

(No Model.)

2 Sheets—Sheet 1.

E. H. CARROLL.  
PISTON ROD SUPPORT.

No. 587,360.

Patented Aug. 3, 1897.

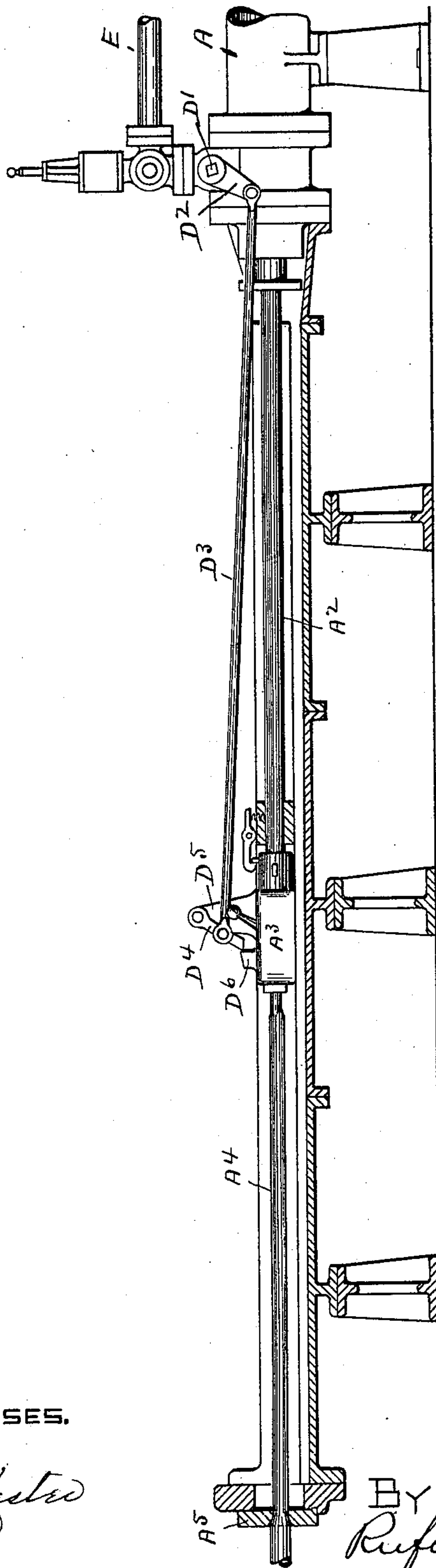


FIG. 1.

WITNESSES.  
*A. Whiting*  
*Lena Kester*

INVENTOR.  
Elliott H. Carroll  
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*Rufus B. Fowler*

