

No. 640,224.

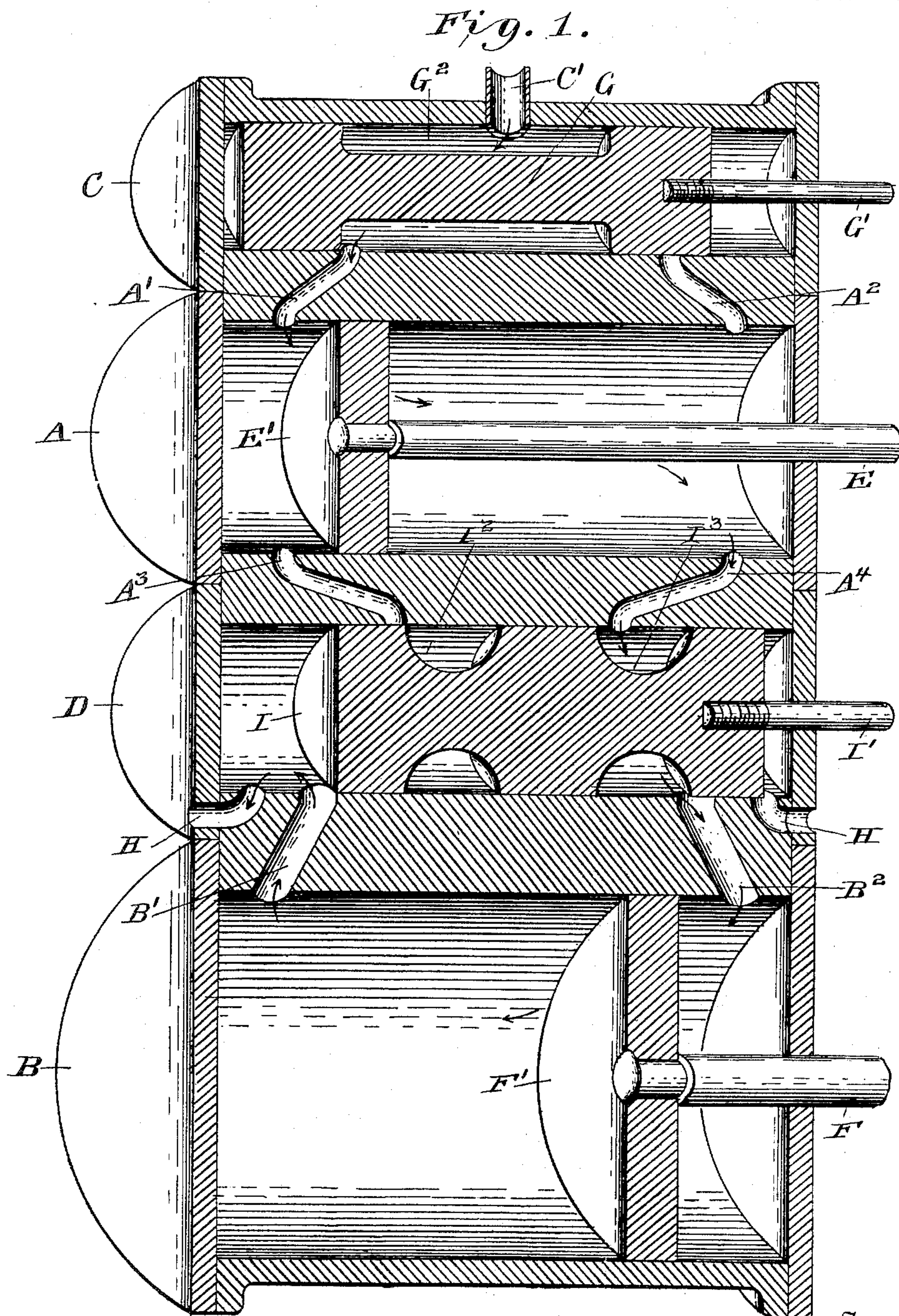
Patented Jan. 2, 1900.

