

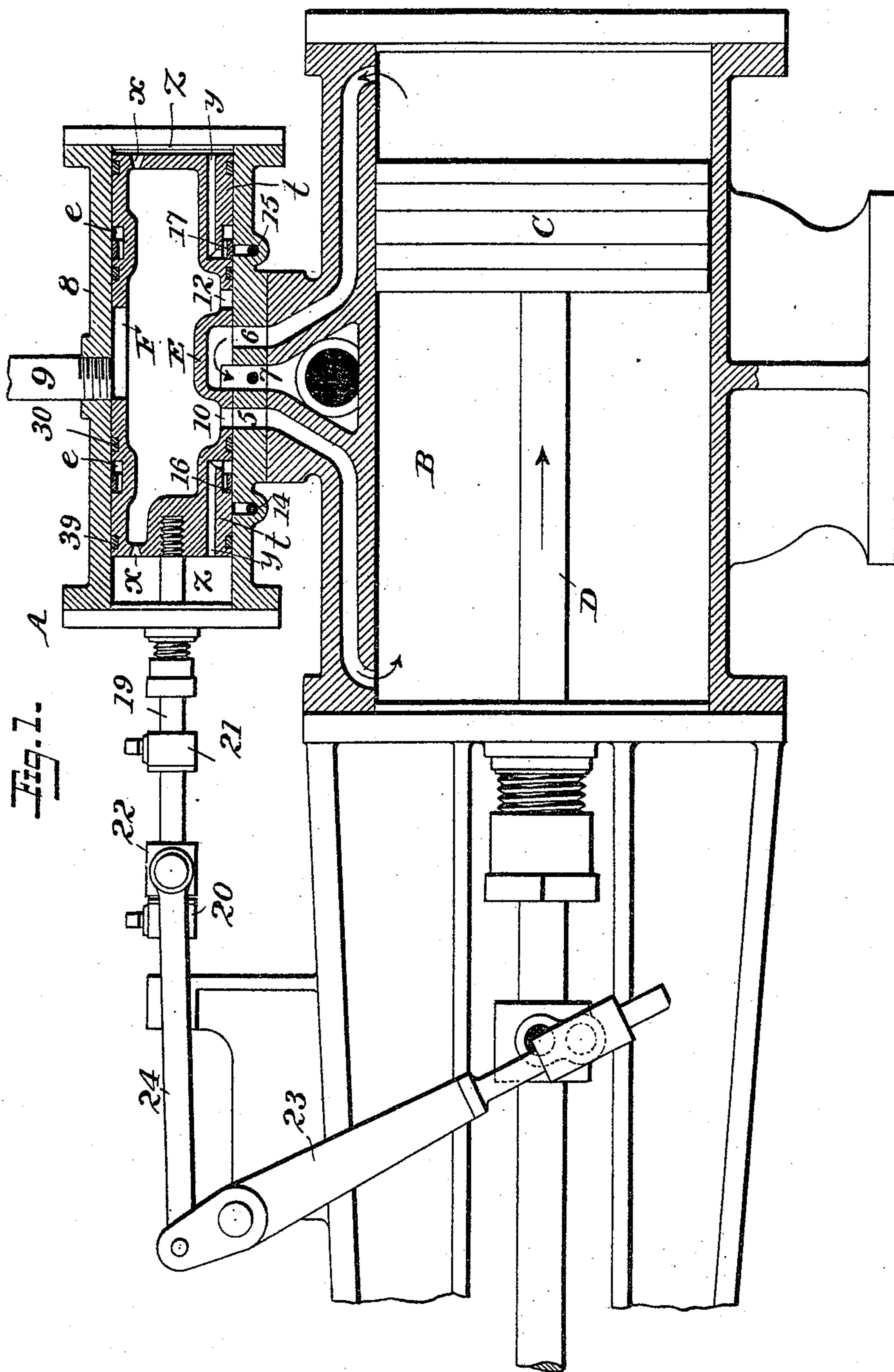
(No Model.)

3 Sheets—Sheet 1.

W. A. DREWETT.
VALVE DEVICE.

No. 518,026.

Patented Apr. 10, 1894.



