J. G. West, Jr.,

Steam-Engine Valve-Gear,

No. 33,561. Patented Oct. 22, 1861.

Fig. 1.

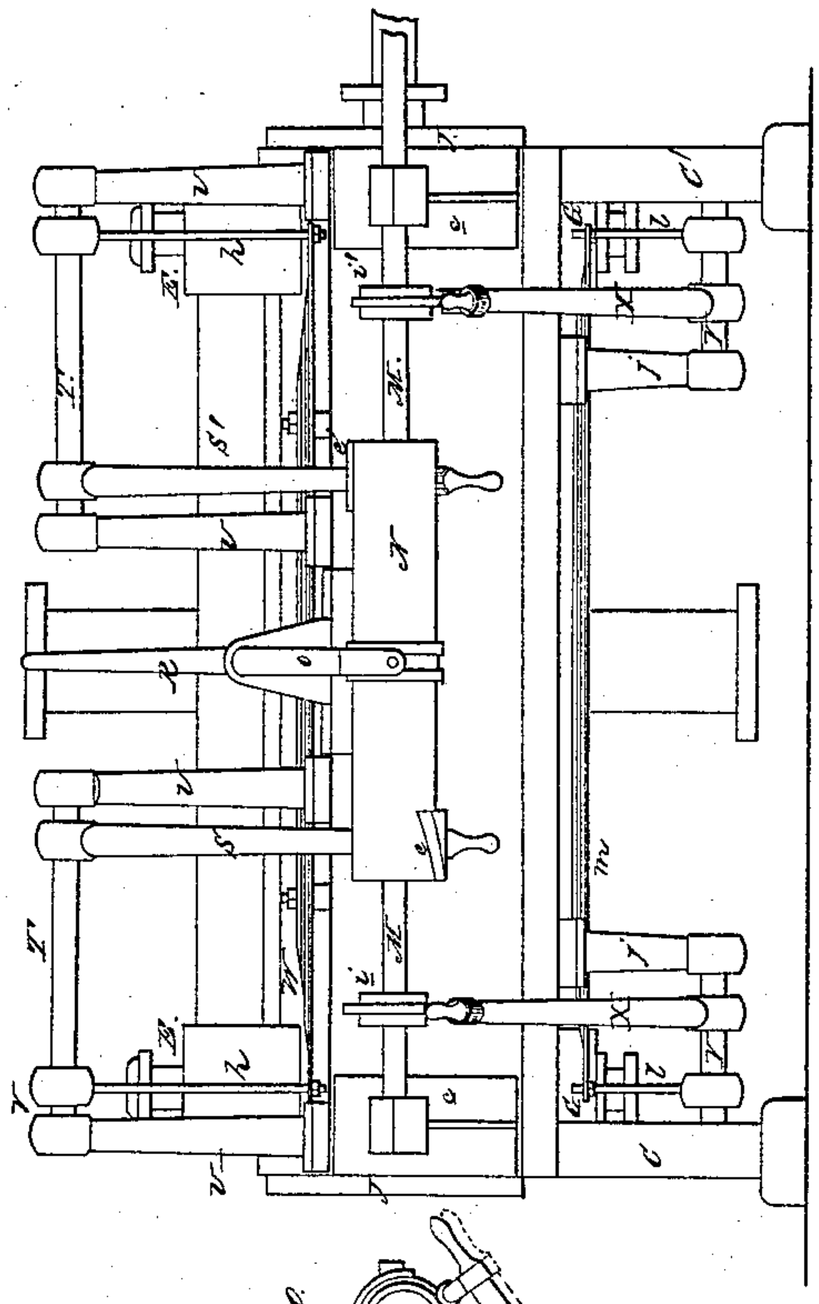


Fig. 2.

