

J. B. Root,

Steam-Engine Valve-Gear.

N^o 42,878.

Patented May 24, 1864.

Fig. 1.

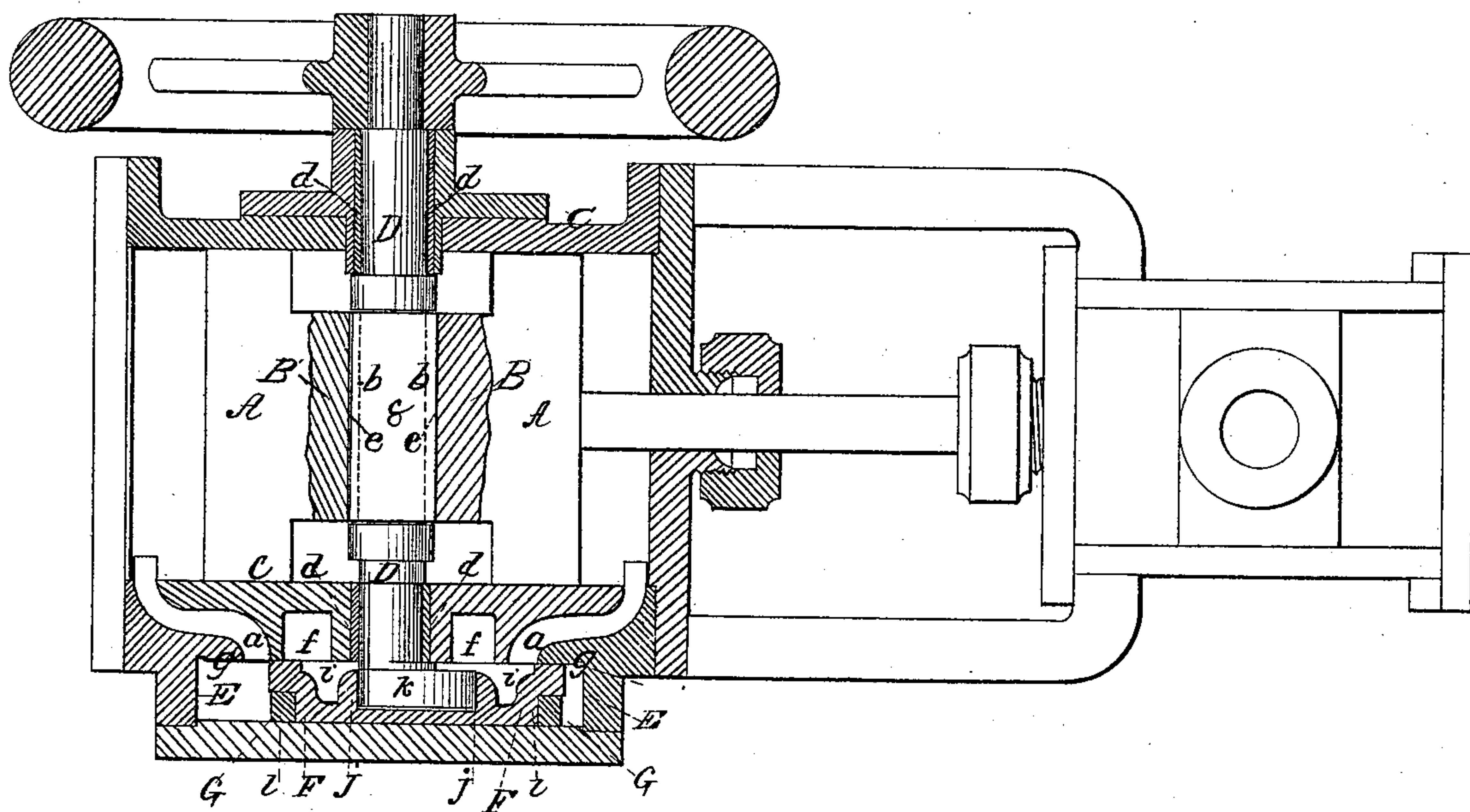


Fig. 2.

