# J. Wilder,

## Steam-Engine Valve-Gear.

No. 1,929. Patented Jan. 9, 1841.

Fig. 5

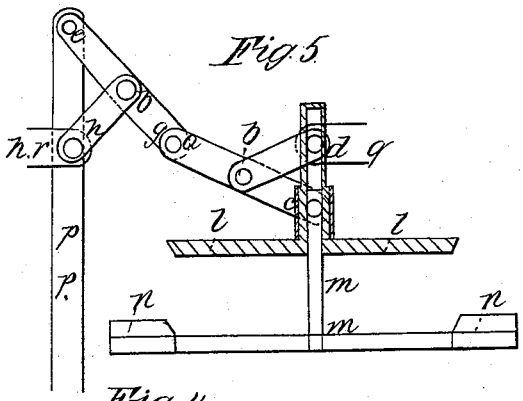


Fig. 6

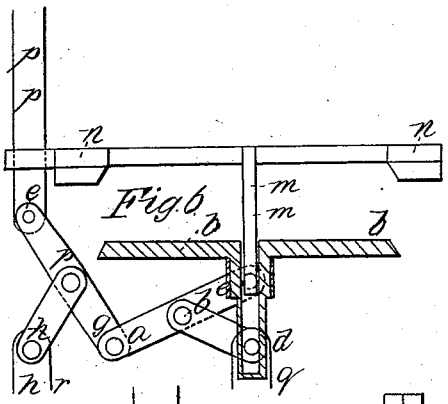


Fig. 4

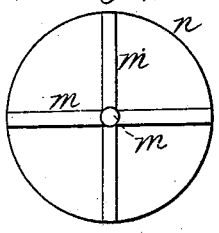


Fig. 2

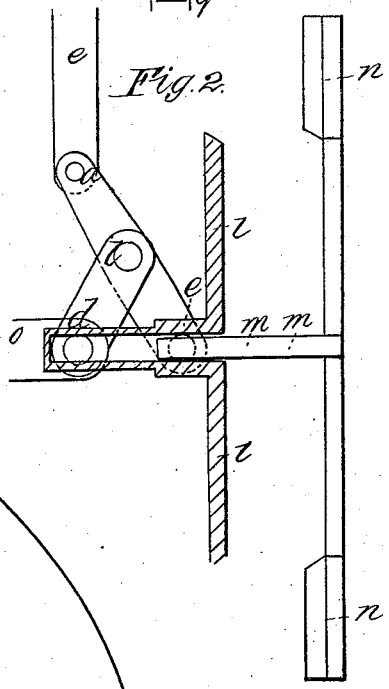
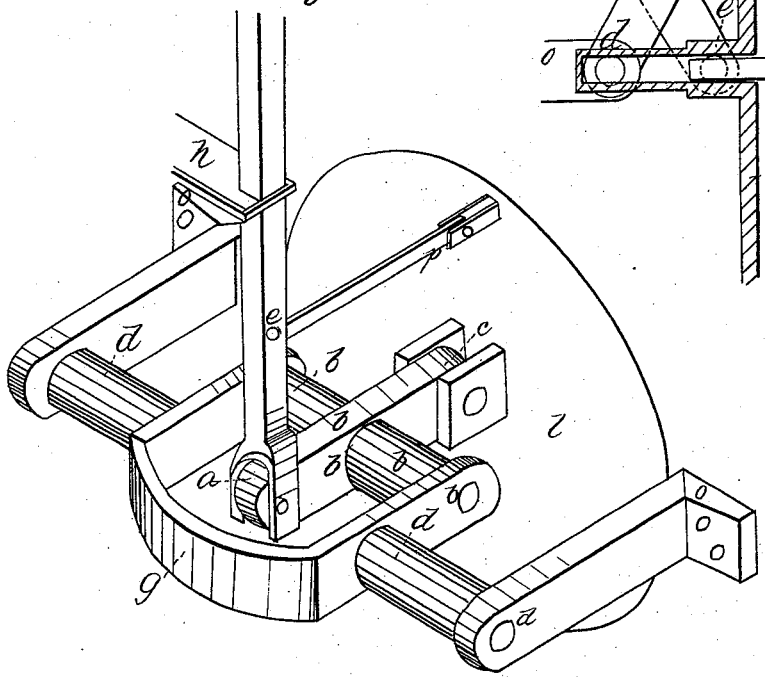


Fig. 1



# UNITED STATES PATENT OFFICE.

JOHN WILDER, OF NEW YORK, N. Y.

