

Vanvorhis & Workman,

Rotary Steam Engine.

N^o 76,676.

Patented Apr. 14, 1868.

Fig. 1.

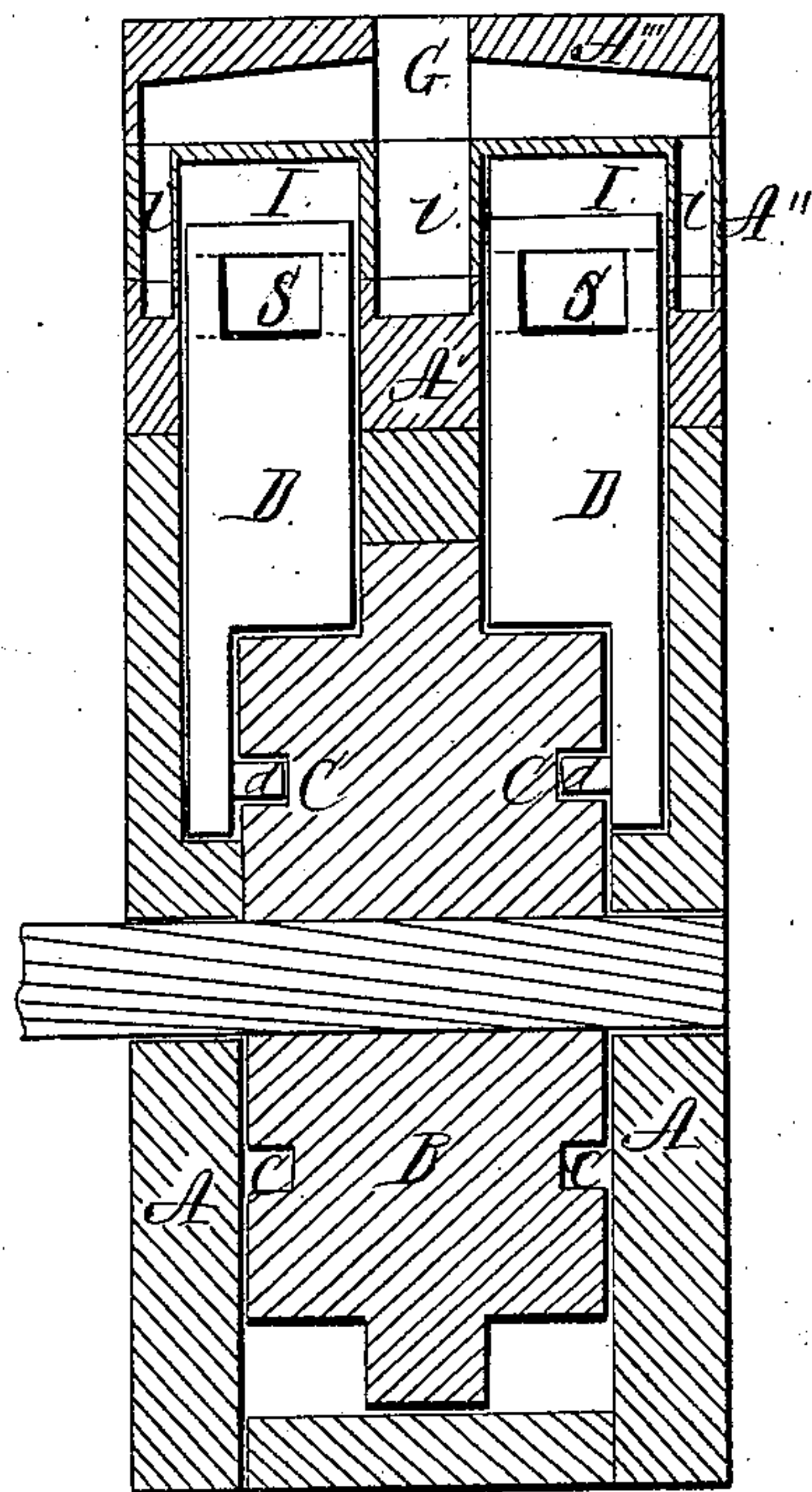
