





No. 685,207.

C. G. HOLMBERG.  
ENGINE VALVE.

Patented Oct. 22, 1901.

(Application filed Jan. 14, 1901.)

(No Model.)

3 Sheets—Sheet 2.

Fig 2

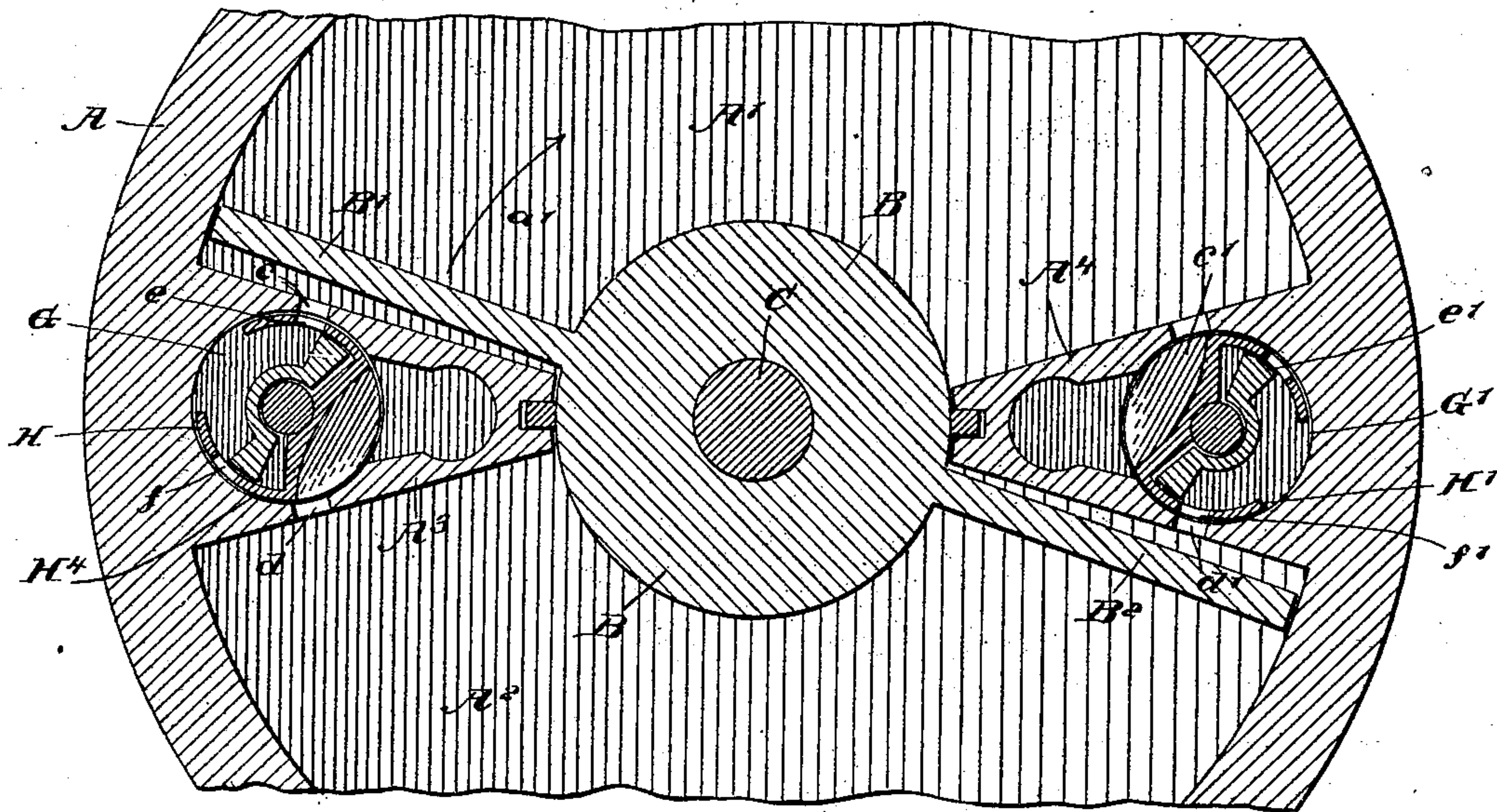
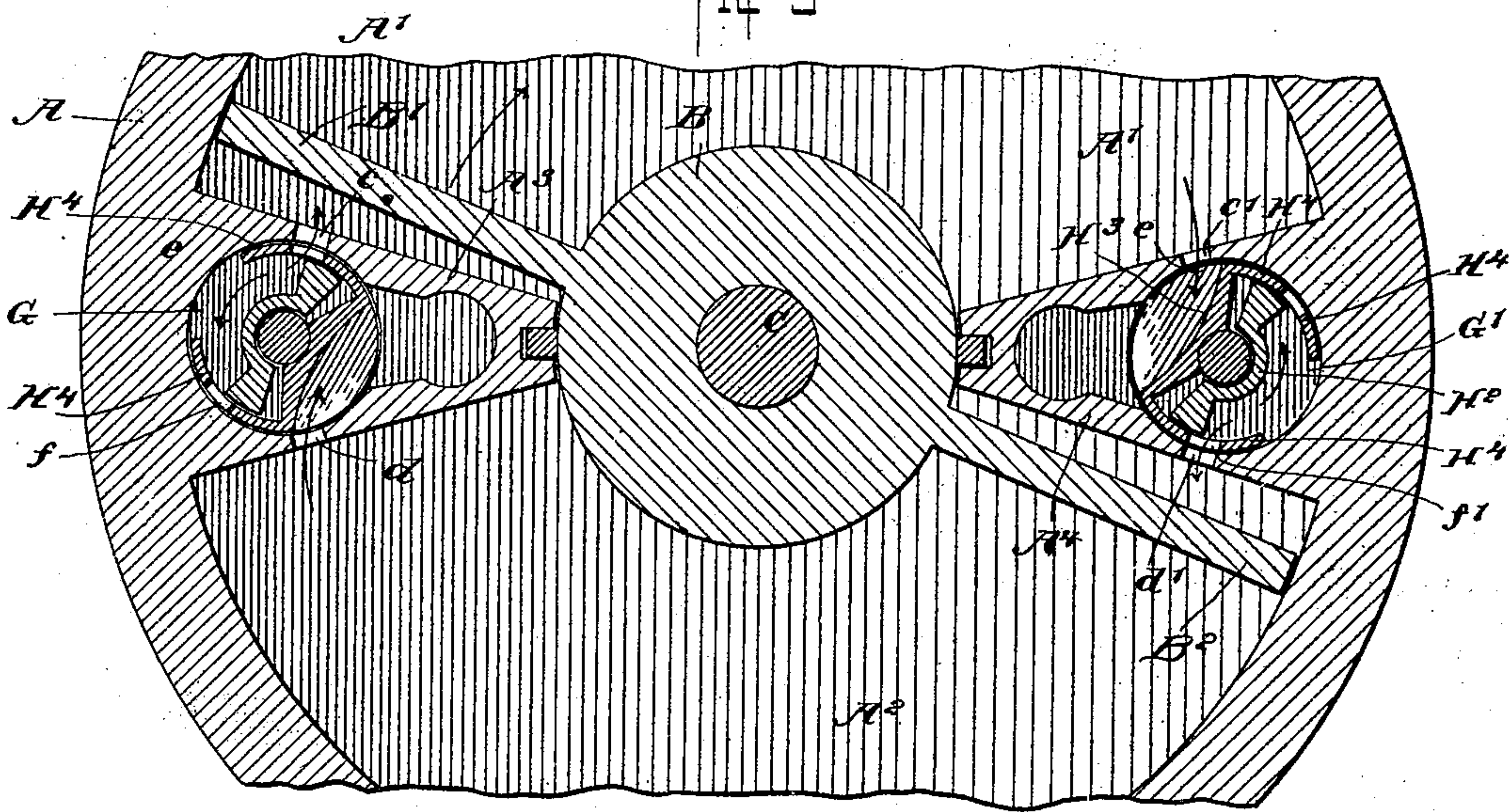


