C. Richardson,

Steam-Engine Valve-Gear,

No. 7,350. Patented May 7, 1850.

Fig 1.

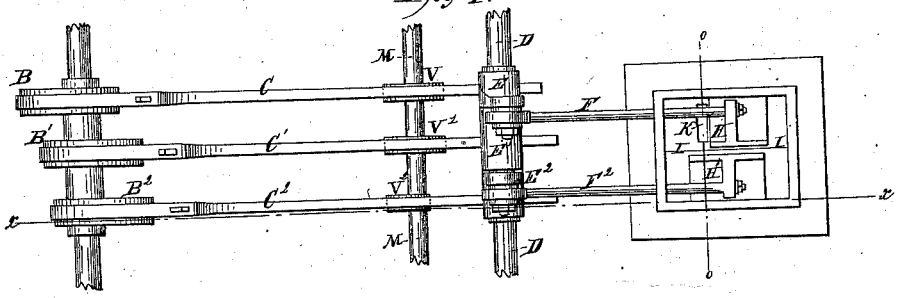


Fig 3.

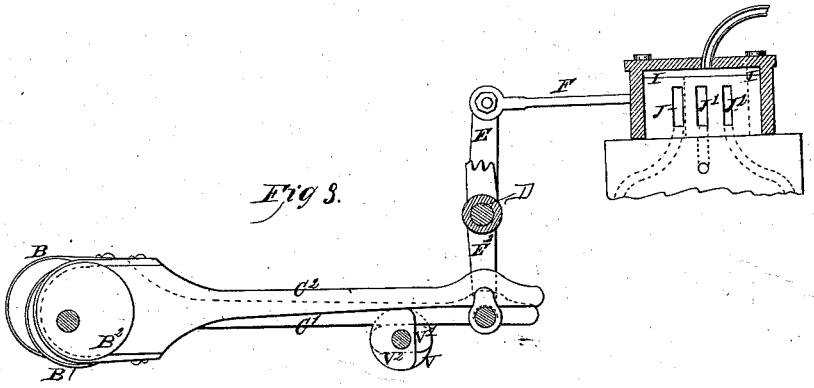


Fig 2.

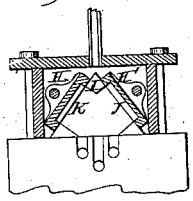
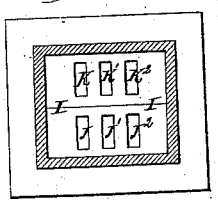


Fig 4.



UNITED STATES PATENT OFFICE.

CYRUS RICHARDSON, OF WOBURN, MASSACHUSETTS.

ARRANGEMENT OF SEVERAL SLIDE-VALVES IN THE SAME STEAM-CHEST.

Specification of Letters Patent No. 7,350, dated May 7, 1850.

To all whom it may concern:

Be it known that I, CYRUS RICHARDSON, of the town of Woburn, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Arranging Valves for Locomotives and other Engines, called "Richardson's Improved Arrangement of Valves," which is described as follows, reference being had to the annexed drawings of the same making part of this specification.

Figure 1 is a plan of the valves, eccentrics, &c., the cap plate of the steam chest being removed in order to exhibit the interior of the steam chest. Fig. 2 is a vertical cross section on the line *o*, *o*, of Fig. 1, the cap plate being in its proper position. Fig. 3, is a longitudinal section on the line *x*, *x*, of Fig. 1, the cap plate being in its place. Fig. 4 is a plan of the steam chest, the cap and valves H, H′, being removed in order to show the openings in the valve seat.

Similar letters in the several figures refer to like parts.

My improved arrangement consists in making two or more valve seats in the same steam chest, with a valve cup to each seat, one of which is made in the usual form, and is used when the engine has to draw its ordinary load, and the valve cups to the other seats are made of various lengths longer than is usual and are used when the engine has less than its ordinary load, and graduates the quantity of steam used as to apportion it in some measure according to the load, and thus enables the engineer to economize, or reduce the quantity of fuel used to generate the steam. This is effected by stopping the ingress of the steam into the cylinder when the cylinder is one third, one half, or partially filled with steam; and by this means the expansive force of the steam is gained.

In the drawing accompanying my application I have represented similar valve seats upon, and wavs through the sides of a triangular bed plate, or prism, represented in the drawings at I, the valve cup H is intended to work a full stroke of steam and is arranged upon one side of the aforesaid triangular bed plate, and is operated by the usual kind of machinery used for that purpose, such as eccentrics B, B′ eccentric hook rods C, C′, vibrating lever beam E, rock shaft D, valve rod F, F^2, cam shaft M, and lifting cams V, V′, for disengaging the eccentric rods C, C′, from the lever E, all of which may be made and operated in the usual manner to change or stop the motion of the valve cup.

The valve cup H′ is intended to work a half stroke of steam, that is to say, stop the ingress of steam into the cylinder, when the cylinder is half full and the piston is at or near the middle of the cylinder and thus allow the steam to act with its expansive force upon the piston, while the piston is moving from the middle to the end of the cylinder; this is effected by making the valve H′ longer and sliding it double the distance that the valve H slides, which is effected by making the sweep of the eccentrics B^2 twice as long as the eccentrics B, B′, so that when the piston arrives at the center of the cylinder the valve closes and shuts or cuts off the steam upon that side of the piston until the next stroke. The valve H′ is connected to the eccentric B^2 by the eccentric hook rod C^2, lever E^2 valve rod F^2. The cam V^2 is designed for disengaging the hook rod C^2, and is operated in the usual manner.

The operation of the common slide valves in steam engines being so well known as to require no farther description, I shall therefore proceed to describe the operation or mode of changing the engine when working from a full to a half stroke of steam. This is done by turning the shaft M, when the cam V raises the hook rod C and disengages it from the pin in the lever E, and the cam V^2 lets the hook rod C^2 on to a pin in the lever E^2 which connects and operates the valve H′ giving the piston half a stroke of steam. There may be several pins in the lever E^2 at various distances from the center of the rock shaft to effect a less stroke by diminishing the sweep of the beam. Where the amount of power required varies, I contemplate the use of steam chests with such a number of valve seats with the requisite steam ways as may be necessary to effect the changes in the quantity of steam used, to suit the quantity of power required, the valves to be arranged upon a plane, or the portion of a cylinder, or upon angular elevations. I am aware that two or more slide valves and valve seats have been used in the same steam chest, as is the case when a cut off valve above the usual valve is employed. I am also aware

that two valves and seats have been used in the same chest arranged for the purpose of preventing any pressure of steam upon the slide. I do not therefore claim any such arrangement, but

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

The arranging of two or more valves in the same steam chest to open and close the several steam ports or passages leading to and from the cylinder of a steam engine, arranged and operated to graduate the admission of steam into the cylinders of steam engines in the manner and for the purpose substantially as above set forth in the foregoing specification.

In testimony whereof I have hereunto signed my name before two subscribing witnesses.

CYRUS RICHARDSON.

Witnesses:

JOHN B. BEERS,

JAMES M. RANDALL.