

No. 699,081.

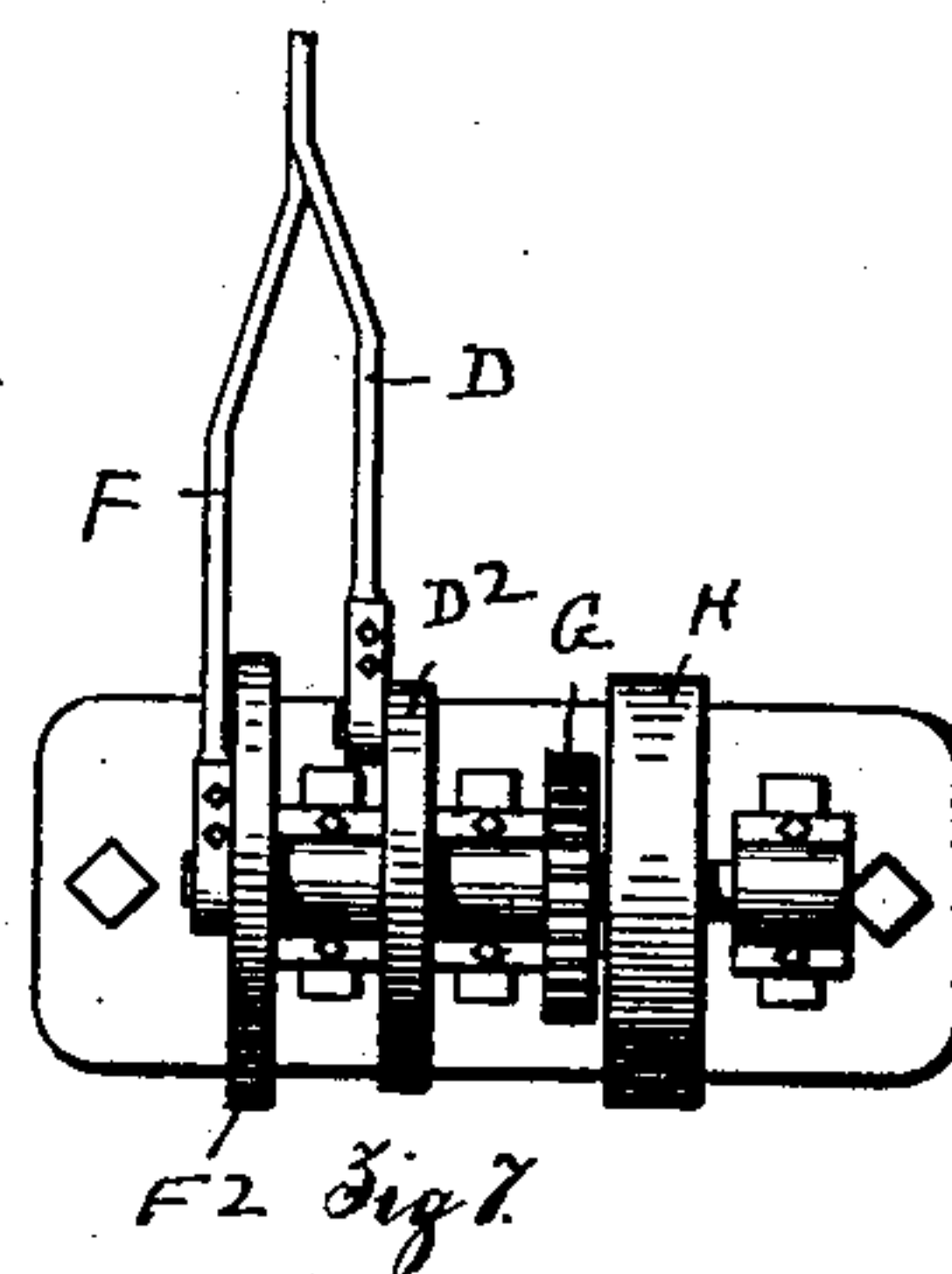
