

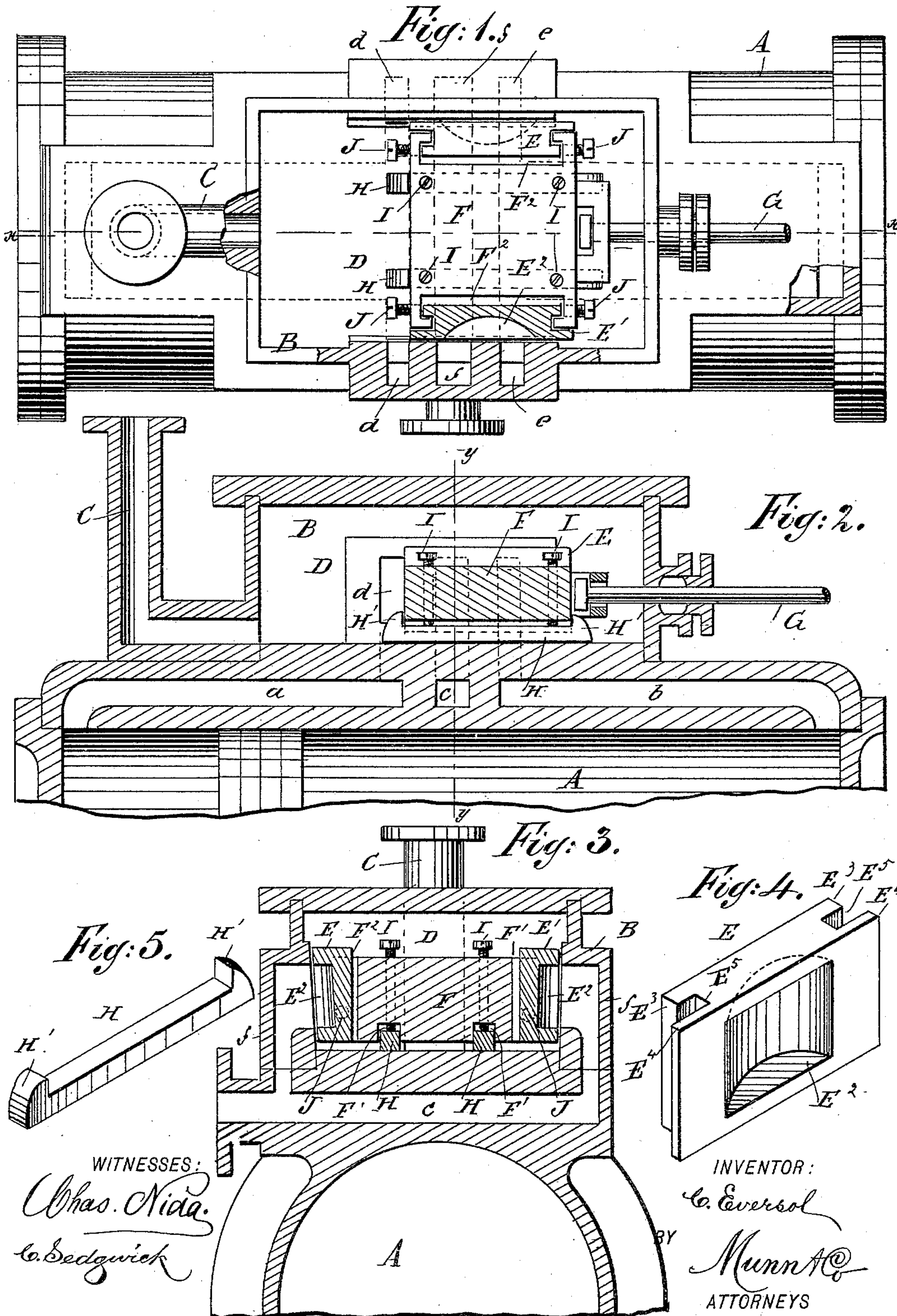
(No Model.)

2 Sheets—Sheet 1.

C. EVERSOLE.  
BALANCED SLIDE VALVE.

No. 462,119.

Patented Oct. 27, 1891.





