

W. H. GUILD, Jr.  
Improvement in Operating Valves of Steam-Engines.  
No. 126,804.

Patented May 14, 1872.

Fig. 1.

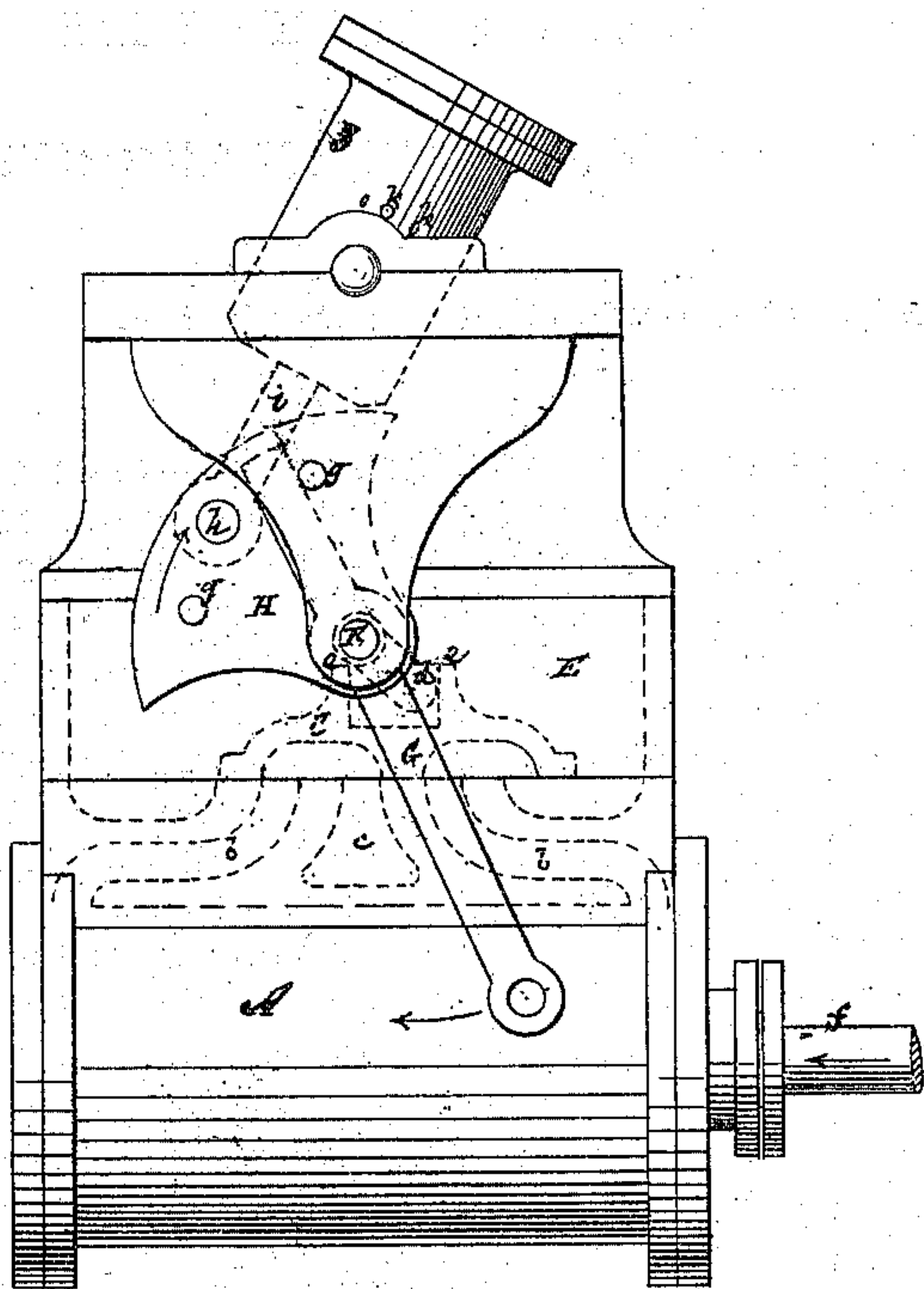


Fig. 2.