Witnesses
Jno. Hinkel
Allen N. Dobson

Inventor
W. A. Drewett
by *Foster & Freeman*,
Attorneys

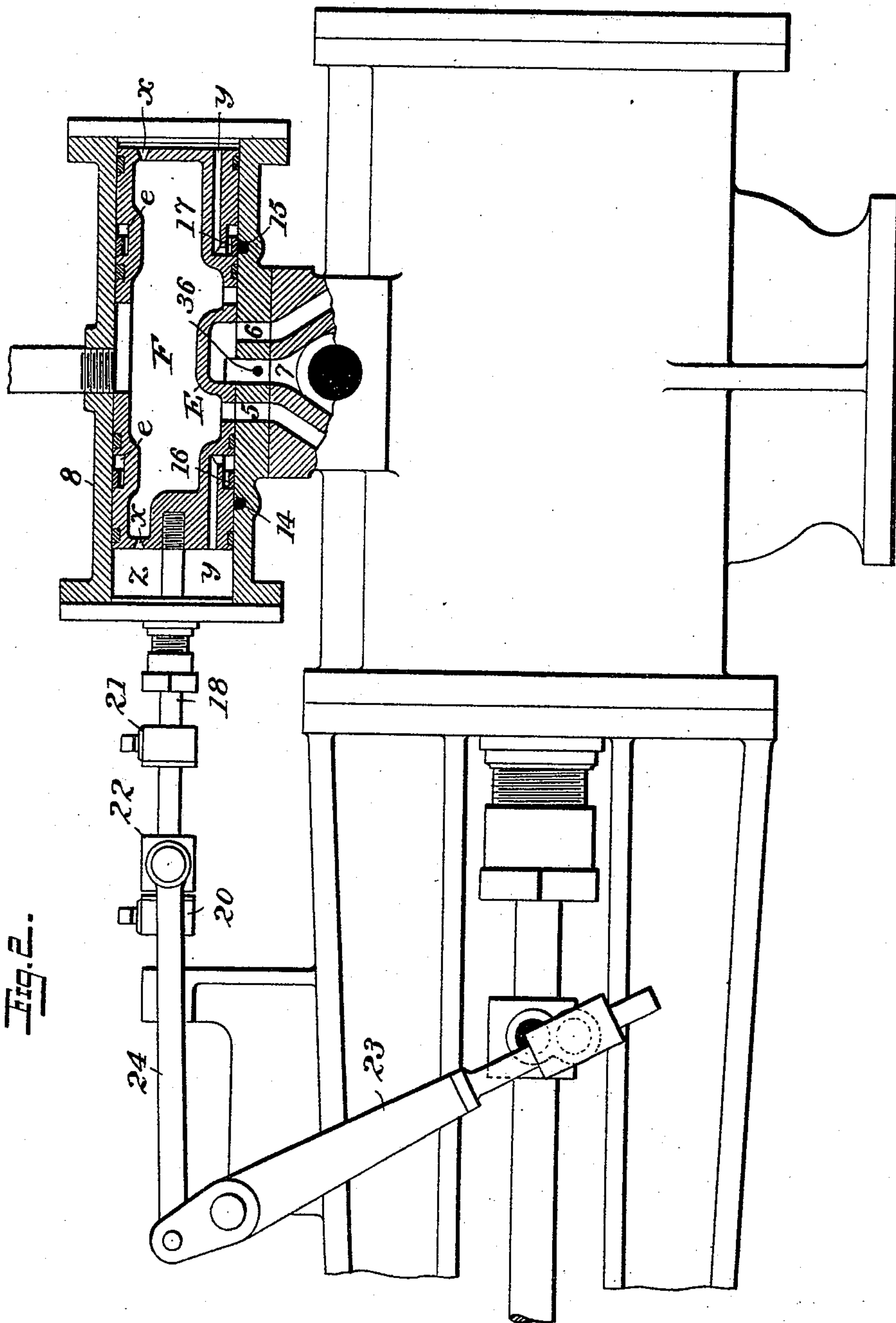
(No Model.)

3 Sheets—Sheet 2.

W. A. DREWETT.
VALVE DEVICE.

No. 518,026.

Patented Apr. 10, 1894.



Witnesses
Geo. G. Hinkel
Allen H. Dobson

Inventor
W. A. Drewett,
by *Foster & Freeman,*
Attorneys

(No Model.)

3 Sheets—Sheet 3.

W. A. DREWETT.
VALVE DEVICE.

No. 518,026.

Patented Apr. 10, 1894.

Fig. 3.

