

A. N. HADLEY.  
Balanced Valves.

No. 138,397.

Patented April 29, 1873.

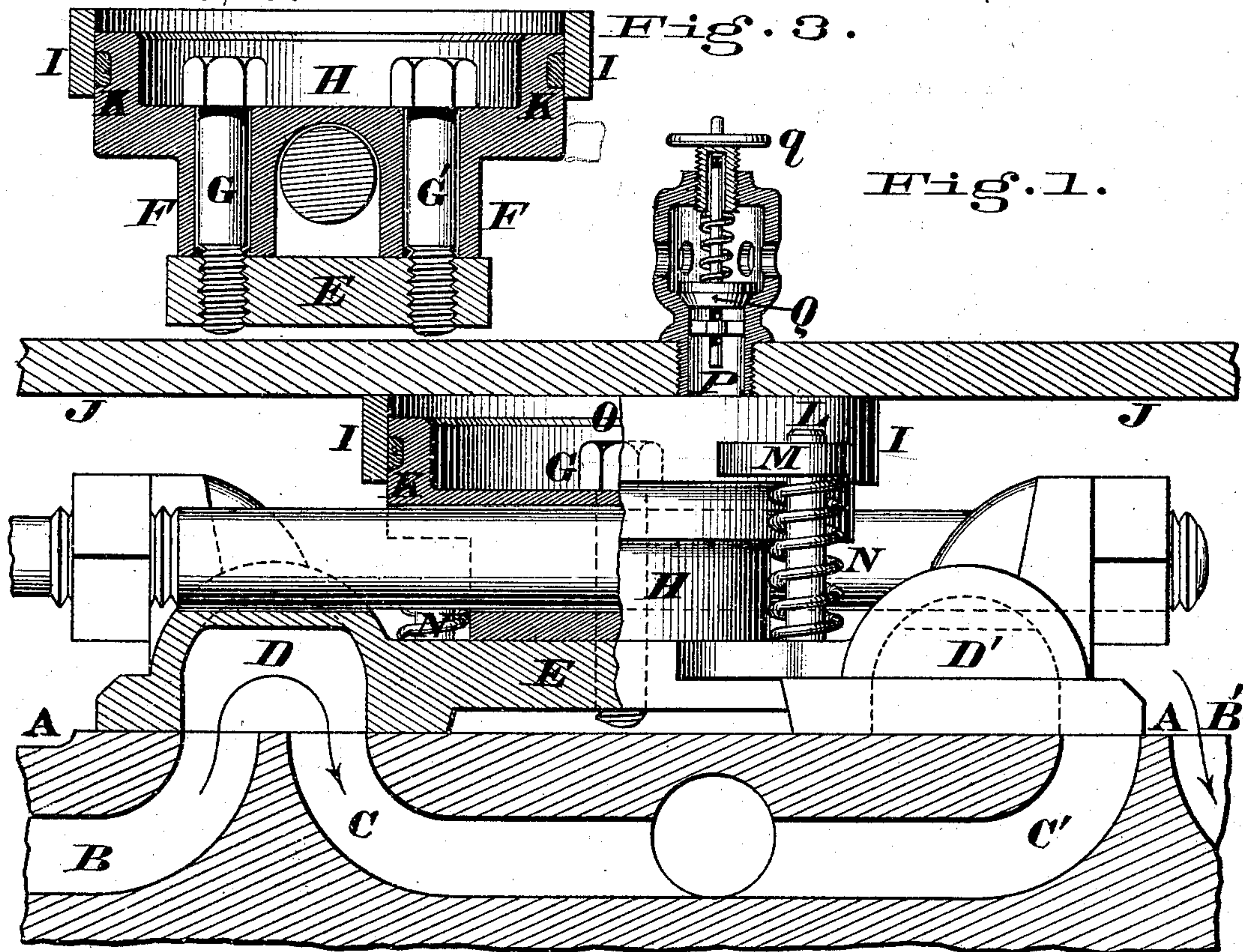
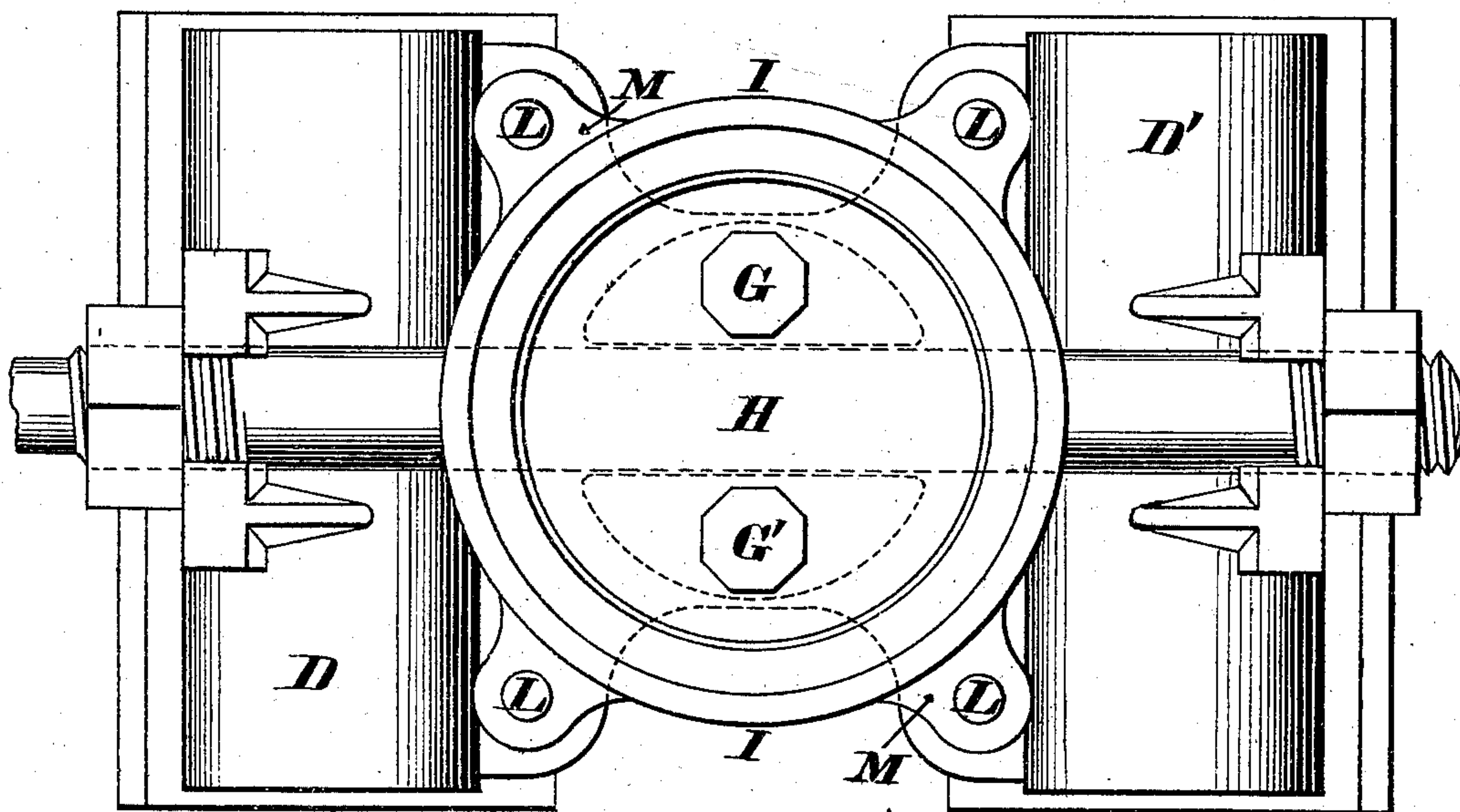


Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN BALANCED VALVES.

Specification forming part of Letters Patent No. **138,397**, dated April 29, 1873; application filed December 11, 1871.

