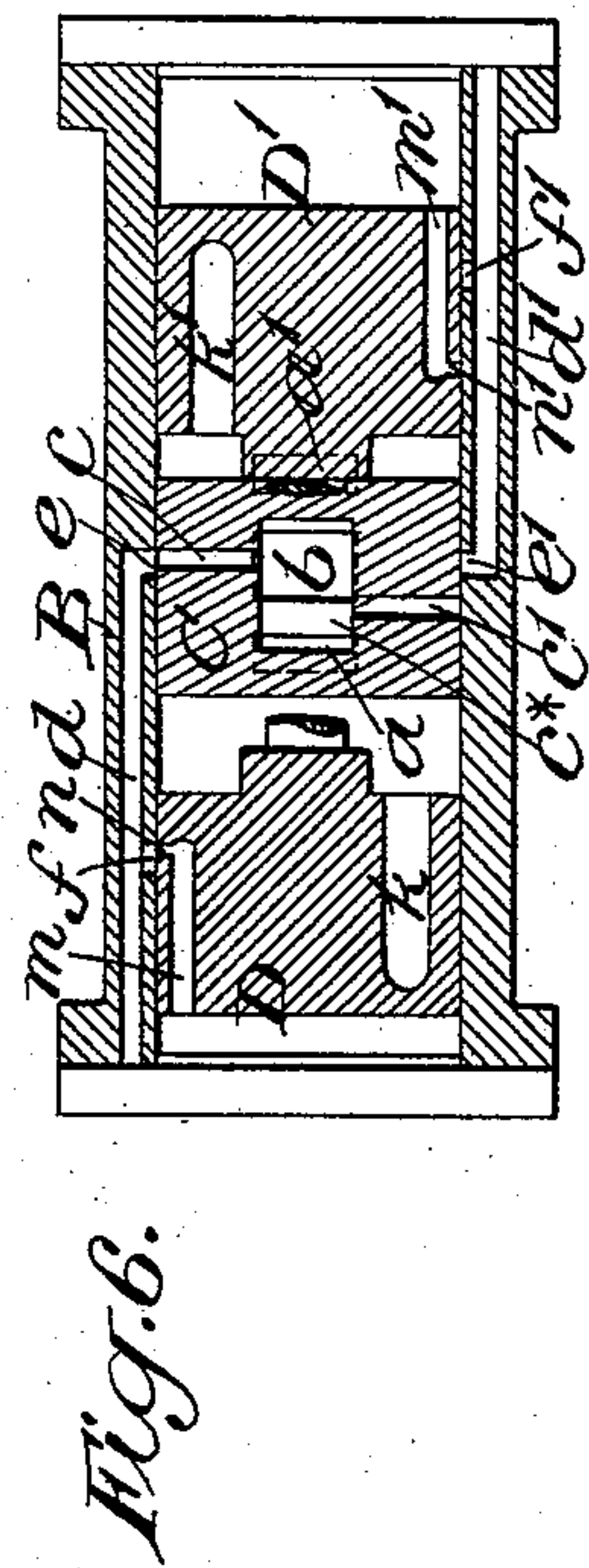
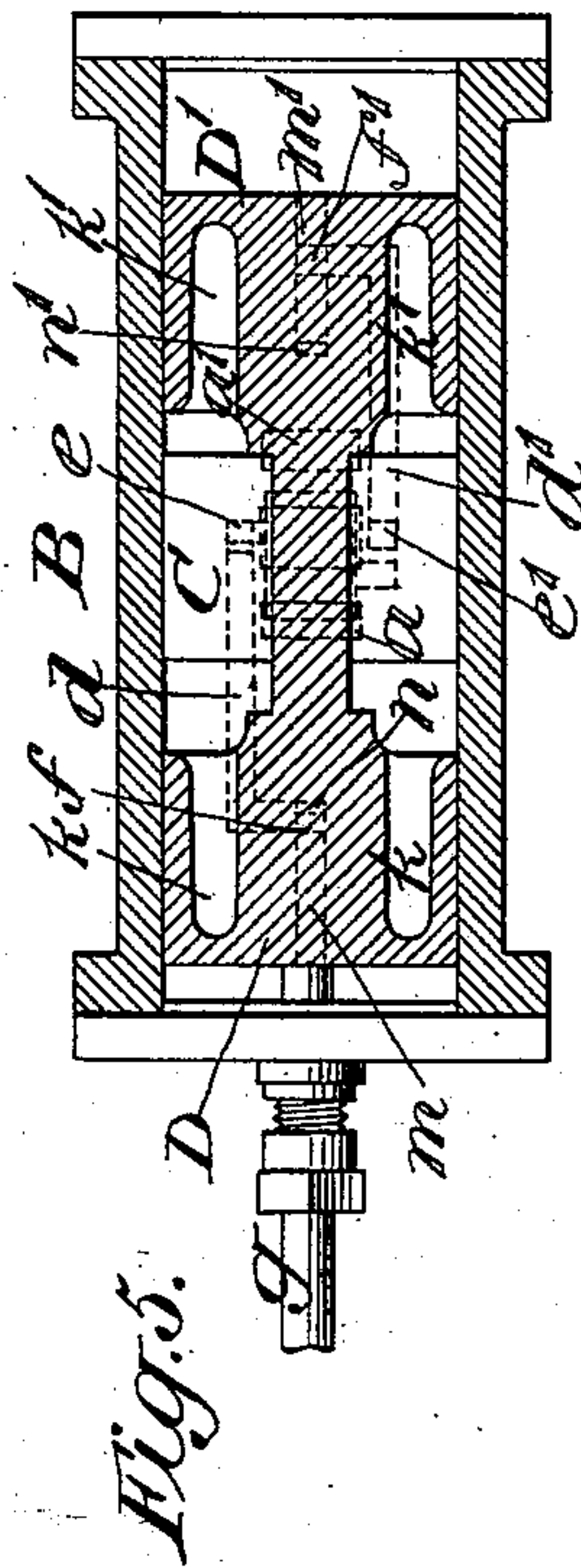
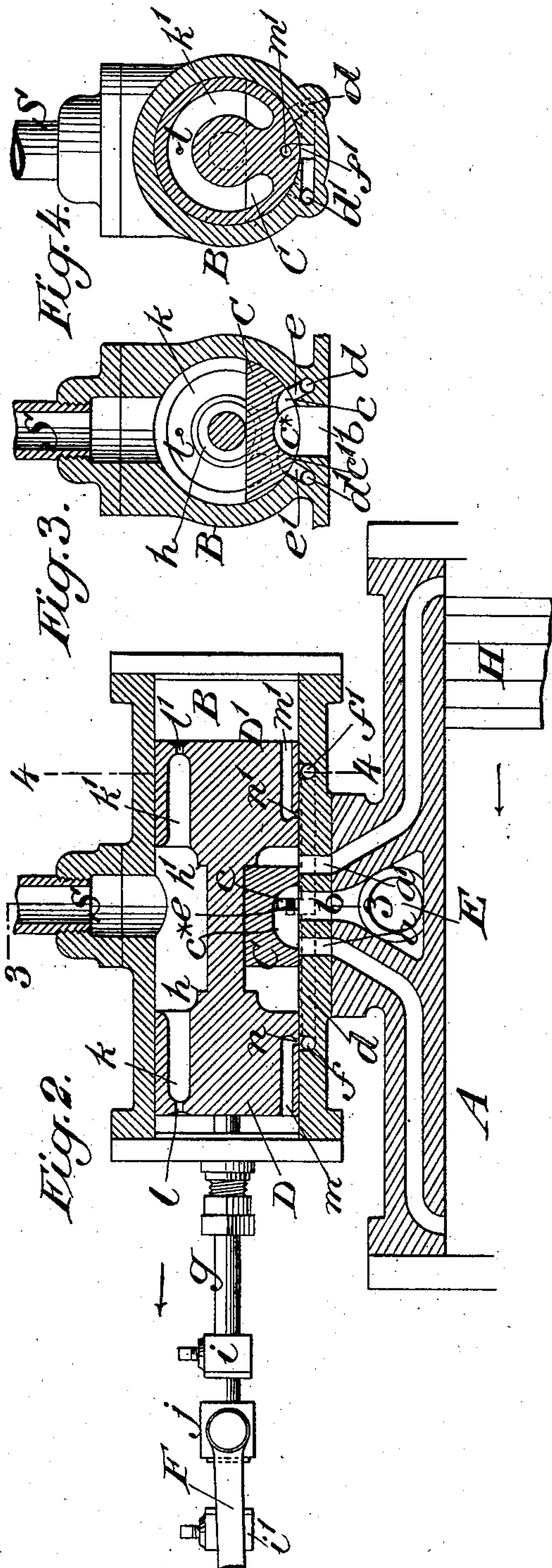
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UNITED STATES PATENT OFFICE.