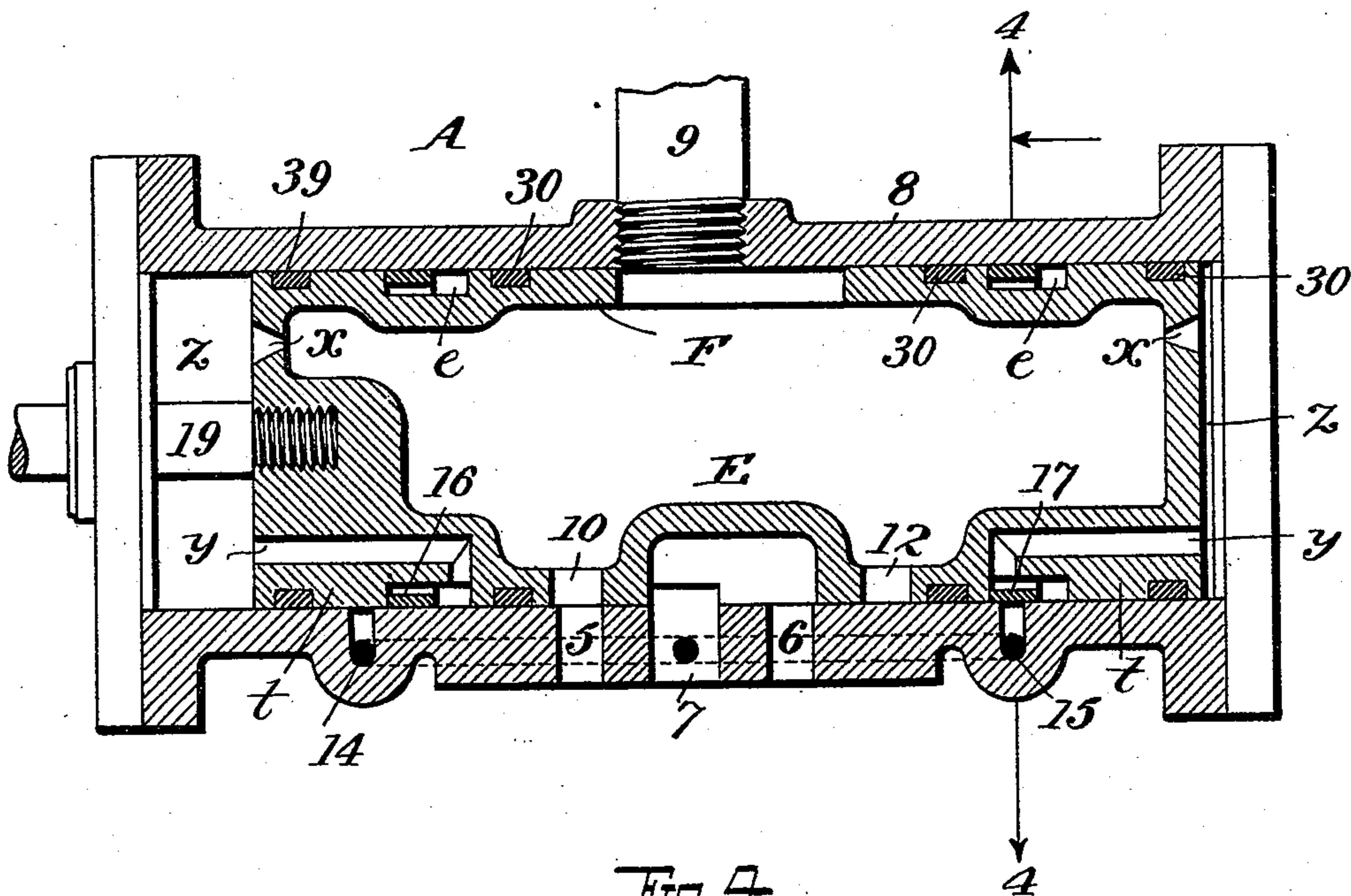