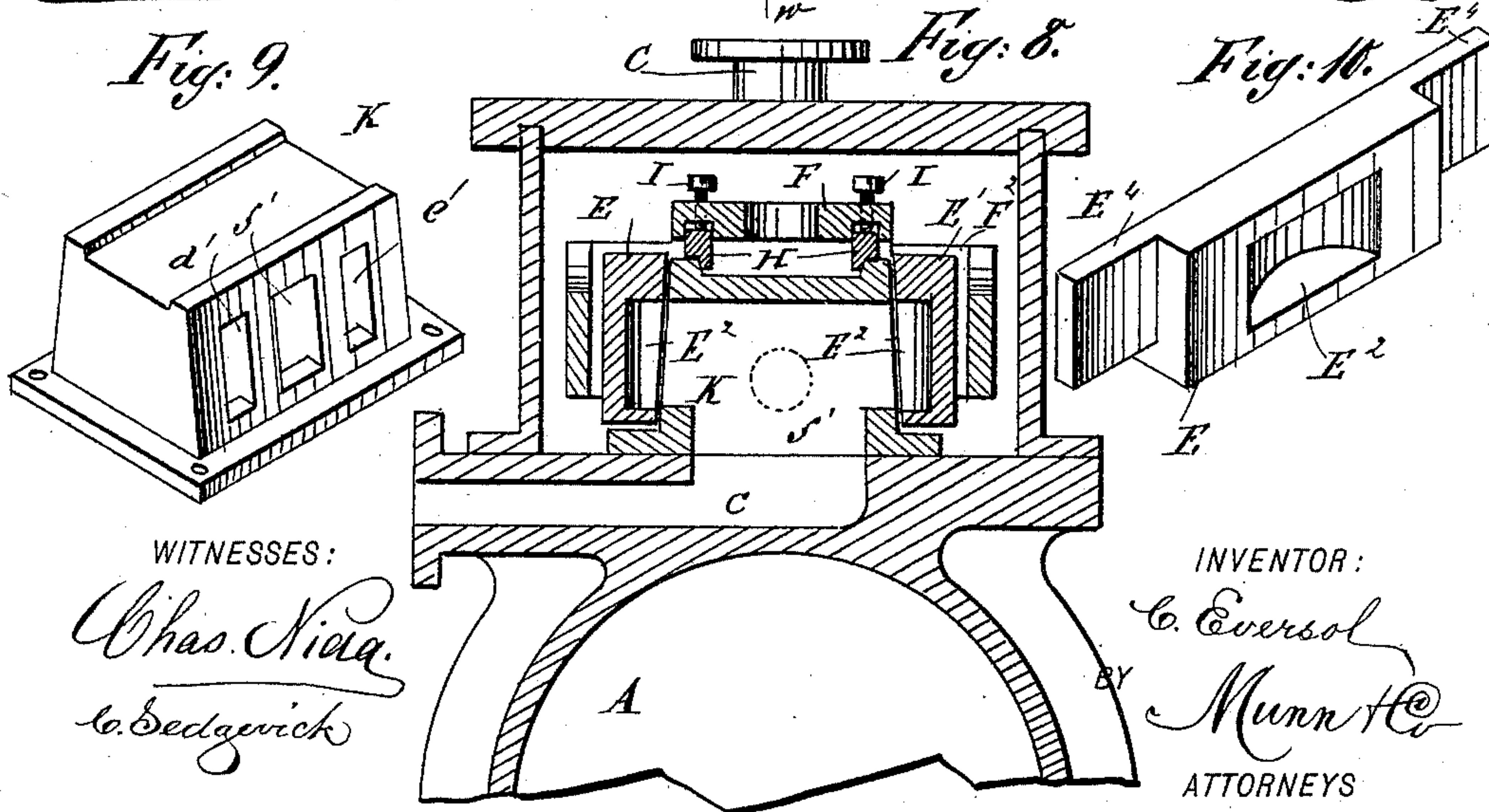
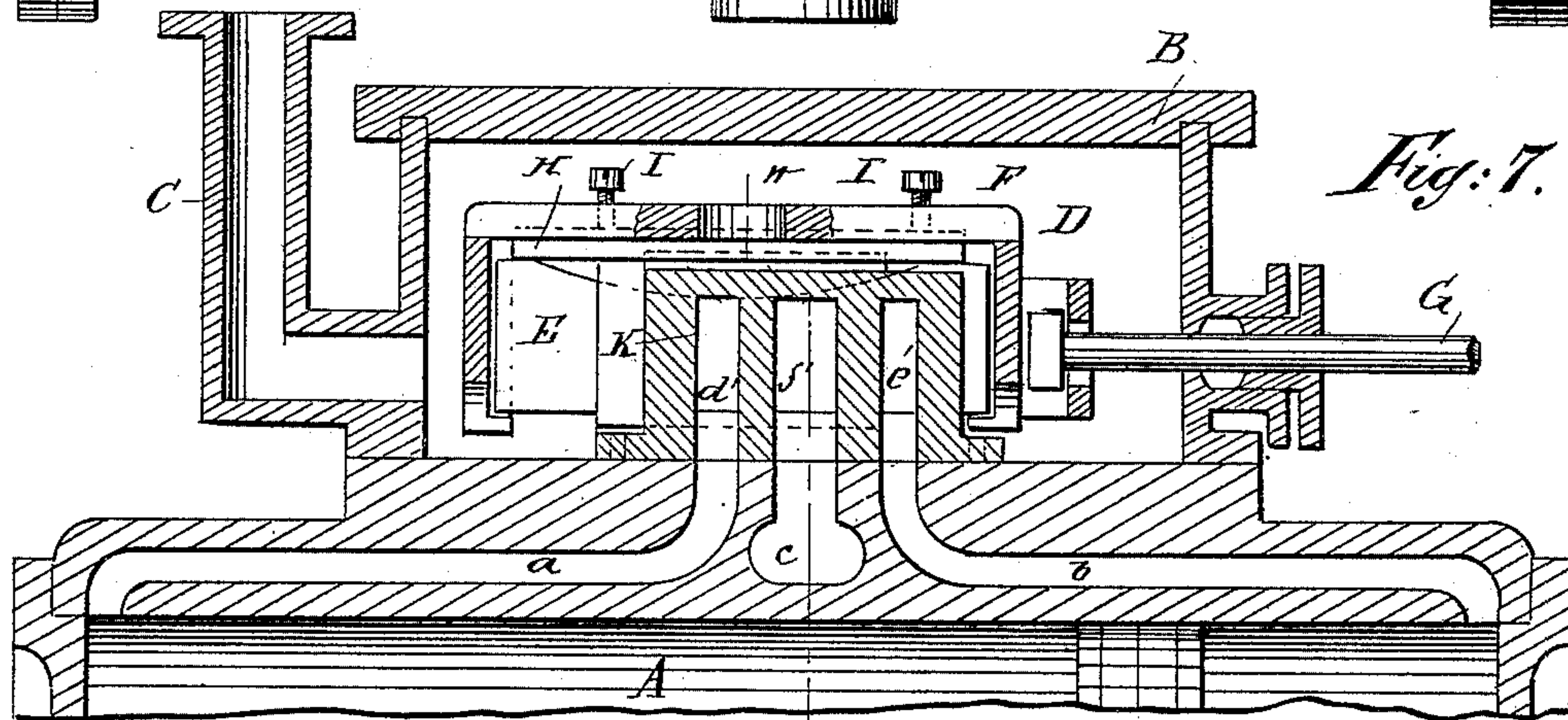
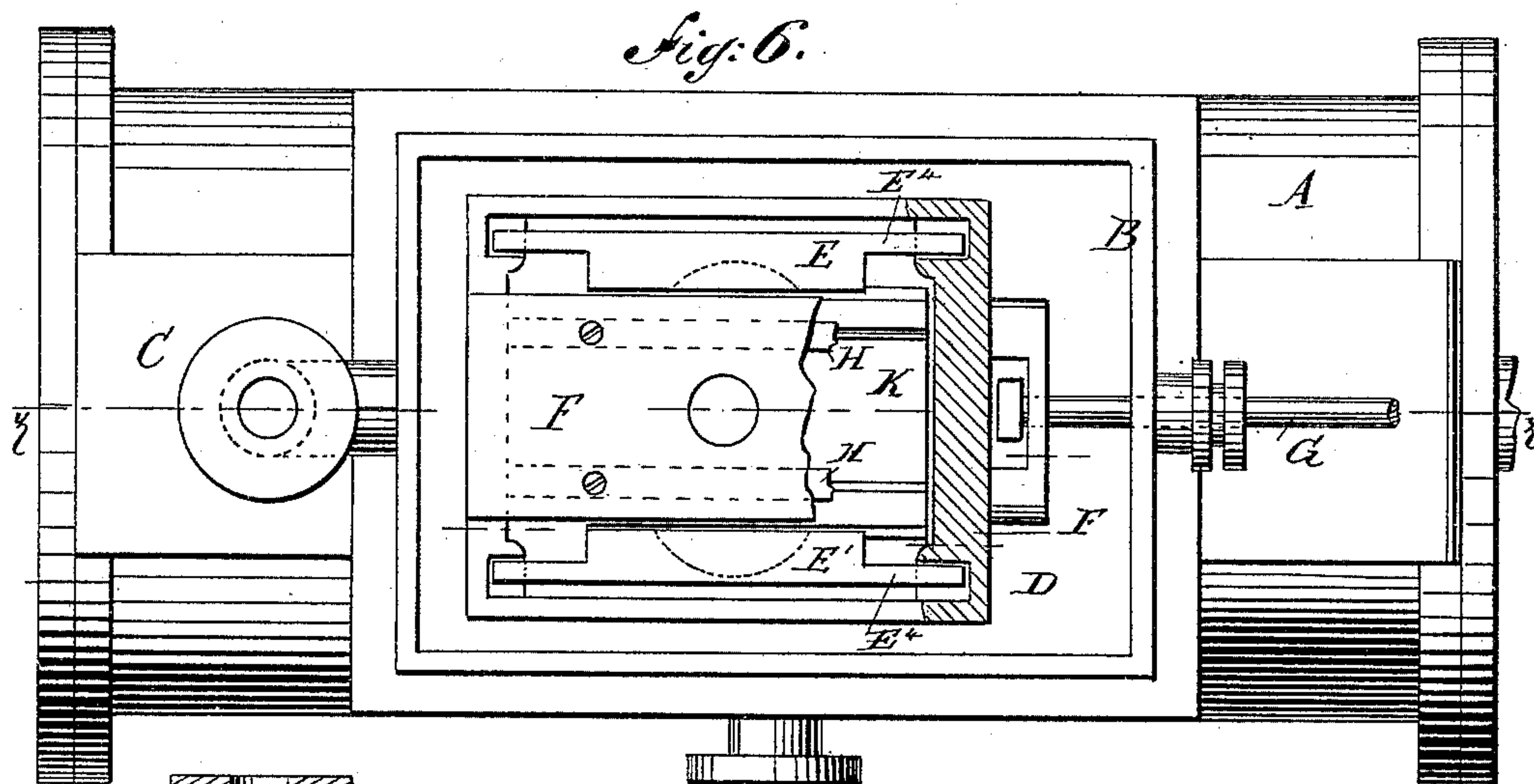
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# UNITED STATES PATENT OFFICE.