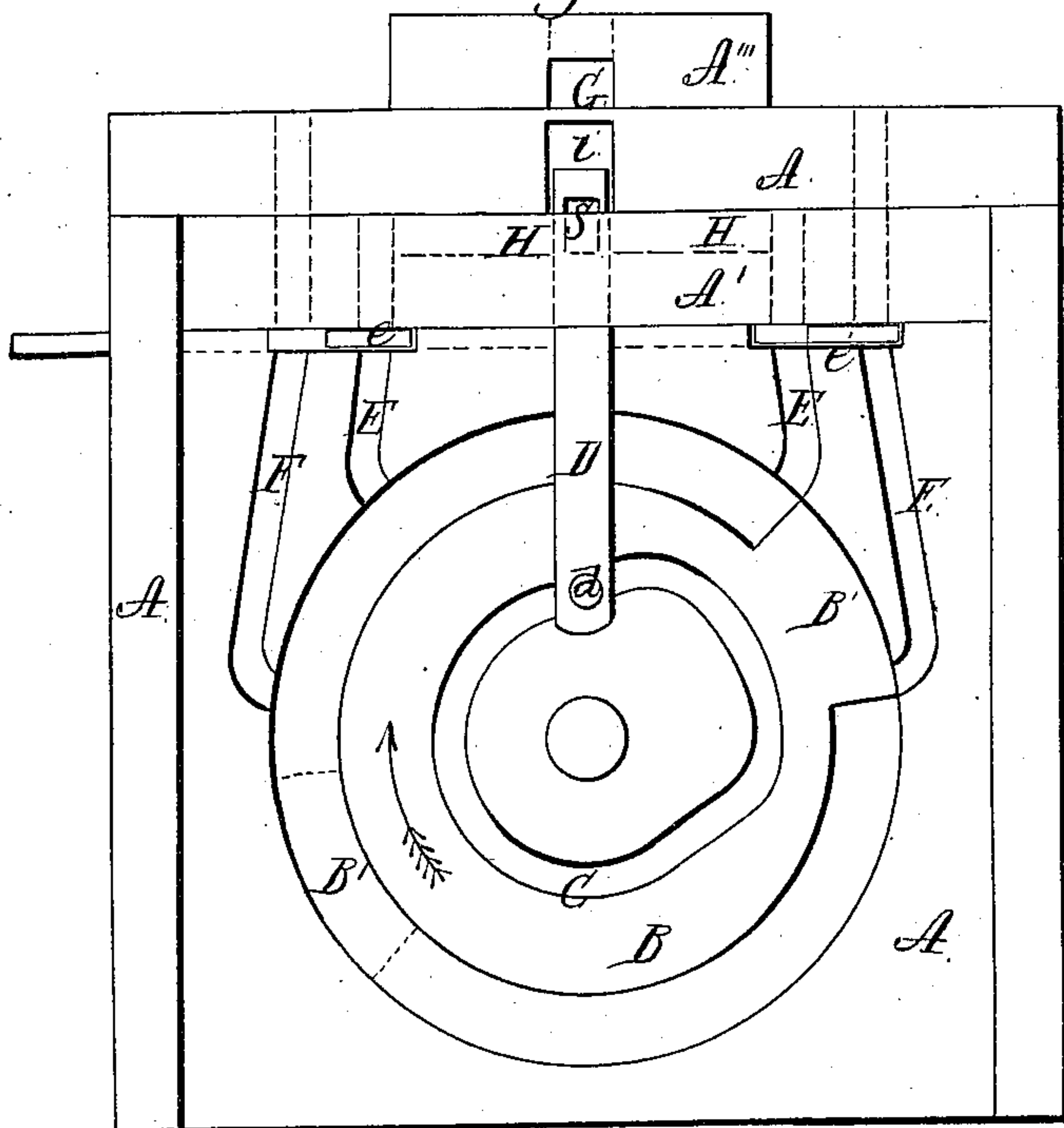
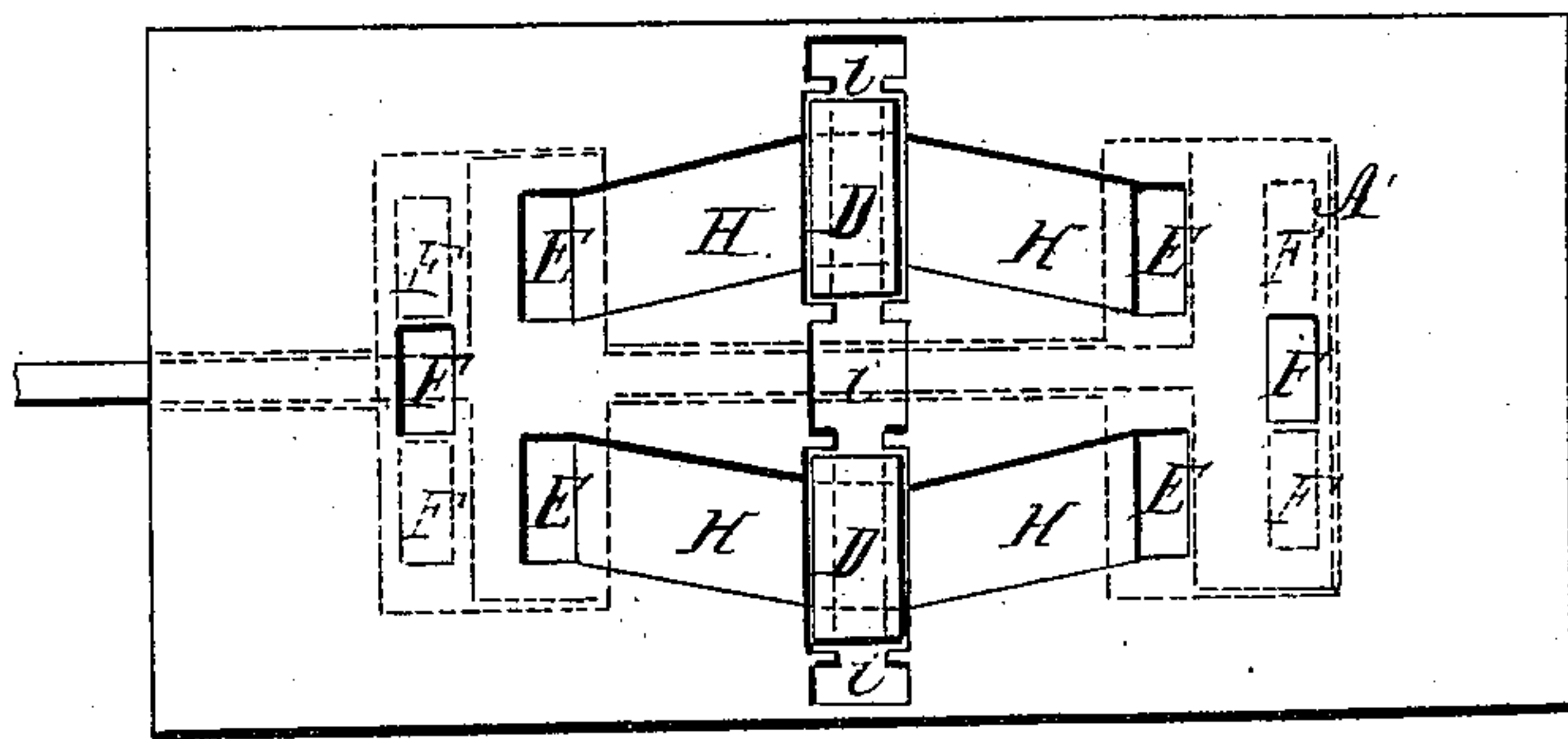