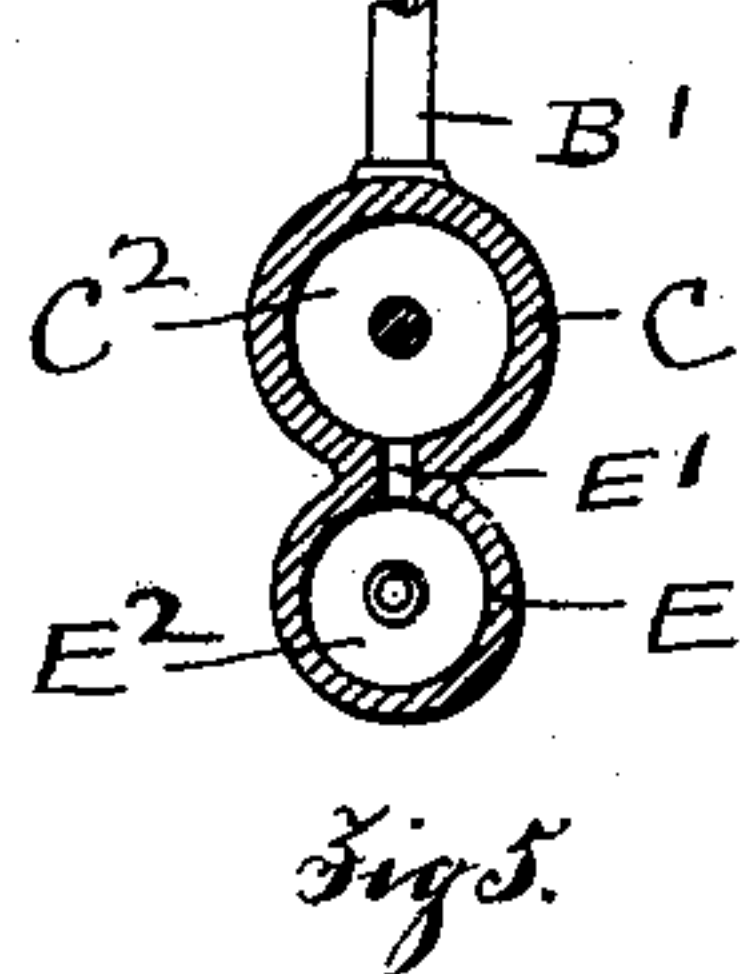