CYRUS EVERSOL, OF SPRINGFIELD, MISSOURI.

## BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 462,119, dated October 27, 1891.

Application filed April 16, 1891. Serial No. 389,156. (No model.)

*To all whom it may concern:*

Be it known that I, CYRUS EVERSOL, of Springfield, in the county of Greene and State of Missouri, have invented a new and Improved Balanced Slide-Valve, of which the following is a full, clear, and exact description.

The invention is an improvement in the class of balanced slide-valves having supplementary valves which are held on their sides and control the inlet and exhaust ports of the cylinders.

The improvement is embodied in the construction and combination of parts, as hereinafter described.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement with parts in section and as applied, the cover of the steam-chest being removed. Fig. 2 is a sectional side elevation of the same on the line *xx* of Fig. 1. Fig. 3 is a transverse section of the same on the line *yy* of Fig. 2. Fig. 4 is a perspective view of one of the valves. Fig. 5 is a like view of one of the runners. Fig. 6 is a plan view, with parts in section, of a modified form of the improvement as applied to an ordinary engine, the steam-chest cover being removed. Fig. 7 is a sectional side elevation of the same on the line *zz* of Fig. 6. Fig. 8 is a transverse section of the same on the line *ww* of Fig. 7. Fig. 9 is a perspective view of the auxiliary casing, and Fig. 10 is a perspective view of one of the valves of the modified form.

The steam-cylinder A is provided with the usual inlet-ports *a* and *b* and the exhaust-port *c*, all three extending transversely to connect with ports *d*, *e*, and *f*, respectively, arranged in the two sides of the steam-chest B, secured on top of the cylinder A in the usual manner. The steam-chest D is provided with the usual steam-inlet pipe C, and within the steam-chest is mounted to slide the balance slide-valve D, provided with two valves E and E', adapted to fit onto the sides of the steam-chest B to control the ports *d*, *e*, and *f*. The valves E and E' are each provided in their outer faces with the usual cavity E<sup>2</sup>, adapted to connect the ports *d* and *f* and *e* and *f* alternately. The valves E and E' are

held in the sides of a slide F, connected at one end with the valve-stem G, actuated in the usual manner so as to impart a reciprocating motion to the said slide F, and consequently to the entire slide-valve D, so as to move the valves E and E' over the ports in the sides of the steam-chest B. The slide F rests on two or more runners H, extending transversely and traveling on the top surface of the cylinder A within the steam-chest B. The runners H fit into transversely-extending grooves F', formed on the under side of the slide F, the outer ends of the said runners being provided with upwardly-extending shoulders H', engaging the ends of the slide, as is plainly shown in the drawings.

