

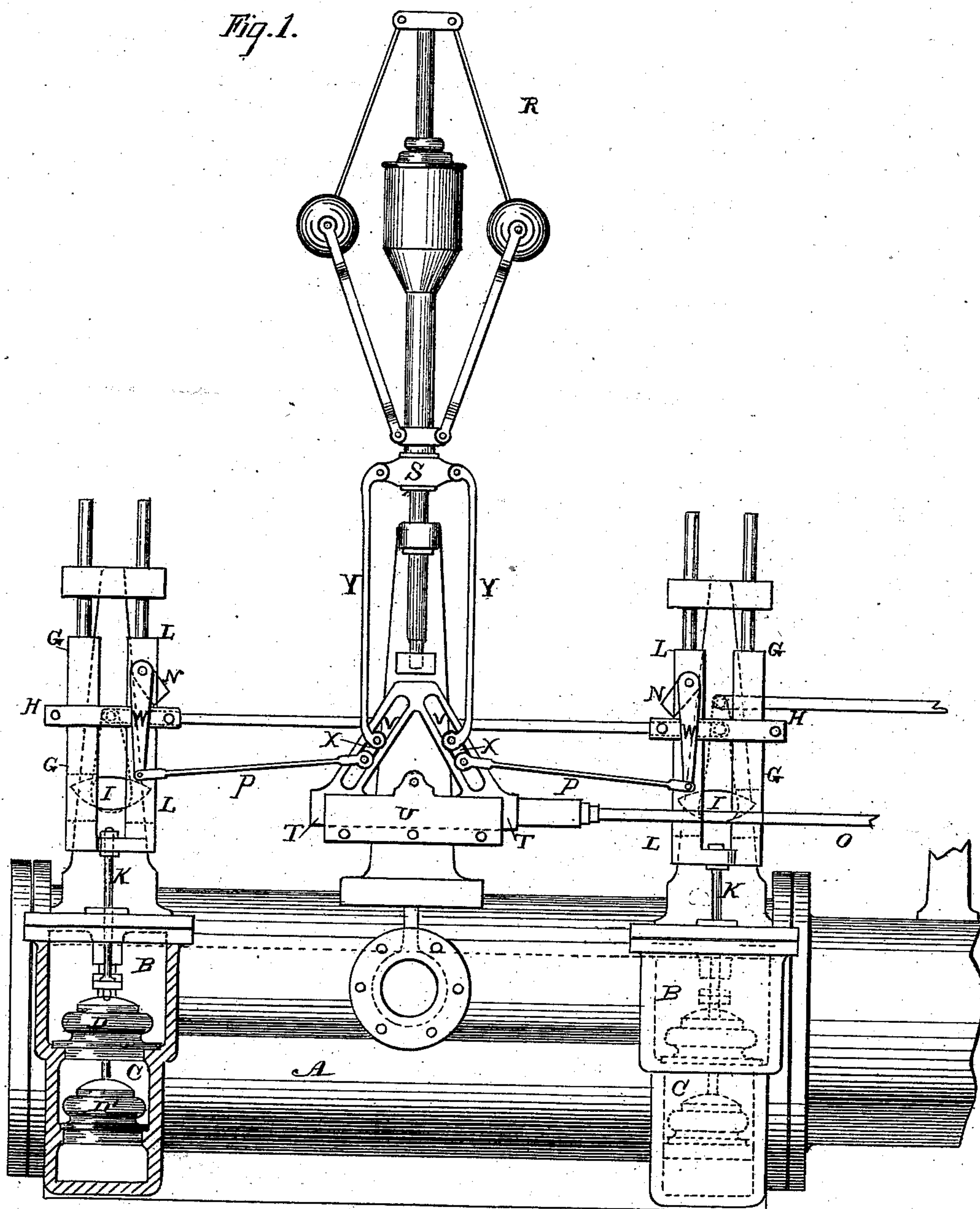
(No Model.)

3 Sheets—Sheet 1.

E. O'NEILL.  
Valve-Motion and Cut-off.

No. 227,918.

Patented May 25, 1880.



