

(No Model.)

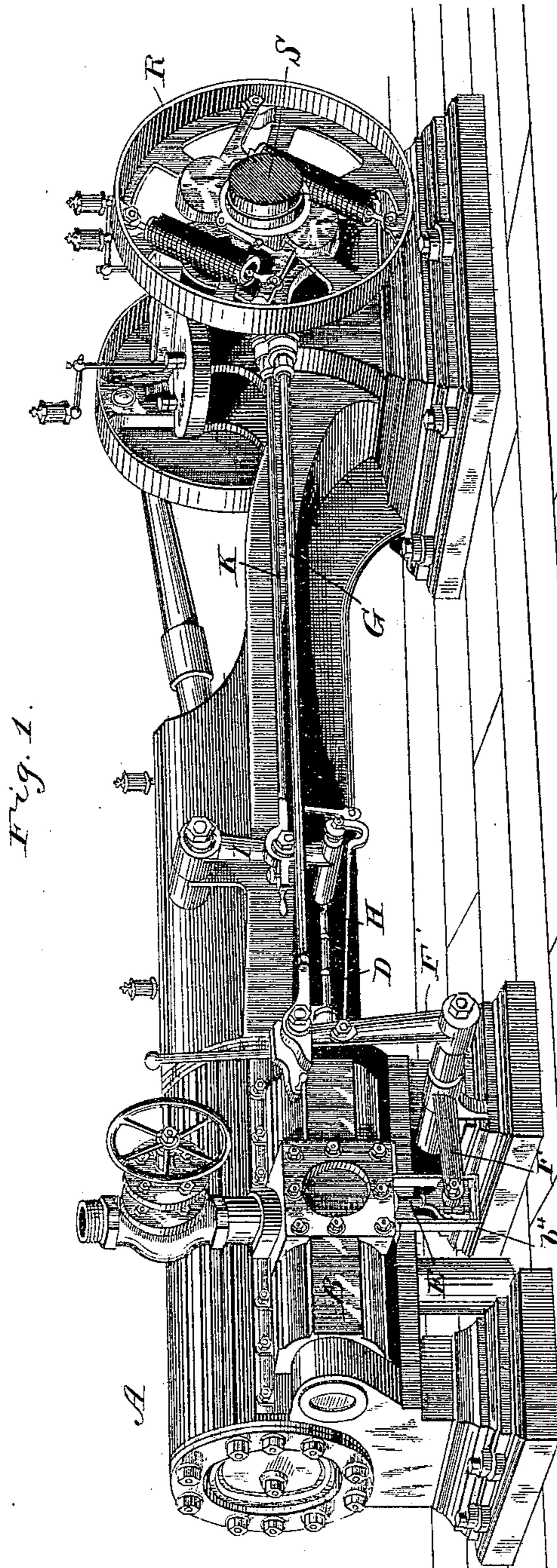
2 Sheets—Sheet 1.

F. SCHUMANN.

CUT-OFF VALVE.

No. 350,324.

Patented Oct. 5, 1886.



Witnesses:

Chas L. Taylor
C. E. Doyle.

Inventor:

Francis Schumann

by H. N. Low
his attorney.