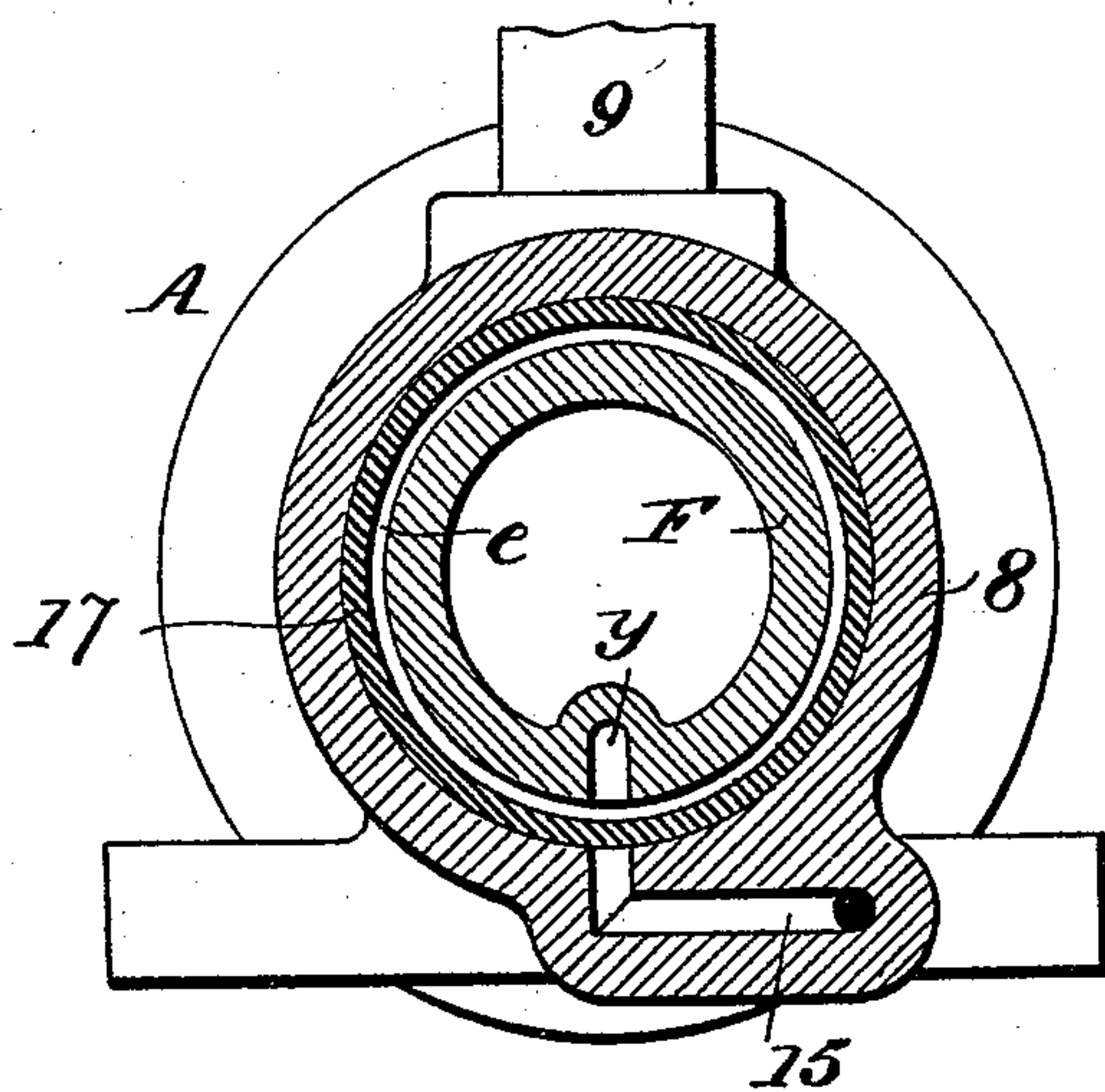