## MODE OF OPERATING VALVES OF STEAM-ENGINES.

Specification of Letters Patent No. 1,929, dated January 9, 1841.

*To all whom it may concern:*

Be it known that I, JOHN WILDER, of the city and county of New York, State of New York, ship-joiner, have invented a new Method or System of Operating Working-Valves of Steam-Engines, by means of which the valve-seats may be let directly into the ends of the cylinder and the eduction-valves may be opened outward as respects the inside of the cylinder and the valves be shut and held to their seats by means of a combination of the lifting rod and certain levers as is hereafter described.

And I further say that in its most simple form the said combination or system of levers may consist of a principal lever of which one end is attached by a vertical joint to the lifting rod and the other end attached by a like joint to the axis of the valve, and a second lever composed of two similar and parallel pieces one on each side of the principal lever and attached to its center by a vertical joint, the other end of the second lever attached by like joints to cheeks fixed at the angle at which the central lines of the lifting rod and the valve axis produced, intersect each other, as the same is shown at Figure 2, a representation of a vertical section of the system wherein the valve and its hollow axis the central spindle on which the valve moves and the valve-seat are shaded and the lifting rod the cheeks and levers are shown in outline. *a*, *e* Fig. 2, the lifting rod attached by a certical joint to the principal lever at *a*, *a*, *b*, *c*, the principal lever attached by a vertical joint at *c*, to the axis of the valve *c*, *l*. *b*, *d*, the second lever attached by a vertical joint to the principal lever at *b*, and by a like joint to the cheeks *d*, *s*, at *d*. With this construction it is manifest that if the lifting rod *a*, *e*, be moved in direction of its length toward *d*, the lever *a*, *b*, *c*, will act on the valve *c*, *l*, to move it in direction perpendicular to its face, upon the central spindle *m*, *m*, toward the valve seat, *n*, *n*, and if it be shut thereto and the lifting rod rests on the principal lever, the valve will be held to its seat by a force determined conjointly by the weight of the lifting rod and the angle made by the principal lever, *a*, *b*, *c*, and the axis of the valve, *c*, *l*.

Fig. 1. An isometrical representation of the new arrangement or system; the valve shown as if shut to its seat and the hood, as that part of the eduction chest or pipe which covers the valve seat is termed, altogether removed.

The principal lever *a*, *b*, *c*, attached by a vertical joint to the lifting rod at *a* and by a like joint at *c*, to the cheeks projecting from the center of the valve *l*. The second lever composed of an axis *d*, *d*, working into the cheeks at *d*, *d*, and of two similar pieces *b*, *d*, *b*, *d*, connected to the axis *d*, *d*, and curved and connected to each other at *g*, to clear the lifting rod, the axis of the principal lever *b*, *b*, working into the arms of the second lever at *b*, *b*. The cheeks *d*, *c*, *d*, *c*, prolonged and bolted at *c*, *c*, to the ends of the horizontal cylinder.

The small lever *e*, *f*, of the exact length of the principal lever *a*, *b*, *c*, is attached by vertical joints to the lifting rod at *e*, and at *f*, to the arm *f*, projecting from the upper edge of the valve, so as to be constantly parallel to the principal lever, and to keep the face of the valve always parallel to its seat, the lifting rod *a*, *e*, slides freely in direction of its length through the guide *h*.

With the foregoing construction it is plain that if the lifting rod, *a*, *e*, be moved in direction of its length from *d*, *d*, the valve *l*, will be opened and moved toward *d*, *d*, and if the valve be shut and the lifting rod rests on the principal lever *a*, *b*, *c*, at *a*, the valve will be held to its seat by a force which is to the weight of the lifting rod inversely as the size of the angle made by the principal lever and the valve axis to its cosine.