Fig. 2.

Fig. 3.



Witnesses:

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FLAVIUS J. VAN VORHIS AND THOMAS C. WORKMAN, OF STOCKWELL,
INDIANA.

Letters Patent No. 76,676; dated April 14, 1868.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, FLAVIUS J. VAN VORHIS and THOMAS C. WORKMAN, of Stockwell, in the county of Tippecanoe, and State of Indiana, have invented new and useful Improvements in Rotary Steam-Engines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1 is a vertical longitudinal section at one side of the piston.

Figure 2 is a vertical transverse section through the centre of the engine.

Figure 3 is a horizontal plan view of the steam-chest.

Similar letters of reference indicate corresponding parts in the several figures.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A is the steam-case, which is here shown of rectangular form, in its external appearance, but which may be of any convenient or desirable form applicable to the construction of this engine. The case is composed of three pieces of castings, a middle and two side-plates. The middle plate is of the thickness required for the transverse diameter of the piston, and is pierced with an opening of the size required for the piston. The steam and exhaust-passages E and F are also formed in the sides of this plate, as shown in fig. 1, and so also is the seat of the reversing-valve e, in its top edge. This plate has flanges cast on its ends to receive the side-plates. The object of this construction of the steam-case is to make it simple to mould and cast, and so that it may be conveniently and cheaply fitted together. The side-plates of the case have grooves to receive the outer edges of the valves D, and serve as guides for them.

The piston B may be cast either solid or in three pieces, to be bolted together, as may be found most convenient in fitting it up. The middle portion of the piston is made to fit steam-tight in the steam-chamber, and serves as a partition, separating it into two compartments, forming a double-acting engine. The side-plates or portions of the piston are as much less in diameter than the middle portion as may be required for the steam-space, or rather as may be required for piston-surface, which latter is obtained by extending a portion of the side-plates out to the perimeter of the middle plate, forming the piston proper, against which the steam acts, as shown at B'. These are arranged opposite each other, as indicated by the dotted lines on the piston in fig. 1. The object being to make the engine double-acting, there are also two valves, D, and a double system of steam-passages to correspond with the double steam-chambers and pistons, all constructed alike, except that the pistons B' and cam-rings C, that actuate the valves D, are arranged opposite each other, so as to operate alternately, so that while the steam is cut off one piston, it is admitted under full-head upon the other.

D are valves, that serve the double purpose of admitting steam to and cutting it off the pistons alternately, and also as abutments to the back pressure of the steam, a shoulder near their lower ends, resting upon the perimeter of the side-plate of the piston, forming the abutment. These valves are actuated by means of the projecting points or pins d, and by the cam-groove C, in the sides of the piston. Cavities, I, are formed in the cap-piece A'' of the steam-chest, to receive the upper ends of the valves, and in which they work steam-tight. The valves are pierced through, near their upper ends, as shown at S, figs. 1 and 2, and by dotted lines in fig. 3, for the passage of the steam, as hereafter described, and, also, in connection with the cavities I, in cap-piece A'', as a means of balancing the valves, or relieving them of the downward pressure of the steam. The upper end of the valve working steam-tight in the cavities I, prevents the steam from getting above them, and the pressure of the steam against the surface of the valve above the openings S being equal to that below, there can be no pressure upon the valve preponderating in any direction.

The steam is admitted by port G, in the cap-piece A'', and passes down the passages i i i, and through the openings S, in the valves D, thence along the passages H, down the passages E, into the steam-space between the pistons B' and the lower ends of the valves D, which form the abutments for the back pressure of the steam.

The pressure of the steam upon the piston B' drives it around until it passes the exhaust-port F, through which it escapes to the open air. At this point the cam-groove C raises the valve D, until the openings S are closed by being housed in the cavities I, in the cap-piece A'', which cuts off the further admission of steam on that side of the steam-chamber, until the piston B' has revolved beyond the steam-induction port E.

The reversing-valve e, fig. 1, and indicated in red dotted lines, fig. 3, is used only in giving direction to the rotation of the piston, being applicable to such engines as require reversing, such as locomotives and steamboat-engines. In stationary engines, when the rotation is always in one direction, this valve, and also one of the induction-ports, with the corresponding exhaust-port, may be omitted.

It will be observed that the exhaust-port behind the piston is always open for the free escape of the steam; hence there is no back pressure.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The construction of the case A, substantially as set forth.
2. The construction and arrangement of the piston B and valves D, substantially as set forth.
3. The arrangement of the valves D, with the piston B and cam-grooves C, substantially as set forth.
4. The arrangement of the steam-passages *z z z*, with the valves D, and the cavities I, substantially as set forth.
5. The arrangement of the valves D, with the passages H and ports E, substantially as set forth.
6. The arrangement of the reversing-valve e, the steam-induction ports E, and exhaust-ports F, substantially as set forth.

FLAVIUS J. VAN VORHIS,
THOMAS C. WORKMAN.

Witnesses:

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