

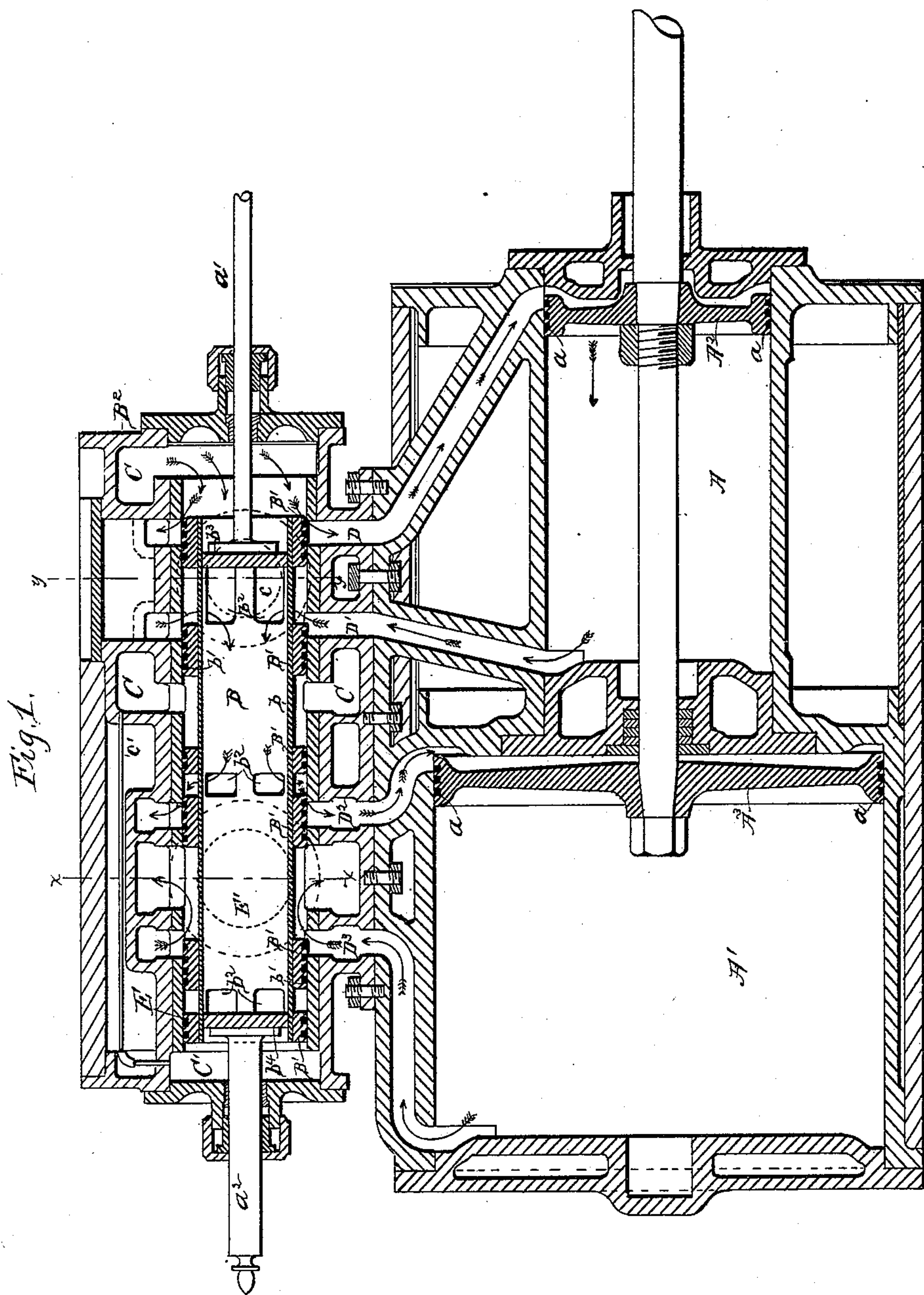
(No Model.)

2 Sheets—Sheet 1.

H. CANFIELD.
BALANCED VALVE FOR STEAM ENGINES.

No. 448,876.

Patented Mar. 24, 1891.