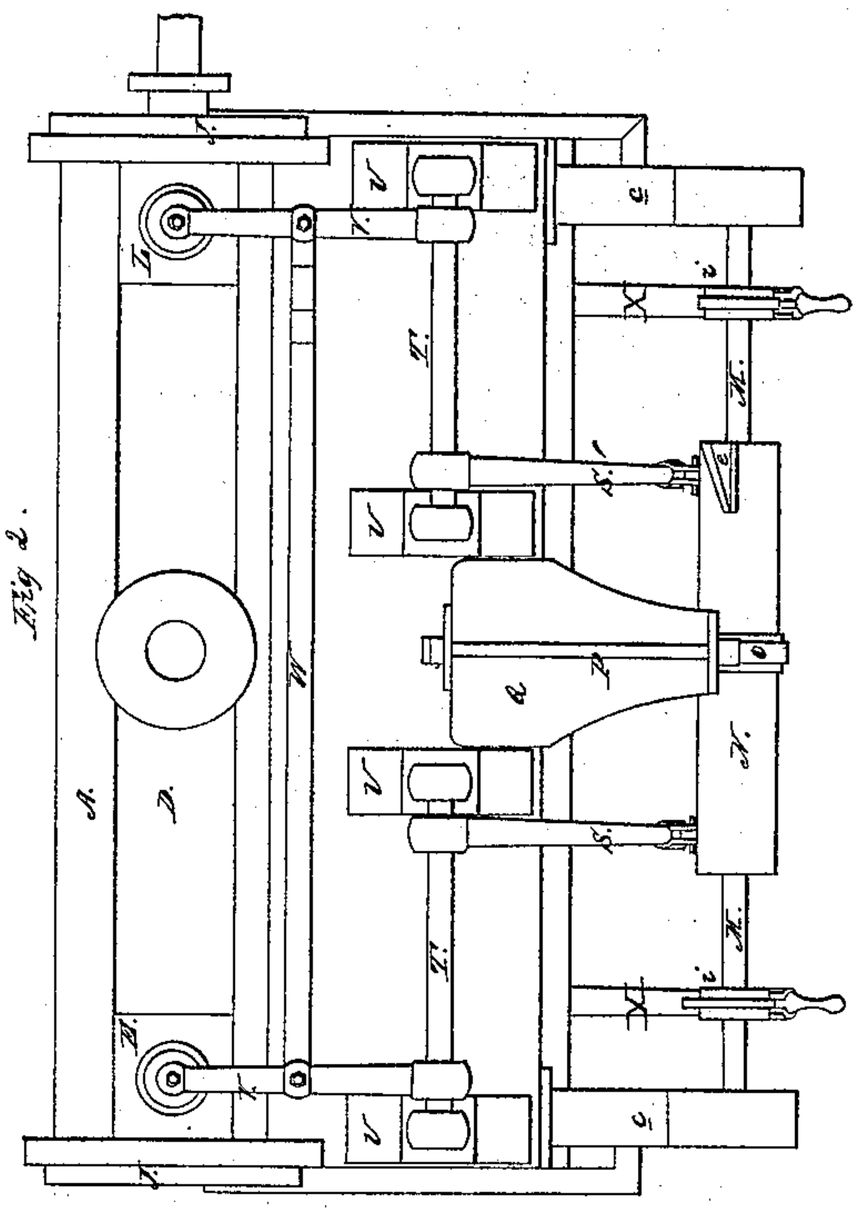


Fig. 3.

