



(No Model.)

2 Sheets—Sheet 2.

C. A. GOYNE.  
VALVE OPERATING DEVICE.

No. 347,173.

Patented Aug. 10, 1886.

FIG. 4.

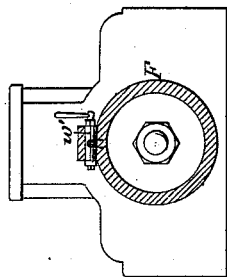


FIG. 3.

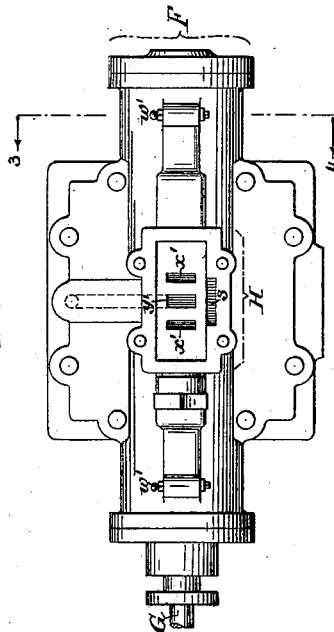
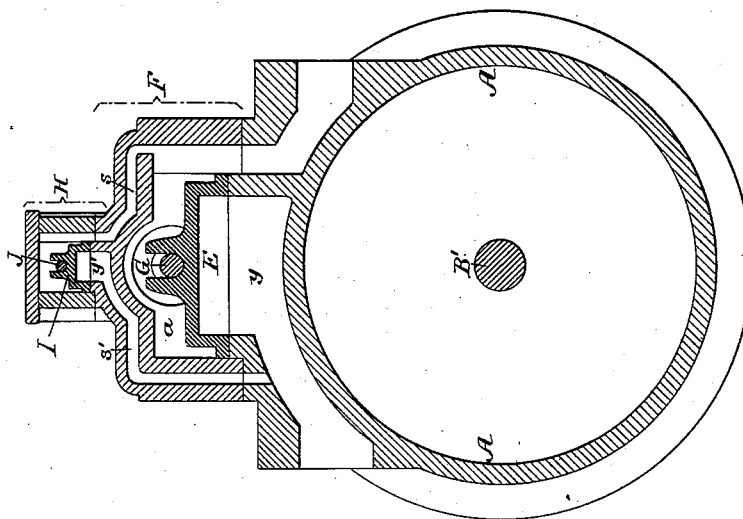


FIG. 2.



Witnesses:  
John E. Parker  
William F. Davis

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by his Attorneys  
Howson and Co.

# UNITED STATES PATENT OFFICE.

CHARLES A. GOYNE, OF ASHLAND, PENNSYLVANIA, ASSIGNOR TO HIMSELF,  
THOMAS R. GOYNE, FRANCIS H. GOYNE, AND ARTHUR H. GOYNE, ALL  
OF SAME PLACE.

## VALVE-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 347,173, dated August 10, 1886.

Application filed April 26, 1886. Serial No. 200,119. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. GOYNE, a citizen of the United States, residing in Ashland, Schuylkill county, Pennsylvania, have  
5 invented certain Improvements in Valve-Operating Devices for Steam-Pumps, of which the following is a specification.

The object of my invention is to so construct the valve-operating mechanism of a  
10 steam-pump as to insure the smooth and easy movement of the valve and prevent the thumping and jarring due to the sudden starting of the piston at either end of the stroke. This object I attain in the manner which I will now  
15 proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of sufficient of a steam-pump to illustrate my invention; Fig. 2, a transverse section of the same  
20 on the line 1 2; Fig. 3, a plan view of the main and supplementary valve chests with the cover-plate of the said supplementary-valve chest removed; and Fig. 4, a transverse section on the line 3 4, Fig. 3.

A represents the steam-cylinder of the pump, and B the piston, the rod B' of which is connected to the plunger D of the pump in the usual manner, the cylinder having the ordinary steam-induction ports, *x*, communicating  
30 with its opposite ends, and a central eduction or exhaust port, *y*, and having the usual D-valve, E, operating in conjunction with these induction and eduction ports in the ordinary manner, so as to direct the steam to and permit it to escape from the ends of the cylinder alternately.

At each end of the central chamber, *a*, in which the valve E works, the valve-chest F has two cylindrical bores, *b* and *d*, of different  
40 diameters, and to these bores are adapted pistons *f* and *g*, secured to or forming part of sleeves which are connected to the main-valve stem G, the pistons *f* being adapted to the inner or smaller bores, *b*, and the pistons *g* to the larger or outer bores, *d*, of the valve-chest.