WITNESSES:

S. O. Edwards
Wm. M. Shiff

INVENTOR

Hobart Canfield
BY *Edwin H. Brown*
HIS ATTORNEY

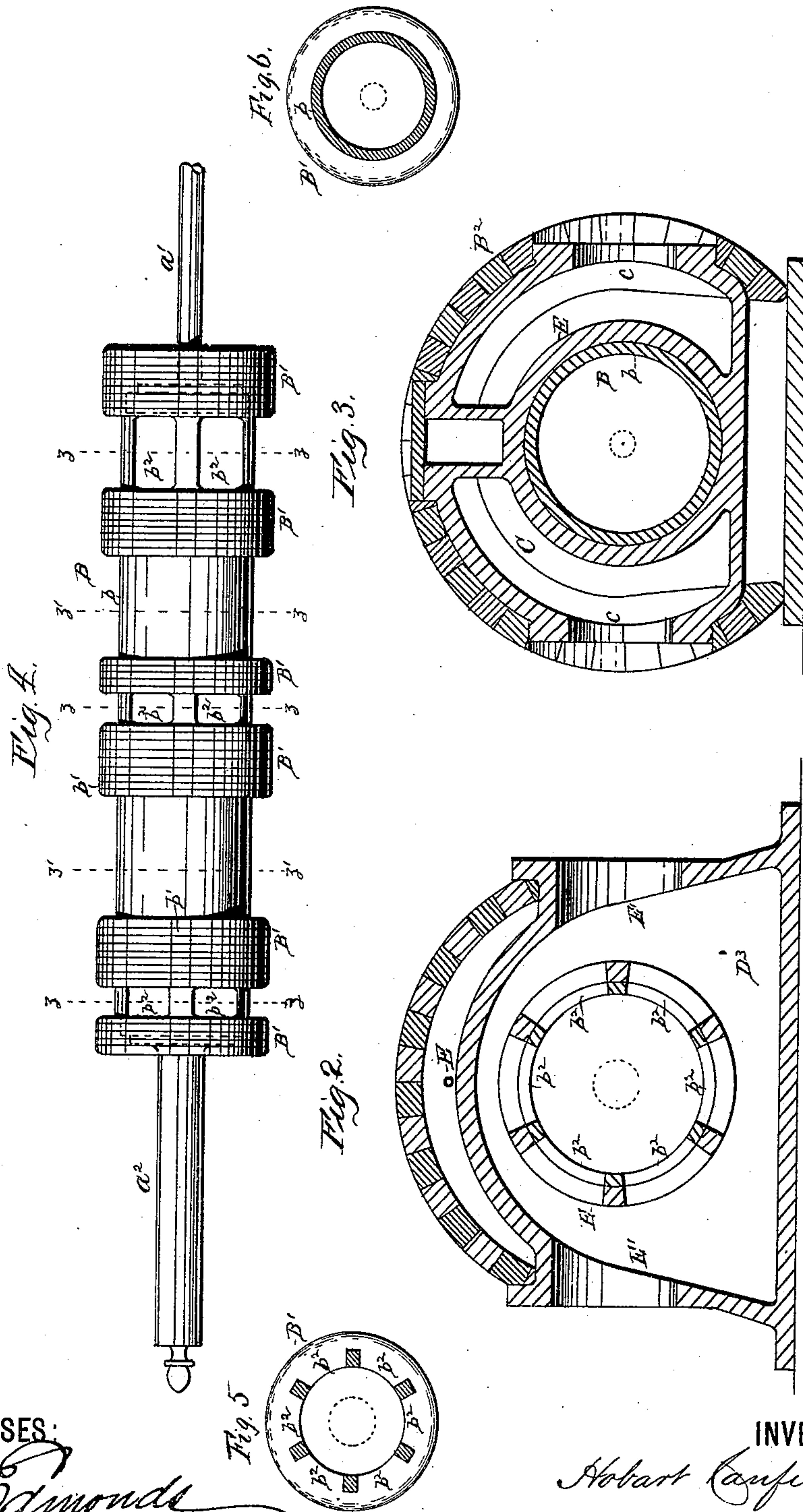
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UNITED STATES PATENT OFFICE.

HOBART CANFIELD, OF MORRISTOWN, NEW JERSEY.

BALANCED VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 448,876, dated March 24, 1891.

Application filed September 25, 1890. Serial No. 366,053. (No model.)

To all whom it may concern:

Be it known that I, HOBART CANFIELD, of Morristown, in the county of Morris and State of New Jersey, have invented a certain new and useful Improvement in Balanced Valves for Steam-Engines, of which the following is a specification.

This invention relates to balanced valves of the piston class employed in compound, marine, locomotive, and stationary engines; and it consists in the construction whereby the arrangement of ports is such that the communication between the high and low pressure cylinders is made by the movements of one valve and in a single steam-chest common to both the high and low pressure cylinders.

In the accompanying drawings, Figure 1 is a longitudinal section of a cylinder steam chest and valve embodying my improvement. Fig. 2 is a transverse section through xx of Fig. 1. Fig. 3 is a transverse section through the line yy of Fig. 1. Fig. 4 shows the valve. Fig. 5 is a section through either of the lines zz of Fig. 4, and Fig. 6 is a section through either of the lines $z'z'$ of Fig. 4.