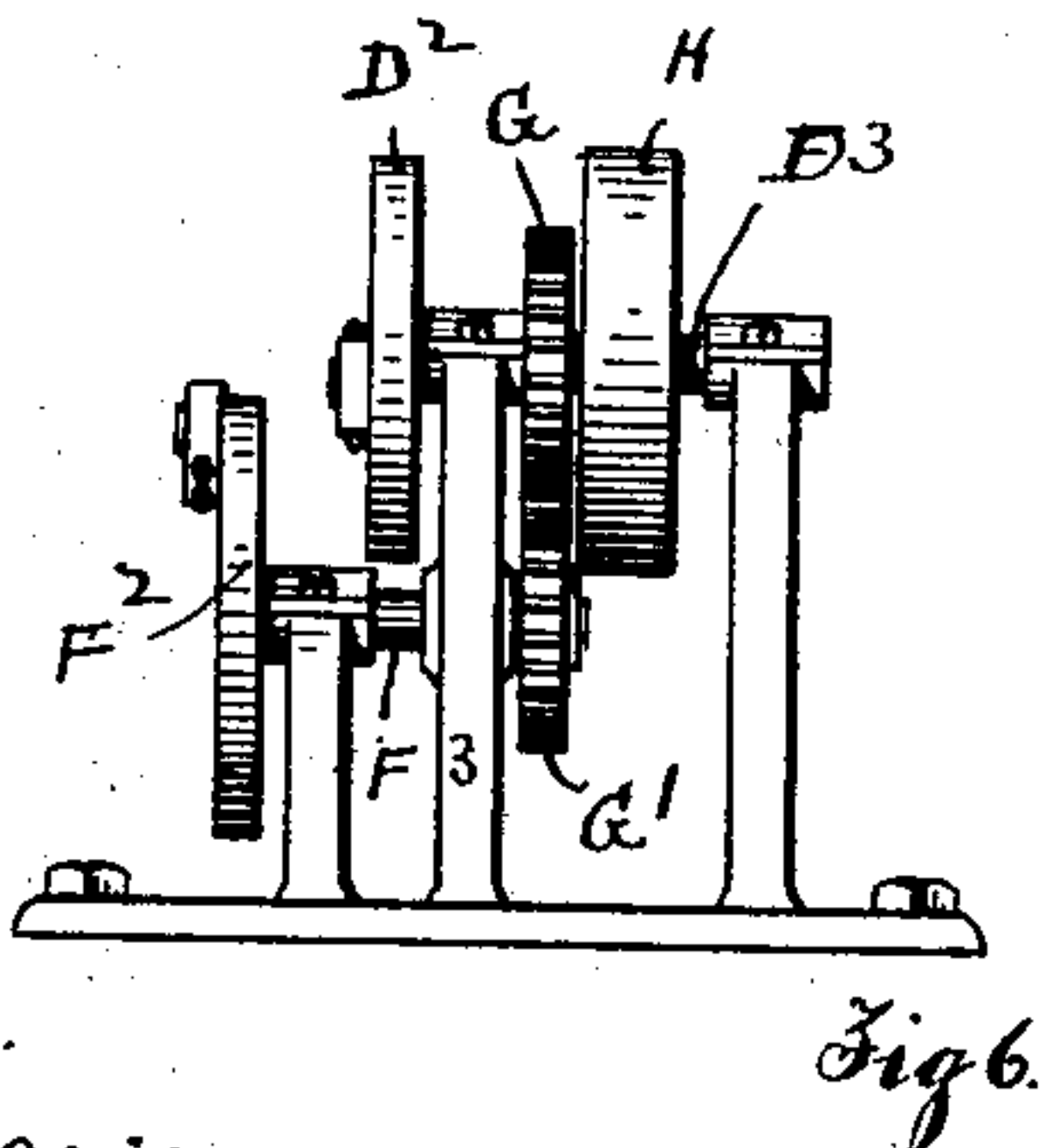
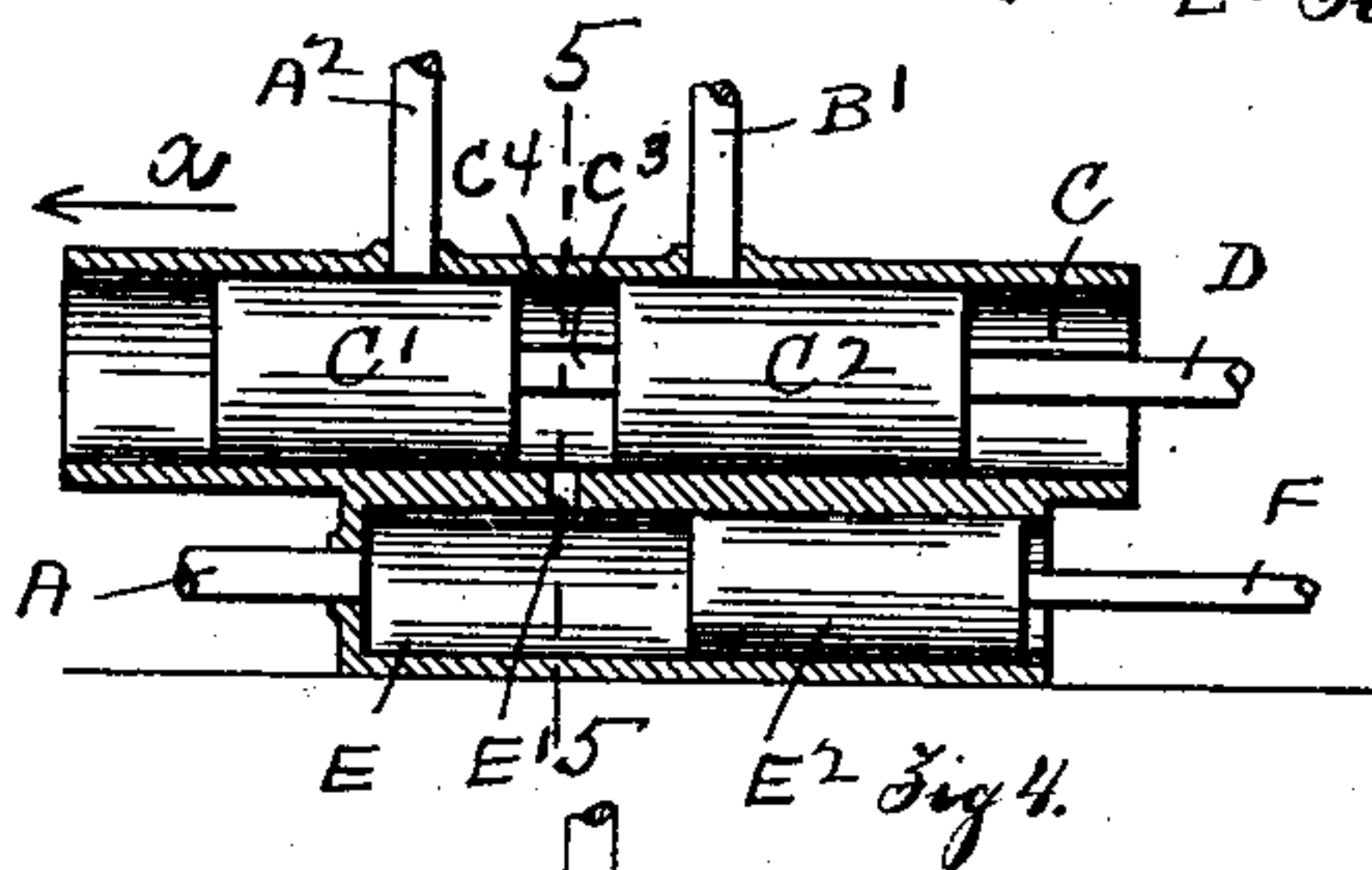