Fig. 4.



Witnesses
Geo. G. Hinkel
and J. Dobson

Inventor
W. A. Drewett

by Foster & Freeman,
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM ALFRED DREWETT, OF BROOKLYN, NEW YORK.

VALVE DEVICE.

SPECIFICATION forming part of Letters Patent No. 518,026, dated April 10, 1894.

Application filed November 14, 1893. Serial No. 490,901. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALFRED DREWETT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valve Devices, of which the following is a specification.

My invention relates to that class of engines in which the valves are moved for a part of the distance by some operating part of the engine and the movement is then completed by the pressure of the motor fluid; and my invention consists in constructing the valve operating devices as fully set forth herein- after and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a steam engine provided with my improved valve device; Fig. 2 a like elevation showing the parts in a different position; Fig. 3 a longitudinal section of the valve device enlarged; Fig. 4 a transverse section on the line 4—4, Fig. 3.

The valve device A, may be used with any suitable construction of engine having a cylinder B, piston C, piston rod D, inlet ports 5, 6, extending to the ends of the cylinder and exhaust port 7, all extending to a face upon which slides a "D," or other valve E. The valve casing 8, of the valve device A, is preferably a cylinder within which slides a hollow cylindrical valve piston F, to which the valve E, is connected, or of which it forms a part, steam passing to the interior of said piston from the inlet pipe 9, and passing from the said piston to the ports 5, 6, through ports 10, 12, according to the position of the piston and its valve E, the escape steam passing from the ports 5, 6, to the port 7, through the valve E, as usual.

My improved valve device is of that class in which the valve after having been carried to either extreme position is moved to a certain extent from some moving part of the engine, and while there is full steam pressure upon both ends of the valve operating piston, and is then shifted by the steam pressure at one end of the said piston when the pressure at the opposite end is reduced by exhausting the steam from said piston; and in order to reduce the cost and avoid the complexity of such constructions wherein this

result is obtained I combine with the parts above described the features which I will now set forth.

With the interior of the casing 8, at any suitable points between the center and the ends communicate two ports 14, 15, from each of which a channel leads to the exhaust 7, and each of these ports is controlled by a supplemental valve in the construction shown, which is in part, a part *t*, of the piston, and in part an independent sliding section or valve 16 or 17, which may be an annular or ring valve within an annular chamber or recess *e*, in the piston F, as shown, or it may be a section of a ring, or a block sliding in said recess, or it may be a plug valve at any point in the channel between the port 14 or 15, and the port 7, with suitable operating connections, but whatever the construction may be, the said valve is of such character that the sliding movements of the piston will cause the supplemental ports to be opened and closed at proper times. In the construction shown where there are two ring valves in annular recesses or chambers in the piston, the said recesses are of such size that the piston may move to a limited extent independently of the valves, which will remain in place by frictional contact with the bore of the casing until the sides of the recesses in the piston, or other contact shoulders or projections are brought against the edges of the valves and shift them. In each end of the piston F, there is a small port or channel *x*, sufficient to permit the steam to escape from the interior of the piston into the chambers *z, z*, at the opposite ends thereof to balance the piston until the pressure is relieved at one end or the other, in which case the preponderating pressure at the opposite end will throw the piston and its valves. This pressure is relieved at one end or the other of the piston after the latter has been moved to a certain extent toward the said end by the action of the engine, by opening a communication between said end chamber *z*, and the port 14, or 15, through a port or channel *y*, communicating with the chamber of the valve 16 or 17. In the construction shown a channel *y*, of greater cross-sectional area than the perforation *x*, extends from each end of the piston to the annular chamber *e*, containing the

valve 14 or 15. Any suitable connection may be made between a moving part of the engine and the piston F. As shown, the spindle 19, of the piston F, carries two stops 20, 21, secured adjustably thereto, and between which plays a block 22, reciprocated from the piston rod D, through the medium of a lever 23, and connecting rod 24. Assuming the parts to be in the position shown in Fig. 1, with the valve piston F, at the right, and the main piston C, traveling in the direction of its arrow toward the right, the block 22, as the piston C, approaches the end of its stroke, will be brought against the contact 20, and the piston F, will be moved by the engine until the chamber *e*, at the left of the piston F, is brought over and communicates with the port 14, when the steam will escape from the chamber *z*, at the left of the piston through the channel *y*, and chamber *e*, and flow through the exhaust port 14, and thence to the exhaust port 7, suddenly reducing the pressure at the left of the piston so that the preponderating pressure at the right will throw the said piston to the left, as in Fig. 2, just as the main piston C, reaches the end of the cylinder at the right, when the said end of the cylinder will be put in communication with the inlet steam port and passage while the space at the left of the main piston will be put in communication with the exhaust. As the piston F, reaches its position at the left the valve 16, is brought in position to cover the port 14, the valve 17, is carried from the port 15, which is covered by the part *t*, of the piston, so that when the piston F, is moved to the right by the action of the engine as the piston C, approaches the left position, the valve 16, has closed the port 14, against the passage of steam, but steam can pass from the right hand end of the piston F, to the port 15, as soon as the part *t*, of the piston uncovers the port and the channel or chamber *e*, is thus brought to communicate with said port 15, when the pressure at the right of the piston F, is relieved and said piston is thrown to the right by the preponderating pressure at the left, and then the valve 17, is brought above the port 15, while the valve 16, and part "*t*" to the left, still covers the port 14.

