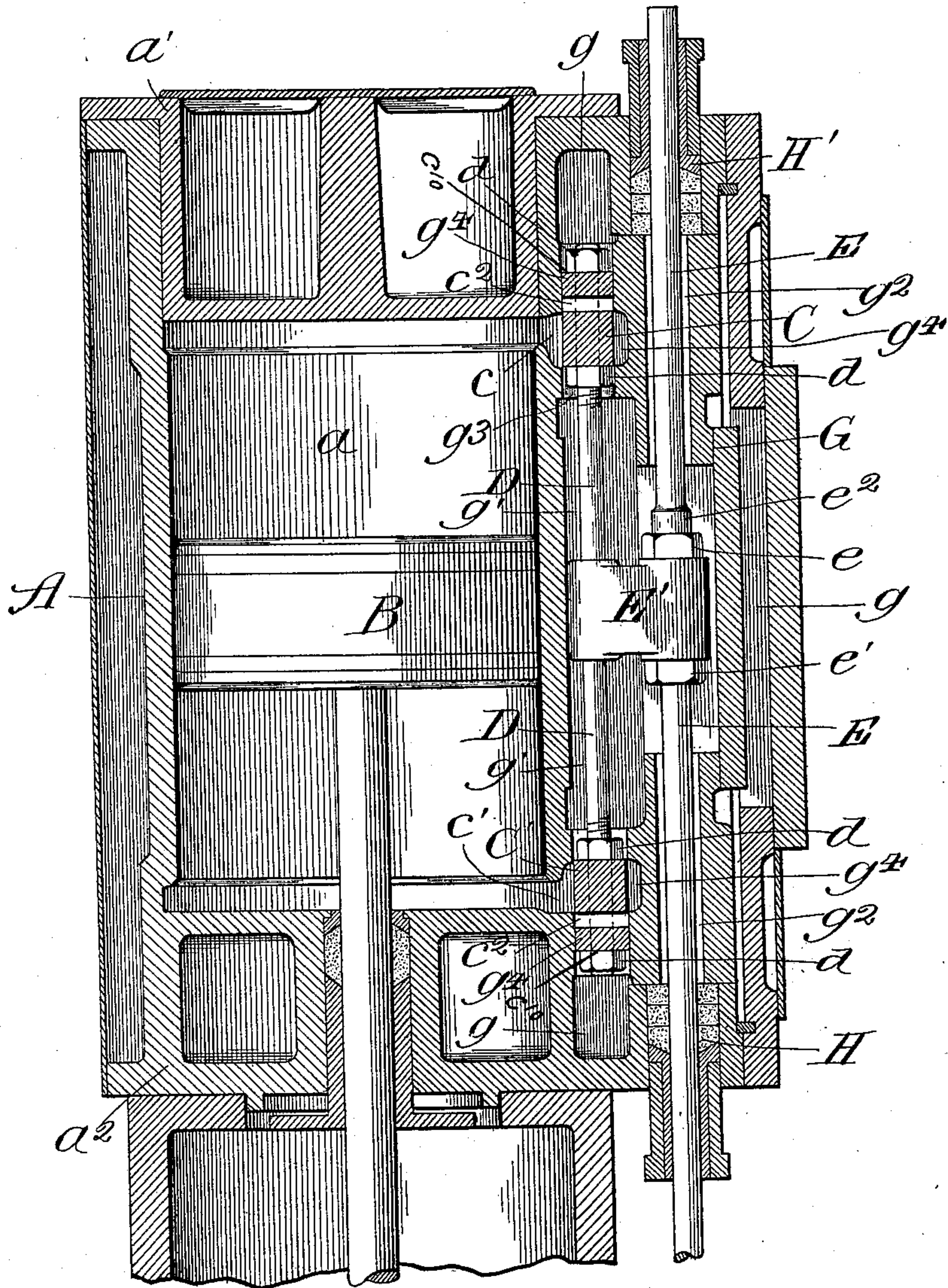


(No Model.)

F. F. FISCHER.  
FLUID PRESSURE ENGINE.

No. 592,108

Patented Oct. 19, 1897.



Witnesses:

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# UNITED STATES PATENT OFFICE.

FRED F. FISCHER, OF CHICAGO, ILLINOIS.