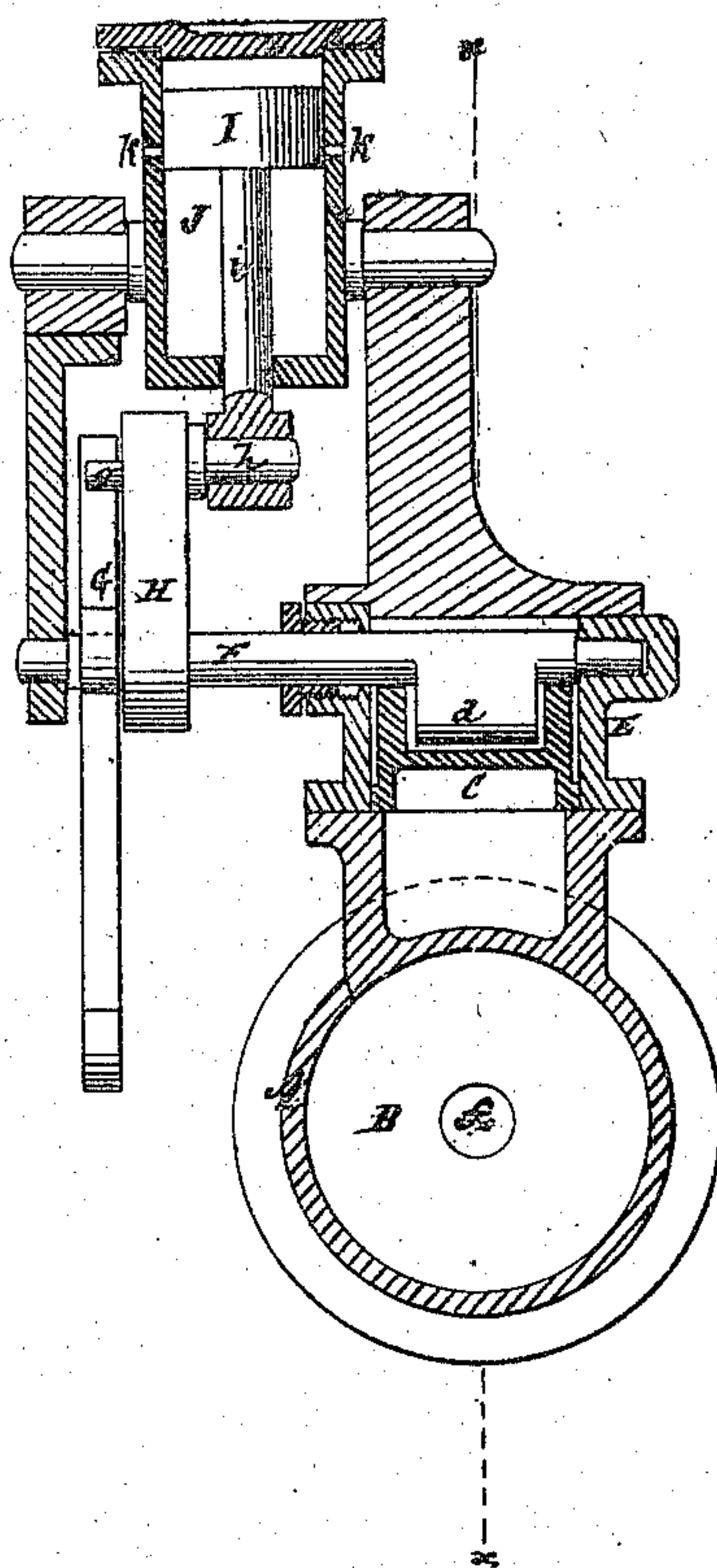