Witnesses:

Frank A. Brooks  
Geo. H. Strong.

Inventor

Engine O'Neill  
By Dewey H. Co.  
att'y

(No Model.)

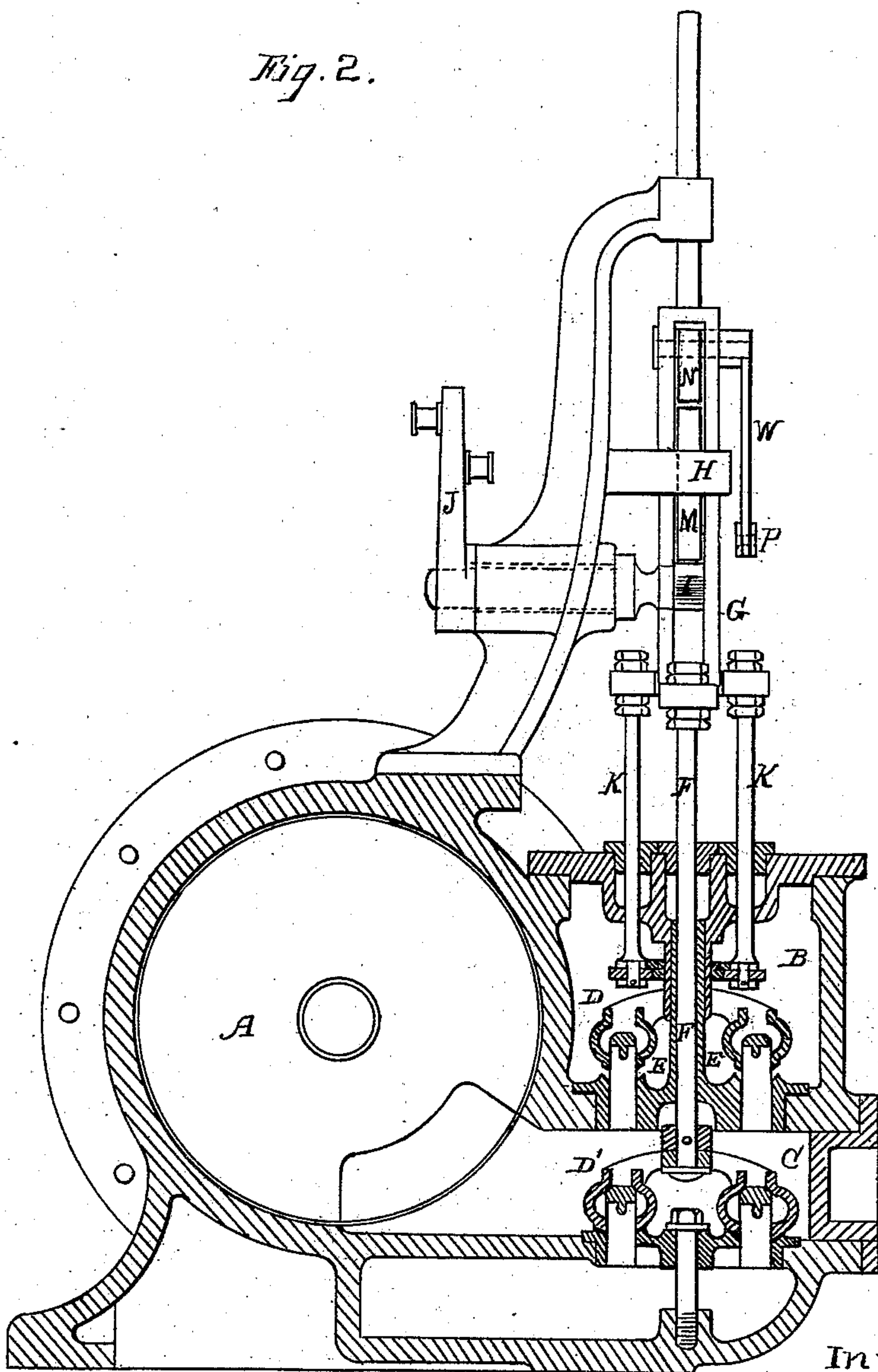
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Fig. 2.



