

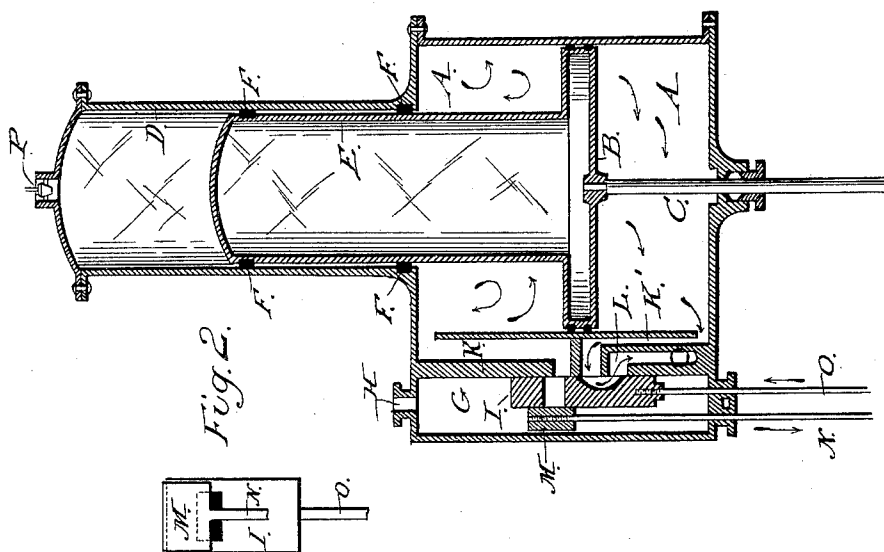
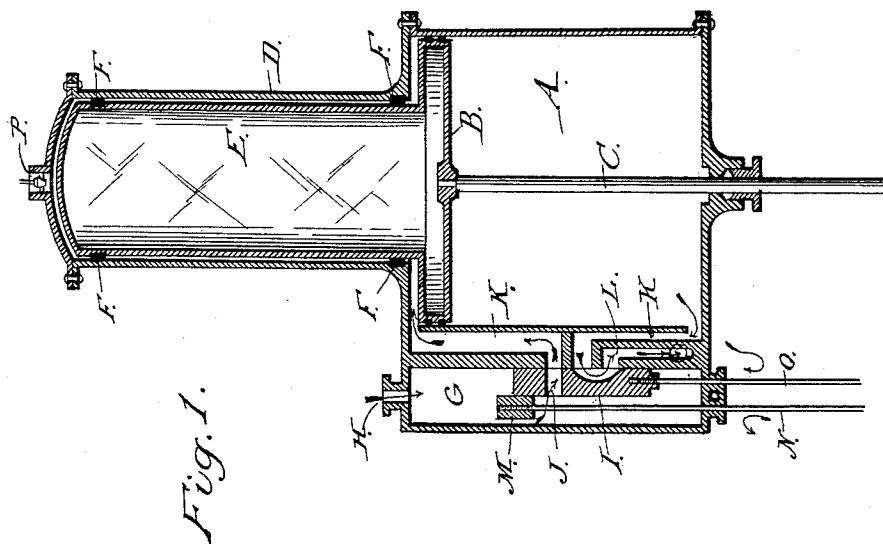
(No Model.)

2 Sheets—Sheet 1.

M. B. DODGE.
STEAM ENGINE.

No. 450,780.

Patented Apr. 21, 1891.



WITNESSES
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UNITED STATES PATENT OFFICE.

MILES B. DODGE, OF SAN FRANCISCO, CALIFORNIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 450,780, dated April 21, 1891.

Application filed February 18, 1890. Serial No. 340,970. (No model.)

To all whom it may concern:

Be it known that I, MILES B. DODGE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Steam-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in steam-engines.

It consists of a cylinder, a piston reciprocating therein and having the areas of steam-space of different sizes upon the two sides of the piston, a valve by which the steam is transferred from the side of smallest area to the opposite side, so as to act expansively therein, and the combination therewith of a cut-off valve and certain details of construction, all of which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a sectional view of the engine-cylinder and valves, showing the piston at the upper end of its stroke. Fig. 2 shows the piston midway in its descending stroke. Fig. 3 shows the piston at the bottom of the stroke. Fig. 4 shows the piston midway of its ascending stroke, the relative positions of the valves being shown in each case.

A is an engine-cylinder having the piston B reciprocating therein and the piston-rod C.