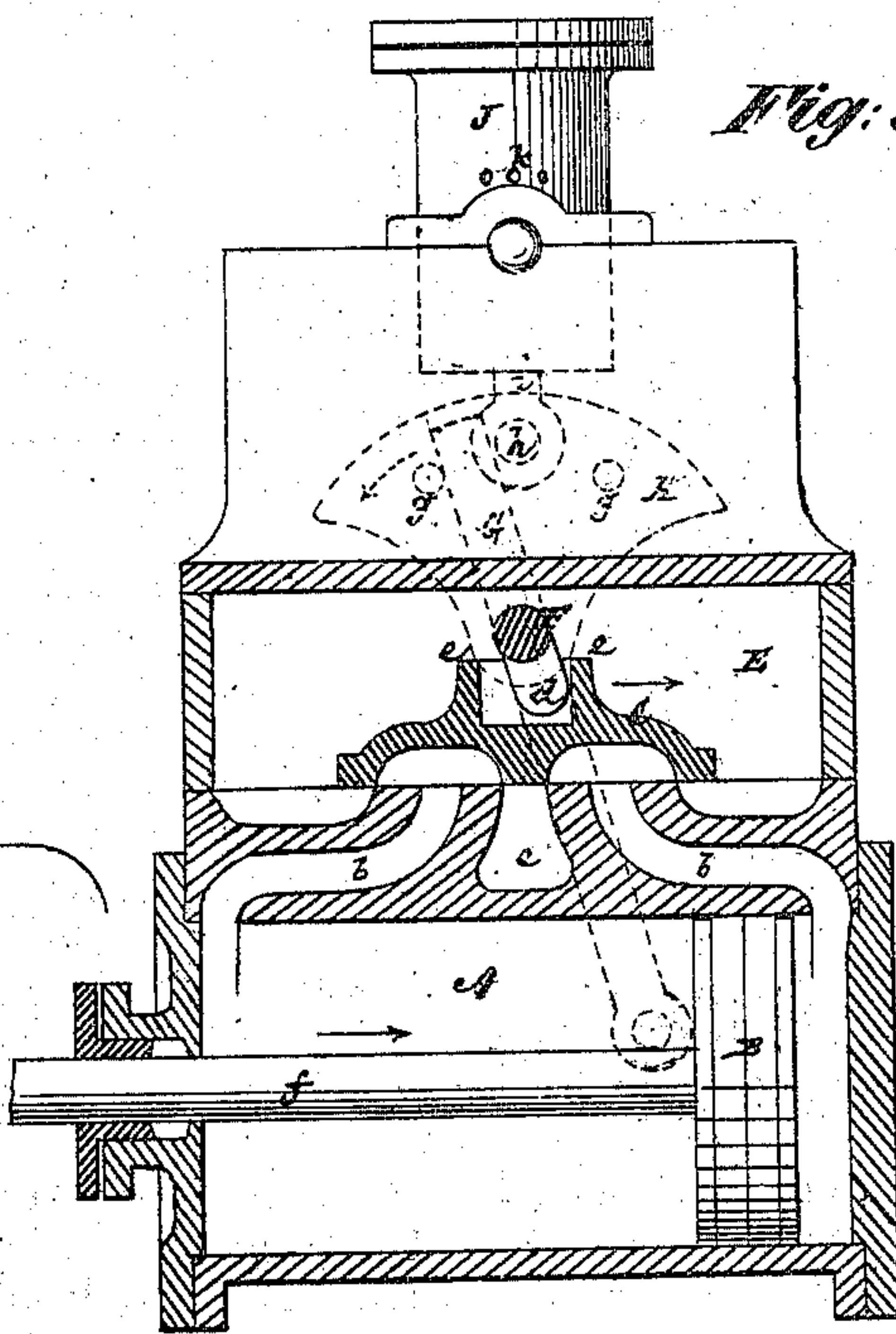


