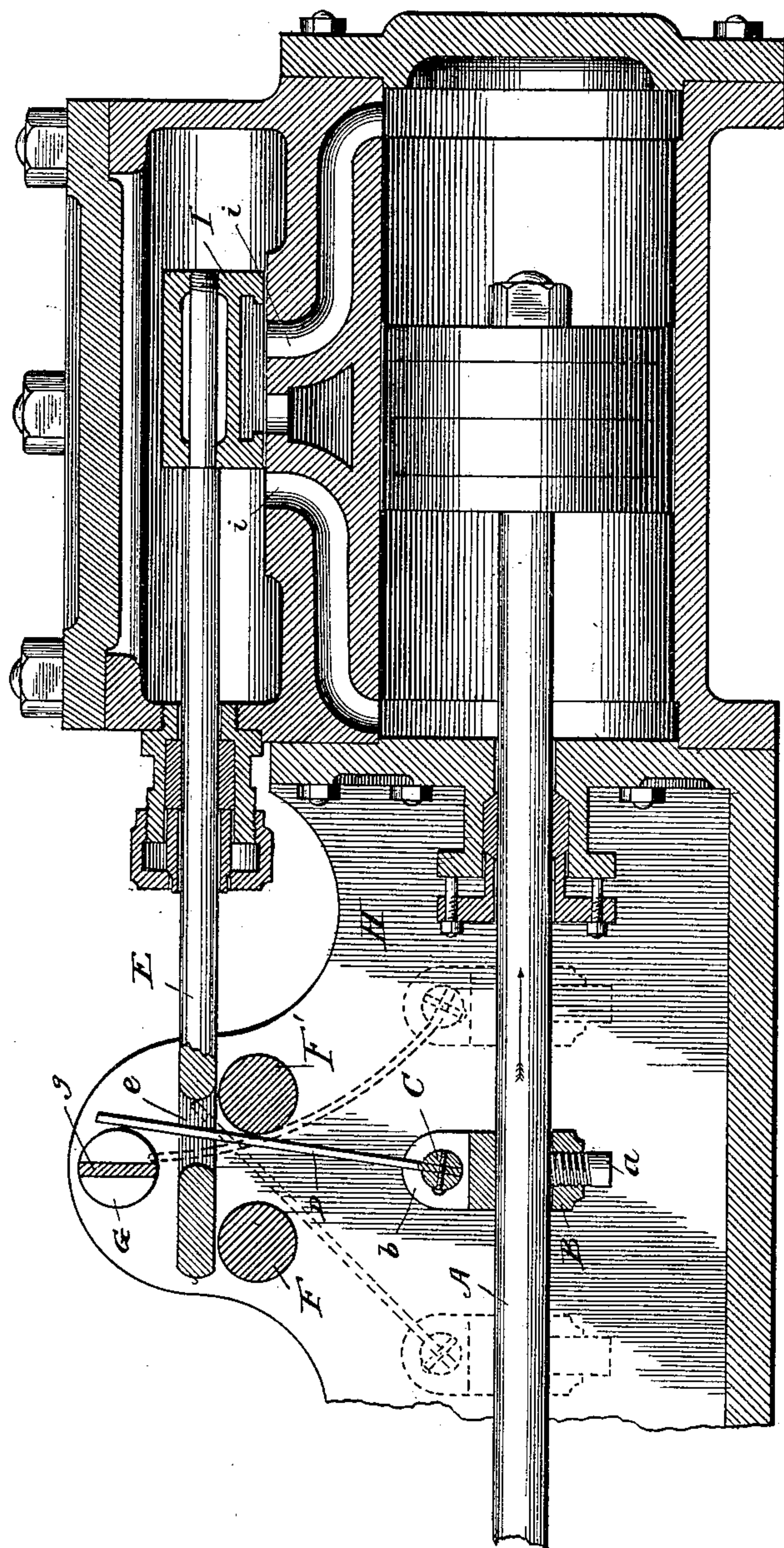


(No Model.)

J. T. ARNOLD.  
VALVE GEAR.

No. 405,939.

Patented June 25, 1889.



Witnesses,  
J. F. Mann,  
T. D. Butler.

Inventor,  
John T. Arnold  
By C. C. Linthicum  
Att'y.



# UNITED STATES PATENT OFFICE.

JOHN T. ARNOLD, OF HYDE PARK, ILLINOIS.

## VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 405,939, dated June 25, 1889.

Application filed October 9, 1888. Serial No. 287,648. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. ARNOLD, a citizen of the United States, residing at Hyde Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valve-Gear, of which the following is a specification.

The object of my invention is to provide effective and simple means whereby to operate the valves of engines; and my invention consists in the devices and combination of devices as hereinafter described, and particularly pointed out in the claims.

The accompanying drawing is a longitudinal sectional view through a cylinder, valve, chest, slide-valve, and guides, of usual construction, the piston, piston-rod, and valve-rod being shown in side elevation and showing my improvements applied.

The piston-rod A carries a head-block B, which is adjustably secured thereto by a set-screw *a*. The upper end of said block is bifurcated, and a wrist-pin C is journaled in the members *b* thereof. One end of a flat spring D is secured to this wrist-pin. Said spring projects upwardly through a slot *e* in the valve-rod E. The end walls of said slot are preferably rounded.

F F' represent stops below and G a stop above the valve-rod. These stops may be secured upon a plate or bracket H, and the stop G is over the center of the space between the stops F F'. Stop G has preferably a thin central rib *g*.

I is an ordinary slide-valve, and *i i* the ports.

As shown in the drawing, the piston is midway of its stroke and the head-block immediately below the stop G, the spring D being idle. As the piston moves toward the back head of the cylinder, the spring will strike the stop F' and its upper end will engage stop G on the side next to the cylinder. As the piston continues its movement, the spring will be bent or flexed, as shown by the dotted curved line, until the upper end slips off or clears the lower edge of rib *g* of stop G, when it will impinge upon the outer end wall of the slot in the valve-rod, and by its reaction force

the rod outward, sliding the valve, closing the front and opening the rear port, and thus admitting steam to the back side of the piston. The steam acting on that side of the piston forces it out until the spring engages the outside of the rib *g*, slips off, strikes the inner wall of the slot, and shifts the valve, when the spring will straighten and assume the position shown by the straight dotted lines of the drawing. In this way the ports are alternately opened and closed by a simple and inexpensive device, and the complicated and expensive valve-gear in general use dispensed with.

Modifications of the construction herein shown and described will readily suggest themselves—as, for example, the valve-rod may carry pins between which the end of the spring may work instead of having the slot, and other means of flexing the spring may be employed.

This device may be adapted to operate other forms of valve than slide-valves.

The stop G may be made vertically adjustable, whereby the length of the stroke may be regulated.

I claim—

1. In valve-gear, the combination, with the piston-rod and valve-rod, of a spring-arm having one end pivotally connected to the piston-rod and its opposite end projected into the path of and engaging the valve-rod and the fixed stops, substantially as described.

2. In valve-gear, the combination, with the piston-rod and valve-rod, of a spring-arm having one end pivotally secured to the piston-rod and the other end projected through a slot in the valve-rod and the fixed stops, substantially as described.

3. In valve-gear, the combination, with the piston-rod having a head-block, a spring-arm pivotally secured thereto and projected through a slotted valve-rod, and the stops F, F', and G, substantially as described.

JOHN T. ARNOLD.

Witnesses:

C. C. LINTHICUM,  
T. D. BUTLER.