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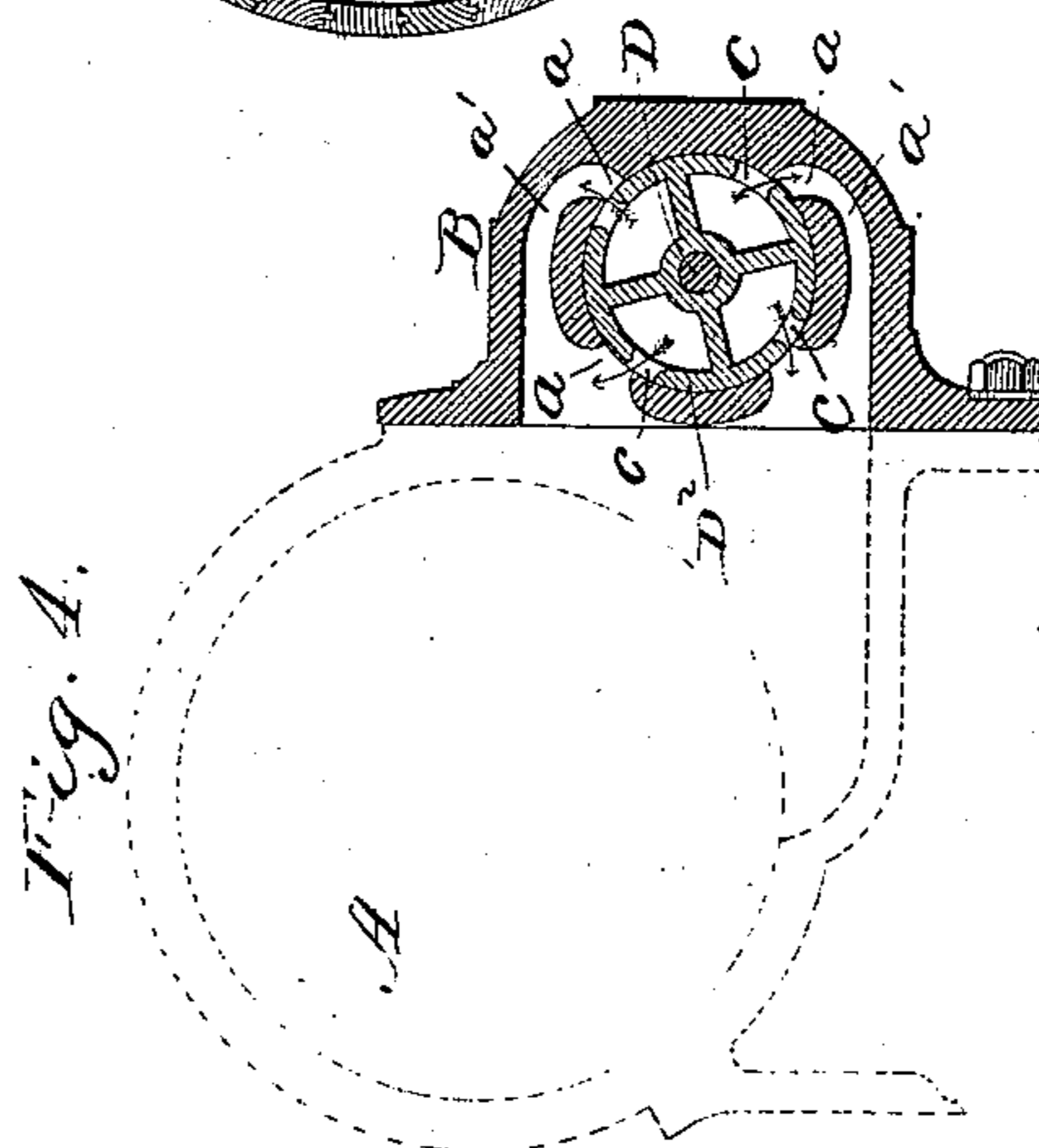
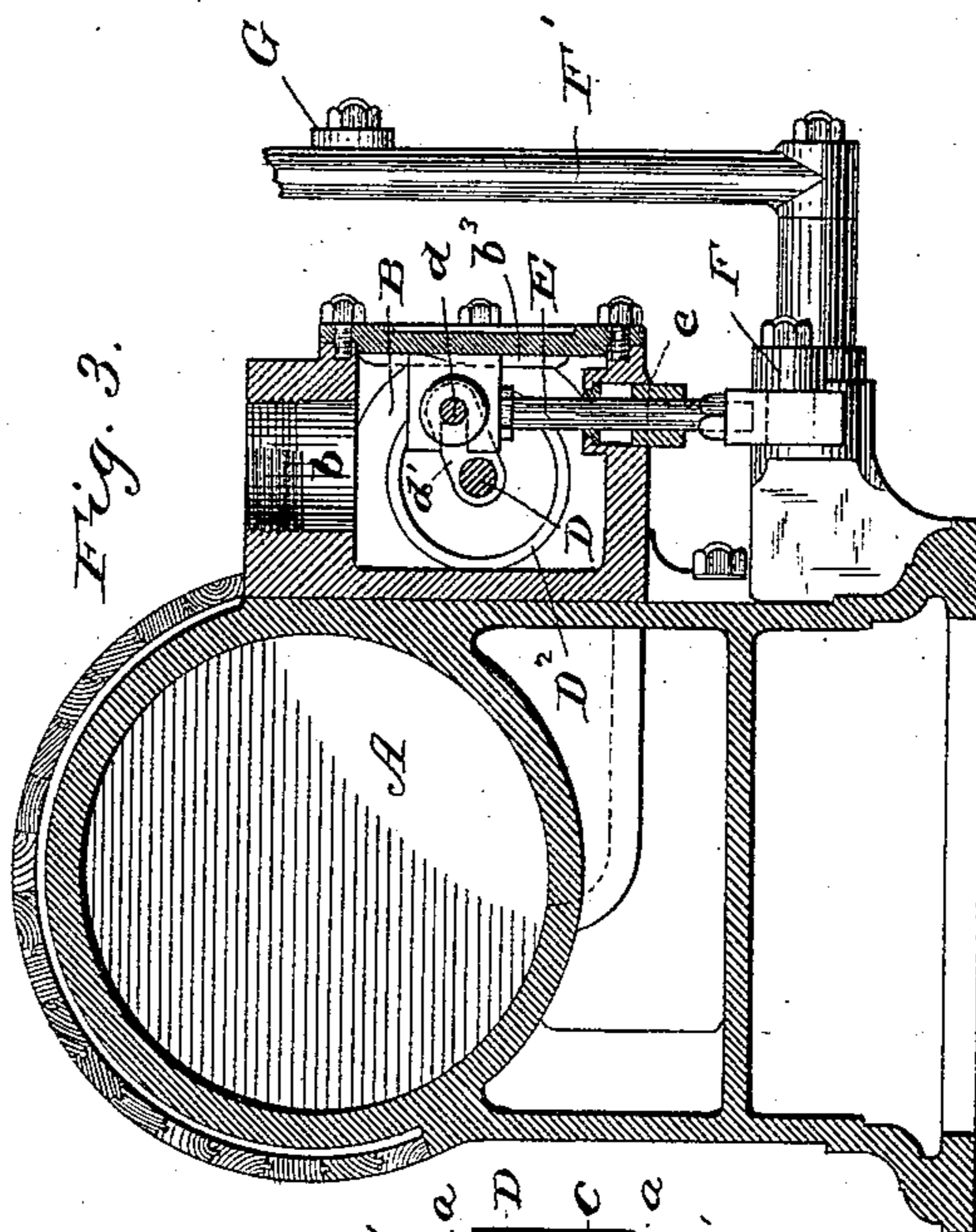