Fig. 3.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN OPERATING VALVES OF STEAM-ENGINES.

Specification forming part of Letters Patent No. 126,804, dated May 14, 1872.

Specification describing certain new and useful Improvements in Means for Operating the Valves of Steam-Pumps and Direct-Acting Steam-Engines, the invention of WILLIAM H. GUILD, Jr., of the Eastern District of Brooklyn, in the county of Kings and State of New York.

This invention relates to means for reversing the throw of the valve which controls the motion of the main or driving piston in steam-pumps and direct-acting steam-engines by an independent force set in motion by the main piston; and the invention consists in a combination, with said valve, of a piston operated by an increase or diminution of pressure of air produced on one side of it by and during the stroke of the main piston, to suddenly throw the valve or complete its reversal at or toward the close of the stroke of the main piston. The invention also consists in a special combination of devices for advantageously carrying out or putting into practice the principle of this invention.

In the accompanying drawing, which forms part of this specification, Figure 1 represents a side elevation of the steam-cylinder of a steam-pump with my improvement applied thereto; Fig. 2, a vertical transverse section of the same; and Fig. 3, a longitudinal section at the line *x x* in Fig. 2.

Similar letters of reference indicate corresponding parts throughout the several figures of the drawing.

A represents the steam-cylinder of a steam-pump, and B the piston working therein. C is the main valve for controlling the motion of said piston. This valve is here shown as of a double D-slide construction working within a valve or steam chest, E, and controlling ports or passages *b b* and *c* for passage of the steam to and from opposite ends of the main cylinder alternately; but I do not restrict myself to any particular form of valve. F is a rock-shaft for operating the main valve by means of a toe or crank, *d*, acting alternately against oppositely-disposed horns *e e* on the back of the valve. These horns or surfaces are arranged at such distance apart that the toe *d* has a certain amount of play or lost motion between them for the purpose of obtaining an intermittent action of the valve. G is rocking or tappet lever, fitted loosely on the shaft F, and receiving

a continuous rocking or vibratory motion from the main piston by any suitable connection with its rod *f* or otherwise. H is an arm, fast on the shaft F, and provided with stops or studs *g g*, between which the one arm of the lever G works, and against which alternately it presses or acts as a tappet to rock the arm H and shaft F for the purpose of moving the valve C by or through the agency of the toe *d*. The movement of the valve C, however, is not produced in a direct manner by the lever G, or only partly so, to close the ports, as shown in Fig. 2, but is effected—that is, so far as regards reversing the position of the valve relatively to the ports or passages of the main cylinder is concerned—by an independent force, produced by the movement of the arm H, through the action of the lever G upon either stud *g*. Thus, connected with the arm H by a pin, *h*, arranged intermediately of the studs *g g*, is a rod, *i*, of a piston, I, fitted to work within an oscillating atmospheric cylinder, J. This cylinder is closed at its one or upper end, but is provided with side perforations *k* in such relation with its top that the piston I at or toward the completion of its descent exposes the perforations *k* to admit air above said piston, and so that the latter, in its ascent, (as the parts are arranged,) closes said perforations and compresses the air within the upper portion of the cylinder J, which cylinder may be open below or in continuous communication, by suitable openings, with the atmosphere on the outside to prevent compression of air within the cylinder below the piston I, or only admitting of a moderate compression of the air in the lower portion of the cylinder J to form a cushion for said piston at or toward the close of its descent, for the purpose of obviating a jerking action of the parts on the valve, and to bring the valve, in an easy manner, to a state of rest after it has been rapidly thrown or reversed by the piston I, as will now be described. The lever G having, by its action against either stud *g*, moved the arm H and valve C to the positions shown in Fig. 2, or so that the pin *h* is carried a little over its culminating point, the air compressed in the upper portion of the cylinder J during the ascent of the piston I, produced by the travel of the pin *h* to such point, then suddenly acts upon said piston with great force to depress it, and to



move or work the arm H independently of the lever G to throw or reverse the valve. This action is repeated toward the close of each stroke of the main piston by reason of the pin *h* working from the versed sine of the arc described by it, to give both an up and down motion to the piston I for one stroke in either direction of the main piston, whereby the cylinder J receives a fresh charge of air and compresses the same to operate by expansion for the purpose of throwing the valve during each stroke of the main piston.

While not restricting my invention to the precise combination or arrangement of parts here shown and described, yet the same form a very simple, smooth, and efficient means for carrying out the principle of the invention.

Instead of using compressed air to throw the piston I, air of ordinary atmospheric pressure may be employed by causing said piston in its one stroke to produce a vacuum in the cylinder J, on one side of it, and exposing the other side of said piston to the atmosphere.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the valve that controls the motion of the main piston, of a piston operated by an increase or diminution of pressure of air produced on one side of it by and during the stroke of the main piston to throw the valve or complete its reversal, substantially as specified.

2. The combination, with the main valve C, of the rocking arm H, the rock or valve shaft F, the pin or connection *h*, and the piston I of the air-cylinder J, for operation of the valve, all arranged essentially as described.

3. The combination of the loose tappet-lever G, the rock-shaft F, by which the valve is moved, the fast-rocking arm H with its studs *g g*, the pin or connection *h*, and the piston I of the air-cylinder J, for operation in relation with each other and the main piston B, substantially as specified.

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Witnesses:

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