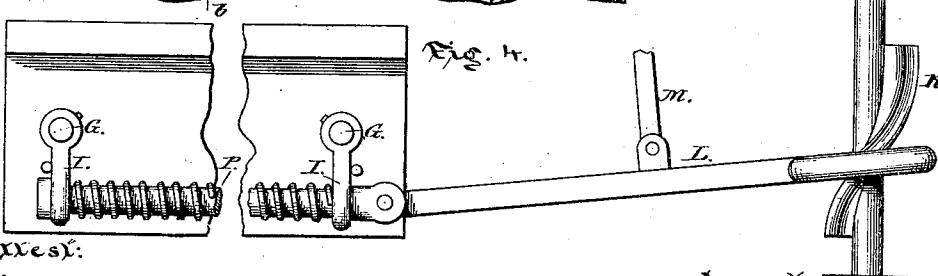
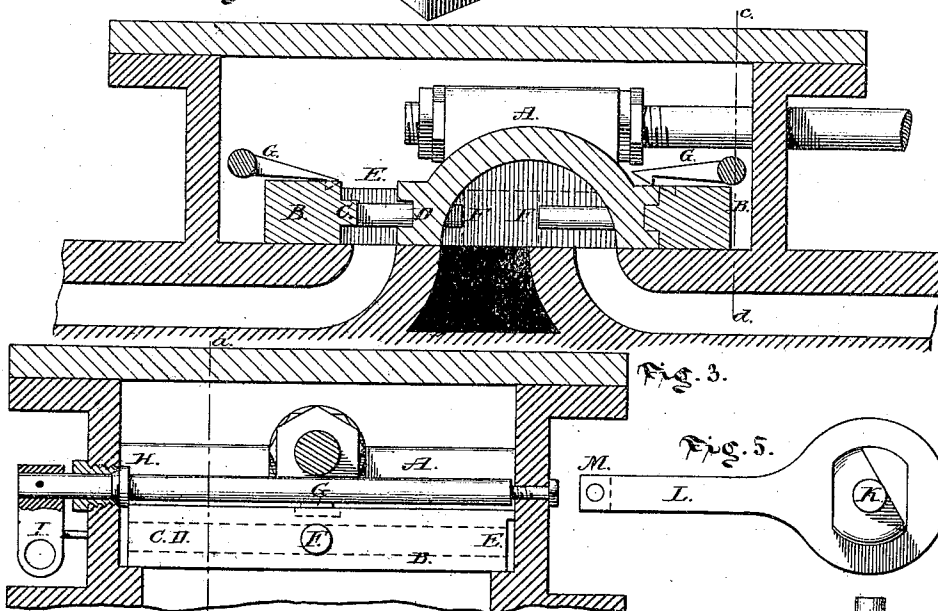
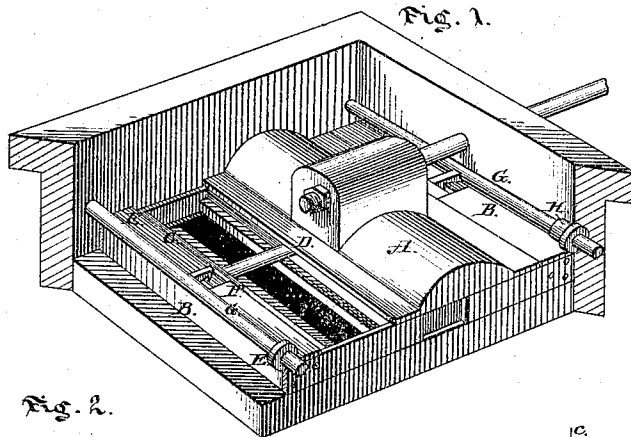


T. HOOKER.

CUT-OFF VALVES FOR STEAM-ENGINES.

No. 178,440.

Patented June 6, 1876.



Attest:
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UNITED STATES PATENT OFFICE.

THOMAS HOOKER, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN CUT-OFF VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **178,440**, dated June 6, 1876; application filed October 28, 1875.

To all whom it may concern:

Be it known that I, THOMAS HOOKER, of the city of Syracuse, State of New York, have invented an Improvement in Cut-Off Valves for Steam-Engines, of which the following is a specification:

The object of my invention is an improved arrangement of automatic cut-off valves, under the control of the governor, the same being applicable to various forms of slide-valve engines.

