

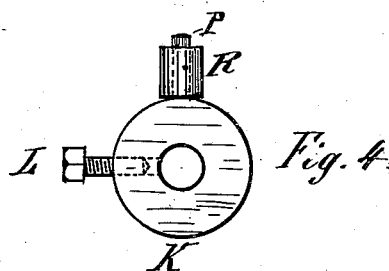
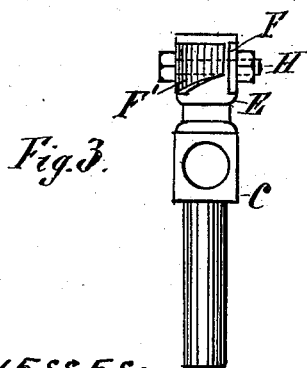
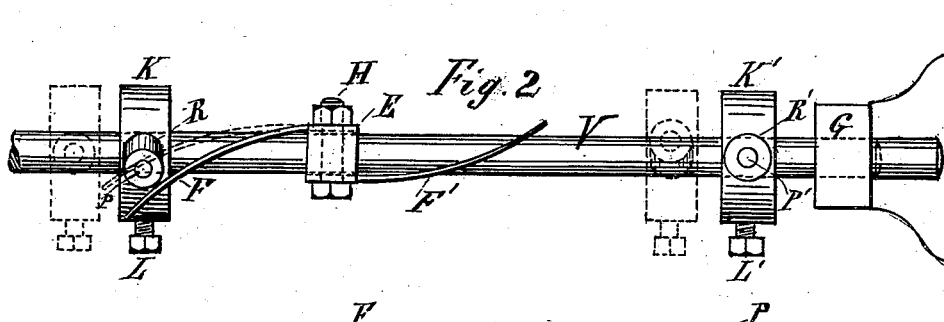
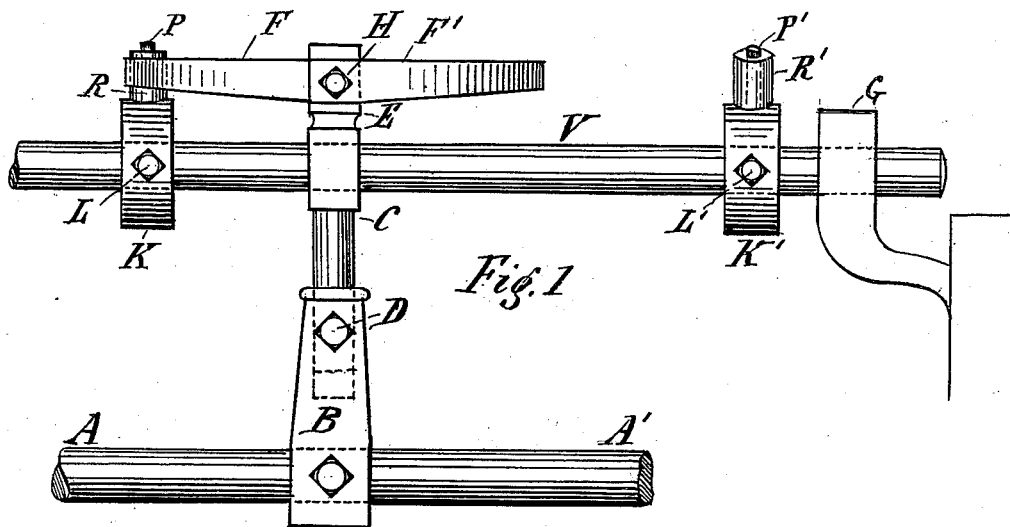
(No Model.)

C. F. RICHARDSON.

VALVE MOVEMENT IN PUMPING ENGINES.

No. 345,731.

Patented July 20, 1886.



WITNESSES:

E. Smith  
E. E. Chapin

INVENTOR:

Chester F. Richardson  
by E. Hoffman,  
Attorney.