C. REEVES.  
COMPOUND STEAM ENGINE.

(Application filed Dec. 16, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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Jas. H. Blackwood

Inventor  
Clifton Reeves by  
James Buchanan  
Attorney



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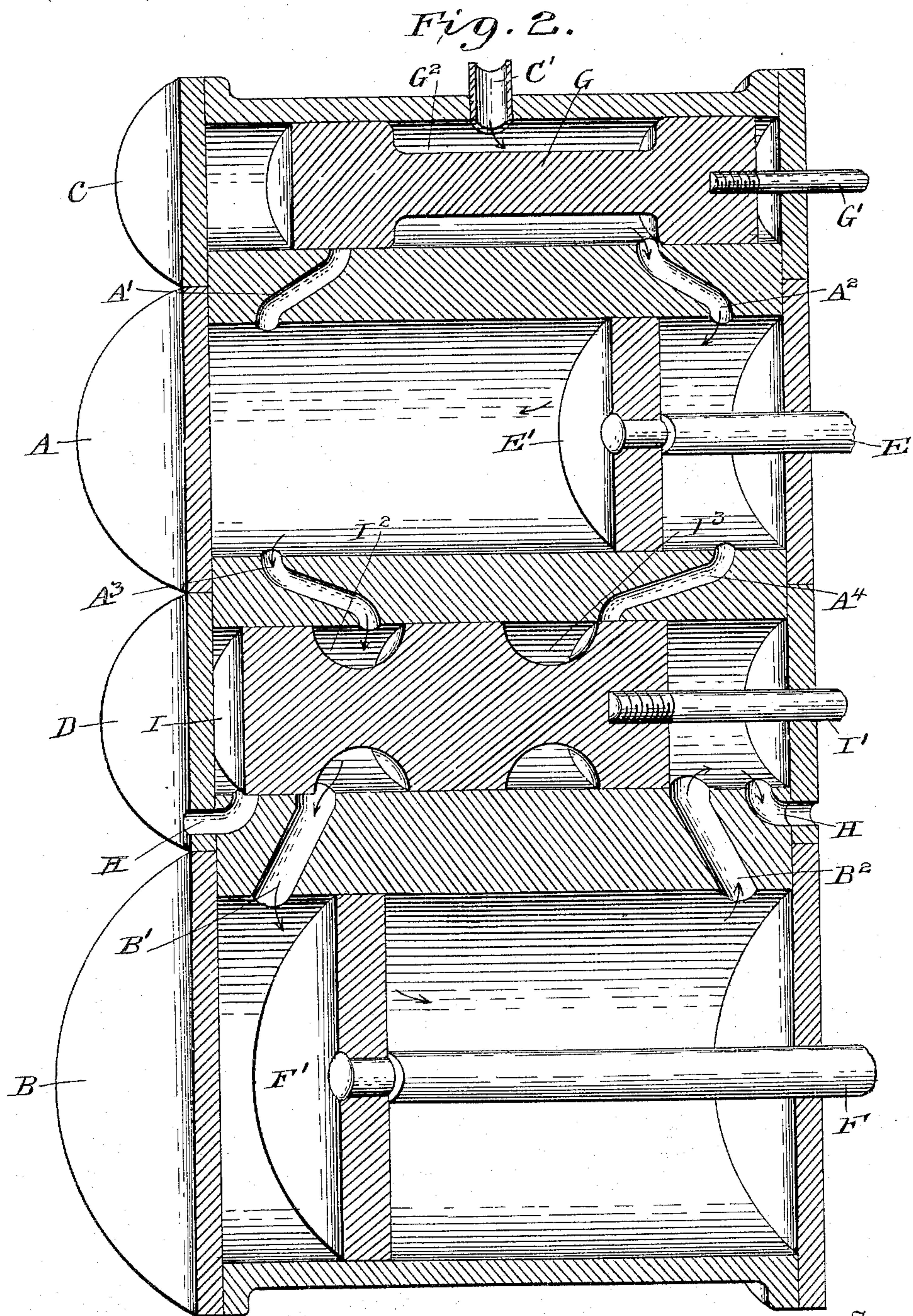
Patented Jan. 2, 1900.