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Fig. 3.

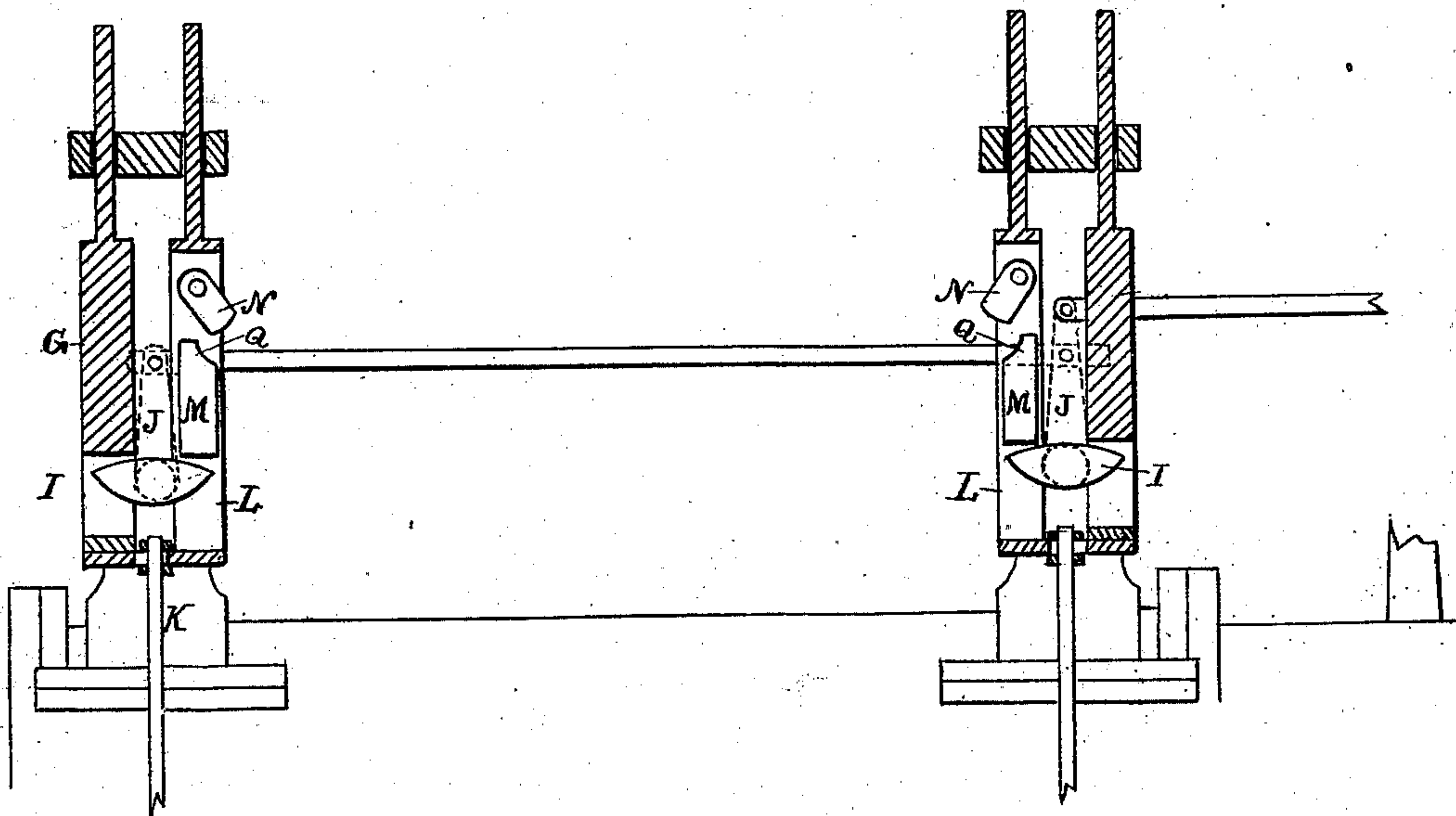
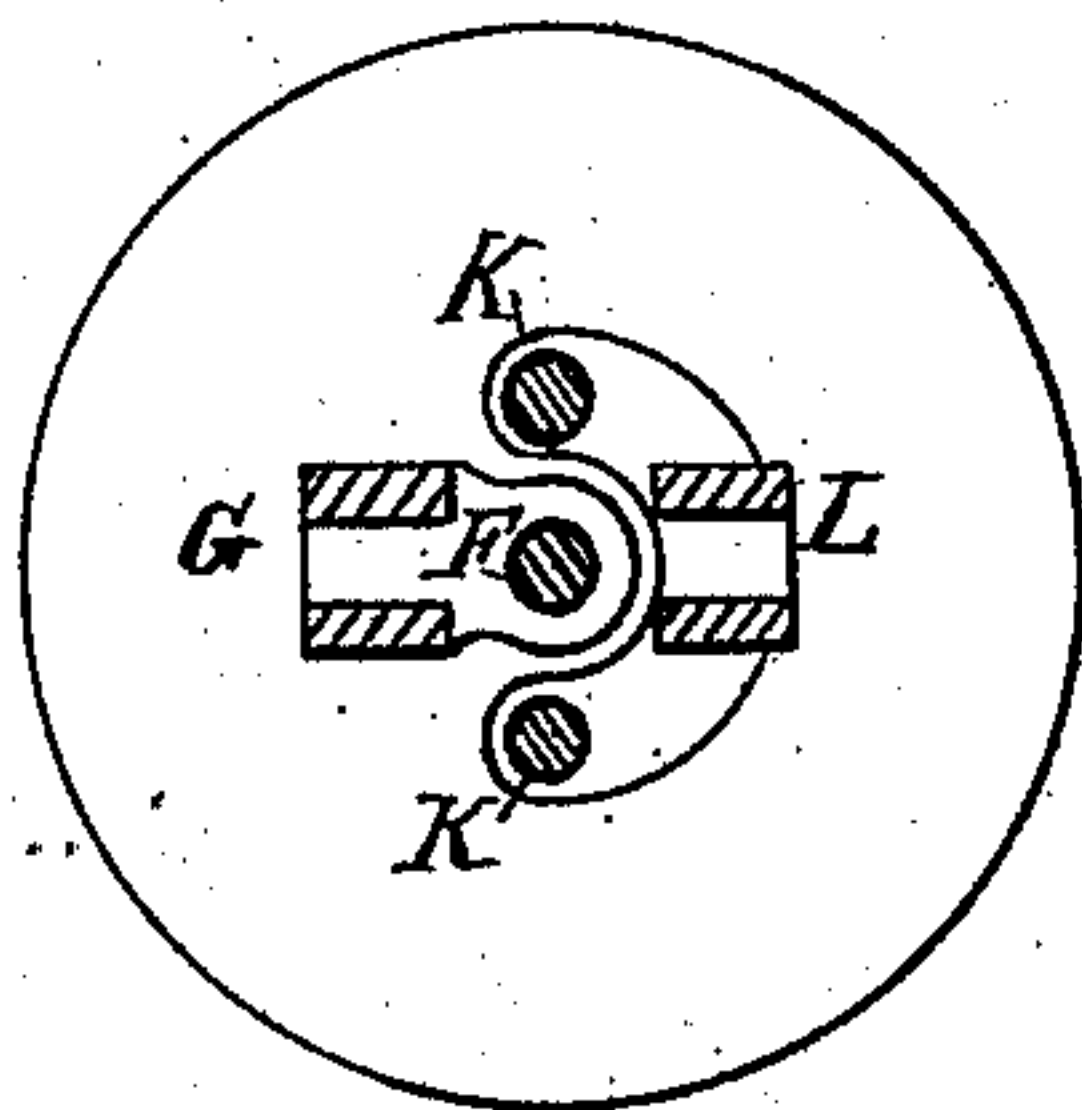