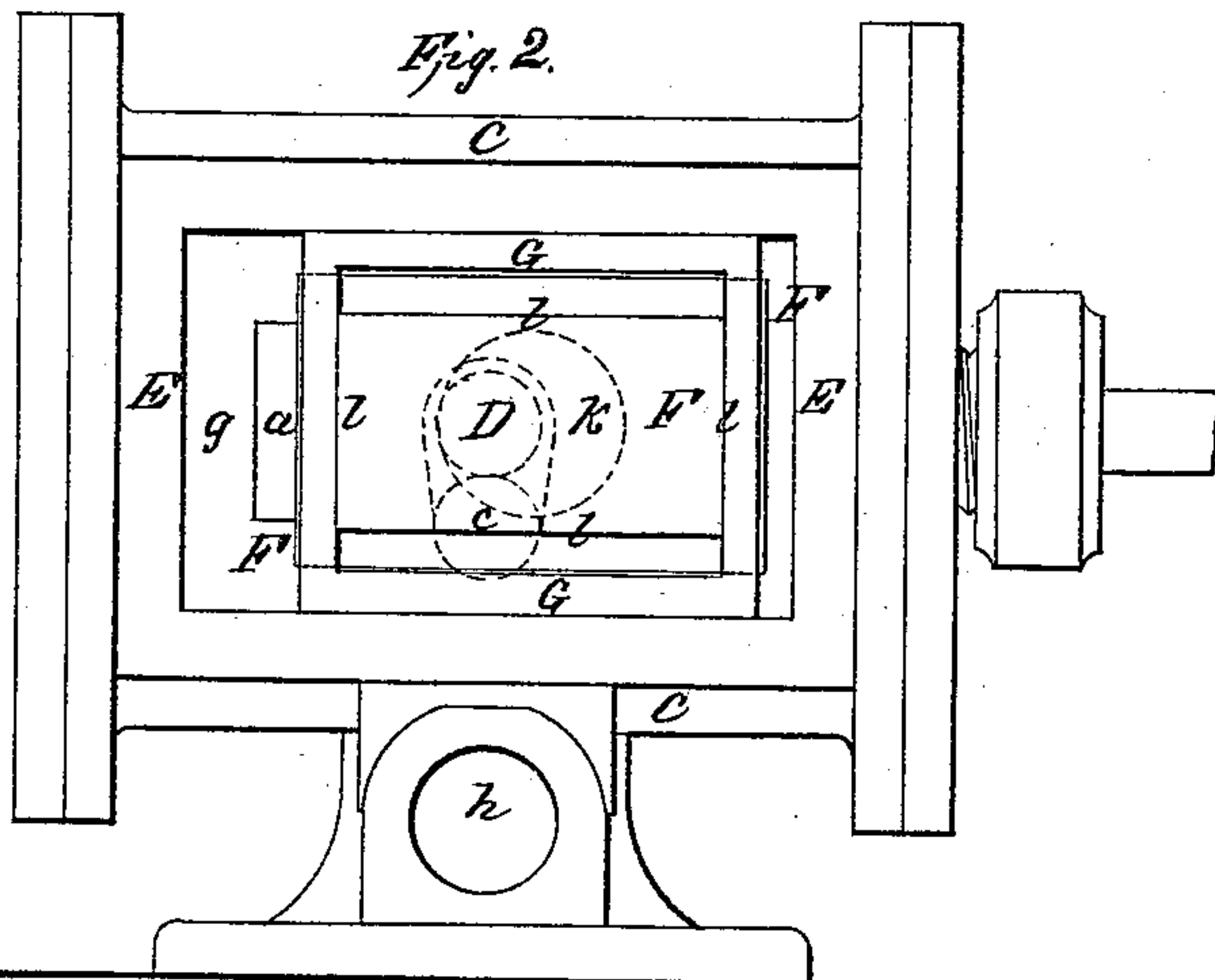
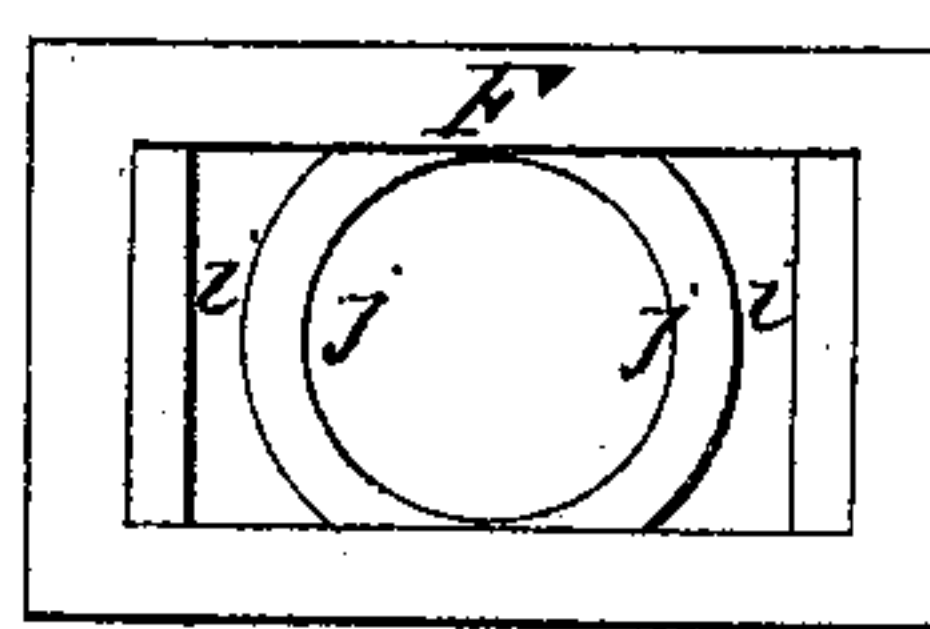


Fig. 3.