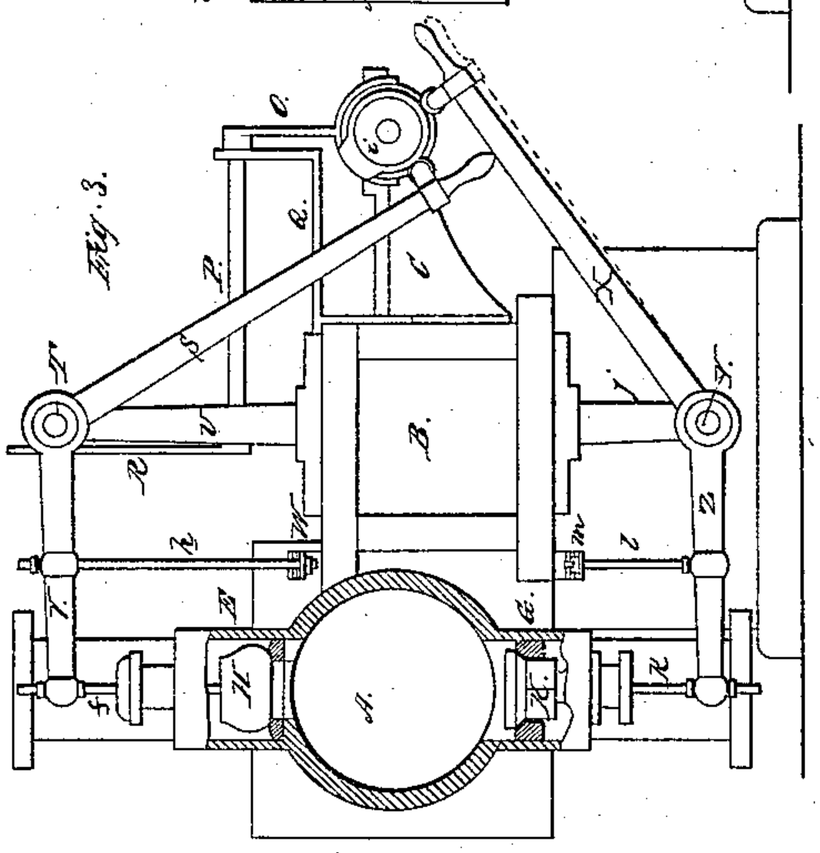
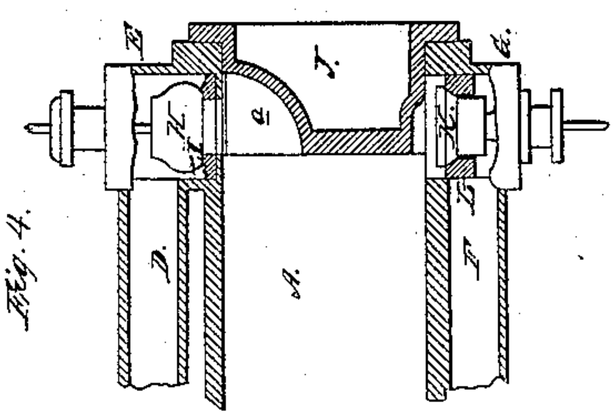


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN G. WEST, JR., OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO JANE H. WEST AND M. C. BOYER, OF SAME PLACE.

IMPROVEMENT IN VALVES AND VALVE-MOTIONS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **33,561**, dated October 22, 1861.

To all whom it may concern:

Be it known that I, JOHN G. WEST, Jr., of Norristown, Montgomery county, Pennsylvania, have invented certain Improvements in Valves and Valve-Motions for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists, first, of an improved arrangement, described hereinafter, of steam and exhaust valves with their seats and chests in respect to the cylinder, whereby a ready and correct application and adjustment of the valves is effected and the usual waste of steam as well as the retention of the exhaust-steam in the cylinder are for the most part obviated; secondly, of a certain arrangement and combination of devices, described hereinafter, for operating the steam-valves; thirdly, of a certain arrangement in combination of devices described hereinafter, for operating the exhaust-valves.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a side view of my improved arrangement of valves and valve-motion for steam-engines; Fig. 2, a plan view; Fig. 3, an end view, partly in section; and Fig. 4, a longitudinal section of part of the cylinder, showing the peculiar arrangement of valves.

Similar letters refer to similar parts throughout the several views.

A represents the steam-cylinder secured to the frame B, which rests on suitable legs C and C′.

D is the steam passage or pipe, one end of which communicates with the steam-chest E of the rear steam-valve, the opposite end communicating with the similar chest of the front steam-valve.

F is the exhaust passage or pipe, one end of which communicates with the chest G of the rear exhaust-valve and the opposite end with the similar chest of the front exhaust-valve. The peculiar arrangement of these chests with their valves and seats in respect to the end of the cylinder and its covers will be best observed on reference to Figs. 3 and 4.

The steam-valve H is of the class termed "balance" or "double-beat," the construction of which is too well known to engineers to require minute explanation. The seat of this valve H is on a plate I, secured to the bottom of the steam-chest E at a point as near to the cylinder's bore as possible, the cylinder-cover J being recessed or cut away at *a*, so as to allow for the free passage of steam into the cylinder through the opening of the seat I when the valve is raised.