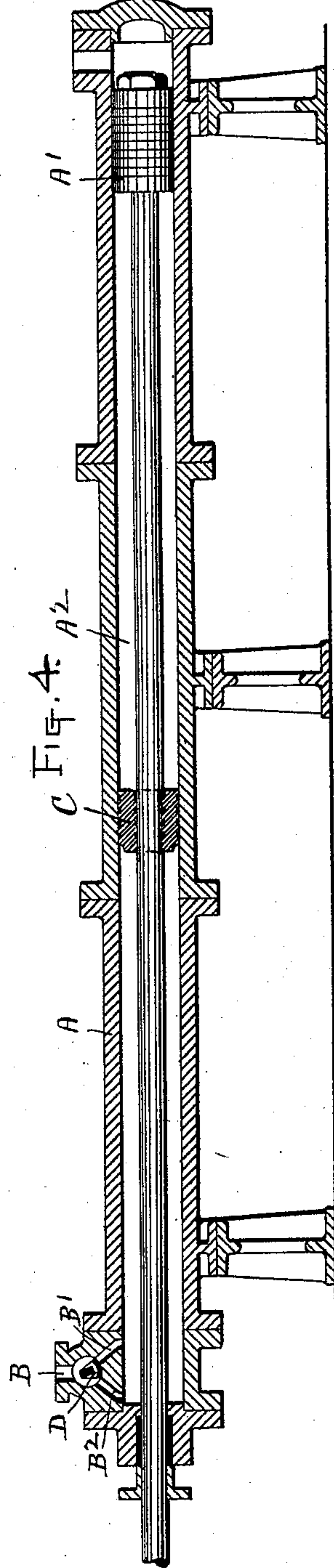
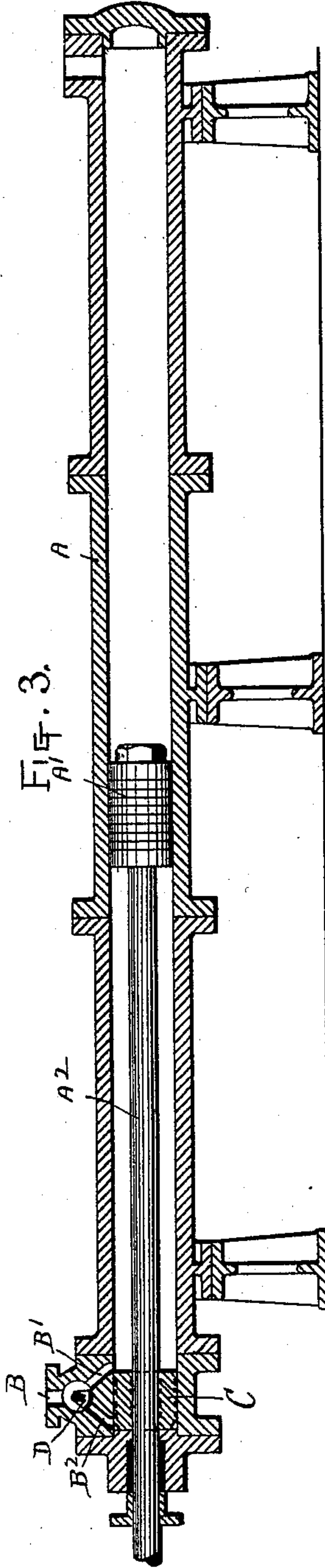
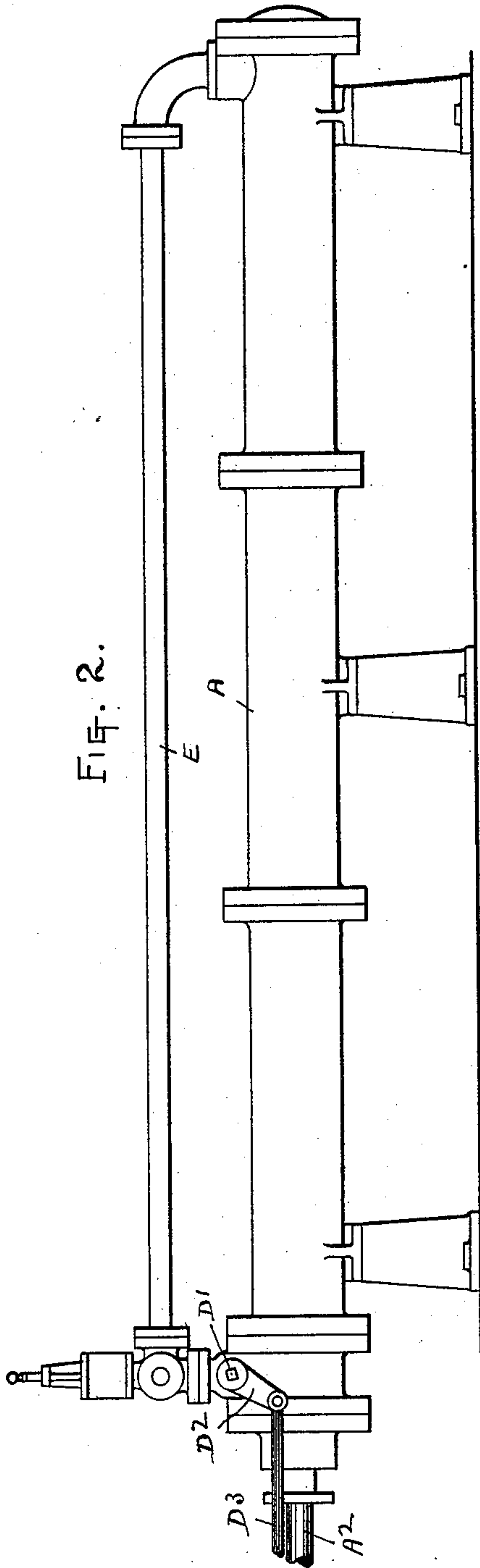
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2 Sheets—Sheet 2.

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No. 587,360.

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WITNESSES.

*Geo. Whiting.*  
*Lena Foster.*

INVENTOR.

*Edbert H. Carroll*

BY HIS ATTORNEY  
*Rufus B. Fowler.*



# UNITED STATES PATENT OFFICE.

ELBERT H. CARROLL, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE MORGAN CONSTRUCTION COMPANY, OF SAME PLACE.

## PISTON-ROD SUPPORT.

SPECIFICATION forming part of Letters Patent No. 587,360, dated August 3, 1897.

Application filed August 3, 1896. Serial No. 601,522. (No model.)

*To all whom it may concern:*

Be it known that I, ELBERT H. CARROLL, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Piston-Rod Supports, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a side elevation of a hydraulic cylinder containing a reciprocating piston and piston-rod provided with my improved piston-rod support. Fig. 2 is a side elevation of a portion of the hydraulic cylinder and showing the mechanism for operating the three-way valve for controlling the water-pressure upon the piston-rod support. Fig. 3 is a central sectional view of the cylinder, showing the piston-rod in full with the piston-rod support at one end of the cylinder; and Fig. 4 is a central sectional view of the cylinder, showing the piston and piston-rod in full with the piston-rod support moved to the center of the cylinder.

Similar letters refer to similar parts in the different figures.

The object of my present invention is to provide a support within a hydraulic or other cylinder for a reciprocating piston-rod in order to increase the rigidity of a slender piston-rod moving within a cylinder of considerable length; and it consists in providing a supplementary piston fitting the interior of the cylinder and capable of sliding upon the piston-rod, in providing a valve by which pressure is transferred from one side to the other of the supplementary piston for the purpose of moving the same along the piston-rod, and also in providing means for actuating said valve and controlling the movement of the supplementary piston as determined by the movement of the piston-rod.

