F. B. RICE.

CUT-OFF VALVE.

No. 181,205. Patented Aug. 15, 1876.

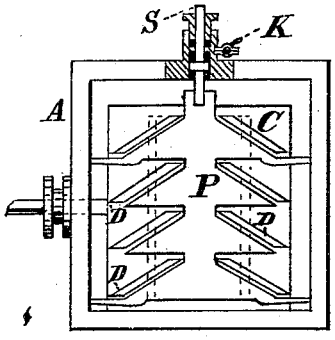

Figure 1,

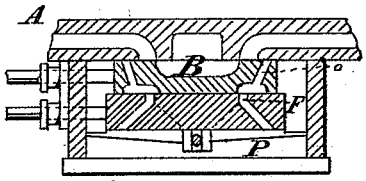

Figure 2,

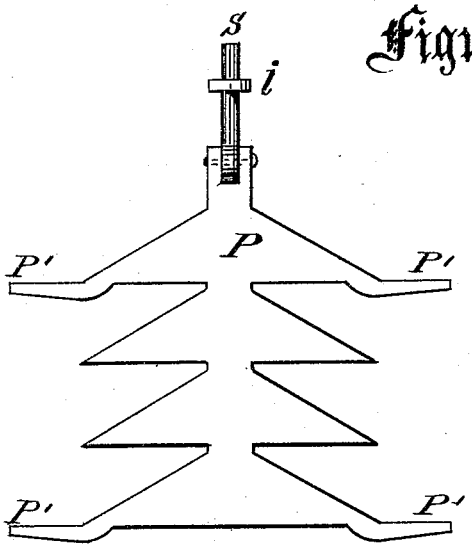

Figure 3,

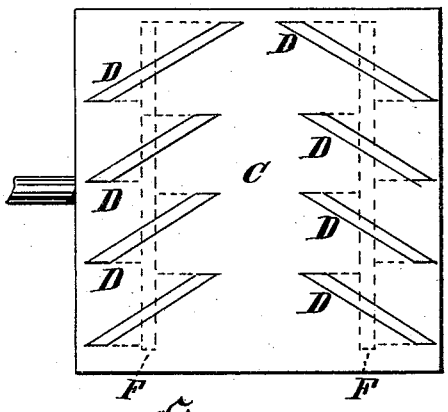

Figure 4,

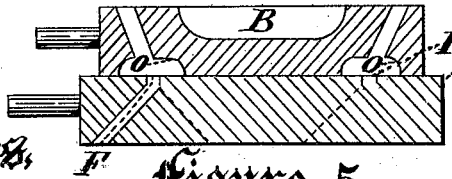

Figure 5,

Witnesses.

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FREDERICK B. RICE, OF WARREN, PENNSYLVANIA.

IMPROVEMENT IN CUT-OFF VALVES.

Specification forming part of Letters Patent No. **181,205**, dated August 15, 1876; application filed October 5, 1875.

To all whom it may concern:

Be it known that I, FREDERICK B. RICE, of the village of Warren, in the county of Warren and State of Pennsylvania, have invented certain new and useful Improvements in Variable Cut-Off Valves for Steam-Engines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of this invention is to produce a simple and efficient cut-off, which may be attached to a common slide-valve engine, and which can be varied or regulated either by a governor or by hand.

In some cuts the ports are closed by the difference in the speeds of two valves. While the effect is good during half the stroke of the piston, it produces a slow choking cut-off during the other half-stroke, and in some cases the range in cutting is limited to half-stroke; but in this invention these defects are obviated, the cut-off being accomplished by a valve sliding under a plate which has no motion, except as it is moved by the governor or by hand, and which allows of a full range of cut-off from the beginning to the end of the stroke.

Its advantages are obvious; and it consists in the combination of a main valve, a cut-off valve, and cut-off plate, having ports so arranged that by their several motions the proper amount of steam will be admitted to the cylinder at the beginning of every stroke of piston, thereby securing an economical expansion of steam, and a consequent saving of fuel, as will be more clearly hereinafter shown.

It also embraces an arrangement which will close the ports and stop the engine should accident happen to the governor.

Figure 1 is an elevation, showing the cut-off valve and plate in position inside the steam-chest; also, the stop arrangement or device. Fig. 2 represents a section through the valves and steam-chest, showing the construction of the ports and passages. Fig. 3 is an enlarged elevation of cut-off plate; Fig. 4, an enlarged elevation of cut-off valve; and Fig. 5 represents an enlarged section through main and cut-off valves.

A is an ordinary steam-chest, the valve-stems passing through the end, as usual. The stem S of the cut-off plate is here shown as passing through the top of the steam-chest. B is the main valve; the steam-ports pass through it, and its back is faced for the cut-off valve C to work on. The ports through main valve terminate in openings O O, which are wide enough to prevent the ports F of the cut-off valve from traveling over their edges and closing the passages between the two valves, so that said passages between said valves are never closed. The cut-off plate being provided for the purpose of cutting off steam at any point of the stroke, it would be not only needless but decidedly objectionable to shut off steam between the cut-off valve and the main valve. The passages through valve C are twisted and divided, making several narrow ports, D D D, through its back, but which terminate in the straight ports F on its face side.

One angular port on each side would answer just as well, but it would be inconvenient to use in many cases, since it would require a comparatively long valve. To obviate this I use a series of angular ports, as shown.

P is the cut-off plate, the edges of which are alike in number and angle to the ports D. The prongs or arms P′ are to prevent the plate moving with the valve under it. They are fitted against the sides of the steam-chest, but permit the plate to move up and down, or at right angles with the motions of the valves. It is moved by the stem S, but may be moved in various other ways. This stem has a collar, *i*, which is fitted to a suitable recess in the top of the chest. This collar has sufficient area to raise the plate should the pressure above it be relieved by the opening of cock K. This cock is arranged to be opened by the governor should the balls fall from any cause, the object being to prevent the engine from running away in case of such accident.

The valve B moves as usual, and valve C moves with or a little in advance of the piston. It may be used on a separate seat instead of riding on the main valve. The plate P is either adjusted by a governor or by hand. It may be made in two pieces for long valves. The number of ports D may be varied, and the plate P made to correspond with it.

If desired, the collar *i* may be omitted and

a simple plug substituted, to be operated in a similar manner.

The operation of the device is simple, and easily understood.

When the engine is required to run fast, the plate P is lowered, which leaves the ports D open longer, thereby admitting more steam, and vice versa, when the engine should run slower.

The operation of the device for stopping the engine in case of accident to the governor is simply that of a piston, which, when the steam is relieved from its top side by the opening of the cock K, will raise the plate P and shut the steam entirely off from the engine-piston.

I claim as my invention—

1. The flat cut-off valve C, each of whose ports terminate on one side in one opening, and on the other in several openings, arranged at an angle to its edges, substantially as described.

2. The combination, substantially as specified, of the main valve, the cut-off valve, having angular ports on one side, and the cut-off plate having jagged edges corresponding to the angular ports of the cut-off valve.

3. The stem S and collar *i*, in combination with the cock K, arranged to operate substantially as and for the purposes set forth.

FRED. B. RICE.

Witnesses:

S. B. BENTLEY,

P. A. FOSTER.