Fig. 4.



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# UNITED STATES PATENT OFFICE.

EUGENE O'NEILL, OF SAN FRANCISCO, CALIFORNIA.

## VALVE-MOTION AND CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 227,918, dated May 25, 1880.

Application filed March 8, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, EUGENE O'NEILL, of the city and county of San Francisco, and State of California, have invented a Valve-Motion and Cut-Off; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a novel mechanism for opening and closing the ingress and egress ports in an engine, and the combination of such mechanism with a governor, so that the movements of the engine will regulate the amount of steam admitted to the cylinder by the direct action of the governor upon the mechanism in a manner which will be more fully described by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my apparatus, showing its application. Fig. 2 is a transverse section through the valves. Fig. 3 is a vertical section through the sliding bars. Fig. 4 is a horizontal section through the same.

In the present case I have shown my invention as applied to a horizontal cylinder engine, A, having a steam-valve chamber, B, and an exhaust-valve chamber, C, at each end, these chambers having suitable passages leading to and from the cylinder for the admission and egress of steam when the valves are opened.

In the present case I have shown my engine as provided with valves of a pattern similar to that for which Letters Patent were issued to me June 12, 1877; but I do not confine myself to any particular form of engine or valve, as my apparatus is applicable to many forms of engine.

The steam-valves D are placed vertically above the exhaust-valves D', the seats being just far enough above the exhaust-valves to leave clearance for the latter to work.

The steam-valve has a central hollow sleeve, E, and the stem F of the exhaust-valve passes up through this sleeve and a stuffing-box in the valve-chamber cover, and is secured to a sliding bar or frame, G, which moves in suitable guides H, and is raised by one end or toe of a rocker arm or cam, I, the shaft of which is oscillated by a crank-arm, J, and a pitman and eccentric from the engine-shaft, as shown.

Two stems, K K, extend upward from the

steam-valve D, one upon each side of the stem F, and these stems have their upper ends secured to a sliding bar or frame, L, the foot of which is curved around the foot of the bar G, so that these two stems K may be secured to it in line with the stem F and upon each side of it.

The bar L is lifted by the toe of the rocker arm or cam I which is opposite to the one which lifts the bar G, so that by this construction the steam and exhaust valves are opened alternately.

The bars G and L are slotted to receive the ends of the lifting-cams I, and the slot in the bar L is continued upward, so as to receive a bar or plate, M, which is placed loosely within the slot. Above this plate is the rocker-arm N, which is secured to a shaft passing through the upper part of the slot in the bar L, and which is caused to oscillate, while the bar rises and falls, by the action of a crank or eccentric upon the main shaft through a pitman, O, and connecting-rods P and crank-arm W. This mechanism causes the arm N to oscillate or rock from side to side, while the plate M is acted upon by the toe of the arm I, and is thus caused to lift the arm N, and with it the bar L, with the connected steam-valve.

The upper end of the plate M has one side cut or beveled off at an angle or curve, as shown at Q, and it will be seen that if the arm N is moved to one side, so as to pass this beveled portion while the plate M is lifting it and the valve, the arm N will slip off, and thus allow the bar L to descend and the steam-valve to close. This may be done at any part of the lift and descent, so that the opening of the steam-valve will be perfectly controlled by determining the point at which the oscillating arm N shall slip off the incline at the upper end of the bar or plate M. This point is determined by a peculiar mechanism which is connected with the governor R. This governor may be of any of the well-known or suitable forms. In the present case I have shown it as a common ball-governor, having a sleeve, S, at the lower part of the spindle, which is caused to slide up and down upon the spindle by the expansion or approach of the governor-balls.



Below the governor is a slide, T, moving in a horizontal guide, U, and having two inclined slots, V, which approach each other at the top, so that with the slide they present the form of a triangle. The slide is connected with the actuating-eccentric by the pitman O, before mentioned, while the connecting-rods P extend from the crank-arms W to blocks X, which are fitted to slide in the slots V. These blocks are also connected with the sleeve S by rods Y, so that when the governor-balls separate the blocks will be drawn up in the slots, and at the same time approach each other. The slide T, which carries the blocks, will be caused to reciprocate regularly by the action of the eccentric upon the engine-shaft, and, through the rods P and cranks W, the arms N will be caused to oscillate. When the governor-balls separate and draw the sliding blocks upward and nearer together the position of these rocker-arms N will be changed, they being turned so that they will release the plate M sooner, and the steam-valves will thus be closed sooner than when the governor runs slowly and the blocks X are near the bottom of the slots, where they are more widely separated.

