

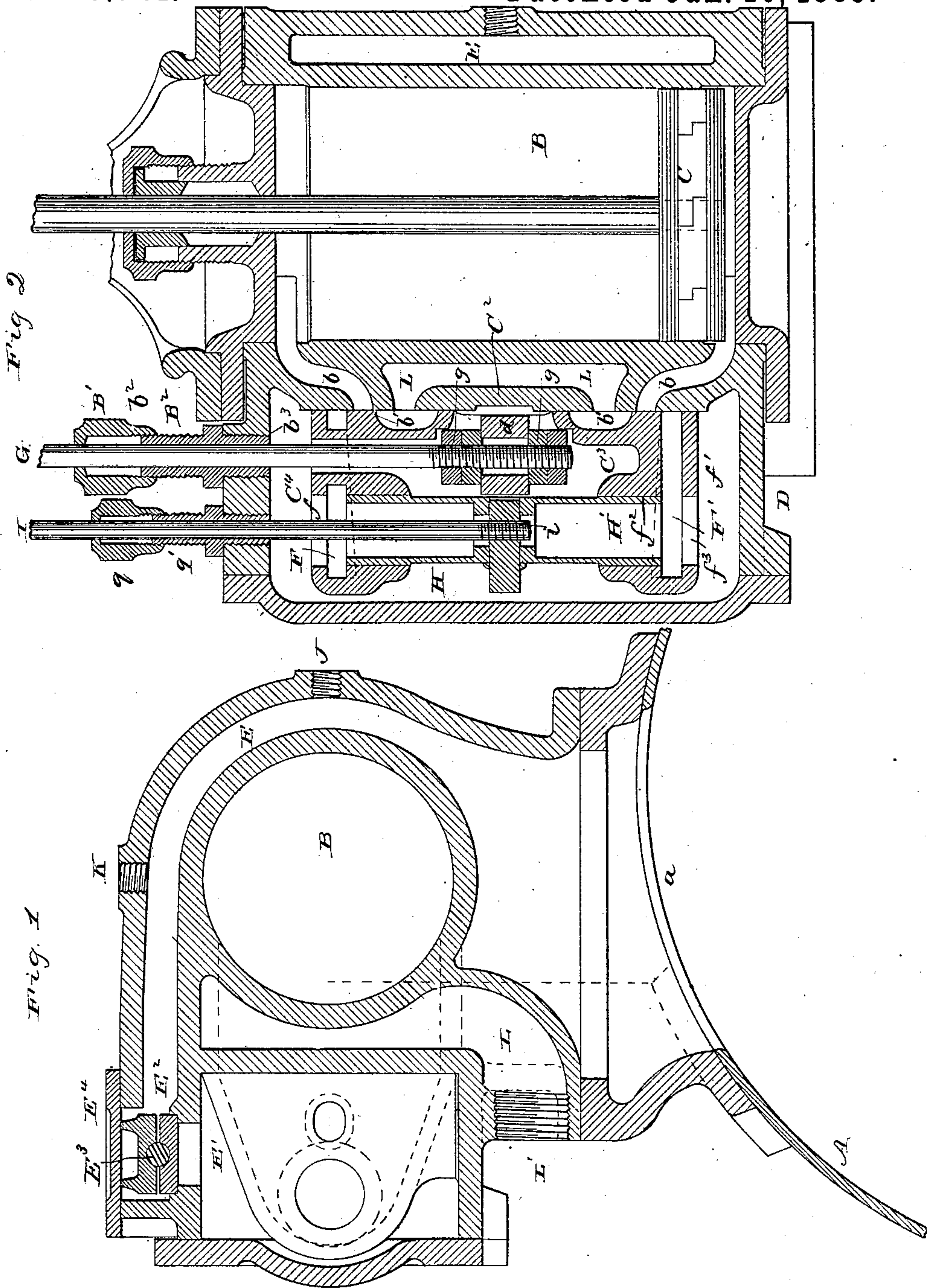
(No Model.)

W. A. CLARKE.

CUT-OFF VALVE.

No. 270,744.

Patented Jan. 16, 1883.



Witnesses:

A. A. Low
J. S. Barker.

Inventor:

Willard A. Clarke
by Doubleday & Bliss

attys.

UNITED STATES PATENT OFFICE.

WILLARD A. CLARKE, OF STILLWATER, MINN., ASSIGNOR TO THE NORTH-WESTERN MANUFACTURING AND CAR COMPANY, OF SAME PLACE.

CUT-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 270,744, dated January 16, 1883.