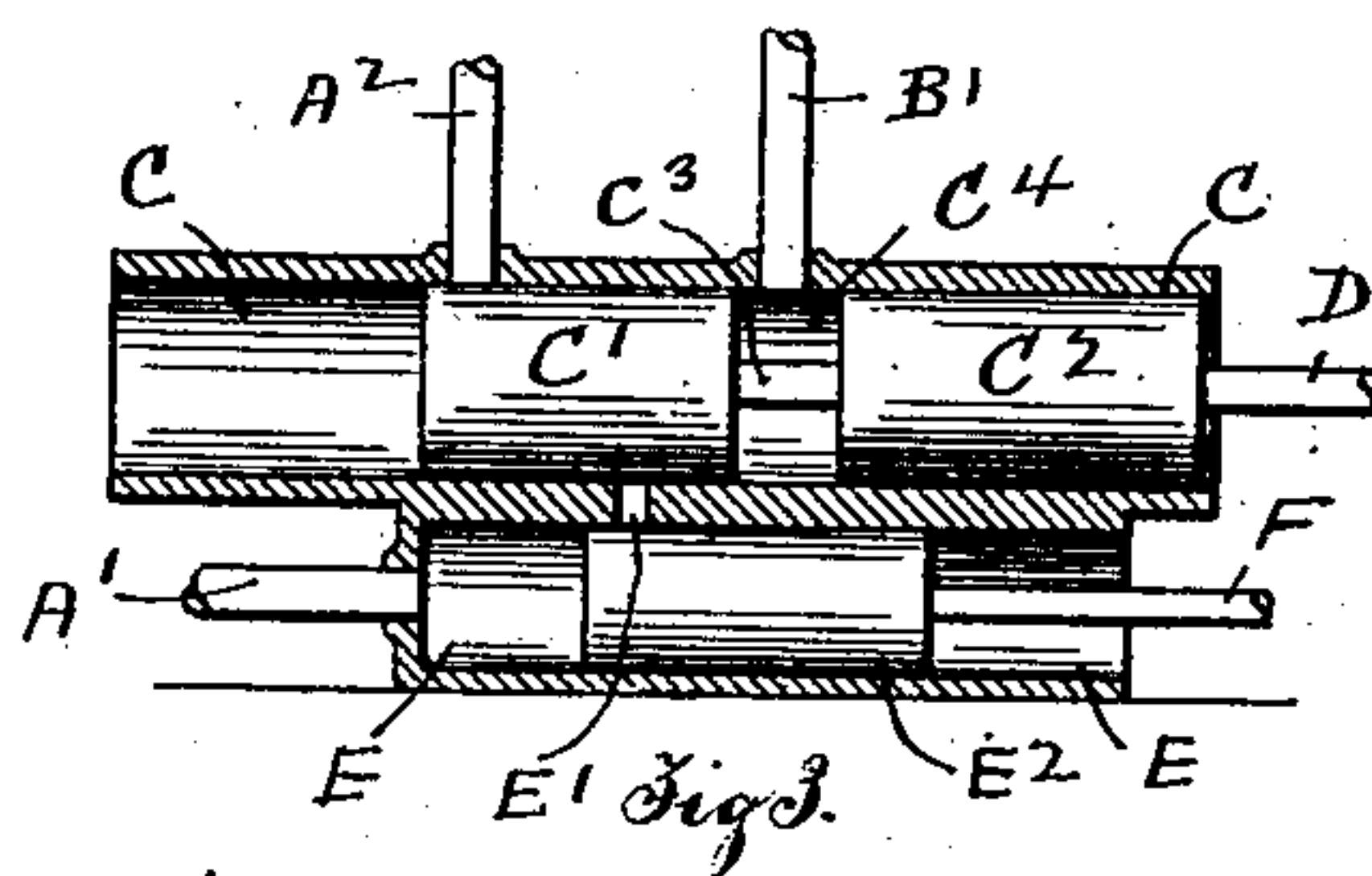