## FLUID-PRESSURE ENGINE.

SPECIFICATION forming part of Letters Patent No. 592,108, dated October 19, 1897.

Application filed December 11, 1896. Serial No. 615,275. (No model.)

*To all whom it may concern:*

Be it known that I, FRED F. FISCHER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid-Pressure Engines, of which the following is a specification.

My invention relates particularly to that class of engines commonly called "steam-engines," and has a special relation to the arrangement, location, and construction of the valves that admit and exhaust the fluid-pressure to the operating-chamber of the cylinder.

The object of my invention is to provide a simple, economical, and efficient valve mechanism for fluid-pressure engines; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawing the figure represents a central, longitudinal, sectional elevation of a cylinder and operating-valves constructed and arranged in accordance with my improvements.

In the art to which this invention relates it is well known that the valve mechanisms that control the admission of and exhaust the fluid-pressure are located at a point more or less remote from the cylindrical chamber, generally in line with the valve-rod, which is also the actuating-rod, and which is arranged to operate outside of the framework. On such structures it will be seen, therefore, that there is a large space that contains steam or fluid pressure that is practically wasted at every reciprocation of the piston, and very little of it, or only the expansion thereof, can be used. The object is that the condensation takes place rapidly. The admission of steam is not immediate to the operation of the valve, so that in high-speed and compound engines there is a large waste.

The principal object of my invention, therefore, is to remove these objections and to provide an engine with operating-valves located immediately adjacent to the cylindrical or operating chamber, so that there is very little, if any, space to hold waste fluid-pressure.

A further object, as will be apparent from the following description, is to provide means

for adjusting the valves independently and simultaneously.

In constructing an engine in accordance with my improvements, I make a cylinder A, of the desired size, shape, and strength, and provide it with a movable piston B, which is located in what might properly be termed the "operating-chamber" *a* of the cylinder. This chamber is provided with the usual cylinder-heads *a'* *a''*, but which do not form any particular novel feature of my invention.

To provide simple, economical operating-valves, I make two valves C C' and locate them at opposite ends of the cylindrical chamber, in line with and arranged to cover and uncover the ported openings *c* and *c'*. These valves may be of any desired shape, but I prefer to make them, for purposes of economy, substantially rectangular in cross-section, and provide them with transverse openings C<sup>2</sup>, that pass through the same and adapted to connect the openings in the cylindrical chamber with the live-pressure chamber hereinafter described. To operate these valves, I connect them together by means of a valve-rod D, which at each end is passed through longitudinal openings in the valves. This rod is provided with lock-nuts *d d* at each side of the valve, by which the position of the valve on the rod is governed. It will be noticed from an inspection of the drawing that a valve is located at each end of the chamber, and with just enough material between them and the chamber to provide for giving the working surface a sufficient strength to resist the pressure required for operating the piston. An actuating-rod E is provided and is passed through suitable openings in the cylinder-casing of said cylinder portion proper outside of the engine-frame, parallel with the valve-rod, and in line with the movable portion of the engine with and by which it is desirable to connect and operate this rod. Connecting the actuating and the valve-rods together is what I term a "spanner" E', which is adjustably held on the actuating-rod by means of lock-nuts *e* and *e'*, which engage an enlarged threaded portion *e''* of the actuating-rod. It will thus be seen that when it is desired to change the location of the valves independently to obtain the initial lap and



lead all that is necessary to do is to release the lock-nuts  $d$ , set the valve independently, and then tighten the lock-nuts.

The valves being set in their initial position, if it be desirable at any subsequent time to change them simultaneously all that is required is to loosen the lock-nuts  $e$  and  $e'$ , set the valves, and retighten the nuts.

A pressure-plate  $G$  is arranged between the outer walls of the cylinder and the valve-seat to form a barrier between the live-pressure chambers  $g$  and the exhaust-chamber  $g'$ . This pressure-plate may be constructed in any desired shape, and is provided, in this structure, with a longitudinal opening  $g^2$ , through which the actuating-rod for the valves passes. The inner portion of this plate is cut or grooved at  $g^3$  in places where the valves are passed through, so as to rest against such valves and the valve-seats  $g^4$  and be held against such valve and seat by means of the fluid-pressure in the live-pressure chamber.