WILLIAM A. DREWETT, OF BROOKLYN, NEW YORK.

VALVE-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 603,399, dated May 3, 1898.

Application filed April 8, 1897. Serial No. 631,201. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. DREWETT, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Valve-Operating Devices for Direct-Action Engines, of which the following is a specification.

This invention relates to direct-action engines the valve-operating devices of which are first actuated to commence the movement of the induction and eduction valve by some moving part of the engine deriving motion from its piston and are afterward actuated to complete the movement of the said valve by the steam or other fluid employed in the engine as its motive agent.

I will first describe my invention with reference to the accompanying drawings and afterward point out its novelty in claims.

Figure 1 is a longitudinal vertical sectional view of those parts of a steam-engine which are necessary to illustrate my invention. Fig. 2 represents a vertical section of a part of the engine-cylinder, of the valve-chest, and the valve and its operating devices, showing the parts in different position. Fig. 3 represents a transverse vertical section in the line 3 3 of Fig. 2; Fig. 4, a transverse vertical section in the line 4 4 of Fig. 2. Fig. 5 represents a horizontal section taken through the center of the valve-chest, showing the parts in the same position as Fig. 2. Fig. 6 is a diagrammatic sectional view corresponding with Fig. 5, but showing some of the parts displayed to better illustrate their mutual relations.

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

A is the engine-cylinder, and B the valve-chest, to which steam is admitted by the pipe S and in which is the seat for the sliding valve C, which controls the induction and eduction of steam to and from the cylinder A. In this seat are the two ports $a a'$, leading to opposite ends of the cylinder, and an intermediate main exhaust-port b , leading to the exhaust-pipe E. The valve-chest B is preferably of cylindrical form from end to end, and the valve C is of corresponding form in its transverse section. This valve is like an ordinary short D-valve, its cove being of a length to include the exhaust-port b and one of the ports $a a'$ and of a width corresponding with the said ports;

but it has besides the cove two narrow side ports $c c'$, (see Figs. 3 and 6,) which debouch laterally from the cove and the function of which will be hereinafter explained.

D D' is a two-headed valve-piston fitted to the cylindrical bore of the valve-chest and having its rod projecting through a stuffing-box in one end thereof. On the so-projecting portion of the said rod g there are adjustably affixed two tappet-stops $i i'$, between which there is fitted loosely to the rod a tappet j , which is connected by a rod F and lever F' with the rod G of the engine-piston H in such manner as to be moved by the engine-piston in the opposite direction thereto for the purpose, by the action of the said tappet j on one of the stops $i i'$, of giving to the valve-piston as the engine-piston approaches the end of its stroke a movement which produces the first part of the movement of the valve, which works with lost motion in the ever-open central steam-space between the two piston-heads D D'. In each piston-head there is a cavity k or k' , and from these cavities very small openings $l l'$ lead, respectively, to the spaces between the two pistons and the closed ends of the valve-chest. Through these openings $l l'$ steam flows constantly between the central space to the spaces in the ends of the valve-chest, so that the piston-heads, having steam on both sides of them, are in *equilibrium* except at the times when the space in either end is opened to the ports $c c'$ in the valve and to the exhaust-cove c^* and exhaust-port b , through one of two side passages $d d'$, to be presently described, for the purpose of completing the movement of the valve by the greater pressure of the steam on the inner end of that piston the space at whose outer end has been thus opened.

The passages $d d'$ just mentioned, which may be termed the "supplemental exhaust-passages," running lengthwise within the walls of the chest, are best shown in the diagrammatic view, Fig. 6. These passages have ports $e e'$, communicating with the valve-seat at points within the range of the lateral exhaust-ports $c c'$ of the valve, and other ports ff' , communicating with the bore of the valve-chest within the range of lateral ports $n n'$, one in each piston-head, the said ports $n n'$ being always in communication through pas-

sages $m m'$ in the piston-heads with the spaces between the said heads and the closed ends of the valve-chest.