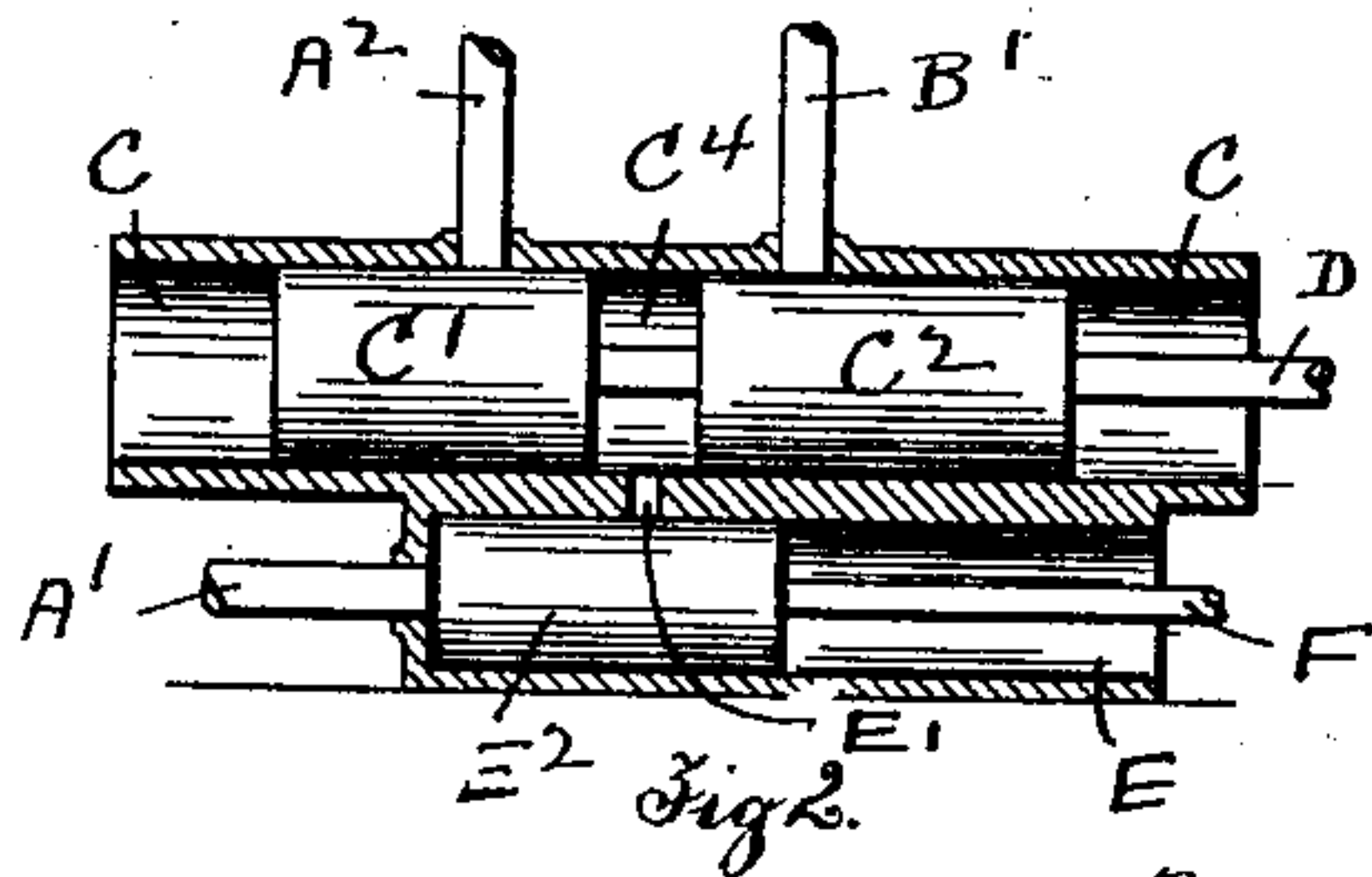