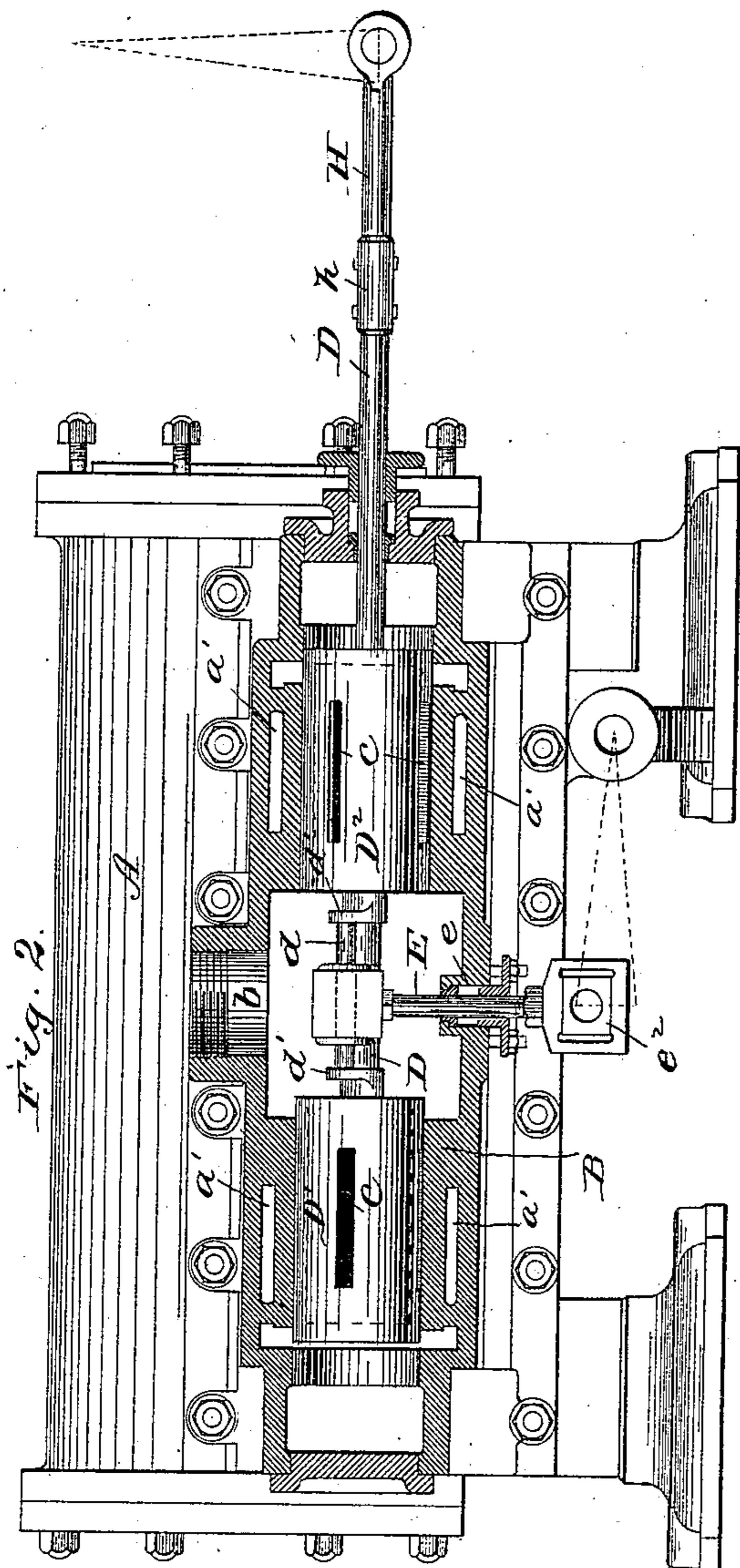
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UNITED STATES PATENT OFFICE.

