

(No Model.)

G. A. GRAY, Jr.  
STEAM ENGINE VALVE.

No. 248,036.

Patented Oct. 11, 1881.

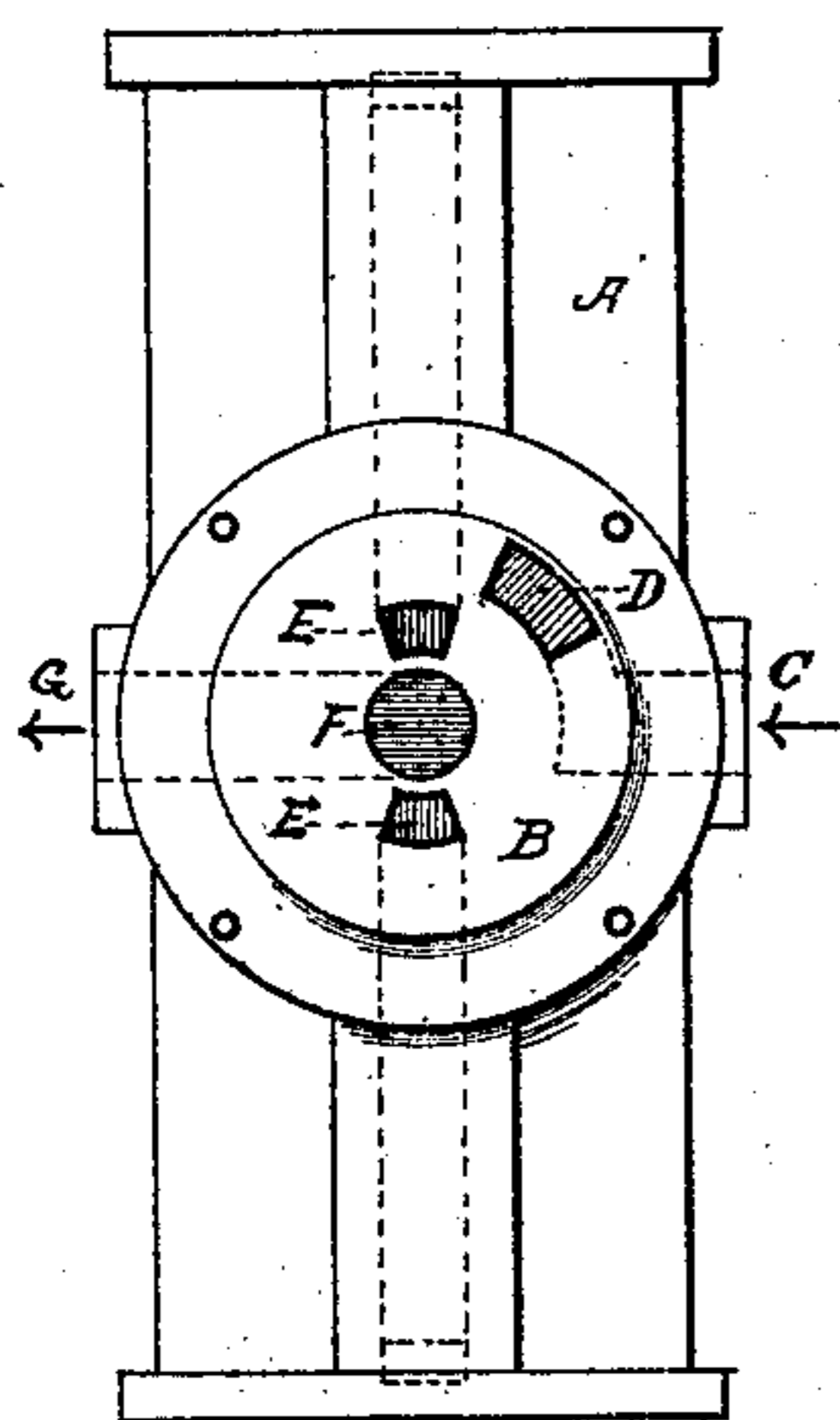


Fig 1

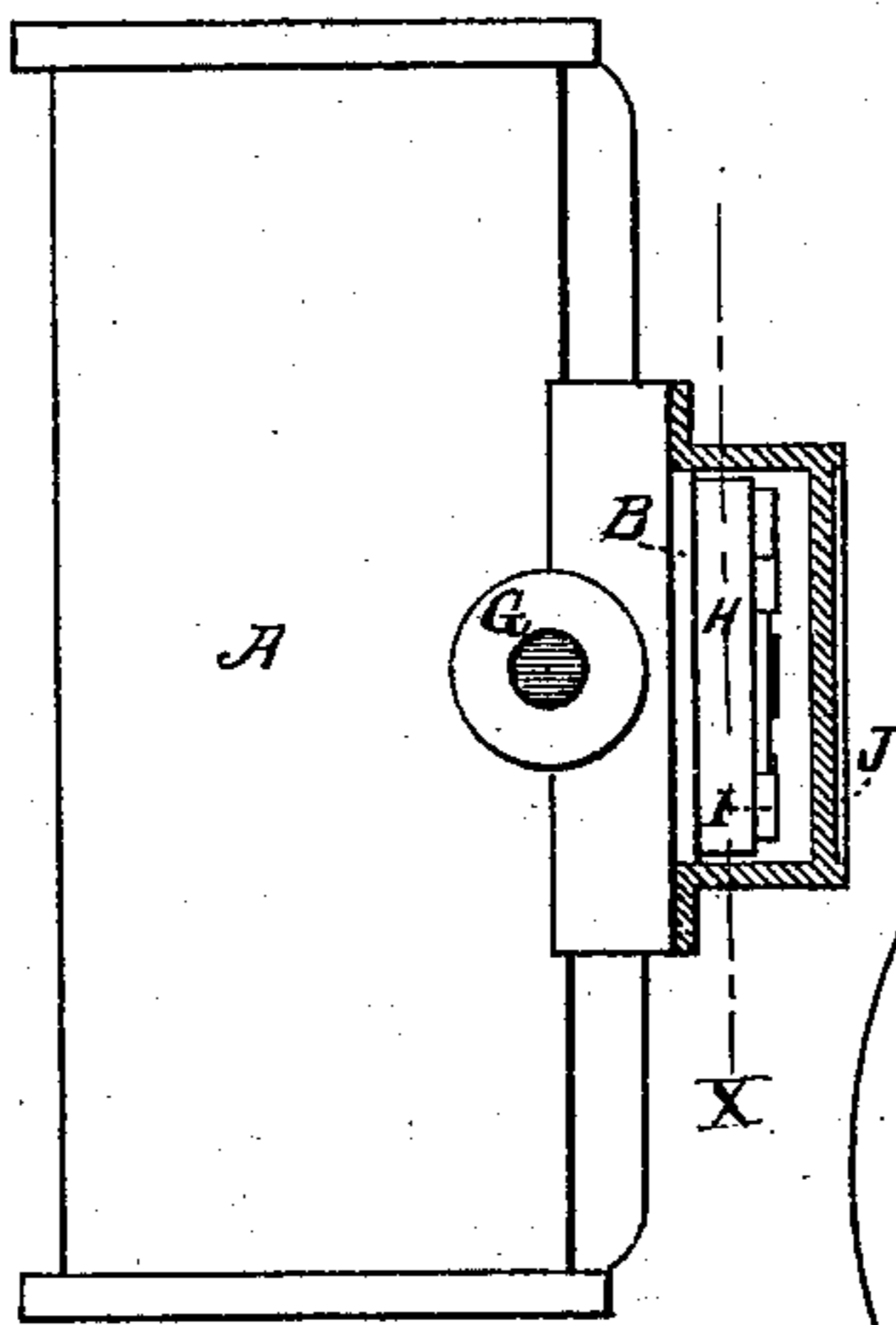


Fig 2

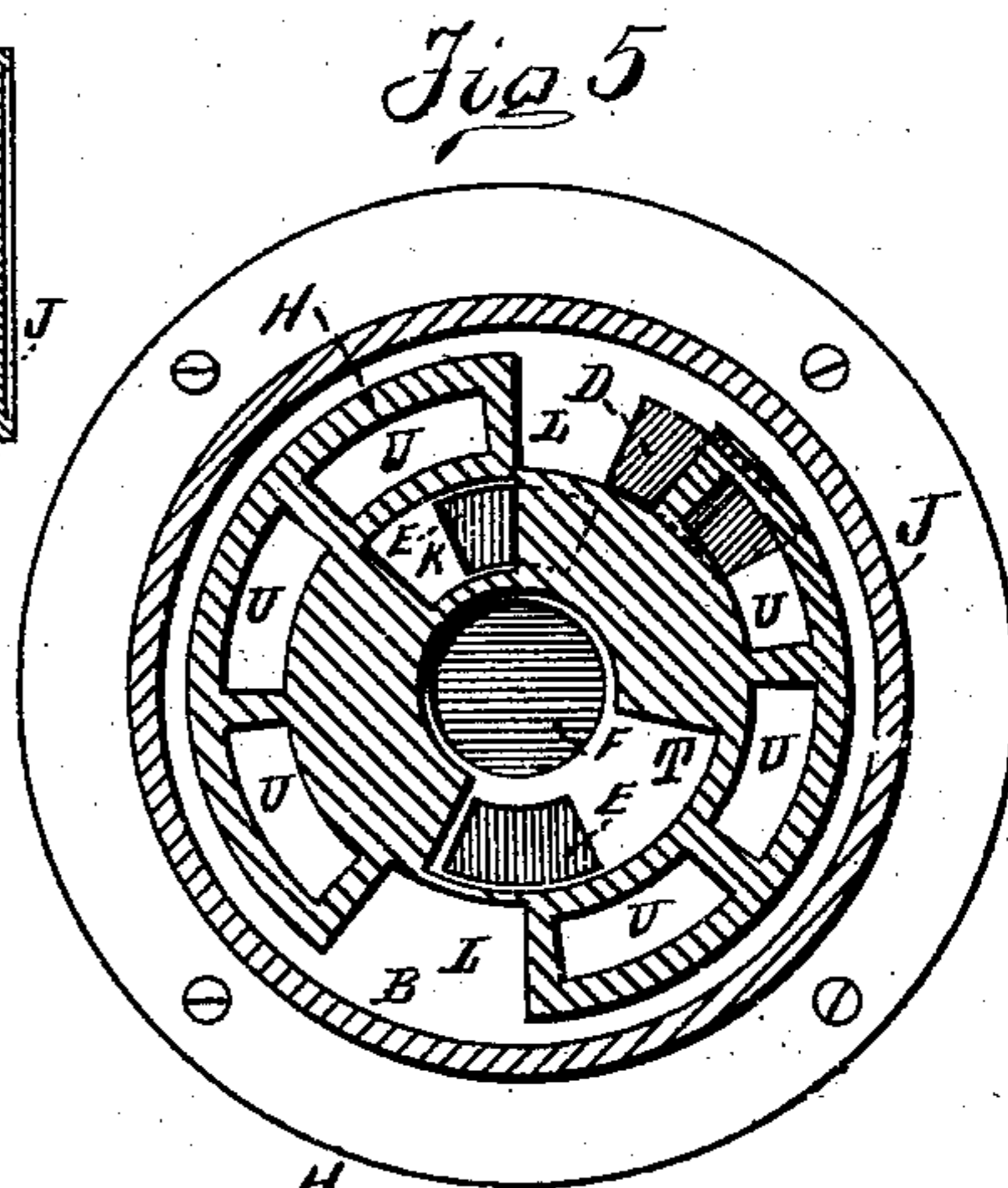


Fig 5

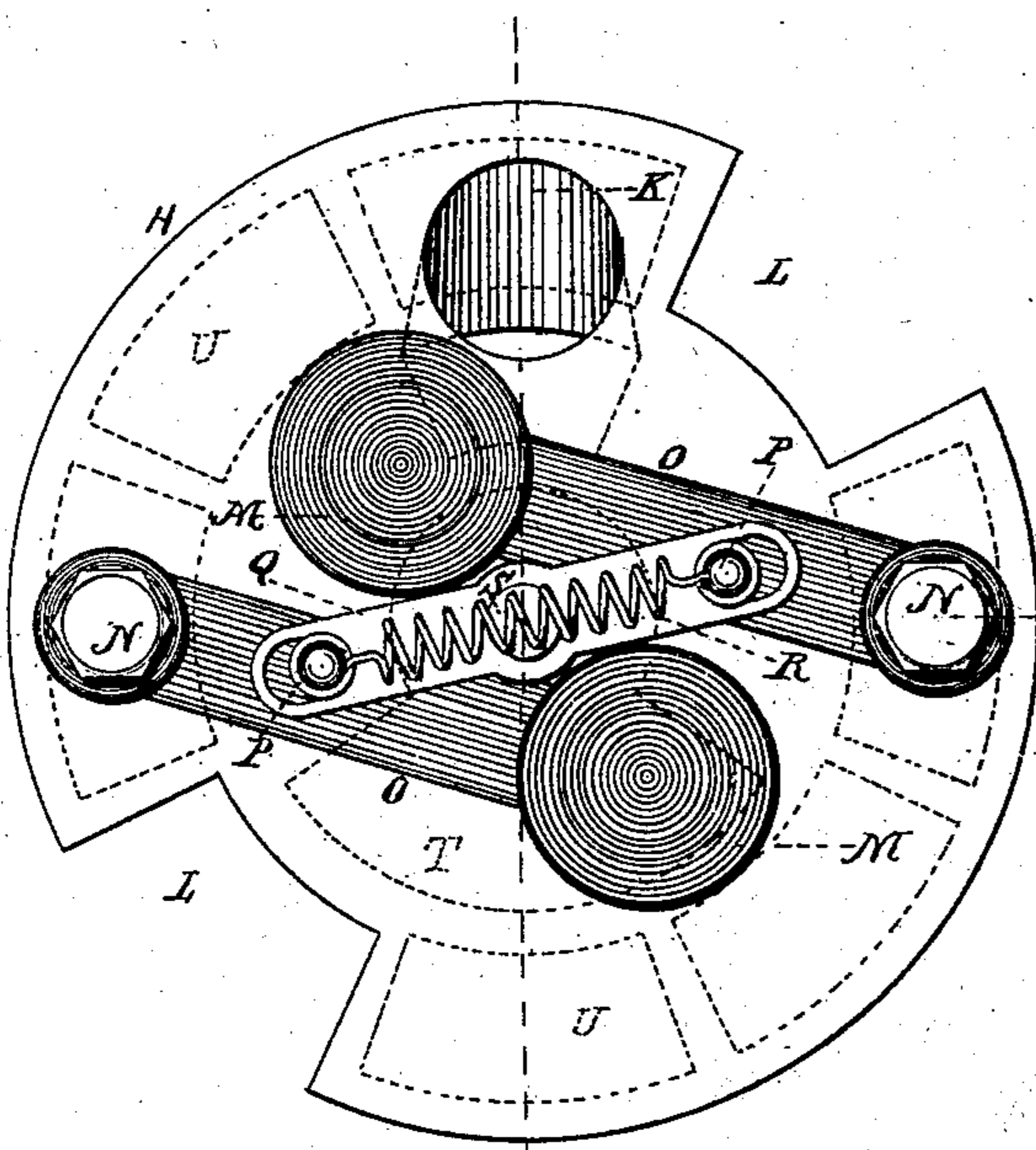


Fig 3

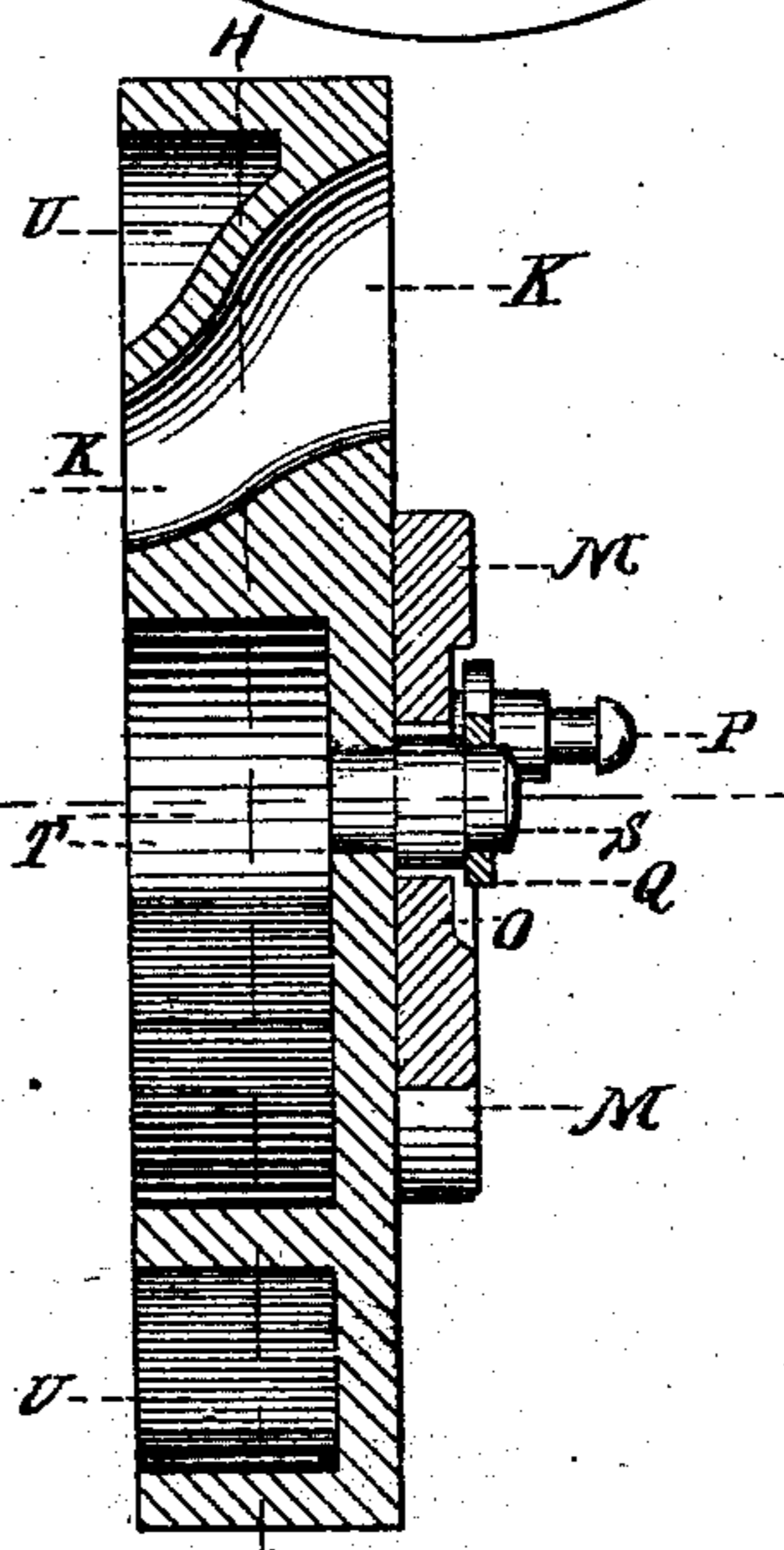


Fig 4

WITNESSES:

Geo. R. Wood  
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George A. Gray Jr. INVENTOR

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# UNITED STATES PATENT OFFICE.