To form a seal between the cylinder-casing and the pressure-plate and to prevent the passage of steam from the live-steam chamber to the exhaust-chamber, I make stuffing-boxes  $H$  and  $H'$  in that portion of the cylinder-casing through which the actuating-valve passes, the packing in such boxes resting against the end of the pressure-plate. This seals the opening  $g^2$  against the passage of steam there-through.

While I prefer, for the sake of economy, to insert the stuffing-boxes in the cylinder-casing, where they perform a double function, it will be readily understood that they can be attached or secured to integral portions of the pressure-plate. The pressure-plate on its inner surface, where it contacts the valve, is provided with a groove or space  $g^4$  immediately opposite the openings in the cylinder-chamber, so that when there is a pressure immediately under the valve there is a corresponding pressure in the space  $g^4$  acting to balance the valve.

In operation, steam is admitted to the live chamber  $g$  and immediately enters the space  $g^4$ . The movement of the piston and the movable parts of the engine actuates the valve-rod so that one of the openings  $g^2$  in the valves is brought into line with one of the openings in the cylindrical chamber to admit a portion of the steam and operate the piston. The main portion of the steam is admitted over the edge  $c^{10}$  of the valves. During the reverse movement of the piston the valves are operated so as to admit steam to the opposite end of the cylinder and allow it to be exhausted from the initial end, leaving at any time but a very small portion of waste pressure in the openings  $c$  and  $c'$ .

The particular advantages due to the use of an engine constructed in accordance with my improvements are, first, that very little steam or high pressure is held in the chambers to permit of condensation and consequent expense of fuel. Further, the arrangement

of the rods in the valve-chest, as above described, provides for an economical arrangement, in that both of such rods being confined within the steam-chest are subjected to the same degree of expansion and contraction, thereby keeping "lap" and lead at all times in proper relative positions.

While I have described my invention with more or less minuteness as regards details and as being embodied in certain precise forms, I do not desire to be limited thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial elements, and the substitution of equivalents, as circumstances may suggest or necessity render expedient.

I claim—

1. An engine provided with a cylinder having a movable piston located therein, inlet and outlet openings in the cylindrical chamber, one located at each end, slide-valves arranged on seats immediately adjacent to the cylindrical chamber and connected together, an actuating-rod arranged outside of the valves and parallel therewith and connected with a movable part of the engine, both rods arranged within the steam-chest and a spanner or equivalent mechanism connecting the actuating rod with the operating-valves, substantially as described.

2. An engine provided with a cylinder having a piston movably mounted therein, and inlet-openings to the cylinder-chamber, one located at each end thereof, slide-valves movably mounted upon the seat portions immediately adjacent to the cylindrical chamber, adapted to cover and uncover the openings to such chamber, a valve-rod adjustably securing such valves together, an actuating-rod arranged outside of the valve-rod and parallel therewith, and a spanner or equivalent mechanism connecting the valve and actuating-rods, all arranged within the steam-chest, substantially as described.

3. An engine provided with a cylinder having a piston movably mounted therein and provided with openings for the piston-chamber, one at each end thereof, slide-valves movably mounted on the seat portions immediately adjacent to the piston-chamber and on the walls thereof, a valve-rod adjustably securing the valves together, an actuating-rod arranged outside of the valve-rod parallel therewith and connected with a movable part of the engine, both of such rods arranged within the steam-chest and a spanner or equivalent mechanism adjustably securing the valve and actuating-rods together, whereby the valves may be adjusted simultaneously or independently, substantially as described.

4. An engine provided with a cylinder having a piston movably mounted therein and provided with openings in the piston or operating chamber, one located at each end thereof, slide-valves mounted upon the walls of the



piston or operating chamber immediately adjacent to such chamber, so as to cover and uncover the inlet and exhaust openings, a rod adjustably securing the valves together, a  
5 pressure-plate arranged outside the valves and separating the live-pressure chamber from the exhaust-chamber and adapted to be held by fluid-pressure against the valves and seat, an actuating-rod passed through the  
10 pressure-plate, stuffing-boxes to seal the open-

ing in the pressure-plate in which the actuating-rod operates, and a spanner or equivalent mechanism adjustably connecting the valve and actuating-rods together, substantially as described.

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Witnesses:

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