Above the main-valve chest F is a supplementary-valve chest, H, in which is a slide-valve, I, connected to a supplementary-valve rod, J, and operating in conjunction with induction-ports *x'* and eduction or exhaust port  
50 *y'*, in the same manner as the main valve E

operates in conjunction with the main ports *x* and *y*. The induction-ports *x'* communicate with the spaces between the opposite pistons *f* and *g* of the main-valve stem, and one of said  
55 induction-ports *x'* communicates through a passage, *w*, having a regulating-valve, *w'*, with the front end of the valve-chest beyond the front piston *g*, the other port *x'* communicating through a similarly-valved port, *w*, with  
60 the rear end of the valve-chest beyond the rear piston *f*. The valve-rod G has adjustable collars *m*, for the action of a slide, K, a projecting arm on which is adapted to act upon similar adjustable collars, *n*, of the supplementary-valve rod J, the slide being reciprocated by the piston-rod B' through the medium of a lever, M, hung to a bracket, N,  
65 carried by suitable rods, N', one arm of said lever being slotted for the reception of a pin, *p*, on the piston-rod, and the other arm of the lever being connected by a rod, *p'*, to the slide K.

The operation of the valve is as follows: Supposing that the piston has reached the limit  
75 of its rearward movement, as shown in Fig. 1, the slide K has been moved so as to strike the forward collars, *m* and *n*, of the valve-rods G and J, the effect of which is to move the main valve E so as to close both of the induction-  
80 ports *x x*, and thus cut off the steam from both ends of the cylinder. At the same time the supplementary valve I has been moved so as to open the rear induction-port *x'* to the steam and the forward port *x'* to the exhaust.  
85 The steam consequently enters the space between the rear pistons *f* and *g*, and, owing to the fact that the area of the piston *g* is greater than that of the piston *f*, the tendency of the steam in the first instance is to move the valve  
90 E rearward, or in a direction the reverse of its proper movement, such rearward movement being prevented, however, by the contact of the collar *m* with the slide K. Steam finds its way to the outer face of the piston *g*  
95 through the contracted opening presented by the regulating-valve *w'*, and as soon as the pressure on the outer face of the piston is greater than the pressure of steam acting on the forward face of the same the piston will  
100 be caused to move forward, the movement, however, being a smooth and easy movement,

and the first movement of the piston being correspondingly gradual, for it should be understood that it is impossible for the pistons *f* and *g* to move at a greater speed than is warranted by the position of the regulating-valve *w'*, as the slightest accelerated movement reduces the pressure on the outside of the larger piston, while the pressure between the pistons remains constant. This is a leading feature of my invention, as with the various other kinds of steam-actuated valves with which I am familiar it requires a greater pressure to start than it does to keep them moving, the consequence being that when started the valve moves rapidly, opens the induction-port to its full area, and starts the piston on its return-stroke with a sudden jarring movement. When the piston reaches the forward limit of its movement, the operations above described are repeated in connection with the forward pistons *f* and *g* and the forward induction and regulating ports. By adjusting the collars *m* and *n* on the valve-rods *G* and *J*, the stroke of the piston *B* may be limited to any desired extent.

In the drawings I have shown a passage, *s*, forming a communication between the supplementary-valve chest *H* and the main-valve chest *F*, in order to convey steam to said supplementary-valve chest, another passage, *s'*, forming a communication between the supplementary exhaust-port *y'* and the main exhaust-port *y*; but it will be evident that any desired means may be adopted for conveying the steam to the supplementary-valve chest and for conveying the exhaust away from the same. When it is not desired to vary the speed of movement of the valve *E*, the valves *w'* in the ports *w* may be dispensed with, these ports being of such contracted area as compared with the area of the ports *x'* that the flow of steam to the outer faces of the pistons *g* will be properly restricted; but the use of the regulating-valves is preferred in all cases.

I claim as my invention—

1. The combination of the main valve, opposite pairs of differential pistons connected

to said valve, a valve-chest having differential bores for said pistons, ports or passages whereby a limited piston area is subjected to a constant pressure tending to move the valve in the wrong direction, and contracted passages through the medium of which a large piston area is subjected to pressure tending to move the valve in the right direction, all substantially as specified.

2. The combination of the main valve, opposite pairs of differential pistons connected to said valve, a valve-chest having differential bores for said pistons, ports through which steam may be admitted to or exhausted from the spaces between said differential pistons, a supplementary valve controlling said ports, and contracted passages through which steam can gain access to the outer faces of the larger pistons, all substantially as specified.

3. The combination of the main valve of a steam engine or pump, opposite pairs of differential pistons connected to said valve, a valve-chest having differential bores for said pistons, ports through which steam may be admitted to or exhausted from the spaces between said differential pistons, a supplementary valve controlling said ports, passages through which steam can pass to the outer faces of the larger pistons, and adjustable valves whereby the area of said passages can be controlled, all substantially as specified.

4. The combination of the cylinder, its piston-rod, the main and supplementary valves and their actuating-rods, having adjustable collars, the slide for acting on said collars, and a lever, one arm of which is connected to said slide, the other arm being slotted for connection to the piston-rod or one of its attachments, all substantially as specified.

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

CHAS. A. GOYNE.

Witnesses:

WM. PEDLOW,  
EUSEBIUS MAYER.