The following is a description of what I consider the best means of carrying out the invention as applied to the ordinary plain slide-valve, reference being had to the accompanying drawing, in which—

Figure 1 is a perspective view of the interior of the valve-chest, a portion of the walls being removed to exhibit the working parts. Fig. 2 is a longitudinal section on the line *a b*, Fig. 3; and Fig. 3, a cross-section on the line *c d*, Fig. 2. Fig. 4 is an elevation, showing the manner of attachment to the governor; and Fig. 5 is a plan of the same.

The main slide-valve is actuated by an eccentric, through a valve-rod, in the usual manner, the ends of the valve being shortened, so as to give little or no lap, and the throw of the valve correspondingly decreased. At each end of the main valve *A* are placed the cut-off valves *B B*, of sufficient size to fully cover the ports in any position of the main valve, with the guides *E* attached, sliding in grooves in the main valve, as shown. Attached to the cut-off valves are also the pistons *F F*, passing through the main valve into the exhaust-opening. The inner sides of the cut-off valves have tongues *C*, which enter grooves *D* in the main valve, the object being to confine a portion of steam to form a cushion and prevent concussion.

Across the ends of the steam-chest are rocking shafts with latches *G*. These shafts pass through one side of the steam-chest, and have arms *I*, Figs. 3 and 4, attached, through which motion is communicated in a manner to be explained below. At the wall of the steam-chest they are provided with the device shown at *H*, consisting of a sleeve screwed into the steam-chest, and a collar fast upon the shaft, between which is a ground joint to prevent leakage of steam. The shaft is held in place

by an adjustable center at the opposite end, as shown in Fig. 3.

The attachment to the governor is shown in Figs. 4 and 5. The arms *I* are held against stops by suitable springs, and through holes in both arms passes the rod *P*, sliding freely, but having shoulders on the outsides. Thus, by a motion of the rod toward the right, the left-hand arm only is affected, and vice versa. At the end of the connection *L* is an enlargement, (shown in Fig. 5,) with an opening, through which the spiral cam *K* passes. This cam is caused to revolve by suitable means, (not shown,) at exactly the same speed as the engine-shaft, and its proportions are so adjusted to the opening in the connection *L* as to raise the latches *G G* in alternation. The cam *K* makes a half-revolution about its shaft, and the position of the connection *L* upon it determines the part of the revolution at which the latches are lifted. Thus, if the bottom of the cam corresponds with the end of the engine-stroke, the top will correspond with the commencement, and each intermediate point to its appropriate position of the piston. At *M* is shown an attachment for a governor of any pattern, whose office is simply to raise or lower the connection *L* to conform to the point of cut-off required.

The action of the valve is as follows: At the commencement of the stroke the main valve admits steam to the cylinder in the usual manner, the cut-off valve at that end being held free of the port by the latch *G*, as shown at the left of Figs. 1 and 2, until, steam enough being admitted, as determined by the governor, the latch is raised, in the manner already described, when, the pressure of steam upon the outer end of the piston *F* not being resisted by any counter-pressure above that of the exhaust, the valve is closed and the steam quickly shut off. As the valve closes a portion of steam is caught in the groove *D*, as already explained, and, being compressed, prevents the valve from hammering. Upon the return stroke the same motions are repeated at the opposite end of the valve, and any variation in the load of the engine affecting the governor causes it to move the connection *L* upon the spiral cam *K*, and thereby change the time of releasing the valves.

I claim as my invention—

1. In combination with any slide-valve, A, the two independent cut-off valves B B, closing upon the same seat as the main valve, and operated by the governor, substantially in the manner described.

2. The combination of the slide-valve, provided with apertures opening into the exhaust-passage, the cut-off valves B B, having plungers F, working in said apertures, and the latches G, substantially as described.

3. The combination of the valve A, provided at its ends with dash-pots D, with the

cut-off valves B B, provided with plungers C and guides E, substantially as described.

4. The combination of the latches G, for detaining the cut-off valves B, with the spiral cam K, rotated at the same speed as the engine-shaft, through the connection L, vibrated by the governor, and the arms I, substantially as described.

THOMAS HOOKER.

Witnesses:

ALLEN D. ROBERTS,
ALBERT L. EDWARDS.