

E. PURVIS.  
STEAM-VALVE.

No. 174,570.

Patented March 7, 1876.

Fig. 1.

Fig. 2.

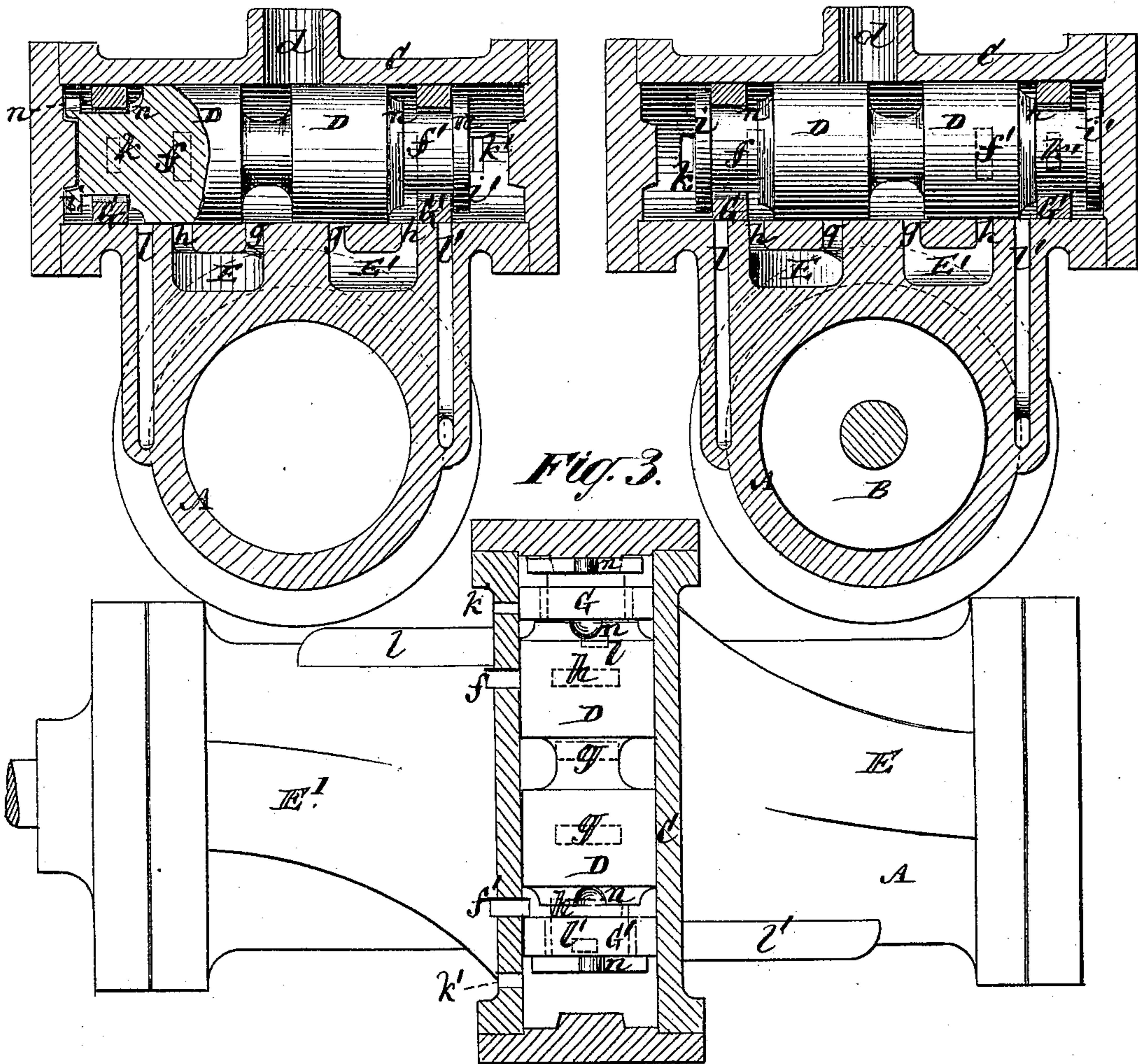
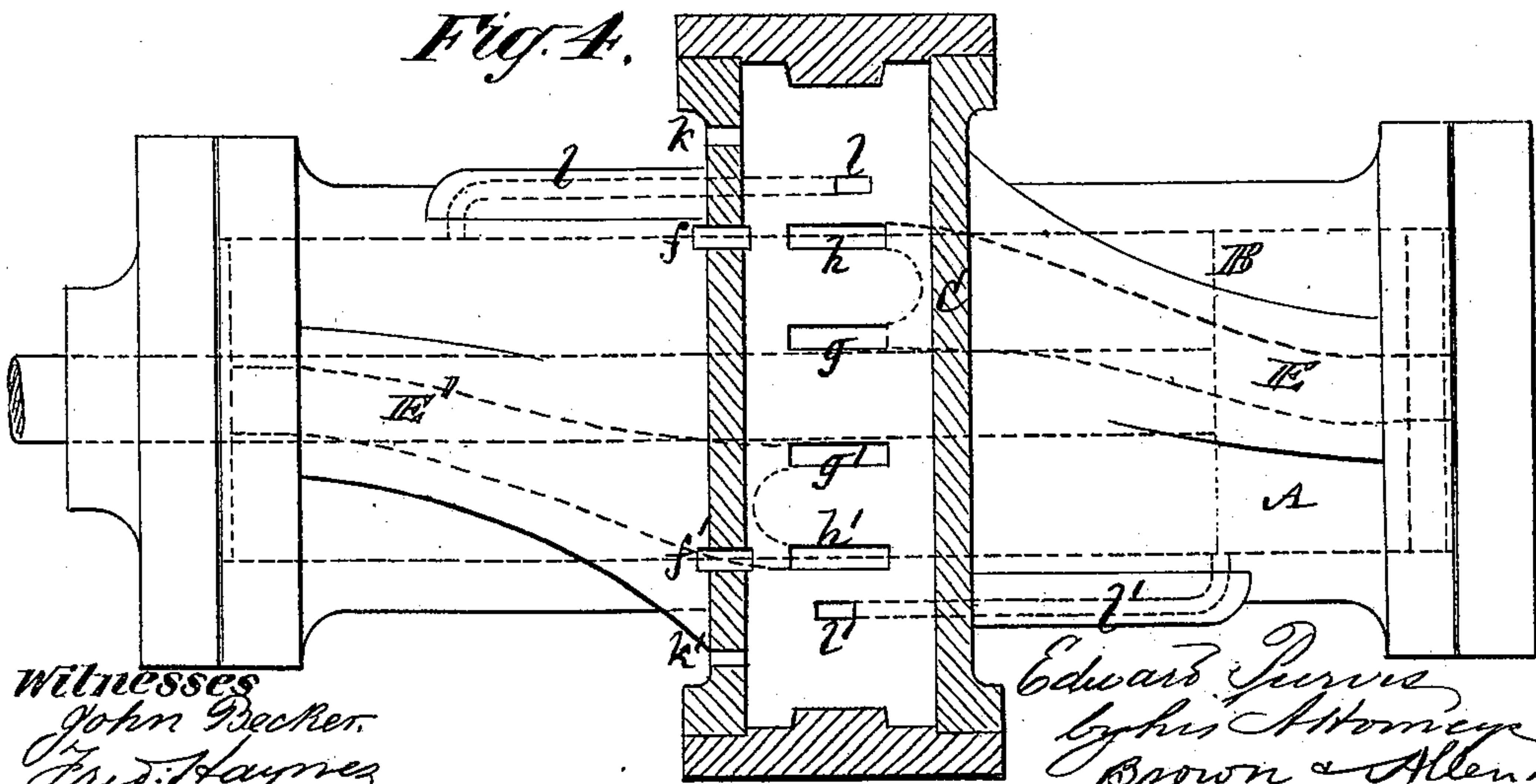


