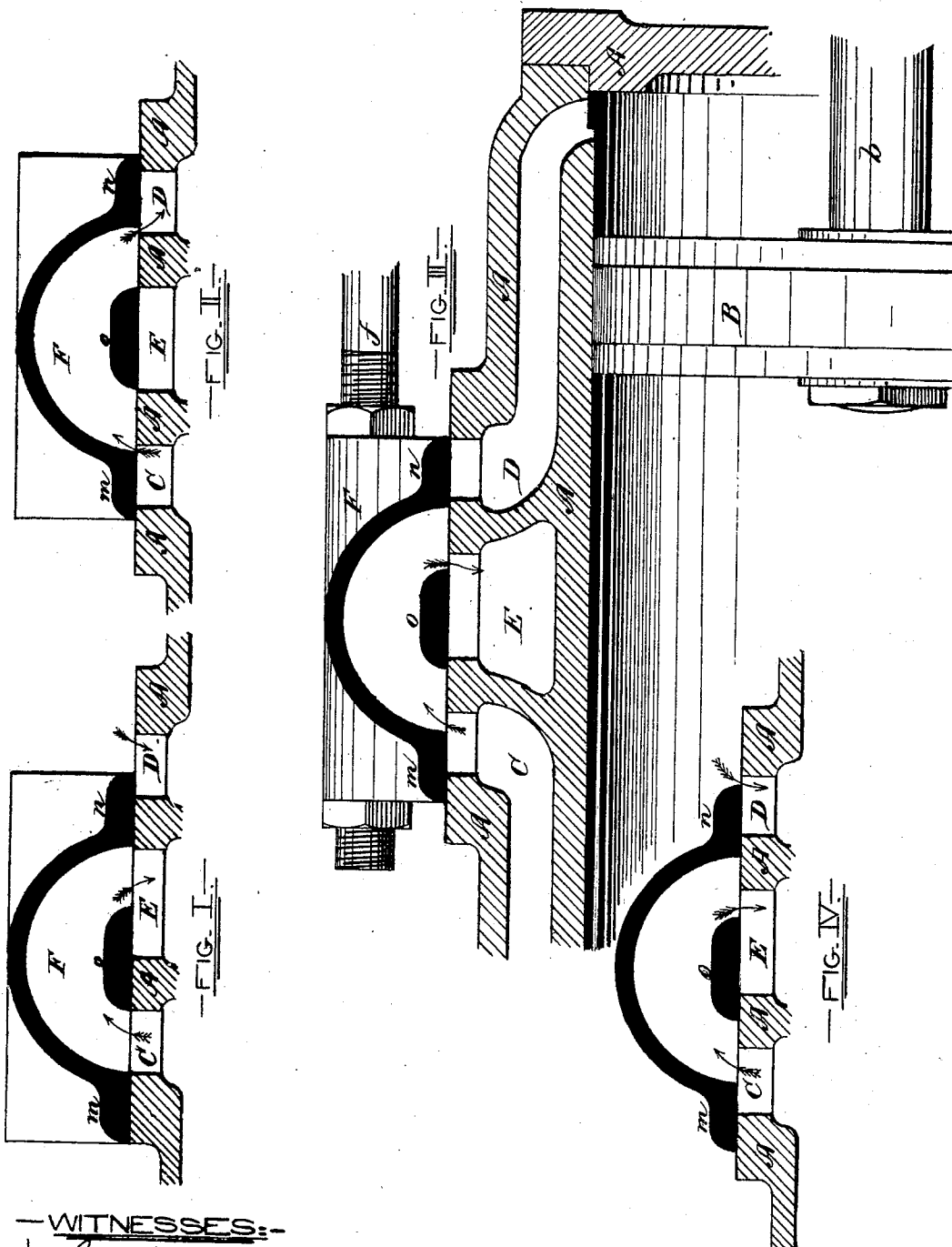


C. B. TURNER.

Improvement in Steam-Valves.

No. 132,120.

Patented Oct. 8, 1872.



WITNESSES:-

Geo. H. Howard

A. J. Ellsworth

INVENTOR.

Chester B. Turner

By His Attorneys

A. J. Ellsworth

UNITED STATES PATENT OFFICE.

CHESTER B. TURNER, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO ALMON D. BORDEN AND JOHN LINDSEY, OF SAME PLACE.