It will be seen that by the construction above set forth, I am enabled to positively shift the valve E, regularly and with certainty and to effect this result by appliances of an extremely simple character than can be constructed at practically a fraction of the expense heretofore required for mechanism for securing the same results. Thus it will be seen that there is no forging or hand fitting as the valve casing can be finished by usual operations in a boring machine the chambers in piston F, may be formed by the tools of a lathe or slotter; the valves 14 and 15, may be split rings sprung into place, or when the chambers *e*, are formed by slotting across the

piston, said valves may consist of simple metal blocks. It will be evident that no packing is required except between the ports 10, and 12, and the chambers *e*, *e*, where there are two ring packings 30, 30, simple in character and durable inasmuch as they do not have to traverse any of the ports. Additional packings 39, are shown, but they may be dispensed with.

While I have referred to the chambers at the ends of the valve casing as being in communication with the piston F, through the perforations *x*, *x*, it will be evident that the said perforations *x*, may be in the valve casing near the ends and communicate with any part of the steam supply chambers or channels with like effect.

It will be seen that as the pressure is always on the top of the valves 16, 17, and the exhaust below, they will be kept firmly to their seats. It will also be seen that by making the chambers, or arranging the contacting shoulders that move said valves, so as to allow the piston to move independently of the valve sections 16, 17, to a limited extent, and by providing the parts *t*, *t*, on said piston to act as parts of the auxiliary valves for closing and opening the ports 14, 15, I am enabled to close one port as the piston moves to one end, then move the piston back to an extent sufficient to open the other port, and then shift the valve of the first port to such a position (without opening said port) that on the return movement of the piston, the port will be first put in communication with the chamber *e*, and then on the further movement of the piston, be closed by said valve. Each port is thus opened to permit the steam to exhaust from the adjacent chamber *z*, and is then closed to prevent such exhaust on the return movement of the piston F.

Without limiting myself to the precise construction and arrangement shown and described, I claim—

1. The combination with the piston and cylinder of a steam engine having inlet and exhaust ports and passages, a main valve controlling the same, and a valve controlling piston in a valve casing, and means for moving said piston from the engine to a limited extent from each end of the casing, of a contracted steam inlet channel or port communicating with each end of the casing, an exhaust channel leading from the main exhaust port to a supplemental exhaust port between the main exhaust port and each end of the casing, a channel leading from each end of the valve operating piston to the supplemental exhaust port, and a valve controlling the channel between each supplemental port and the main exhaust port, and means for shifting said valve by the valve operating piston, substantially as set forth.

2. The combination with the engine cylinder, piston, ports and valve, and valve casing, of a piston connected with said valve and

sliding in said casing, supplemental exhaust ports communicating with the main exhaust, supplemental valves controlling each exhaust port, a channel leading from each supplemental valve to the end of the piston, means for shifting the supplemental valves by the action of said piston, and contracted ports communicating with the ends of the valve casing and with the steam supply, substantially as set forth.

3. The combination of the valve casing, piston, and main valve carried thereby, of supplemental valves and supplemental exhaust ports in the casing controlled by said valve, channels in the piston leading from the ends thereof to said supplemental valves, means for shifting said supplemental valves by the movements of the piston and contracted ports communicating with the ends of the valve casing and with the steam supply, substantially as set forth.

4. The combination in a valve device of a casing having ports 5, 6, and 7, and a valve controlling the same, and supplemental exhaust ports 14, 15, communicating with the port 7, a piston operating the main valve and provided with chambers *e*, containing supplemental valves controlling the supplemental ports, and channels between the ends of the

piston and the chambers *e*, substantially as set forth.

5. The valve casing having the ports 5, 6, 7, 14 and 15, in combination with the piston F, valve E, annular chambers *e*, in said piston and annular valves in said chambers and channels extending from the chambers *e* to the ends of the pistons and contracted ports communicating with the ends of the casing and with the steam supply, substantially as set forth.

6. The combination of the valve casing, having main ports communicating with the ends of the cylinder, an exhaust port, and supplemental ports communicating with the exhaust, valves sliding over said supplemental ports, and a piston having shoulders arranged to make contact with and move said valves while permitting a limited independent movement of the piston, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ALFRED DREWETT.

Witnesses:

JOHN LOWE,
A. R. BAYLIS.