Witnesses:

*Jas. C. Hall
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UNITED STATES PATENT OFFICE.

JOHN B. ROOT, OF NEW YORK, N. Y.

IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 42,878, dated May 24, 1864.

To all whom it may concern:

Be it known that I, JOHN B. ROOT, of the city, county, and State of New York, have invented a certain new and useful Improvement in the Valve-Motion of Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan of a direct-action steam-pump with the steam-cylinder, valve-chest, and valve in section, illustrating my invention. Fig. 2 is a side view of the steam-cylinder with the cover of the valve-chest removed to expose my invention to view. Fig. 3 is a face view of the valve.

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

This invention relates to slide-valves, all portions of which have a similar circular movement about an axis perpendicular to the faces of the valve and seat, and is applicable both to the slide-valves of ordinary reciprocating engines and to the valve of the engine which constitutes the subject-matter of my Letters Patent dated September 16, 1863, as well as to the peculiar kind of reciprocating engine represented in the accompanying drawings.

It consists in the employment, for guiding the circularly-moving valve, of a yoke within which the valve is permitted to move rectilinearly, and which works between rectilinear guides in the valve-chest at right angles to the movement of the valve within the yoke, whereby the valve is kept in proper relation to straight ports in its seat.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The engine represented receives the steam at, and has it exhausted from, opposite ends of the cylinder C alternately, through ports *a a'* in the same manner as an ordinary reciprocating engine, but it has two pistons, A A, which are connected together rigidly by an interposed yoke, B. In this yoke there is a slot, *e*, which is perpendicular to the length of the cylinder for the reception of the brasses *b b* of the crank-pin *c*, the crank-shaft D being inserted transversely through the center of the cylinder at the middle of its length, and working in bearings *d d* in the sides of

the cylinder. The steam acts between the cylinder-heads and the outer sides of the pistons in the same manner as in an ordinary reciprocating engine to produce the reciprocating movement of the pistons, and in this reciprocating movement the slotted yoke B acts upon the crank to produce the rotary movement of the shaft, the crank-pin brasses sliding in the slot *e*. The valve-chest E is upon one side of the cylinder opposite to one end of the crank-shaft which terminates in the said chest. The steam-ports *a a'* and exhaust-port *f* are arranged in the valve-seat *g* in the same manner as in ordinary reciprocating engines, but the exhaust-port is larger, as it has arranged within it the crank-shaft bearing *d*, and it is connected by a suitable passage with the opening *h* under the cylinder where the exhaust-pipe is connected. The steam-pipe may be connected with any portion of the valve-chest.

The slide-valve F is of the same construction as the short three-port valve commonly used in reciprocating engines, except that it is elongated in a degree corresponding with the greater length of the exhaust-port *f* in the seat, and within its exhaust-cavity *i* there is a circular bearing, *j*, for the reception of an eccentric, *k*, which is fast on the crank-shaft D, the throw of this eccentric being what is required to produce a sufficient movement of the valve lengthwise of the cylinder to open and close the ports in the seat, and the said eccentric being properly set to produce the opening and closing of the ports at the proper time relatively to the movements of the pistons. The movement of the valve produced by the eccentric is a circular one about the axis of the crank-shaft, every point in it having the same movement, and hence its movement transversely is as great as its movement lengthwise of the seat. To permit this transverse movement the width of the interior of the valve-chest and of the seat must exceed the width of the valve by the diameter of the circles described by the valve in its motion.

G is the yoke, which constitutes the principal feature of my invention, is of quadrangular form, and fitted to slide parallel with the length of the cylinder and valve-seat between the sides of the valve-chest. The projection *l l* on the back of the valve is fitted between the ends of the said yoke to slide therein in a direction at right angles to the length of the

valve-seat and cylinder. The width of the projection *l l* is so much less than that of the interior of the yoke as to permit the movement of the valve transversely to the seat, consequent upon its circular motion produced by its eccentric. This yoke keeps the valve square upon its seat, and so keeps its ends and the ends of the cavity *i* parallel with the parts.

Instead of the eccentric, a crank may be used to work the valve.

In an ordinary reciprocating engine the valve having the yoke *G* applied in the same manner may be worked in the same way by means of a crank or eccentric on a shaft inserted through the back or cover of the valve-

chest and working in a bearing in the back of the valve, the said shaft being driven by any suitable mechanical means from the crank-shaft of the engine.

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

The sliding yoke *G*, applied and operating in combination with the valve and valve-chest, substantially as and for the purpose herein specified.

JOHN B. ROOT.

Witnesses:

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GEO. W. REED.