Similar letters of reference indicate like parts in all the figures of the drawings.

Referring by letter to the drawings, A designates the high-pressure cylinder, and A' is the low-pressure cylinder on the same center line with the first-named cylinder. The cylinder A is provided with a piston A² and the cylinder A' has the piston A³. These pistons are connected together in the usual manner, and may be provided with the usual packing-rings a .

It may be here stated that the construction of the pistons and cylinders may be other than that shown; or, in other words, my invention may be applied to high and low pressure cylinders, either horizontal or vertical and of the various constructions now in use.

B designates the piston-valve, consisting, essentially, of the hollow cylinder b and the piston-rings B'. For the cylinder b I preferably employ steel or similar hard metal, and the piston-rings B' are preferably of softer metal—such as wrought-iron—shrunk onto the cylinder. Each of the piston-rings B' may be provided with annular channels, into which metal packing-rings b' are fitted and properly doweled to break joints. Port-openings b^2

extend through the cylinder b between certain of the piston-rings B'. The openings b^2 for the passage of live steam are shown as larger than the other openings b^2 . Closures or heads b^3 b^4 are provided at the respective ends of the cylinder b . From the closure b^3 a valve-rod a' extends through a head of the valve-casing B² to connect with any well-known driving mechanism, whereby a reciprocating longitudinal movement is imparted to the piston-valve. From the closure b^4 a tail piece or rod a^2 extends through the other head of the valve-casing B². The casing-heads may be provided with stuffing-boxes and glands, within which the rods a' a^2 operate.

C designates the steam-chest, into which steam may be admitted through the opening or openings c . As shown in the drawings, the steam-chest C is located over or opposite the high-pressure cylinder A, and a steam-chest C' is located over or opposite the low-pressure cylinder A'. The steam-chest C has communication for live steam with the steam-chest C' through a small duct or pipe c' , and the latter steam-chest is provided for the purpose of receiving steam to bear against the head or closure b^4 , while steam in the chest C bears against the opposite end of the valve, whereby an equal pressure is established at both ends of the valve to maintain a perfect balance.

In the drawings I have shown the tail rod a^2 as of larger diameter than the rod a' , thus reducing the bearing area at that end of the valve, and thus compensating for the weight of the valve and valve-rod. This construction, however, need be employed only when the valve is used with a vertical compound engine. In a horizontal cylinder the tail rod and valve-rod may be of the same diameter, and its main use is to keep the valve central and relieve the weight on the packing-rings of the piston-rings.

D D' D² D³ designate steamways or ports, providing for the entrance of steam to the high-pressure cylinder and for the exhaust therefrom to the low-pressure cylinder. The liner E is also provided with ports communicating with the ports D D' D² D³.

In the drawings, Fig. 1, it will be seen that the pistons A² A³ are about to be moved in the direction indicated by the arrow adjacent

to the piston A^2 , and the various arrows show the course of the steam and exhaust. For instance, steam is admitted to the high-pressure cylinder through the port D , the exhaust 5 passes from the high-pressure cylinder through the port D' to the interior of the valve by way of ports b^2 and through the port D^2 into the low-pressure cylinder, and the exhaust from the low-pressure cylinder 10 escapes through the port D^3 to an exhaust-outlet E' . Of course when the direction of the valve movement is reversed the live steam is admitted to the high-pressure cylinder through the port D' , and the exhaust is 15 through the port D into the low-pressure cylinder through the port D^3 , the exhaust therefrom being through the port D^2 .

By reference to Figs. 2 and 3 it will be seen that the requisite increase of area for the admission of low-pressure steam is gained by 20 enlarging the ports D^2 D^3 transversely to the length of the cylinders.

Having described my invention, what I claim is—

25 1. The combination, with high and low pressure cylinders having ports substantially such as described, of a steam-chest arranged

above or opposite the high-pressure cylinder, another steam-chest arranged above or opposite the low-pressure cylinder and communicating with the first-named steam-chest 30 through a conduit of reduced area, and a reciprocating hollow piston-valve having ports allowing the passage of steam through its interior and receiving a pressure of steam at its 35 ends within said steam-chests, substantially as specified.

2. The combination, with the cylinders, the valve-casing, and the steam-chests, of the reciprocating hollow valve having the end closures, a valve-rod extending from one of said 40 closures, and a tail rod extending from the other of said closures, the said tail rod having a greater diameter throughout its length than the valve-rod, whereby the pressure area 45 on that end of the valve is decreased, substantially as specified.

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

HOBART CANFIELD.

Witnesses.

C. R. FERGUSON,
S. O. EDMONDS.