Fig 3



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## ENGINE-VALVE.

SPECIFICATION forming part of Letters Patent No. 685,207, dated October 22, 1901

Original application filed October 4, 1900, Serial No. 31,975. Divided and this application filed January 14, 1901. Serial  
No. 43,219. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES GUSTAVE HOLMBERG, a citizen of the United States, and a resident of Woonsocket, in the county of Sanborn and State of South Dakota, have invented a new and Improved Engine-Valve, of which the following is a full, clear, and exact description, this being a division of the application for Letters Patent of the United States for an engine, Serial No. 31,975, filed by me on October 4, 1900.

The object of the invention is to provide certain new and useful improvements in engine-valves, whereby the admission and exhaust of the motive agent to and from the engine-cylinder are properly controlled and the desired cut-off of the motive agent is obtained.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional plan view of the improvement as applied. Fig. 2 is a sectional side elevation of the same on the line 2-2 in Fig. 1. Figs. 3 and 4 are like views of the same with parts in a different position. Fig. 5 is a side elevation of one of the valves with parts in section, and Fig. 6 is a sectional plan view of the same.

The engine on which the improvement is applied is provided with a cylinder A, in which oscillates a piston B in the form of diametrically-extending wings B' B<sup>2</sup> and secured on a cylinder-shaft C, mounted to turn in suitable bearings in the heads of the cylinder A and connected with the main shaft in the manner more fully shown and described in the application above referred to, so that further description of this part of the engine is not deemed necessary.

The cylinder A is formed with two working chambers A' A<sup>2</sup>, formed by partitions A<sup>3</sup> A<sup>4</sup>, integral with the cylinder, and into said working chambers A' A<sup>2</sup> extend the wings or piston-heads B' B<sup>2</sup> of the piston B, as is

plainly shown in the drawings. The piston-heads B' B<sup>2</sup> stand diametrically opposite each other, and when the engine is running the motive agent acts simultaneously on the said piston-heads in such a manner that one is moved in its working chamber from the partition A<sup>3</sup> to the partition A<sup>4</sup>, while the other piston-head is moved in its working chamber, but from the partition A<sup>4</sup> to the partition A<sup>3</sup>. In the partitions A<sup>3</sup> A<sup>4</sup> are formed valve-chests G G', respectively, containing oscillating valves H H', respectively, for controlling the motive agent to and from the working chambers A' A<sup>2</sup>, as hereinafter more fully explained.

In one of the heads of the cylinder A are formed ports a b, leading at their inner ends to the valve-chests G G' and connected at their outer ends with the motive-agent-supply pipes I I', respectively, connected with the boiler-pipe I<sup>2</sup>, containing a valve I<sup>3</sup> under the control of the governor I<sup>4</sup>. The valve-chests G G' are also connected by ports c c' with the working chamber A', and similar ports d d' connect the said chests with the chamber A<sup>2</sup>. The ports c d and c' d' are controlled by the valves H H', respectively, so that motive agent is admitted to one chamber A' or A<sup>2</sup>, while exhaust takes place from the other chamber through the corresponding valve, the exhaust motive agent passing from chest extensions G<sup>2</sup> G<sup>3</sup> to exhaust-pipes J J', leading to the outer air.

The valves H H' are alike in construction, and each is provided with a main valve H<sup>2</sup> and an auxiliary valve H<sup>3</sup>, having cut-off flanges H<sup>4</sup>, as is plainly indicated in the drawings. The main valve H<sup>2</sup> is secured on a hollow stem H<sup>5</sup>, and the auxiliary valve H<sup>3</sup> is secured on a stem H<sup>6</sup>, mounted to turn in the hollow stem H<sup>5</sup>. (See Figs. 5 and 6.) The hollow stem H<sup>5</sup> is mounted to turn in suitable bearings carried by the heads of the cylinder A, and the outer ends of the stems H<sup>5</sup> carry arms H<sup>7</sup>, pivotally connected with each other by a link H<sup>8</sup>, so that when a rocking motion is given to one of the stems H<sup>5</sup> then both stems for the valves H H' are simultaneously rocked. The stems H<sup>6</sup> for the two valves H H' are similarly connected with each other—that is, they are provided with



arms  $H^9$ , pivotally connected with each other by a link  $H^{10}$ , and consequently when one of the stems  $H^6$  is rocked a similar rocking motion is given to the other stem.

5 In the cut-off flanges  $H^4$  for the valve  $H$  are formed ports  $e f$ , adapted to register alternately with the ports  $c d$  in the partition  $A^3$ , and similar ports  $e' f'$  are also formed in the cut-off flanges  $H^4$  for the valve  $H'$ , and the  
10 ports  $e' f'$  are adapted to successively register with the ports  $c'$  and  $d'$ . (See Figs. 2 and 3.)

In order to impart the desired oscillating motion to the valves, the stem  $H^5$  of the valve  $H'$  is provided with an arm  $K$ , arranged to  
15 receive a rocking motion from the main driving-shaft  $F$  by a suitable mechanism, and said arm  $K$  is formed on its upper end with shoulders  $K' K^2$ , adapted to alternately engage the free end of an arm  $K^3$ , secured to  
20 the stem  $H^6$ , so that the rocking motion of the latter is controlled from the stem  $H^5$ , it being understood that upon swinging the arm  $K$  in one direction one shoulder  $K'$  or  $K^2$  engages the arm  $K^3$  and carries the latter along,  
25 and when the arm  $K$  is on the return stroke the arm  $K^3$  remains at a standstill for the time being until the other shoulder  $K^2$  or  $K'$  engages the arm  $K^3$  and again carries the same along.