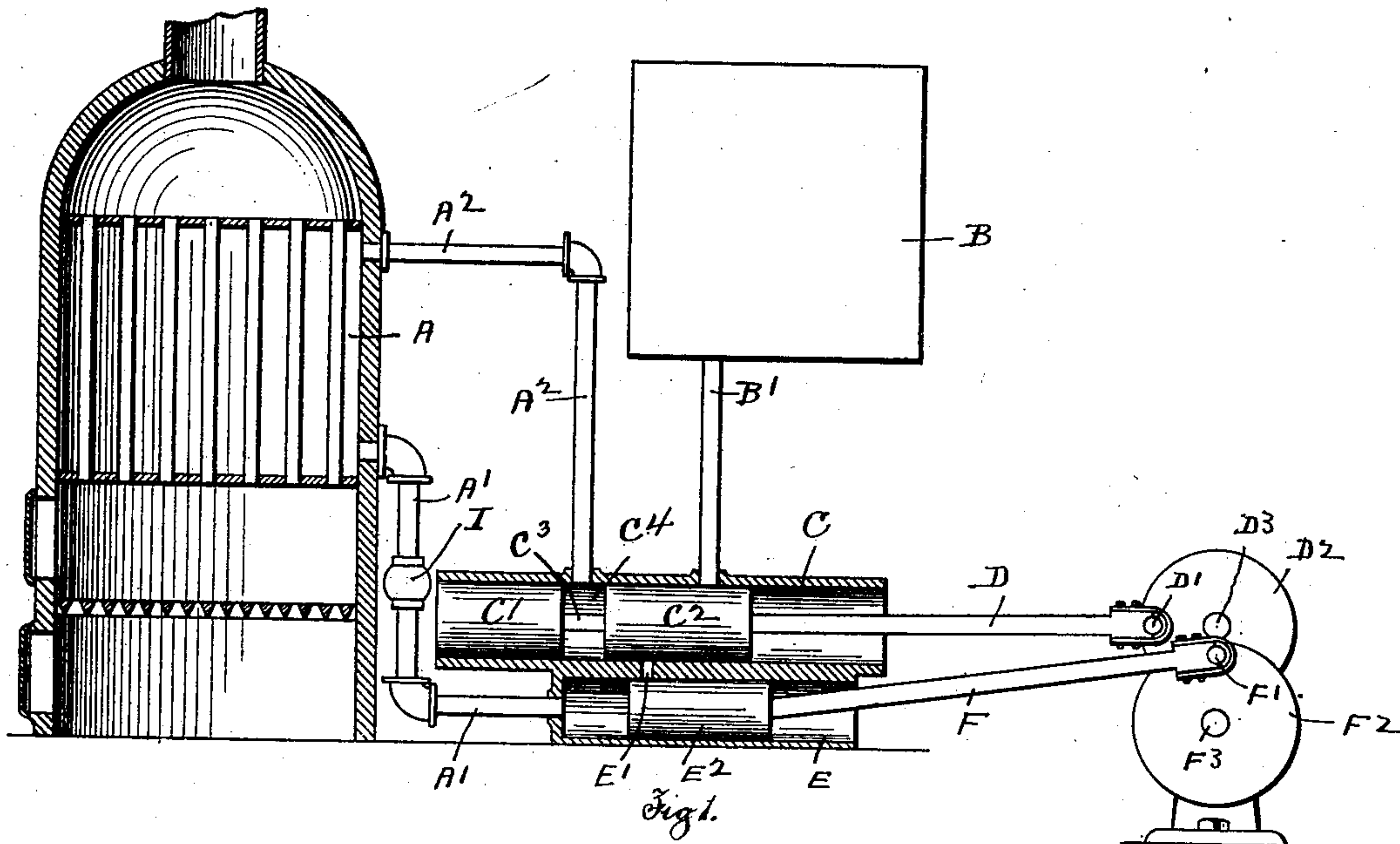
Patented Apr. 29, 1902.