Application filed September 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLARD A. CLARKE, a citizen of the United States, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Cut-Off Valves for Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a vertical section of a portion of the steam-boiler and of a cylinder having applied thereto my improvements. Fig. 2 is a horizontal section on line *xx* of Fig. 1.

In the drawings, A represents the boiler proper, which, so far as the details of its construction are concerned, may be of any preferred character. At *a* there is an orifice in the upper wall of the boiler, through which the steam passes to the steam-chest.

B is the cylinder, in which is arranged the piston C, substantially in the ordinary manner. The steam is admitted to the ends of the cylinder through ports *b b*, the entrance of the steam being regulated by means of a sliding valve.

One part of the present invention relates to an improved apparatus for cutting off the steam—that is, for regulating the amount of steam which passes to the cylinder in proportion to the speed desired or the weight to be overcome. The valves C C, which close the ports *b b*, are carried by a frame or box having the intermediate parts, C², and the parts C³ C⁴ outside thereof. The valves and the parts which carry them are mounted in the chest D, and the steam passes into the chest from the boiler through aperture *a* in the latter, there being a passage, E, extending from said aperture upward to a point immediately over the chest.

In the ends of the frame or box which carries the valves there are formed passage-ways F F', into which the steam can enter from the chest D, and from which it can pass into the ports *b b*. The valve frame or box is moved to and fro by means of the valve-rod G passing out through the ends of the steam-chest, and connected to the main shaft by means of an eccentric in the common or in any preferred manner. This rod at its inner end is screw-

threaded, and engages with the valve-frame by means of nuts *g g* bearing against lugs or projections *d* on the valve-frame.

It is well known that the amount of steam should be varied in the same ratio as the weight or speed may be varied. To accomplish this—that is, to so relate the parts of the engine that the amount of steam shall be automatically varied—I provide a cut-off valve which automatically increases or decreases the amount of steam entering the cylinder at any given action, as occasion may require. This cut-off is represented in the drawings by H H'. It is seated in the valve frame or box, and adapted to slide therein on lines parallel with the path of the valve. At its ends the cut-off is mounted in the projections C³ C⁴ in such position that when the fullest amount of steam is entering the cylinder its ends are flush with the inner walls of the passage-way F F', through which the steam passes to the ports *b b*. With this cut-off there is combined a stem, I, united to it by means of a screw-thread on its ends at *i*. This rod extends outward through the end of the steam-chest, and is connected with the main shaft by means of an eccentric whose position is variable relatively to said shaft, the variation in position resulting automatically. Preferably I mount the said eccentric on the shaft in the manner which I have described and shown in my previous patent, No. 261,432, and dated July 18, 1882, and combine therewith the governor device also set forth in said patent; but other devices for this purpose may be employed, if desired. These parts are so related that when the speed becomes too great, or when the load is suddenly decreased, the sliding cut-off H H' shall be so situated as to partially cut off the steam from the passage-way F', when said passage-way corresponds or registers with its port *b*, and shall also correspondingly cut off the amount of steam which enters the passage-way F, from which the steam enters the other port *b*.

It will be seen that the cut-off is so constructed and arranged relatively to the steam-passages that it shall always be balanced, so far as the steam-pressure is concerned, in whatever position it may be.

At J the outer wall of the passage-way E is

provided with an aperture, into which the whistle is inserted, and at K another aperture is formed for the attachment of the safety-valve, both the whistle and the valve being preferably united by means of a screw-threaded connection.

The steam which is exhausted from the cylinder is carried outward alternately through the ports b and passage-ways b' , formed in the valve frame or box, to the escape-passage L, which is continued outward to the point L', where the exhaust-pipe is attached. The steam passes into the chest D from the passage-way E through the port E', its passage being regulated by means of a valve, E², which is operated by a handle, E³, projecting toward the engineer's platform.

The valve E² can be readily inserted into place and withdrawn through an opening formed in the wall of the passage E, said opening being closed by a plate, E⁴, which can be bolted upon it, as shown in Fig. 4.

I am aware that stationary engines have been heretofore made with some of the parts which I have above described; but I believe myself to be the first to have adapted them in structure and arrangement to successful use on portable or traction engines.

By means of these devices I cause the steam to enter the chest from the top and utilize it in its passage from the boiler as a jacket for the cylinder, and preventing entirely the passage of water from the boiler to the chest or cylinder, owing to the increased distance between the water-level and the port into the steam-chest, and accomplishing this without using the steam-drum ordinarily necessitated in portable or traction engines.

