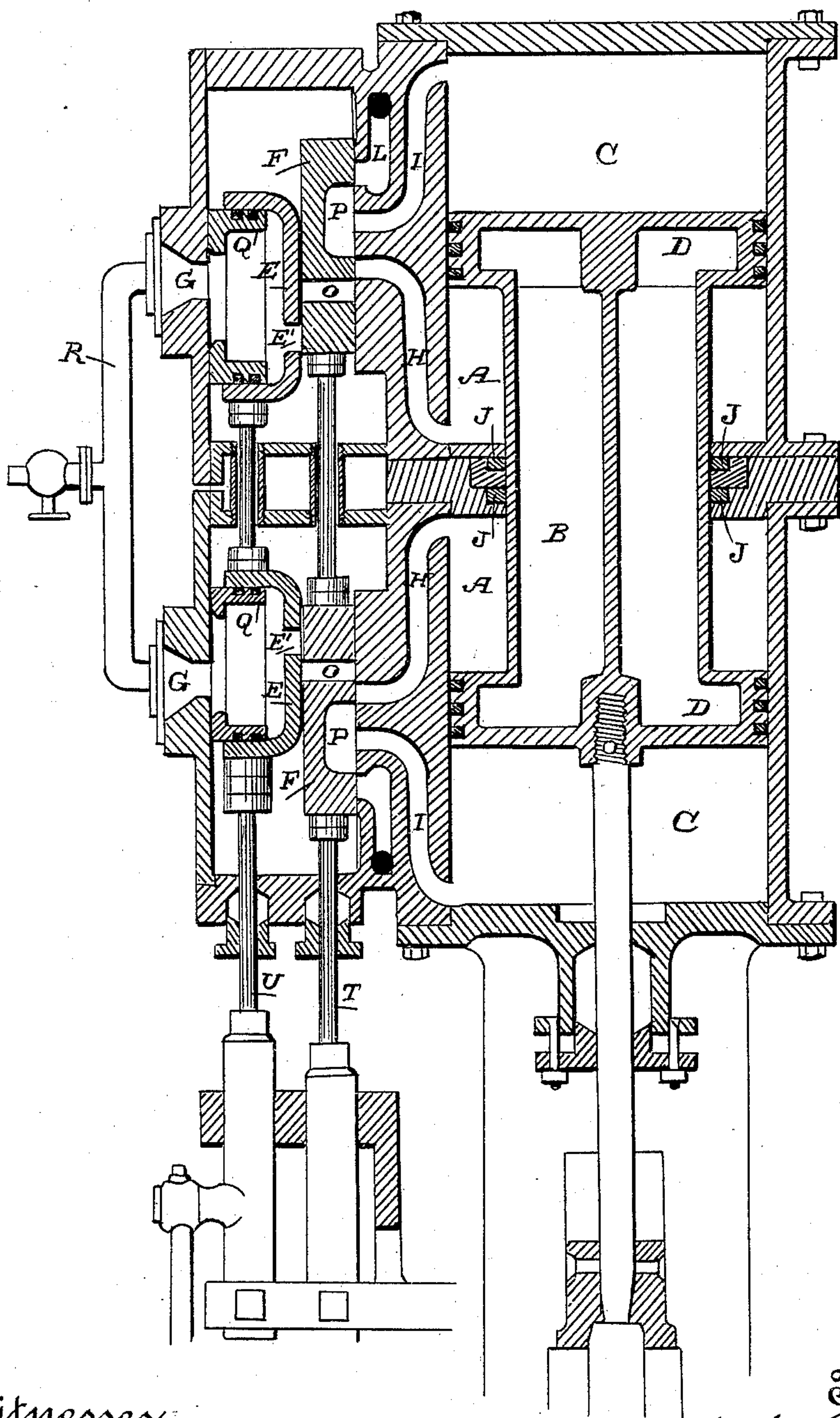


(No Model.)

M. B. DODGE.
ENGINE.

No. 473,657.

Patented Apr. 26, 1892.



Witnesses,
J. A. Bayless

Inventor,
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UNITED STATES PATENT OFFICE.

MILES B. DODGE, OF SAN FRANCISCO, CALIFORNIA.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 473,657, dated April 26, 1892.

Application filed July 1, 1891. Serial No. 398,171. (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 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 engines.

It consists of a pair of cylinders placed end to end, having independent main and cut-off balanced valves and pistons joined together by a trunk which passes through the intermediate head between the cylinders, so that steam is first admitted alternately into the spaces around the trunks to act as a high pressure against the smaller area of the pistons, and is thence conveyed through the valves to the larger area at the opposite ends of the pistons and expanded therein for the return stroke of the pistons.