GEORGE A. GRAY, JR., OF COVINGTON, KENTUCKY.

## STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 248,036, dated October 11, 1881.

Application filed July 23, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. GRAY, Jr., of Covington, Kenton county, Kentucky, have invented certain new and useful Improvements in Steam-Engine Valves, of which the following is a specification.

This invention pertains to rotary valves, and relates to a novel method of reducing friction of movement in valves, and to a novel regulating or governing attachment.

In the accompanying drawings, Figure 1 is an elevation of a cylinder and valve-seat. Fig. 2, a side elevation of same with steam-chest in section and valve in position; Fig. 3, an elevation of valve; Fig. 4, a vertical section of valve, and Fig. 5 an elevation of valve-seat with steam-chest and valve in section upon line X.

In Figs. 1, 2, and 3, A is the cylinder of an ordinary steam-engine.

B is a valve-seat fitted for a rotary valve.

J is the steam-chest, bolted to the seat, as usual. The steam-chest has no inlet or outlet save through the valve-seat.

E E are ports leading to ends of cylinder, as usual.

F is the exhaust-port communicating with exhaust-outlet G.

D is the live-steam inlet-port in the valve-seat, communicating with the steamway C.

H is a rotary or revolving valve arranged to revolve on the seat B and operate on the ports therein. The valve is to be rotated or revolved by any means adapted to the purpose, and should be revolved continuously in one direction. The function of the valve H is to admit steam to the interior steam-chest through inlet-port D at proper times, to cut off said admission at proper times, so that no unneeded live steam remains in the chest to exert a pressure on the back of the valve, to admit steam from the steam-chest to the cylinder, and to permit steam to exhaust from the cylinder to the atmosphere. The valve H is a disk adapted to cover all the ports in the seat B.