In the accompanying drawings I have represented my invention as applied to the reciprocating piston-rod of a wire-drawing table as representative of the piston-rod requiring a stroke of considerable length. My invention is, however, applicable to any long-stroke piston-rod.

Referring to the drawings, A denotes a hy-

draulic cylinder containing a reciprocating piston A', having a piston-rod A<sup>2</sup>. The outer end of the piston-rod carries a cross-head A<sup>3</sup>, which in the present instance is provided with gripping-jaws for seizing the end of the wire A<sup>4</sup> and drawing it through a die A<sup>5</sup> as the piston is moved back within the cylinder.

The cylinder A is provided with suitable passages for the admission of water under pressure, that for admitting water in front of the piston consisting of the waterway B, which is divided as it enters the cylinder into the two branches B' and B<sup>2</sup>, which enter the interior of the cylinder at sufficient distance apart to receive between them a supplementary piston C, fitting the interior of the cylinder and capable of sliding upon the piston-rod. When water is admitted to the cylinder through the waterway B, it is controlled in its passage through the branch waterways B' and B<sup>2</sup> by means of a segmental valve D, carried by a rocking spindle D', to the outer end of which I attach an arm D<sup>2</sup>, which is connected by a link D<sup>3</sup> with a lever D<sup>4</sup>, pivoted at one end upon a fixed bracket D<sup>5</sup> and having its opposite end interposed in the path of a lug D<sup>6</sup>, carried by the cross-head A<sup>3</sup>. When the cross-head is at the forward end of its stroke, the supplementary piston C is at the forward end of the cylinder in the position represented in Fig. 3 and with the piston A' next the supplementary piston C. The end of the wire is then seized and the valve D rocked to close the passage B<sup>2</sup>, so that water under pressure will be admitted through the waterway B and branch B' between the supplementary piston C and the piston A'.

As the piston A' is moved back along the cylinder the lug D<sup>6</sup> upon the cross-head is brought into contact with the lever D<sup>4</sup> at a point midway the stroke of the piston A', so the movement of the cross-head as it passes the center of its stroke will rock the valve D from the position shown in Fig. 3 to that represented in Fig. 4, thereby closing the passage B' and opening the passage B<sup>2</sup> to admit water in front of the supplementary piston C, causing the supplementary piston C to be moved along the cylinder and continuing the movement of the piston A' by means of the body



of water interposed between the piston A' and the supplementary piston C until the stroke of the piston is completed, carrying the piston A' to the rear end of the cylinder and leaving the supplementary piston C midway the cylinder and supporting the piston-rod.

The motion of the piston A' is reversed by admitting water to the rear end of the cylinder through the pipe E, the waterways B<sup>2</sup> and B becoming an exhaust-port until the supplementary piston is returned to the position shown in Fig. 3 and the piston A' is moved to the middle of its stroke, when the lug D<sup>6</sup> upon the cross-head will reverse the valve D, closing the passage B<sup>2</sup> and opening the passage B' to allow water between the piston A' and the supplementary piston C to pass out of the cylinder and the piston A' to complete its stroke.

I do not confine myself to the mechanism shown for operating the valve D at the center of the stroke of the piston A', and the embodiment of my invention, so far as it relates to the employment of a supplementary piston for supporting the piston-rod, is not confined to the use of water or steam pressure to move the supplementary piston, substantially as described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a reciprocating piston and a cylinder for employing a fluid under pressure of a supplementary piston fitting said cylinder and said piston-rod and capable of sliding in said cylinder and along said piston-rod and a valve mechanism whereby a fluid under pressure can be applied al-

ternately to opposite sides of said supplementary piston, substantially as described.

2. The combination with a cylinder for employing a fluid under pressure, a reciprocating piston inclosed in said cylinder and a piston-rod attached to said piston of a supplementary piston inclosing said piston-rod and capable of sliding thereon, passages for the admission of a fluid under pressure to both sides of said supplementary piston and means for alternately opening and closing said passages whereby said supplementary piston is moved in said cylinder, substantially as described.

3. The combination with a cylinder A, piston A', and piston-rod A<sup>2</sup> of a supplementary piston as C, capable of sliding in said cylinder and on said piston-rod, said cylinder having a passage B provided with the branch passages B' and B<sup>2</sup>, and a valve as D arranged to alternately open and close said passages, substantially as described.

4. The combination with a cylinder for employing a fluid under pressure, and a reciprocating piston having a piston-rod moving in said cylinder, of a piston capable of sliding in said cylinder and on said piston-rod, and means operatively connected with said reciprocating piston-rod for controlling the admission of a fluid under pressure to said cylinder and alternately upon opposite sides of said piston, substantially as described.

Dated this 27th day of July, 1896.

ELBERT H. CARROLL.

Witnesses:

RUFUS B. FOWLER,  
LENA KESTER.