To explain the operation, I will first suppose the parts to be in the relative positions shown in Fig. 1, the valve-piston and valve being in their extreme right-hand positions, steam entering the engine-cylinder at the left-hand end and exhausting therefrom at the right-hand end, the engine-piston having made the greater portion of its stroke to the right and the tappet j having just arrived at the stop i on the rod of the valve-piston. At this time the supplemental exhaust-passages $d d'$ are both closed at both ends, their ports $c c'$ being closed by the valve C and their ports $f f'$ being both closed by the valve-piston heads. The further movement of the engine-piston, acting through the tappet j , produces the movement of the valve-piston to the left without moving the valve until the shoulder h' on the piston-head D' comes in contact with the valve, when the continued movement of the valve-piston by the tappet starts the valve and carries it to the position in which it closes both ports $a a'$. Up to this time the exhaust-passages $d d'$ remain closed, because, although the port n' in the piston-head D' has been passing and open to the port f' of the passage d' , the port e' at the other end of said passage is closed by the valve, while the other passage d has its port e closed by the valve and its port f closed by the piston-head. The steam-pressure is thus equal on the outer ends of both piston-heads; but just as the tappet brings the valve to the position last mentioned the side port c in the valve begins to open to the port e and the piston-head D begins to open its port n to the port f , as shown in Figs. 2, 5, and 6, and then, there being an opening from the left-hand end of the valve-chest through the passage m , ports $n f$, passage d , and ports $e c$ to the exhaust-cove c^* and port b , while the ports $n' f'$ remain closed, the pressure between the valve-piston and the left-hand end of the valve-chest being reduced, the preponderating pressure on the right-hand end of the valve-piston quickly completes the movement of the valve-piston and the valve to the left and admits steam to the right-hand end of the engine-cylinder A , and the movement of the engine-piston to the left takes place. A similar operation to but the reverse of that described takes place between the tappet j , the tappet-stop i , the valve-piston, the valve, and the several ports and passages in the valve, piston-heads, and valve-chest during the latter part of the movement of the engine-piston to the left for the purpose of opening the left-hand end of the cylinder to the steam and the right-hand end to the exhaust.

In the completion of the movement of the valve-piston in either direction beyond the point at which the ports $e f$ of the passage d or the ports $e' f'$ of the passage d' have been closed there is, by reason of the smallness of

the passages $l l'$ in the piston-heads, a cushioning of the steam between the valve-piston and the adjacent end of the chest.

It may be here explained that the length of the valve and the distance between the shoulders $h h'$ on the heads of the valve-piston by which the valve is acted upon are so proportioned that the lost motion between the piston and the valve is just sufficient to permit the port n or n' in the piston-heads to pass by and close the port f or f' in the valve-chest before the valve-piston moving in either direction begins to act upon the valve.

The piston-heads are represented as furnished with packing-rings o ; but excepting this packing and the tappet mechanism, by which the operation of the valve is commenced, my valve-operating devices consist of only three parts, viz: the valve-chest, the valve, and the two-headed valve-piston.

What I claim as my invention is—

1. In an engine, the combination with a valve-chest, a two-headed piston therein and a single valve interposed with a lost motion between the piston-heads, of a main exhaust-port in the chest controlled by the valve, and two supplemental exhaust-passages each communicating with the valve-chest by two ports so located that one of them is opened and closed to the main exhaust-port by the passage by it of the valve and the other of them is opened and closed to the space between the adjacent end of the chest and the piston by the movement over it of the piston itself, substantially as herein described.

2. The combination of a valve-chest and a valve therein for controlling the induction and the eduction of the motive fluid to and from an engine and a two-headed piston working within said chest and between the heads of which said valve works with a lost motion, the said chest being provided with external passages each of which has ports communicating with the interior thereof at two points in its length, the said piston having in each head a lateral port in communication with the space between the said head and the adjacent end of the chest, and the valve itself having two lateral exhaust-ports one for each of said passages, each of said lateral exhaust-ports being capable of communicating with one end of its respective passage while the other end of said passage is in communication with the said lateral port in one of the piston-heads, substantially as herein described.

3. In an engine, the combination of a cylindrically-bored valve-chest to which there is an inlet for the motive agent and within the bore of which is a valve-seat having ports communicating respectively with the ends of the engine-cylinder and with an exhaust-outlet, a piston having two heads fitted to the bore of said chest with an intermediate space which includes said inlet and ports, the two heads having passages through them which form constant communication from said intermediate space to the spaces between the

piston and the ends of the chest and having
also lateral ports communicating with the
last-mentioned spaces, a D-valve fitted to
said seat in the bore of the chest and capable
5 of a lost motion between the two piston-heads
and containing lateral exhaust-ports, and two
passages outside of the valve-chest each of
said passages having two terminal ports com-
municating with the valve-chest, one of said

terminal ports being within range of one of 10
the lateral ports of the valve and the other
of said terminal ports being within range of
the lateral ports in one of the piston-heads,
substantially as herein described.

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Witnesses:

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