C. CROMPTON.

PUMPING MECHANISM FOR FEEDING WATER TO STEAM BOILERS.

(Application filed July 11, 1900. Renewed Apr. 7, 1902.)

(No Model.)



Witnesses:

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Inventor:

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# UNITED STATES PATENT OFFICE.

CHARLES CROMPTON, OF WORCESTER, MASSACHUSETTS.

PUMPING MECHANISM FOR FEEDING WATER TO STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 699,081, dated April 29, 1902.

Application filed July 11, 1900. Renewed April 7, 1902. Serial No. 101,613. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES CROMPTON, a citizen of the United States, and a resident of Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Pumping Mechanism for Feeding Water to Steam-Boilers, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1 represents a steam-boiler with my improved pumping mechanism, with the boiler and pumping-cylinders shown in vertical central sectional view. Figs. 2, 3, and 4 represent the pumping-cylinders shown in central sectional view, with their pistons in different positions. Fig. 5 is a transverse sectional view on line 5 5, Fig. 4. Figs. 6 and 7 are respectively end and top views of the mechanism for actuating the reciprocating pistons.

Similar reference-letters refer to similar parts in the different views.

The object of my invention is to provide a water-feeding device for steam-boilers which shall be automatic in its action and capable of maintaining the water in the boiler at a uniform level; and it consists in the construction and arrangement of parts, as hereinafter described, and set forth in the annexed claims.

Referring to the drawings, A denotes a boiler, shown in vertical central sectional view, A' a feed-pipe by which water is fed to the boiler, and A<sup>2</sup> a pipe entering the boiler at the desired water-line.

B is a water-tank sufficiently elevated to cause the water to flow through the pipe B' to the pumping-cylinders; but instead of the tank B the pipe B' may connect with any source of water-supply under pressure. The pipes A<sup>2</sup> and B' communicate with a cylinder C, containing two reciprocating pistons C' and C<sup>2</sup>, connected together by a common piston-rod C<sup>3</sup>, with a space C<sup>4</sup> inclosed between the pistons, forming a water-receptacle. The piston C<sup>2</sup> is connected by a connecting-rod D with a crank-pin D', carried upon a crank-plate D<sup>2</sup>, mounted upon a rotating shaft D<sup>3</sup>. Immediately below the cylinder C is a cylinder E, communicating with the cylinder C by an opening E' and containing a reciprocating piston E<sup>2</sup>, connected by a connecting-rod F

with a crank-pin F' on a crank-plate F<sup>2</sup>, carried by a rotating shaft F<sup>3</sup>. The shafts D<sup>3</sup> and F<sup>3</sup> are geared together by gears G G', so the reciprocating pistons in the cylinders C and E will move in unison, and rotary motion is imparted to the shaft F by means of a belt-pulley H or in any other suitable manner. The pipes A<sup>2</sup> and B' communicate with the cylinder C and are so arranged that when the pistons C' and C<sup>2</sup> are at one end of their stroke, as represented in Fig. 1, the pipe A<sup>2</sup> will communicate with the space C<sup>4</sup> between the pistons and the pipe B', and the opening E' will be closed by the cylinder C<sup>2</sup>, and the reciprocating piston in the cylinders C and E are so arranged that when the pistons C' and C<sup>2</sup> are at either end of their stroke the piston E<sup>2</sup> will be at the middle of its stroke, as represented in Figs. 1 and 3. When the pistons are in the position shown in Fig. 1, if the water in the boiler is above the pipe A<sup>2</sup>, where it enters the boiler, water will flow through the pipe A<sup>2</sup> and fill the space C<sup>4</sup>; but if the water in the boiler is below the pipe A<sup>2</sup>, then steam will flow through the pipe A<sup>2</sup> into the space C<sup>4</sup>. As the crank-plates D<sup>2</sup> and F<sup>2</sup> rotate the pistons C' and C<sup>2</sup> are moved from the positions shown in Fig. 1 through the positions shown in Fig. 2 to the positions shown in Fig. 3, bringing the pistons C' and C<sup>2</sup> at the opposite end of their stroke and the piston E<sup>2</sup> at the center of its stroke and bringing the space C<sup>4</sup> between the pistons C' and C<sup>2</sup> beneath the pipe B', which leads to the water-tank B. If the space C<sup>4</sup> be already filled with water through the pipe A<sup>2</sup>, no water will flow from the tank B; but if steam only has been admitted to the space C<sup>4</sup> it will become condensed, and the space C<sup>4</sup> will be filled with water from the tank B. When the pistons C' and C<sup>2</sup> reach the middle of their stroke on their return movement or in the position shown in Fig. 4, the space C<sup>4</sup> will be brought opposite the opening E', and the piston E<sup>2</sup> will have moved to the end of its stroke, thereby uncovering the opening E' and allowing the water contained in the space C<sup>4</sup> to flow by gravity into the cylinder E.