30 Now when the engine is in motion an intermittent swinging motion is given to the arm  $K$ , so that the two valves  $H H'$  are simultaneously actuated to cause the valve  $H$  to admit live motive agent to one working chamber and to allow the exhaust of the other  
35 working chamber to pass to the open air, while the other valve  $H'$  admits motive agent to the last-mentioned chamber and allows escape of exhaust motive agent from the first  
40 working chamber. Thus when the several parts are in the position shown in Fig. 2 the live motive agent passes through the valve  $H$  and the registering ports  $e c$  into the chamber  $A'$  behind the piston-head  $B'$ , so as to turn the  
45 piston  $B$  in the direction of the arrow  $a'$ , it being understood that a like action takes place against the other piston-head  $B^2$  by the motive agent passing through the valve  $H'$  and the registering ports  $f'$  and  $d'$  into the work-  
50 ing chamber  $A^2$ .

When the ports  $e$  and  $f'$  are in register with the ports  $c$  and  $d'$  and a sufficient quantity of motive agent has been admitted to the chamber  $A'$ , as described, then the rocking  
55 motion given to the arm  $K$  causes the main valve  $H^2$  to turn, while the auxiliary valve  $H^3$  remains stationary for the time being, it being understood that when this movement of the main valve takes place the motive agent is  
60 gradually cut off from the ports  $e$  and  $f'$ , and consequently from the ports  $c$  and  $d'$  and the working chambers  $A' A^2$ . When the motive agent has finally been cut off, the shoulder  $K'$  or  $K^2$  on the rocking arm  $K$  engages the free  
65 end of the arm  $K^3$  and carries the same along, so that the main valves  $H^2$  and their auxiliary valves  $H^3$  move together, the motive agent

being cut off during the time the piston-heads  $B' B^2$  are on their outward stroke. Thus if the motive agent is steam it works  
70 expansively in the working chambers  $A' A^2$ .

When the piston-heads have reached the ends of their strokes, the position of the valves is reversed by the action of the parts connected for the purpose with the arm  $K$ ,  
75 so that the motive agent is again admitted to the working chambers to move the piston-heads  $B' B^2$  on their return stroke—that is, in the inverse direction of the arrow  $a'$ . (See Fig. 3.)  
80

When the arm  $K$  is rocked in an inverse direction, then the arm  $K^3$  remains stationary for a time to cause a movement of the main valves  $H^2$  of the valves  $H H'$  for cutting-off  
85 purposes, as above explained.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A valve for controlling the admission and exhaust of a motive agent, the said valve  
90 comprising a main valve, and an auxiliary valve controlled from said main valve, the auxiliary valve having cut-off flanges each provided with a port adapted to register alternately with ports in the valve-chest, and a  
95 cut-out portion or cavity for the passage of the exhaust, as set forth.

2. A valve for controlling the admission and exhaust of a motive agent, the said valve  
100 comprising a main valve and an auxiliary valve controlled from said main valve, the auxiliary valve having ports for the admission of the motive agent, and a cut-out portion or cavity for the passage of the exhaust, an arm on the main valve and arranged to  
105 receive an intermittent rocking motion, and an arm on the said auxiliary valve and adapted to be alternately engaged by shoulders on the main-valve arm, as set forth.

3. A valve for controlling the admission  
110 and exhaust of a motive agent, the said valve comprising a main valve, and an auxiliary valve controlled from said main valve, the auxiliary valve having cut-off flanges each provided with a port adapted to register alternately with ports in the valve-chest, and a  
115 cut-out portion or cavity for the passage of the exhaust, a hollow stem mounted to turn and on which the main valve is secured, a stem mounted to turn in said hollow stem  
120 and carrying the auxiliary valve, an arm on the hollow stem and arranged to receive an intermittent rocking motion, the said arm being provided on its upper end with spaced shoulders, and an arm on the stem of the  
125 auxiliary valve and adapted to be alternately engaged by the said shoulders, as set forth.

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

CHARLES GUSTAVE HOLMBERG.

Witnesses:

L. H. PIER,

S. J. MITCHELL.