The steam and exhaust valves are loosely mounted upon the sleeves and stems, respectively, so that they may turn around upon them, and by this means the seats will be prevented from irregular wear.

The operation of my engine will then be as follows: The engine-piston is connected with a crank upon a main shaft, and the governor is caused to rotate by belt or other suitable connection. The oscillating double-toed cam I is moved by an eccentric upon the main shaft, and this alternately lifts the steam and exhaust valves.

The exhaust-valve remains open throughout the entire stroke; but the steam-valve is closed and the steam cut off from the cylinder by the closing of the valve at a point in the stroke which is determined by the speed of the engine and through the action of the governor. The increased speed of the governor spreads the balls, draws the sleeve S and the sliding blocks X upward, and the blocks are caused to approach each other by the inclined slots in which they move. These blocks and the slide T which carries them are caused to reciprocate by the action of a second eccentric or crank from the main shaft. Connecting-rods P extend from these blocks to rocking arms W upon the lifting-bar L, and arms N upon the same shafts are caused to vibrate or rock by this motion.

A plate, M, within each bar L has its lower end adapted to be lifted by the action of the vibrating arm or cam I, while the upper end acts, in combination with the oscillating arm N, to lift the whole of the frame or bar L and the steam-valve which is connected with it. The upper end of this plate is cut or bev-

eled off at one side, so that when the arm N swings far enough to one side it will pass this edge of the plate, and the bar L, with this arm N and the valve, will be allowed to drop. The time of this drop depends upon the position of the blocks X in the slots V. If they are near the bottom it, in effect, lengthens the connecting-rods P, and thus turns the cranks W with their shaft, so that the arms N, in their oscillation, will remain upon the tops of the plates M longer and retain the valve open a longer time.

When the blocks X have been moved up in the slots V by a more rapid movement of the governor the effect will be to shorten the rods P, and by turning the axis of the arm N the arm will be turned so far that in its oscillations it will release the plate M sooner, and the valve will be closed quicker. The admission of steam to the cylinder will thus be exactly regulated by the speed of the engine.

The arrangement of the valves in a vertical line enables me to place large valves very compactly, and reduces the steam-passages between the valve and the cylinder.

It will be seen that the same cut-off mechanism may be equally well applied to slide-valve engines with slight changes in the connection.

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

1. The steam-valve D, having its seat vertically above the seat of the exhaust-valve D', and having the double stem K K upon each side of the exhaust-valve stem F, in combination with the vertically-sliding bars G and L, having their lower ends or feet adapted to receive and hold the valve-stems while they are alternately lifted by suitable mechanism and the valves operated, substantially as herein described.

2. The valves D D', having their seats in a vertical line, with their stems K and F, and the sliding frames G L, as shown, in combination with the oscillating cam lever or lifter I, with its shaft operated from the main engine-shaft to open the valves alternately, substantially as herein described.

3. The bar L, actuated by the cam or lifter I to open the steam-valve, in combination with the loose plate M and the rocking arm N, working in the bar L, whereby the bar is released and the valve allowed to close when the rocking arm passes the edge of the plate, substantially as herein described.

4. The oscillating arms N, vibrating within the bars L, the connecting-rods P, reciprocating block T, pitman O, and the inclined slots V, with the sliding blocks X, in combination with the governor R and the connecting-rods Y, whereby the movement of the governor alters the position of the arm N and regulates the closing of the valve, substantially as herein described.



5. In an engine actuated by air or vapor under pressure, and having a steam and an exhaust valve controlling the corresponding ports at each end of the cylinder, the slide T, with its blocks X, adapted to be moved to or from each other upon the angular lines V, as shown, and connected with the steam-valves by intervening mechanism, so that the closing

of the valves may be regulated, substantially as herein described.

In witness whereof I have hereunto set my hand.

EUGENE O'NEILL.

Witnesses:

GEO. H. STRONG,  
S. H. NOURSE.