The following measures and proportions are given for a single acting horizontal engine (I have included all engines in the denominations horizontal and upright) the diameter of the cylinder inside 26 inches, diameter of the valve in the clear opening 7 inches, length of principal lever from *a*, to *c*, $3\frac{1}{2}$ inches; width $1\frac{1}{8}$ inches; thickness, $\frac{5}{8}$ of an inch; length of second lever $1\frac{3}{4}$ inches from *b* to *d*; width $1\frac{1}{8}$ inches; thickness of each arm $\frac{3}{8}$ of an inch, diameter of axes of first and second levers 1 inch, diameter of axis in the journals at *a*, *b*, and *d*, $\frac{9}{16}$ of an inch, diameter of pin at *a*, $\frac{3}{8}$ of an inch, width of cheeks 2 inches, thickness $\frac{5}{8}$ of an inch, length from *d*, to *c*, 4 inches, the cheeks to stand at right angles to the valve seat and to the lifting rod, which is parallel to the valve seat, length of small lever, *e*, *f*, $3\frac{1}{2}$ inches width $\frac{1}{2}$ inch thickness $\frac{1}{4}$ of an inch and jointed to the lifting

rod at *e* and to the arm at *f*, so as to be always parallel to the principal lever. The angle made by the principal lever and the axis of the valve when shut may be from one to two degrees or more at pleasure, in general the angle and the weight of the lifting rod may be so determined as that the eduction valve may be held to its seat by a force double of any calculated resistance on the other side of the valve. If it is wished to move the valve very quick the lifting rod may be jointed to the principal lever in any part of its length toward *c*, or if it is desired to move it slowly the principal lever may be prolonged, but such variations produce an angular motion both of the lifting rod and the valve axis, which must in most cases be corrected by guides.

Fig. 5, represents a vertical section of the arrangement for the top of an upright cylinder, wherein a second system of levers is applied to the first, the valve with its hollow axis, the central spindle and the valve seat shaded, the levers *a*, *b*, *c*, and *b*, *d*, and *e*, *f*, *g*, and *f*, *h*, the lifting rod *e*, *p*, and the cheeks *d*, *g*, and *h*, *r*, shown in outline. The valve *l*, *l*, moves to or from the valve seat *n*, *n*, on the central spindle *m*, *m*, as a guide.

Fig. 6 represents a vertical section of the arrangement for the bottom of an upright cylinder wherein a second system of levers is applied to the first, the valve with its hollow axis, the central spindle and the valve seat shaded, the levers *a*, *b*, *c*, and *b*, *d*, and *e*, *f*, *g*, and *f*, *h*, the lifting rod *e*, *p*, and the cheeks *d*, *g*, and *h*, *r*, shown in outline the valve *l l* moves to or from the valve seat *n*, *n*, on the central spindle *m*, *m*, as a guide. In other respects the arrangement of Nos. 5 and 6, may be similar to No. 2. Fig. 4 shows the opening of the valve seat, *n*, *n* and the manner in which the bars *m*, and *m*, cross each other at *m* where the central spindle *m*, *m*, Figs. 2, 5, and 6, is fixed.

It is plain that the construction and proportions of the levers may be raised but these given are considered best. The arrangement of the lifting rod and levers is shown as if inside of the eduction pipe or chest, into which the rocking shaft by which the lifting rod is commonly worked may pass in the same manner that the axis of the common throttle valve passes into the steam pipe as is manifest.

I do not claim any new method of working the lifting rod by means of the rocking shaft or otherwise.

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

The combination of the lifting rod *a*, *e*, principal lever, *a*, *b*, *c*, and the second lever *b*, *d*, with the eduction valve *l*, the whole being constructed, combined and operating substantially in the manner set forth.

JOHN WILDER.

Witnesses:

D. S. Ellsworth,

Edward L. Bodett.