# UNITED STATES PATENT OFFICE.

CHESTER F. RICHARDSON, OF MILWAUKEE, WISCONSIN.

## VALVE-MOVEMENT IN PUMPING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 345,731, dated July 20, 1886.

Application filed February 4, 1886. Serial No. 190,800. (No model.)

*To all whom it may concern:*

Be it known that I, CHESTER F. RICHARDSON, a citizen of the United States, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Attachments for Oscillatory Steam-Valve Movements in Pumping-Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention has relation to improvements in attachments for oscillating steam-valve movements in pumping-engines; and it consists in the construction and arrangement of parts, as will be hereinafter described, and particularly pointed out in the claims.

The object of my invention is, first, to provide for a regular positive action of the valve; second, to provide for a perfect cut-off and a steam-opening at the end of the stroke; third, to relieve the valve of the pressure of the steam-cushion at either end of its stroke, thus overcoming the dead-center so objectionable in pumping-engines; fourth, to move the valve to its proper position by means of spring-pressure; fifth, to save power and steam, and, sixth, to provide for an adjustable cut-off by means of my improved valve-rod collars, enabling the lengthening and shortening of the stroke of the piston and plunger at will. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my improved attachments. Fig. 2 is a plan view of Fig. 1. Fig. 3 is an end view of spring head or tip of the tappet-arm. Fig. 4 is an end view of my improved valve-rod collar.

Similar letters refer to similar parts throughout the several views.

In Fig. 1, A and A' represent part of the piston-rod which leads from the broken-off end A to the piston of the steam-cylinder, while A' is supposed to connect with the pump-plunger. Secured thereto is the usual rocker or tappet arm, B, which has a socket at its upper end, wherein the spring-head C is held by the set-screw D. The valve-rod V passes through this spring-head C, whereby a longitudinal and revolving movement is al-

lowed therein. The top E of the spring-head C is square, two sides of which are recessed to receive the springs F and F', as shown in Figs. 1, 2, and 3. They are secured to the head E by bolt H, standing in opposite direction, curved inward, as shown in Fig. 2.

The valve-rod V, which is held in position at its end by the usual guide-block, G, extending from the pump-chamber, and at the other end connecting with the oscillating valve by the usual gland and stuffing-box of the steam-chest, is provided with the two adjustable collars K and K', which are exactly alike in construction, but differ in their respective position in which they are held by the set-screws L and L'. The faces of said collars K and K' are provided with anti-friction rollers R and R', revolving on pins P and P', respectively, as shown in Figs. 1, 2, and 4.

Fig. 2 shows the spring-head C with its springs F and F' at the end of the stroke of the piston in the act of throwing the valve in its proper position. This is accomplished by the pressure of spring F against roller R of collar K, which will bring the collars in the position indicated by dotted lines in Fig. 2, and revolve the valve to its proper position. The steam will immediately be cut off, exhausted, and admitted to press against the other side of the piston, causing the stroke to reverse, moving the piston-rod A A', with the tappet-arm B and spring-head C, in the direction of the end A' until the spring F' comes in contact with the roller R' of collar K', (shown in dotted lines in Fig. 2,) causing the valve-rod to move to its original position, as shown in full lines in Fig. 2. The same effect will be caused as in the movement afore described, and a regular reciprocating oscillating movement of the valve is thus attained.

I am aware that a similar movement is obtained by other methods; but the results are imperfect.

What I claim as my original invention, and desire to secure by Letters Patent of the United States, is—

1. In a pumping-engine, the combination, with the head C E, adjustable in the tappet-arm B, the valve-rod V, having adjustable

collars and anti-friction rollers, of the springs F F', as shown and described, and for the purpose set forth.

2. The combination, with the spring-head  
5 C, of the springs F F', working in connection with the valve-rod collars K K', said collars provided with anti-friction rollers, substantially as and for the purpose set forth.

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

CHESTER F. RICHARDSON.

Witnesses:

E. E. CHAPIN,

WM. McDONALD.