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(Application filed Dec. 18, 1898.)

(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

CLIFTON REEVES, OF TRENTON, NEW JERSEY, ASSIGNOR OF ONE-HALF TO  
ANDREW CROZER REEVES.

## COMPOUND STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 640,224, dated January 2, 1900.

Application filed December 16, 1898. Serial No. 699,441. (No model.)

*To all whom it may concern:*

Be it known that I, CLIFTON REEVES, a citizen of the United States of America, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Compound Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of steam-engines known as "compound" steam-engines; and its object is to provide such engine with an intermediate valve located between the high and the low pressure cylinders and provided with openings so arranged with reference to the ports of such cylinders as to permit alternately one set of ports to be open to the passage of steam from one cylinder to the other, while the other set is closed to such passage, and vice versa, and also, simultaneously therewith, to open and close the low-pressure cylinders to the exhaust-ports. This I accomplish by the mechanism shown in the accompanying drawings.

In the drawings similar letters of reference indicate similar parts.

Figure 1 is a drawing in half-section and in perspective of my invention. Fig. 2 is a similar drawing with the piston heads and valves in a position exactly the reverse of that shown in Fig. 1.

In Fig. 1, A is a high-pressure cylinder.

B is a low-pressure cylinder.

C is a cylinder containing the feeding-valve, and D is the steam-chest containing the connecting or controlling valve.

Cylinder A is provided with two inlet-ports A' and A<sup>2</sup>, communicating with steam-chest C. It has also two outlet-ports A<sup>3</sup> and A<sup>4</sup>, leading from it to the chest D.

Cylinder A is provided with a piston-rod E, having piston-head E', adapted to move freely within the cylinder. Cylinder B is provided with ports B' and B<sup>2</sup>, leading from it to and connecting with chest D. These ports act alternately as outlet and inlet ports. Within the cylinder B is the piston-rod F with piston-head F', adapted to move freely within the cylinder.

The chest C is provided with steam-pipe C',

by means of which steam enters within the chest. It is also provided with a slide-valve G, having valve-stem G' and cavity G<sup>2</sup>, extending along its length sufficiently far that when port A' is uncovered A<sup>3</sup> will be covered, and vice versa. I have described and figured G and C as round or cylindrical; but they may be of any convenient form, so that the function of alternately covering and uncovering the ports as the valves slide to and fro be preserved. As shown, the ports A<sup>3</sup> and A<sup>4</sup> enter the chest D from and connect it with the high-pressure cylinder A, and the ports B' and B<sup>2</sup> enter it from and connect it with the low-pressure cylinder B. This chest D is provided also at each end with an exhaust-pipe H. These pipes I have figured only to the exterior of the engine; but they may be carried up the smoke-stack or to any convenient point. Within this chest I place a controlling or connecting valve I, provided with valve-stem I' and adapted to be moved freely to and fro within the chest D. Around this valve and at some distance from its forward end I provide an annular groove or depression I<sup>2</sup>, and at the same distance from the other end of the valve I place another similar groove or depression I<sup>3</sup>. These grooves are so placed in relation to the ports that when, as shown in Fig. 1, the valve is drawn back the ports A<sup>4</sup> and B<sup>2</sup> are uncovered, and the port A<sup>3</sup> is closed, and the valve is of such length with reference to the ports, that at the same time the forward end of the valve uncovers the port B', to connect with forward exhaust H, the rear end of the valve closes the rear exhaust H. When the valve is drawn forward, as shown in Fig. 2, the reverse of all this occurs. I have not figured the means by which these valves G and I are moved backward and forward, as any of the valve motions long known and suitable can be employed therefor. Neither have I figured the connection of the piston-rods E and F with the crank-shaft, as such devices are old and form no part of my present invention.