The exhaust-valve K is in the present instance of the class generally known as "conical valves," although in the larger class of engines it may be advisable to use a double-seat valve. The seat of this valve K is on a plate L, secured to or formed within the chest G, and so situated as to be as near as possible to the cylinder's bore, the cover J being recessed or cut away at *b* immediately above the valve, so that on raising the latter the free outlet of steam from the cylinder toward the opening of the seat may not be obstructed

The front steam and exhaust valves with their respective chests and passages are arranged in a manner precisely similar to that above described.

M is a horizontal shaft operated by the crank-shaft of the engine and turning in suitable brackets *c c*, secured to the frame-work B, and on this shaft a sleeve N is so arranged as to slide freely on, but to turn with the shaft. The sleeve has a central groove *d* for receiving pins attached to the forked lever O, which is secured to the shaft P, the latter turning in projections on a plate Q, which is attached to the frame B, and the opposite end of the shaft having an arm R, connected by any suitable system of screws, rods, or levers to the governor, which thus controls the position of the sleeve on the shaft. On the sleeve are two inclined projections *e* and *e′*, the former for operating the arm S, secured to a horizontal shaft T, which turns in the standards U U on the frame B, another arm V on the same shaft being connected to the spindle *f* of the rear steam-valve, as well as to one end of the spring W, by a rod *h*, this spring being secured to the frame B and serving the purpose of depressing the

steam-valves after they have been raised. The inclined projection *e'* of the sleeve operates the arm S' and through the medium of appliances precisely similar to those described above operates the front steam-valve of the engine.

On the shaft M are secured the two cams *i* and *i'*, the former for operating an arm X on the shaft Y, which turns at one end in one of the legs C of the frame and at the opposite end in a pillar *j*, secured to the under side of the frame, another arm Z being secured to this shaft, and this arm being connected to the spindle *k* of the rear exhaust-valve K, as well as to one end of a spring *m*, by means of a rod *l*, the spring being secured to the under side of the frame B and serving the purpose of depressing the exhaust-valve after it has been raised.

As the engine is in operation a continuous rotary motion will be imparted to the shaft M and its sleeve N, on which the projections *e* and *e'* are so situated as to raise the front and rear steam-valves alternately and at the proper time through the medium of the levers described above. As the side of each of the projections *e* and *e'* which bears against the roller on the end of the lever S is inclined, it will be evident that the length of time during which the steam-valves remain open will depend upon the position which the sleeve has been caused to assume on the shaft M, by the movements of the governors, the quantity of steam admitted into the cylinder will therefore depend upon the speed of the engine.

In all steam-engines it is most desirable that both steam and exhaust valves should be situated as close as possible to the cylinder's bore, so as to prevent in the case of the steam-valve the loss of steam remaining in the usual lengthy passages at every movement of the valve, and in the case of the exhaust-valve to prevent the retention of an inconvenient amount of waste steam in the cylder after the exhaust-valve has closed. It will be seen that this important end is attained by the peculiar arrangement of the valves, their seats, and chests on the opposite ends of the cylinder, as best observed on reference to Fig. 4, the seats of both valves being situated so near to the rear of the cylinder that the above-described evils are obviated to a great extent.

Another advantage of the above-described arrangement of valves is the facility and accuracy with which they, as well as their seats, can be applied and adjusted. When the cover J is removed from the cylinder and the covers and valves are withdrawn from the chests a clear opening is presented for the insertion of a boring-bar at right angles to the cylinder through both steam and exhaust chests, thereby enabling the constructer to bore and level off the valve-seats with the greatest accuracy.

It will be evident that the chests and valves may be arranged on the sides of the cylinder as well as above and below the same without departing from the main features of my invention.

I wish it to be understood that I do not desire to claim, broadly, the use of revolving and sliding sleeve N, with its inclosed projections and controlled by the governor for operating the steam-valves, such a device having been heretofore used; but

I claim as my invention and desire to secure by Letters Patent—

1. The arrangement herein described of the steam-valves H, with their seats and chests, and the exhaust-valves K, with their seats and chests, in respect to the cylinder, for the purposes specified.

2. The arrangement and combination herein described of the shaft M, the sleeve N, with its projections *e* and *e'*, the levers S and Y, and steam-valves H.

3. The arrangement and combination herein described of the shaft M, its cams *i* and *i'*, the levers X and Z, and the exhaust-valves K.

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

JOHN G. WEST, JR.

Witnesses:
HENRY HOWSON,
JOHN WHITE.