IMPROVEMENT IN STEAM-VALVES.

Specification forming part of Letters Patent No. 132,120, dated October 8, 1872.

To all whom it may concern:

Be it known that I, CHESTER B. TURNER, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and Improved Steam-Valve; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figures 1, 2, and 4 are sectional views representing the valve in different positions; and Fig. 3 is a section designed to show the operation of the steam-cushion.

Similar letters of reference in the accompanying drawing indicate the same parts.

The object of my invention is to construct a steam-valve, which can be easily applied to any of the old steam-engines in common use, in place of the valves heretofore employed, for the purpose of economizing steam, and producing a smooth, easy action of the piston. The main principle of my invention consists in exhausting a portion of the steam in front of the piston over into the space behind the piston-head, and then using it on the return stroke as a steam-cushion, in order to obviate the necessity of using fresh steam for that purpose; and the invention consists in the construction of the valve and its combination with the other parts of the engine to effect that purpose, as I will now proceed to describe.

In the drawing, A represents the cylinder; B, the piston; C D, the steam-ports; E, the exhaust; F, the valve; and *f*, the valve-rod. All the parts are constructed as usual except the valve F, which differs from the ordinary construction, in the employment of three bearing-surfaces, *m n o*, arranged in relation to the ports C D E, as shown. The central part or bridge *o* is equal in width to the exhaust, and its movement is such as to half open the exhaust at each throw of the valve, as shown in Fig. 1, first uncovering it on one side and then on the other. The other parts *m n* are so arranged that when the bridge covers the exhaust they nearly but not quite cover the ports C D, leaving a small passage for the steam to escape from one end of the cylinder to the other, as shown in Fig. 2; and they are further constructed of such dimensions and arranged in such relation to the bridge that whenever

either steam-port C or D is entirely closed the exhaust is at that moment partially open—in other words, whenever the exhaust is wholly closed the passage from one end of the cylinder to the other is open, as shown in Fig. 2; and whenever the exhaust is partially open the port for the dead steam is wholly or partially open, as shown in Figs. 1, 3, and 4, while the port for the live steam is either closed, as shown in Fig. 3, to cut off the steam, or opened, as shown in Figs. 1 and 4, to let steam to the piston. In Fig. 1 the piston has begun its movement toward the left, the steam-port D is open, and the port C and exhaust are in communication. When the piston advances to the proper position the valve moves, and for an instant cuts off the steam at the port D without entirely closing the exhaust. The piston still moves on and the next instant the valve, continuing its movement, assumes the position shown in Fig. 2, where the live steam is cut off, the exhaust closed, and the dead steam exhausting over into the space behind the piston-head. In an instant more the valve has moved so far as to close the port C, confining all the remaining dead steam in the left-hand end of the cylinder, where it forms a cushion for the piston, serving to assist in arresting its movement without unnecessary and injurious jar. The piston is now ready to return to the right. The valve moves on, opening the port C to the live steam, and putting the ports D E into communication. The live steam rushing in through the port C finds the left-hand end of the cylinder already full of steam, and is therefore ready to exert at once its whole force upon the piston, which moves immediately toward the right—the operation of all the parts, upon the return stroke, being the reverse of that already described. In Fig. 3 the section shows the piston-head when it has almost completed its stroke toward the right, the valve D being closed so that the steam in that end of the cylinder forms a cushion. In constructing the valve the bridge *o* may be supported by a bolt or bolts extending from it up through the back of the valve, said bolts being screwed or otherwise properly fastened to the valve and bridge in any manner that may be preferred.

This valve, while adapted to all new engines

of the forms in common use, can also be easily applied to the old engine, it being only necessary to remove their valves, insert the bridge *o* between the ends of the steam-space to cover the exhaust, and, if required, elongate the steam-space in the face of the valve, so that it will leave the passage open around the piston-head when in the position shown in Fig. 2.

The effect of this construction, which has been subjected to the most complete practical tests, is to greatly decrease the expenditure of the steam, to increase the power, and to make the engine run smoothly and easily, and, there-

fore, wear much longer than when constructed as heretofore.

Having thus described my invention, what I claim is—

The combination of the valve *F*, constructed as described, with the ports *C D* and exhaust *E*, substantially as described, for the purposes set forth.

CHESTER B. TURNER.

Witnesses:

S. A. KENNEDY,
H. JOSLIN.