The operation of my mechanism is as follows: Steam from the boiler is admitted at C'. The valve G being slid along until the port A' is uncovered, the steam passes into the for-



ward end of high-pressure cylinder A. The port  $A^3$  being closed by the position of valve I, the steam presses against the front of the piston-head  $E'$  and forces the piston-head back. Meantime the steam which had entered cylinder A by the port  $A^2$  is shut off from returning by the closing by valve G of that port as  $A'$  was opened, and the steam behind piston-head  $E'$  passes by the port  $A^4$ , annular groove  $I^3$ , and port  $B^2$  behind the piston-head  $F'$  and presses it toward the front of cylinder B. When the port  $B^2$  was opened by the valve I, the same motion opened the port  $B'$  to forward exhaust H and the steam in front of piston-head  $F'$  is free as the piston moves forward to escape by way of port  $B'$  to the exhaust and thence to liberty. I have traced the course of the steam by the points of the arrows. (Shown in the drawings.) When the position of the valves is reversed, as shown in Fig. 2, the reverse of all this takes place. The port  $A'$  and port  $A^4$  are closed and the port  $A^2$  is opened and the steam presses against the rear of piston-head  $E'$  and presses it toward the forward end of cylinder A. The port  $A^3$  is opened and the steam in front of the piston-head  $E'$  passes by it, groove  $I^2$ , and port  $B'$  in front of piston-head  $F'$  and presses the piston back. Rear exhaust H is also open and the steam in rear of piston-head  $F'$  passes, by port  $B^2$  and rear exhaust H, to liberty.

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

1. A compound steam-engine comprising a high-pressure cylinder having a piston, a low-pressure cylinder having a piston, a steam-chest having admission-ports connecting it with the high-pressure cylinder, and an admission-valve in said steam-chest adapted to alternately open and close said ports; a controlling-chest having exhaust-ports in the ends and ports connecting it with the high-pressure cylinder and the low-pressure cylinder and a valve in said controlling-chest adapted to alternately open and close the ports between the high-pressure cylinder and the low-pressure cylinder at one end, and to simultaneously open the port at the opposite end of the low-pressure cylinder and the exhaust-

port at the opposite end of the controlling-chest substantially as described.

2. A compound steam-engine comprising a high-pressure cylinder, having a piston, a low-pressure cylinder having a piston, a steam-chest having ports connecting it with the high-pressure cylinder and a slide-valve in said steam-chest having a circumferential groove, said slide-valve adapted to alternately open and close said ports, a controlling-chest having exhaust-ports and ports connecting it with the high-pressure cylinder and the low-pressure cylinder and a valve in said controlling-chest having circumferential grooves adapted to alternately open and close the ports between the high-pressure cylinder and the low-pressure cylinder at one end, and to simultaneously open the port at the opposite end of the low-pressure cylinder and the exhaust-port at the opposite end of the controlling-chest substantially as described.

3. In a compound steam-engine a high-pressure cylinder A, having a piston-rod E, and piston-head  $E'$ , a low-pressure cylinder B, having piston-rod F, and piston-head  $F'$ , a steam-chest C, having ports  $A'$  and  $A^2$ , connecting it with the high-pressure cylinder and a slide-valve in said steam-chest having a valve-rod  $G'$  and a groove  $G^2$ , said groove so arranged that when port  $A'$ , is covered port  $A^2$ , will be uncovered, and vice versa, and a controlling-chest having exhaust-ports H, and H, and ports  $A^3$ , and  $A^4$ , connecting it with the high-pressure cylinder and ports  $B'$ , and  $B^2$ , connecting it with the low-pressure cylinder and a valve I, in said controlling-chest having a valve-rod  $I'$ , and grooves  $I^2$ , and  $I^3$ , said grooves so arranged that when port  $A^3$ , is covered ports  $A^4$ ,  $B^2$ , and the forward exhaust-port will be uncovered and when port  $A^4$ , is covered ports  $A^3$ , and  $B'$ , and the rear exhaust-port will be uncovered substantially as described.

In witness whereof I have hereto affixed my signature in the presence of two witnesses.

CLIFTON REEVES.

Witnesses:

JOHN RELLSTAB,  
H. STONIER, Jr.