The continued movement of the pistons C' and C<sup>2</sup> in the direction of the arrow a, Fig. 4, will carry the piston C<sup>2</sup> over the opening E', closing the same and causing the water in the



cylinder E to be forced by the movement of the piston E<sup>2</sup> through the pipe A' into the boiler, and its return is prevented by a check-valve I of the ordinary construction inserted in the pipe A'. At each reciprocating movement of the piston E<sup>2</sup> the charge of water received in the space C<sup>4</sup> between the pistons C' and C<sup>2</sup> will be forced into the boiler. When the boiler is filled above the entrance of the pipe A<sup>2</sup>, then the water forced into the boiler by the piston E<sup>2</sup> will be received from the boiler itself through the pipe A<sup>2</sup>; but in case the water-line falls below the pipe A<sup>2</sup>, then water will again be received from the tank B and forced into the boiler until the water rises in the boiler high enough to cover the pipe A<sup>2</sup>, when water will again flow through the pipe A<sup>2</sup> into the space C<sup>4</sup>, thereby shutting off the supply from the tank B.

I do not confine myself to the specific mechanism shown to actuate the reciprocating pistons C', C<sup>2</sup>, and E<sup>2</sup>, nor do I confine myself to the precise construction and arrangement of the cylinders C and E with reciprocating pistons. The essential elements of my invention consist of a mechanism for forcing water into the boiler against the boiler-pressure, a water-space from which water is fed to the water-forcing apparatus, a communication between said water-space and the boiler at the water-line, and a communication between said water-space and a source of water-supply, whereby said water-space receives either water or steam from the boiler, and means for alternately opening said communications to the boiler and the water-supply. In the mechanism shown the cylinder E and piston E<sup>2</sup> form a pump by which the feed-water is forced into the boiler, and the cylinder C and pistons C' and C<sup>2</sup> act as valves which control the water-supply to the pump; but the source of the water-supply is determined by the water-level in the boiler.

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

1. In a water-feeding device for feeding water to a boiler, the combination of means for forcing water into the boiler against pressure, an inclosed water-receptacle from which water is fed to said forcing mechanism, a pipe leading from said water-receptacle to the boiler at its water-line, a pipe leading from said water-receptacle to a source of water-

supply and means for alternately opening and closing said pipes, whereby said forcing mechanism is supplied from the water-supply or from said boiler as determined by the water-level in the boiler, substantially as described.

2. The combination with a boiler, of a pumping-cylinder, a reciprocating piston in said cylinder, a feed-water pipe leading from said cylinder to said boiler, a check-valve in said feed-water pipe, a valve-cylinder placed above said pumping-cylinder and communicating therewith, a pair of connected reciprocating pistons in said valve-cylinder with a space forming a water-receptacle between them, a pipe leading from said valve-cylinder to said boiler, a pipe leading from said valve-cylinder to a source of water-supply, said pipes being arranged to alternately communicate with the water-receptacle between said pistons, substantially as described.

3. The combination with a boiler, of an automatic feed-water mechanism, comprising a pump, a pipe provided with a check-valve leading from said pump to said boiler below its water-line, a water-receptacle independent of said pump, means for periodically connecting said water-receptacle and said pump, a pipe connecting said receptacle and the boiler at the water-line, a pipe connecting said receptacle with a source of water-supply and means for alternately opening and closing said pipes, substantially as described.

4. The combination of an inclosed water receptacle, or chamber, means for admitting water, or steam from the boiler to said chamber as determined by the water-level in the boiler, a source of water-supply communicating with said water receptacle, or chamber, means for alternately closing said water receptacle, or chamber, to the boiler and to the water-supply, a pump-cylinder and means for communicating said water receptacle, or chamber, with said pump-cylinders, substantially as described.

In testimony whereof I have signed my name to this specification, in presence of two subscribing witnesses, this the 21st day of May, 1900.

CHARLES CROMPTON.

Witnesses:

GEORGE H. KIMBALL,  
J. FRED HUMES.