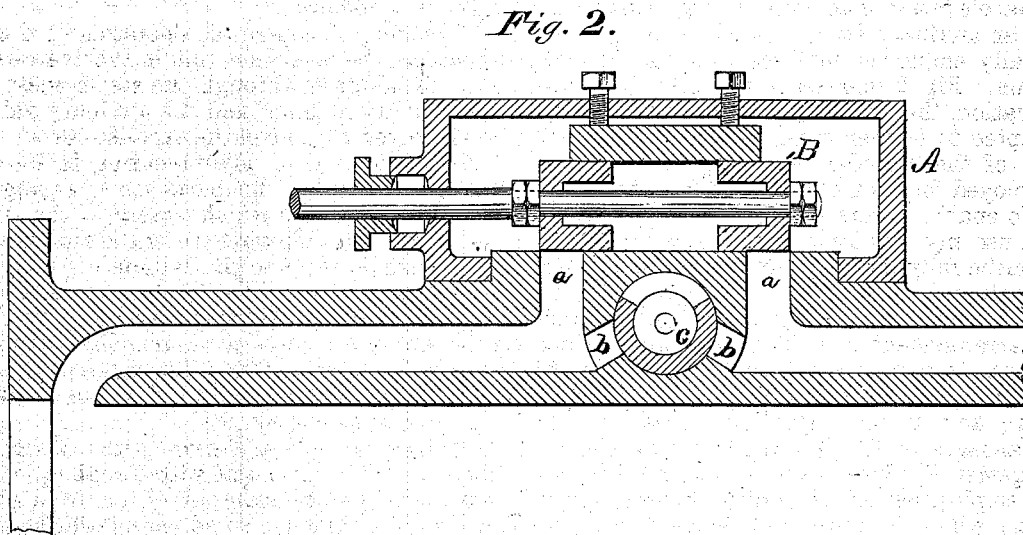
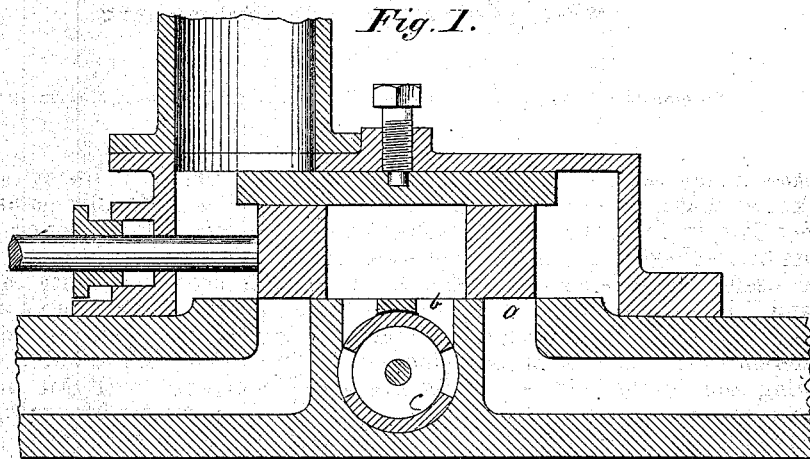


JOHN C. WOODHEAD.
Improvement in Steam-Engines.

No. 115,145.

Patented May 23, 1871.



Witnesses:

E. Greenaway
W. B. Raymond

Inventor

John C. Woodhead, by
H. M. Beadle, atty

UNITED STATES PATENT OFFICE.

JOHN C. WOODHEAD, OF ALLEGHENY CITY, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 115,145, dated May 23, 1871.

To all whom it may concern:

Be it known that I, JOHN C. WOODHEAD, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawing and to the letters of reference marked thereon.

This invention consists mainly in so constructing and combining two valves that one of them shall supply steam alternately to each end of the cylinder, while the other is employed for controlling the exhaust. It further consists, also, in certain modifications and in certain details of construction, which will be fully described hereinafter.

In the drawing, Figure 1 represents a sectional elevation of an ordinary slide-valve, having an auxiliary valve located in the chamber usually employed for receiving the exhaust steam. Fig. 2 represents a similar sectional elevation, the auxiliary valve, however, being adapted to deliver steam alternately to each end of the cylinder, while the side-valve is employed for controlling the exhaust.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

The object of this invention is to produce an arrangement of valves for engines which shall be very simple in construction, and not exceed in cost, materially; the ordinary slide-valve, and at the same time possess all the advantages of the best modern fan-valve arrangements. This result is accomplished by the employment of an additional or auxiliary valve, which is preferably located below the slide-valve in the chamber ordinarily provided for the exhaust steam.

A, Fig. 2, represents a steam-chest, which is provided with a valve, B, of any proper construction. C represents the auxiliary valve located beneath the main valve in the passage ordinarily used for receiving the exhaust steam, the latter being adapted for its reception, as shown. *aa* represent the ports of the main valve, arranged in the usual well-known manner. *b* *b* represent the ports of the auxiliary valve, through which live steam from the boiler is

admitted directly to the cylinder. The auxiliary valve is preferably connected to the governor by any suitable devices, by which means its delivery of steam to the cylinder is controlled in accordance with the varying speed of the governor. The valve, also, besides having the usual reciprocating motion, is preferably provided with suitable catch or detent gear connected with the governor. It has also a connection with springs, weights, or a small steam-piston, which closes the valve when the catch or detent gear is liberated by the action of the governor on the slightest acceleration of speed. It thus always operates to close the steam-valve dead when the load or resistance on the engine diminishes instead of partially closing the throttle-valve, as in the ordinary engine. The throttle-valve is dispensed with in all engines where the steam-valve is automatic.

If desired, of course the operation of these valves may be reversed—that is, the live steam may be admitted through the steam-chest in the ordinary manner, and the auxiliary valve be employed to control the exhaust-ports.

A modification of my invention is shown in Fig. 1, in which the parts are so arranged that the live steam which enters by the auxiliary valve is delivered to the main valve, which distributes it to the cylinder.

By means of my invention I am enabled to obtain all the advantages possessed by the most elaborate valve arrangements, without materially increasing the cost of the ordinary slide-valve, the throttle-valve and its connections being dispensed with.

I obtain variable expansion with invariable exhaust. The steam is admitted at about boiler pressure, and thus the loss of fuel from wire drawing is avoided, a steady and uniform motion is obtained, and a saving of fuel effected.

The valves are simple and inexpensive in their construction, and are not liable to get out of order.

Other forms of valves may be employed, for I do not limit myself to any particular form of valve or arrangement of valve-gear, nor do I confine myself to a single cylinder; but

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

1. An auxiliary valve, arranged in the ex-

haust-chamber, in combination with the main valve, substantially as described.

2. The combination of the single induction-valve supplying steam directly to each end of the cylinder, with an eduction-valve controlling only the exhaust-ports, substantially as described.

3. The combination of the valves B and C,

having the ports *a a b b* relatively arranged, as described.

This specification signed and witnessed this 4th day of March, 1871.

J. C. WOODHEAD.

Witnesses:

D. NEILLIE,

H. ISHEN.