Upon the side of the cylinder opposite the piston-rod is a cylinder-chamber D, concentric and in line with the main cylinder A, and E is a plunger forming an extension from the piston B and traveling within the extension D.

F F are packing-rings, which form a tight joint between the plunger E and the interior of the cylindrical extension D.

G is a valve-chamber having the steam-inlet H.

I is the main valve, which is of the well-known D form, but having an extension at one end, with a port J passing through it.

K K' are the steam-admission ports leading from the valve-chamber to the opposite ends of the cylinder A, and L is an exhaust-port so arranged with relation to the lower steam-port K' that when the valve I is in the proper position the two ports are connected,

so as to allow the steam to exhaust from the lower part of the cylinder A through these ports.

Upon the back of the valve I is a cut-off valve M, which is moved by an independent valve-stem N, the main valve being moved by the stem O. This cut-off valve controls the steam-passage J through the main valve and operates to close this passage at a certain portion of the stroke of the engine.

The operation of my engine will then be as follows: The piston being at the top of the cylinder, as represented in Fig. 1, the valve I is in position to admit steam through the ports J and K into the upper part of the cylinder A above the piston B. At the same time the exhaust-port L is in communication with the lower steam-port K' through the chamber beneath the valve I, so that as steam is admitted through the ports J and K above the piston B to force the latter down the steam which is beneath the piston in the cylinder A will escape through the ports K' and L. The cut-off valve M is in such position as to expose the port J in the main valve and allow steam to pass through it.

In Fig. 2 the piston B is represented as having completed half of its downward stroke. The valve M has moved so as to cut off the steam-passage J through the valve I, and the steam which is now within the cylinder above the piston B must act expansively during the remainder of the downward stroke of the piston. The exhaust-passage is still open for the escape of steam from below the piston.

In Fig. 3 the piston is represented as having completed its downward stroke, and the valves are in position for its return. In this figure the valve M has moved downward to the lower part of its stroke and the valve I has moved upward, so as to connect the steam-passages K and K' by means of the chamber beneath the valve. The passage J, being upon the valve-face in the steam-chest, communicates with nothing. Steam is now allowed to pass through the space above the piston B, through the ports K and K', into the space below the piston, and this space being of much larger area than the space above the piston, this steam which is acted expansively above the piston during the latter portion of its

downward stroke, is now allowed to pass below the piston and complete its expansion in forcing the latter upward to the upper end of its stroke.

5 Fig. 4 shows the piston midway in its upward stroke. By this construction I am enabled to use the steam at high pressure above the piston in that portion of the cylinder which has the least area, and for a portion of
10 the stroke, then complete the downward stroke by the expansion of this high-pressure steam, and afterward continue the upward stroke of the piston by the continued expansion of this steam, which is admitted from the
15 upper side of the piston to the lower side. In order to prevent the piston from striking the bottom of the cylinder in its downward stroke, I have so proportioned the area of the chamber D above the plunger E that the
20 vacuum produced in this space as the plunger moves downward will be sufficient to act as a cushion, the vacuum preventing the piston from striking the bottom of the cylinder.

P is a small valve at the upper end of the
25 chamber D, which closes inwardly and prevents the entrance of air into the chamber D, but in case of any slight leakage will allow any air or vapor within the chamber to escape when the plunger E rises.

30 I have here described my engine as using the ordinary slide-valve and cut-off; but it will be manifest that other forms of valves

may be substituted for these, which will admit the steam in the manner herein described.

Having thus described my invention, what I 35 claim as new, and desire to secure by Letters Patent, is—

A vertical engine consisting of a main steam-cylinder and an extension of smaller diameter at the top in line therewith, a piston 40 reciprocating in the main cylinder, a trunk projecting from the upper side of the piston so as to reciprocate within the extension of the cylinder and produce a vacuum on its downward stroke, and an outwardly- 45 opening relief-valve in said extension, a valve-chamber with steam-supply ports leading to opposite ends of the main cylinder only, and an exhaust-port outside of and in line with the steam-ports, a valve having an 50 extension at one end with a port corresponding with the upper steam-port and a concavity in its face, which alternately connects the two steam-ports and the lower steam and the exhaust port, and a cut-off valve reciprocating upon the main valve to open and close 55 the single port in said valve, substantially as herein described.

In witness whereof I have hereunto set my hand.

MILES B. DODGE.

Witnesses:

S. H. NOURSE,

H. C. LEE.