It also consists in certain details of construction which will be more fully explained by reference to the accompanying drawing, in which the figure is a longitudinal vertical section, taken through the axis of the cylinder and the steam-chests, showing the arrangement of the valves and ports.

A A are the two cylinders of my engine, having the same diameter of bore and same stroke. These cylinders are removably connected together in line with each other, and the intermediate head has a large opening made through it with suitable packing, as shown at J. Through this opening passes the hollow trunk B, which connects the pistons D, these pistons reciprocating in the two cylinders and moving simultaneously.

H and I are the ports leading from the valve-chambers to the opposite ends of each cylinder, and L are the exhaust-ports through which the steam is discharged after it has performed its service.

F F are slide-valves traveling upon the valve-seats in the steam-chests, and having the steam-admission ports O made through them near one end and the D-shaped chambers P at the other end, which are formed on their lower faces and alternately connect the two ports H and I to admit steam from one end of the cylinders to the other, and with

the ports I and L to allow the steam to be exhausted after it has done its duty.

Upon the back of each of the valves F is fitted the cut-off valve E. Each of these valves E has a port E', through which to admit steam through the passages O of the main valves when they are brought in line with each other, and to cut off the supply at the proper time. The valves E are made cylindrical in shape, and have the corresponding-balanced pistons Q, fitted into them with suitable packing-rings. The upper surfaces of these balance-pistons travel against the upper face of cover of the steam-chest, and are left open so that steam may be admitted through them from the supply-pipe R, and thence into the valves E, from which it is supplied by the movements of these valves to the cylinders.

The valves F and E of each steam-chest are respectively connected with each other by rods extending through the intermediate wall of the steam-chests, and both sets of valves are actuated by the valve-stems T and U in any suitable or well-known manner from the main engine-shaft.

The operation of my engine will then be as follows: Steam being admitted through the throttle-valve into the supply-pipe R will flow thence through the passages G into the interior of the valves E, and by reason of the pistons Q these valves are balanced so as to have a light bearing upon the backs of the main valves F. When, by the reciprocation of these valves, the ports E' are brought into line with the ports O of the main valves, and simultaneously into line with the ports H, which lead to the adjacent inner ends of the cylinders A, steam will be admitted into these ends of the cylinders. The movement of the valves is such that steam is admitted into the end A of one of the cylinders, and acting therein at a high pressure it forces the piston toward the opposite end of the cylinder. The admission of steam is cut off at any suitable or desired point by means of the valves E, which are set to cut off at any point desired, and at the time when the steam is being received through the port H into the inner end A of one of the cylinders, the valve F of the opposite cylinder will have been moved so that the chamber P in the valve will connect

the ports H and I of that cylinder. This allows the steam, which has previously been supplied to the end A of that cylinder, to pass freely through the ports and valve to the opposite and larger end C of the cylinder, so that while steam at high pressure is operating upon the inner end of the piston in one of the cylinders, and upon the smaller area of that piston by reason of the trunk which connects the pistons, the expanding steam from the smaller space of the other cylinder will be delivered through the ports and valve into the outer and larger end C of that cylinder, the two pressures thus acting to force the double piston to one end of its stroke. When this end of the stroke is reached, the operation will be reversed, and when the valves have so moved that live steam is being admitted into the smaller area of either of the cylinders, the opposite end of that cylinder will be connected with the exhaust-port L by a movement of the valve F, which carries its chamber P into the position to connect the ports I and L. By this operation I provide a very complete and serviceable double engine with great economy in the use of steam.

I am aware that trunk-engines having cylinders and pistons similarly arranged to the foregoing have been constructed. I do not claim, broadly, such an arrangement, neither do I claim, broadly, the special arrangement of valves herein shown; but

What I claim as new, and desire to secure by Letters Patent, is—

In an engine, the separate and independent cylinders, with independent valve-chambers in connection therewith, said cylinders being secured together in line with each other, an intermediate removable head having a chamber and packing-rings removably fitted therein, pistons fitting each of the cylinders, a trunk connecting said pistons passing through the intermediate head of the cylinder and the packing-rings, ports connecting each of the cylinders with its independent steam-chest, and exhaust-ports leading from the outer ends of each of the steam-chests, valves F, having chambers P, by which the inner and outer ends of the cylinders and the outer ends and exhaust-passages are each alternately connected together, supply-ports made through the extended inner ends of the cylinders, whereby steam from the boiler is admitted directly to the inner ends of the cylinders only, slide cut-off valves movable upon the backs of the main slide-valves, and connecting-rods extending through the intermediate walls of the valve-chambers, whereby the slide and cut-off valves of each of the cylinders may be removed or adjusted independently of each other, substantially as herein described.

In witness whereof I have hereunto set my hand.

MILES B. DODGE.

Witnesses:

S. H. NOURSE,
J. A. BAYLESS.