FRANCIS SCHUMANN, OF TRENTON, NEW JERSEY, ASSIGNOR OF ONE-HALF
TO W. D. HAVEN, OF SAME PLACE.

CUT-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 350,324, dated October 5, 1886.

Application filed January 8, 1886. Serial No. 188,014. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS SCHUMANN, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Cut-Off Valves for Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the construction of and to the means for operating a combined reciprocating and oscillating steam-valve.

Heretofore two oscillating and reciprocating valves—one for each end of the steam-chest—have been operated by mechanism in some respects similar to that which I am about to describe; but it is the object of this present invention to provide an improved means for admitting and exhausting steam at both ends of the cylinder by what may be termed a “double” valve—i. e., a valve all the parts of which both reciprocate and oscillate together, and which yet performs the functions of a valve for each end of the cylinder. I do not wish, however, to be understood as claiming such a valve, broadly, as this general idea of a double reciprocating and oscillating valve has been heretofore put in practice.

My present invention consists in the particular construction of the double valve, and in the means which I have combined with it to give it the necessary movements, resulting in a very simple, smooth-working, and efficient engine.

My invention can best be understood by reference to the accompanying drawings, in which I have shown a means for carrying it into effect.

In the drawings, Figure 1 is a perspective view of a steam-engine embodying my invention. Fig. 2 is a longitudinal vertical section of the steam-chest. Fig. 3 is a transverse section of the same. Fig. 4 is a similar section, showing the steam-admission ports.

A indicates the steam-cylinder, and B the steam-chest or valve-casing. The latter is cylindrical internally, and forms a bearing for the double valve, which is reciprocated and oscillated therein through the medium of the

valve-stem D. The valve-stem is actuated by a pitman, H, rock-lever I, eccentric-rod K, and an eccentric (not shown) on the engine-shaft S. The joint *h* permits the oscillation of the valve-stem.

The valve-chamber and the steam-chest are one and the same compartment, which is kept supplied with live steam when the engine is in operation through the opening *b*. Exhaust-ports of the usual character open from the cylinder into the valve-chamber at each end, which are opened and closed in the ordinary manner by the ends of the valve as it reciprocates.

The steam-admission ports are constructed and operated as follows: The valve-casing is provided near each end with one or more openings, *a a*, communicating directly with the interior of the cylinder. These openings are preferably in the form of long and narrow slots running lengthwise of the casing. The valve is provided with corresponding ports, *c c*, in its cup-shaped portions *D' D'*, so arranged with reference to the ports *a a* that, the valve being in the proper position at one end of its reciprocation, its oscillation can either open or close the communication between the cylinder and valve-chamber at that end, and that being at the opposite end of its stroke, communication with the latter end of the cylinder can be similarly opened or closed.