*To all whom it may concern:*

Be it known that I, ARTEMAS N. HADLEY, of Richmond, Wayne county, Indiana, have invented a new and useful Improvement in Balanced Slide-Valves, of which the following is a specification:

This is an improvement in those slide-valves for steam-engines in which the service friction consequent on the steam pressure on the top of the valve is counteracted by the same pressure exerted in an opposite direction; and my invention relates specifically to devices for the proper adjustment and regulation of the counteracting appliances to suit the requirements of the engine, the pressure of steam, and other circumstances.

In the accompanying drawing, Figure 1 is a longitudinal section of a slide-valve embodying my improvements. Fig. 2 is a plan of the same. Fig. 3 is a transverse section at the mid-length of the valve.

My improvement is here shown applied to the customary double valve employed in conjunction with an exhaust-port and a steam-port near each end of the cylinder; but it is equally applicable to the form which has a single exhaust port or opening or for any other form.

A is the valve-seat having the customary steam-ports B B' and exhaust-ports C C'. D D' are the two inverted cups constituting the valve proper, and are connected by a plate, E, with which they may form one continuous casting. Connected firmly with the plate E, by means of columns F F' and bolts G G', is my counteracting piston H, which piston is fitted steam-tight, and plays freely within a short cylinder or ring, I, whose upper edge is ground to fit the polished under surface of the cap J of the steam-chest. The piston H is made steam-tight by metallic packing or by a fillet of soap-stone, K, or by any other suitable means. Stud L, which rise vertically from the plate E, occupy lugs M that project outwardly from the ring. Each stud is inclosed in a stout spiral spring, N, which springs collectively operate to hold the ring with sufficient force against the under surface of the cap to insure their mutual contact at

the instant of the admission of steam to the interior of the chest. In order to liberate the steam that slowly penetrates the chamber O between the piston H and the chest-cap I provide a small orifice, P, which, if left open, maintains a pressure within the said chamber corresponding to that of the atmosphere. This orifice may be provided with a cock, which, being more or less nearly closed, will enable the said escaping steam to compensate the lifting action of the piston to any degree required. I prefer, however, for this purpose to employ an adjustable pressure-valve, Q, which may be similar in every respect to the safety-valve of an ordinary locomotive. By means of the adjusting-nut q any desired counter pressure may be secured in the chamber O. In this preferred form of my device the piston H may be given an area somewhat in excess of the effective area of the slide-valve so as, when the orifice P is entirely open, to render said piston capable, when steam is admitted to the chest, of lifting the slide-valve entirely off of its seat so as to permit live steam to escape by the exhaust without effective action. This being observed, it will be the engineer's duty to partially close the regulating-valve until steam ceasing to escape begins to impel the engine, after which, so long as uniform pressure of steam is employed, the engine will continue to run with only so much excess of pressure on the outside of its valve as to insure proper contact with the seat. Should the pressure of live steam decrease, and the valve be observed to labor, relief can be instantly applied by relaxing the regulating-valve Q; or should there, from any excessive pressure of steam or other causes, be an escape of steam from the valve, such loss can be immediately remedied by partial closure of the said safety-valve.

I thus enable a slide-valve engine to run at all times practically free of friction.

A steam-pressure indicator on the chamber O and another one on the steam-chest may be employed to aid the engineer in regulating the above-described mechanism so as to prevent loss by friction on the one hand and by escape of steam on the other hand.

Although specifically intended and designed for the common slide-valve steam-engine, my invention is equally applicable to air-driven and other engines and pumps employing slide-valves.

*Claim.*

I claim herein as new and of my invention—  
The combination, with a steam-engine slide-

valve and steam-chest, of the piston H, floating ring I, and regulating valve or cock Q, substantially as and for the purpose set forth.

In testimony of which invention I hereunto set my hand.

ARTEMAS N. HADLEY.

Witnesses:

GEO. H. KNIGHT,

JAMES H. LAYMAN.