L L are gaps in the valve, which twice during each revolution of the valve will uncover the inlet-port D and admit steam to the steam-chest. The gaps L are so located and proportioned with reference to the other features that when a supply of steam is needed in the chest it will be admitted, and when not needed the chest will be cut off from all live-steam supply.

U U U are pockets in the face of the valve, so located that they will in turn pass over the inlet-port D. No provision is made for letting steam out of these pockets, the purpose being to entrap steam in them, so as to exert an outward pressure and reduce the friction, at the same time lubricating the surfaces with steam. The steam does not seem to condense in the pockets, but rather to become superheated by friction and retain its full pressure. The pockets U, instead of taking live steam direct from the inlet-port D, may obviously be arranged to move over a special port having a live-steam communication.

K is a mortise through the valve, so located and proportioned that at proper times and during proper intervals it will in the rotation of the valve place the steam-chest in communication with the cylinder-ports E E. The entry-gaps L in the valve are to provide a supply in the steam-chest whenever it is required that steam should pass through mortise K to the cylinder.

T is the exhaust-pocket in the valve. It is always in communication with the exhaust-port F in the seat, and is arranged, as usual, to communicate with the cylinder-ports E E alternately. When the valve is in the position shown in Fig. 5 the upper gap, L, has about half opened the inlet-port D, thus admitting live steam to the steam-chest, one of the pockets U is receiving steam from the inlet-port D, the upper cylinder-port is half-open and is receiving steam from the steam-chest through mortise K, and the lower cylinder-port is placed in free communication with exhaust-port F by the exhaust-pocket T.

On the back of the valve I mount centrifugal valves M. Only one is needed, but two are used to produce an equilibrium of weights. Centrifugal force throws these valves outward and affects in a greater or less degree the area of the admission-mortise K. This constitutes the engine-governor. The yoke Q, swiveled on the central stud, S, has a slot at each end. The slots engage with studs P on the valve-arms O, and the yoke thus serves to equalize the motion of the two valves. The spiral spring R, attached to the studs P, furnishes the centripetal force. Other forms of centripetal springs may be used, and other devices for equalizing the motion of the two valves will

suggest themselves. The valves pivot on the bolts N, and the whole arrangement is simple, substantial, and effective.

The same general plan of attaching centrifugal valves to the back of the main valve of the engine, where the said valves may operate directly on the main admission-mortise, may obviously be carried out by means of valves fitted to slide radially instead of being pivoted, as shown; but the general arrangement as I have shown it will be found simple and effective.

I claim as my invention—

1. In a steam-engine valve, the combination, with a valve-seat having a port for the admission of steam to the steam-chest from the boiler, one or more ports for the passage of steam from the steam-chest to the cylinder, and one or more ports for the passage of steam from the cylinder to the atmosphere, of a main valve adapted to operate upon said seat and effect the proper opening and closing of all said ports, substantially as set forth, for the purpose of preventing the accumulation of high-pressure steam in the steam-chest.

2. In combination with a steam-engine valve-seat having one or more ports for the passage of steam from the steam-chest to the cylinder, one or more ports for the passage of steam from the cylinder to the atmosphere, and a

port in communication with a reservoir of steam, of a valve adapted to operate upon said seat, and provided with a pocket for placing said ports for the passage of steam to the cylinder and said port for the passage of steam to the atmosphere in communication, and one or more additional pockets in its face adapted to work over said port communicating with a reservoir of steam, substantially as set forth, for the purpose of entrapping high-pressure steam under the face of the valve.

3. The combination, with a rotary main valve having a port or mortise for allowing the passage of steam to the cylinder ends, of a centrifugal valve adapted to control the area of said port or mortise, and a centripetal spring, substantially as set forth.

4. The combination, with a rotary valve and a steam port or mortise, of a centrifugal valve pivoted to said rotary valve, and adapted to vary the area of said port or mortise, and a centripetal spring, substantially as set forth.

5. The combination, with two pivoted levers or arms, of an equalizing-yoke connected with said levers or arms, and a central pivot for the yoke, substantially as set forth.

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Witnesses:

JAMES W. SEE,  
L. P. CLAWSON.