In order to adjust the slide F and its valves E and E', set-screws I are used, screwing in the slide F and abutting against the tops of the runners H. By adjusting these set-screws I the slide F can be raised or lowered, so as to bring the valves E and E' with their outer bearing-surfaces in the proper position with relation to the ports *d e f* in the sides of the steam-chests B.

As illustrated in Fig. 3, the outer or bearing surfaces of the valves E and E' are slightly tapering, fitting on correspondingly-planed surfaces on the sides of the steam-chest B. Each of the valves E and E' is provided on its ends with two flanges E<sup>3</sup> and E<sup>4</sup>, forming a vertical groove E<sup>5</sup>, as is plainly shown in Fig. 4, the inner flange E<sup>3</sup> being fitted loosely into a recess F<sup>2</sup>, formed on the sides of the runner F. The lower ends of the said flange E<sup>3</sup> of each valve is hung on centers J, screwing in the cover of the slide F. The valves E and E' are thus tilted with their outer bearing-surfaces against the sides of the steam-chest B, so that all leakage is prevented.

The operation is as follows: Live steam entering the inlet-pipe C can pass in the steam-chest B around the parts of the valve D, so that the latter is perfectly balanced, and thereby friction is reduced to a minimum. The live steam in the steam-chest D can pass on the inner sides of the top and bottom of the valves E and E', so that the latter are held in contact with the inner bearing-surfaces of the sides of the steam-chest B. The live steam can pass on the bottom of the slide F, as the latter is set on the runners H to raise the bot-



tom of the slide F over the top surface of the cylinder C. When the several parts are in the position shown in Figs. 1 and 2, the live steam in the steam-chest passes into the ports *d* in the sides of the steam-chest and from the said ports into the ends of the cross-channel forming part of the port *a*. The steam thus passes into the latter and into the outer end of the cylinder A to force the piston therein to the other end. The exhaust in front of the piston takes place through the port *b*, the ports *e*, the cavities  $E^2$  in the valves E and E', and the ports *f*, leading to the exhaust-port *c*. When the piston in the cylinder A nears the end of its stroke, the position of the valve D is changed so that the ports *e* form the steam-inlet ports, while the ports *d* are connected by the cavities  $E^2$  with the ports *f*, leading to the exhaust-port *c*.

When it is desirable to apply the improvements on steam-engines already in existence, an auxiliary casing K is employed, secured to the top of the cylinder over the ports *a*, *b*, and *c*, the said casing being provided with ports *d'* *e'* *f'*, registering with the said ports *a* *b* *c* and opening in the sides of the casing to connect with the cavities  $E^2$  in the valves E and E'. The valves are placed in the slide F, which in this case has its runners H traveling on the top of the casing K, the said runners being adjustably connected by the set-screws I with the top of the slide F. Each of the valves E and E' is provided only at its ends with flanges  $E^4$ , fitting in corresponding recesses formed in the ends

of the slides F. (See Fig. 6.) The inner surfaces of the valves are the bearing-surfaces and fit onto the sides of the casing K, the cavities  $E^2$  being correspondingly formed on the insides of the valves; otherwise the operation is the same as above described.

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

1. In a balanced slide-valve, the combination, with the cylinder and a steam-chest provided in its side with inlet and outlet ports leading to the ports of the cylinder, of a slide fitted to slide in the said steam-chest, valves held on the sides of the said slide and controlling the ports in the sides of the said steam-chest, and the runners H, arranged in grooves  $F'$  in the bottom of the valve and sliding on the flat top surface of the cylinder, whereby the valve is held clear of such surface, substantially as shown and described.

2. In a balanced slide-valve, the combination, with a cylinder and a steam-chest having in its sides ports leading to the ports of the cylinder, of a slide fitted to slide in the said steam-chest, valves held in the sides of the said slide and having their outer surfaces inclined to fit on correspondingly-shaped surfaces on the sides of the said steam-chest, and centers held on the said slide for supporting the said valves, substantially as shown and described.

CYRUS EVERSOLE.

Witnesses:

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