It will be seen that the great part of the circumference of the cylinder B is subjected directly to the heat of the upwardly-rising steam, and as a result the condensation of the steam inside the cylinder is entirely avoided. Any foam or spray that may rise through the aperture a , and all water that may be dashed upward, will be caught upon one side or other of the comparatively long and winding channel E, and returned to the boiler.

The steamways F F', when constructed in the manner described, can be made with very large area, they widening more and more as they approach the face of the steam-chest, and the openings f f' can be as large as the entire circumference of the cut-off valve, and therefore the steam will entirely surround the cut-off portions of the valve, so as to balance them and greatly reduce the friction experienced in its travel.

I have found that the governor responds much more easily and accurately when combined with a cut-off valve of this nature than when use is made of the flat cut-off bearing against the valve-apertures, and having the steam pressed upon one side of it.

Preferably the exhaust-pipe communicates with the interior of the feed-water heater L³,

and from said heater the exhaust-steam is carried to the smoke-stack L⁴, all of these last-described devices being, if desired, of the ordinary construction.

The valve-rod is provided with a stuffing-box or gland, B', connected to a sleeve, B², by a screw-thread, b^2 , the sleeve being fitted to the end of the steam-chest by a screw-thread, b^3 . The cut-off stem has also a gland or stuffing-box, q , connected by a sleeve, q' , to the steam-chest in a manner substantially similar to that for fastening the box B'.

I am aware that use has been made of a slide-valve, a stationary frame or plate by the side of the valve, cylindrical cut-off valves mounted in the stationary plate or frame, and an oscillating shaft mounted transversely across the steam-chest to operate the cut-off valve, and I do not claim such construction as my invention.

I am also aware that use has been made of an oscillating cut-off valve of the form of a solid cylinder provided with flanges projecting from the ends of the solid portion, adapted to alternately close and open spiral slots in the valve, said cut-off valve being mounted in a bearing threaded its entire length, the bearing being provided directly by the slide-valve.

In my construction I admit the steam directly into the ways or ports through the valve, and construct the valve with plane ends, so that the walls do not need to be cut or perforated to provide a passage-way for the steam. Moreover, I mount the valves in such manner that but little friction is experienced, it being supported at the ends only, the bearings being long enough to merely properly support it, and the greater part being without frictional contact with the slide-valve. By mounting the reciprocating tubular cut-off directly in the valve, and by forming the ports in the valve on parallel planes, as shown, I can make them very large, so as to allow the entrance of the steam with great freedom. As soon as the end of the cut-off escapes the outer bearing, f^3 , the steam is instantly admitted around the whole path of the cut-off.

What I claim is—

1. The combination of the steam-chest, the slide-valve provided with lateral extensions at the ends, the valve-stem G, reciprocating through an aperture in the end of the steam-chest, the stem I, reciprocating through another aperture in the steam-chest, and the tubular cut-off valve H', mounted at its ends in said lateral extensions of the slide-valve, having its ends plane, substantially as set forth.

2. The combination of the slide-valve having the lateral projections, the valve-stem G, reciprocating through the end of the steam-chest, the stem I, reciprocating through the end of the steam-chest, and the tubular square-ended cut-off H', having its ends mounted in the lateral extensions of the slide-valve, arranged to have its central portion free from contact with the slide-valve, substantially as set forth.

3. The combination of the steam-chest, the slide-valve therein, having lateral projections provided with the steam-ports F F', situated on parallel lines from end to end, the valve-stem G, reciprocating through the wall of the steam-chest, the stem I, passing through and reciprocating in said wall, and the tubular plane-ended cut-off valve mounted directly in the slide-valve extension, and adapted to have the plane ends thereof regulate the admission of steam to the parallel ports, substantially as set forth.

4. The combination of the slide-valve, the extensions projecting laterally therefrom, the cylindrical apertures through said extensions, the steam-ports F F', extending across and around said cylindrical aperture, whereby there is produced at each end a bearing, f^2 ,

inside of the steam-port, and an opening, f^3 , outside, and the tubular cut-off valve H', adapted to be seated in said bearing f^2 and opening f^3 , to cut off the steam from the surrounding port, substantially as set forth.

5. The combination, with the tubular cut-off valve, of a bearing for said cut-off, having a steam passage-way arranged, substantially as set forth, to entirely surround all the sides of the cut-off when the latter closes the steam passage-way.

In testimony whereof I affix my signature in presence of two witnesses.

WILLARD A. CLARKE.

Witnesses:

POWELL MACY,
H. J. CHAMBERS.