It will be observed that, the valve being at either end of its stroke, the closing of the ports and the cutting off of the steam from the cylinder depend entirely upon the oscillation of the valve, and may be regulated by regulating the oscillation only. In constructions, however, where the steam has been admitted to the cylinder through exhaust-ports opened by the reciprocation of the valve, the admission and cut-off have depended upon the reciprocation of the valve also, making regulation a matter of difficulty and complication. The steam-admission ports of my valve may therefore be said to be in a sense independent of the exhaust-ports. It is manifest, however, that the passages *a'* from the ports *a* might lead into the exhaust-passages, and thence to the cylinder, or that the exhaust-ports where they open into the valve-chamber could consist of a series of longitudinal openings similar to the openings

a. In either case the admission of the steam to the cylinder could be entirely regulated by governing the oscillation of the valve only.

The means for oscillating the valve will now be described. It consists, essentially, of a rod connected with the valve through the medium of a crank-arm secured to the valve-stem or equivalent device, and a bell-crank lever or disk operated from the engine-shaft or otherwise and adapted to reciprocate the rod, and consequently oscillate the valve. The rod may be connected with the valve-stem crank at any convenient point. In the construction which I have illustrated the connection is made inside the valve-chamber; but this is not essential to my invention.

E is a rod or pitman entering the steam-chest through a suitable stuffing-box, *e*, on a line at right angles to the reciprocation of the valve. It engages at its upper end with a crank-pin, *d*, carried by a crank arm or arms, *d'*, extending from the valve-stem D, in such manner that the reciprocation of the rod E causes a simultaneous oscillation of the valve. The crank-pin *d* is of such length that it can slide in the rod E as the valve reciprocates. The upper end of the rod E slides in a guide, *b*³, formed in the wall of the valve-chamber, and the lower end in a frame, *b*⁴, secured to and extending below the chamber. In the lower end of the rod is fitted a slide, *e*², to which is pivoted the horizontal arm F of a bell-crank lever, the other arm, F', of which is connected by an eccentric-rod, G, with an eccentric upon the engine shaft S. This eccentric is regulated by the governor R, which consequently regulates, through the connecting devices just described, the oscillation of the valve and the admission to and cut-off of the steam from the cylinder.

The manner of operation of my valve and of the actuating devices has been sufficiently set forth in the above description of the construction and arrangement of the parts.

I do not in this application claim the valve, as that is in part the subject of my application No. 181,295, filed October 29, 1885.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a double reciprocating and oscillating valve having its two parts provided with ports, whereby it is

adapted to operate at both ends of the cylinder, said parts being connected and oscillating together, of means for reciprocating the same, a bell-crank lever, a rod connecting said lever with the valve to oscillate the latter, and an eccentric-rod for oscillating the lever, substantially as set forth.

2. The combination, with a double reciprocating and oscillating valve having its two parts provided with ports, whereby it is adapted to operate as a valve at both ends of the cylinder, of means for reciprocating the same, a sliding rod at right angles to the valve and engaging therewith to oscillate the same, ways for guiding the rod, and a bell-crank lever for reciprocating the rod, said rod and valve having a sliding engagement which permits the reciprocation of the valve, substantially as set forth.

3. The combination, with a reciprocating and oscillating valve, of a bell-crank lever, a rod connecting said lever positively with the valve to oscillate the same in each direction, and an eccentric-rod for oscillating the lever, substantially as set forth.

4. The combination, with a reciprocating and oscillating valve, of means for reciprocating the same, a sliding rod at right angles to the valve and engaging therewith to oscillate the same, a horizontally-sliding plate, *e*², mounted in the rod, and a bell-crank lever for reciprocating the rod, said lever being pivoted to the plate *e*², substantially as set forth.

5. The bell-crank lever and its rod, in combination with the valve-reciprocating pitman or eccentric-rod, constructed and arranged as shown, for imparting an oscillating and longitudinal movement to the valve, substantially as described.

6. The combination, with the valve, of the steam-chest having ports, as described, and the valve-stem, together with its eccentric-rod, a rod, and a bell-crank lever having one arm connected to said rod and the other to the valve-stem, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

FRANCIS SCHUMANN.

Witnesses:

W. D. HAVEN,
T. BRADEN.