Fig. 4.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN STEAM-VALVES.

Specification forming part of Letters Patent No. 174,570, dated March 7, 1876; application filed December 18, 1875.

*To all whom it may concern:*

Be it known that I, EDWARD PURVIS, of the city, county, and State of New York, have invented certain Improvements in Valves for Direct-Acting Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms a part of this specification.

This invention relates to that class of valves for direct-acting engines in which the steam from the engine-cylinder is caused to throw the main valve to reverse the action of the engine-piston, and in which auxiliary valves, operated by the main valve, are used for said purpose.

The invention consists in a combination, with the main valve, of loose rings, which form movable partitions, dividing the valve-chest into compartments, and which act as auxiliary valves to control the ports and passages that admit steam to actuate the main valve. The invention also consists in a shouldered construction of the main valve to provide for the action of said auxiliary valves in combination with the main valve. Furthermore, the invention consists in a novel arrangement of the several ports, in combination with the main and auxiliary valves of the engine.

Figures 1 and 2 represent transverse sections through the engine-cylinder, and longitudinal sections through the valve-chest, with the main and auxiliary valves in different positions. Fig. 3 is a plan or longitudinal view, mainly, of the engine-cylinder with the upper covering of the valve-chest removed, and with the valves in the position represented for them in Fig. 1. Fig. 4 is a longitudinal view or diagram of the engine-cylinder and lower portion of the valve-chest.

A is the cylinder of a direct-acting engine, and B its reciprocating piston. C is the valve-chest, which is here shown of cylindrical construction internally, and is arranged in transverse relation with the engine-cylinder. D is the main valve, which has a free sliding action within the chest C, and which is constructed with a transversely-divided body—or, in other words, with duplicate heads that operate as a piston within said chest to control the pas-

sages E E', which conduct the steam to and from opposite ends of the engine-cylinder. Steam is admitted to the valve-chest between the heads of said piston by an inlet, *d*. It is exhausted from said chest, after the performance of its duty, alternately by outlets *f f'*, which are controlled by the main valve. The passages E E' terminate in the valve-chest—that is, each passage in a separate induction-port, *g*, and a separate exhaust-port, *h*, all of which are controlled by the main valve.

G G' are loose rings, at opposite ends of the main valve, and fitting, in a piston-like manner, the interior of the valve-chest, but having a free passage for the steam through them, and at liberty to move longitudinally independently of the main valve between the heads of the latter and collars *i i'* on the outer ends of the main valve. These rings form the auxiliary valves, which control the ports and passages *l l'*, that admit steam from the engine-cylinder to throw the main valve, the passages *l l'* leading from the valve-chest toward opposite ends of the engine-cylinder, and so that they are uncovered by the engine-piston toward the completion of its stroke, to pass steam to either outer end of the valve-chest, when either port or passage *l l'* is uncovered by the loose ring G or G' controlling it. The loose rings or auxiliary valves G G' also control exhaust-ports *k k'*, which serve, when uncovered, to free the ends of the valve-chest of steam, and give a clear vent beyond the ends of the main valve, to facilitate the action of the latter. The outer ends of the piston-heads of the main valve, and the collars *i i'* on the ends of said valve, are notched or formed with reductions *n n*, to allow of a free passage through the loose rings G G' at all times. Dash-pots may be provided at the ends of the valve-chest to cushion the main valve at the completion of its throw in either direction.

The operation is as follows: Supposing the valves to be in the position represented in Fig. 1, then steam is passing from between the heads of the main valve D, through the port *g* and along the passage E, to throw the piston B to the left, the exhaust-port *h* of said passage, also the induction-port *g* of the passage E', then being closed by the main valve, and



the exhaust-port *h* of the passage *E'* being open. The exhaust-ports *f' k'* are also open, and the exhaust-ports *f k* closed. Likewise the port or passage *l* is open and the port or passage *l'* closed by the auxiliary valves *G G'*, which have been shifted by the left-hand piston-head, and the right-hand collar *i'* of the main valve, to the position shown for them in Fig. 1, as the main valve completed its throw to the left. As the piston *B* nearly completes its left-hand stroke it uncovers the passage *l*, and allows steam from the cylinder *A* to pass along said passage, and through the ring *G*, to the left-hand end or back of the main valve *D*, and so causes the latter to be thrown to the right—that is, to the position shown in Fig. 2—and as the main valve approximates this position, but not before, its collar *i* and right-hand piston-head shifts the auxiliary valve or rings *G G'*, as shown in Fig. 2, thereby opening the exhaust-port *k* and passage *l'*, and closing the port *k'* and passage *l* and the opening and closing of the ports *g h* of the passages *E E'* and the exhaust-ports *f f'*, being also reversed by the motion of the main valve, to effect the the throw of the latter again in due course to the left, in the manner described.

From this description it will be seen that the loose rings or auxiliary valves *G G'* are always in equilibrium. The main valve *D* is also a balanced one; but, if preferred, a suitably-constructed *D* main valve, with the loose rings or auxiliary valves *G G'* applied to it, may be substituted for the piston-like or cylindrical one.

I claim—

1. The combination, with the main valve, of loose rings *G G'*, arranged to form auxiliary valves, and serving to control the ports and passages that admit steam to actuate the main valve, substantially as specified.

2. The shoulders *i i'*, on the sliding main valve, in combination with the auxiliary valves *G G'*, essentially as described.

3. The arrangement of the ports and passages *E E'*, *l l'*, *f f'*, *k k'*, and the inlet *d*, with the main valve *D*, the auxiliary valves *G G'*, the engine-cylinder *A*, and its piston *B*, essentially as described.

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Witnesses:

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