

SAMUEL B. FREEMAN.

Rotary Engine.

116293

PATENTED JUN 27 1871

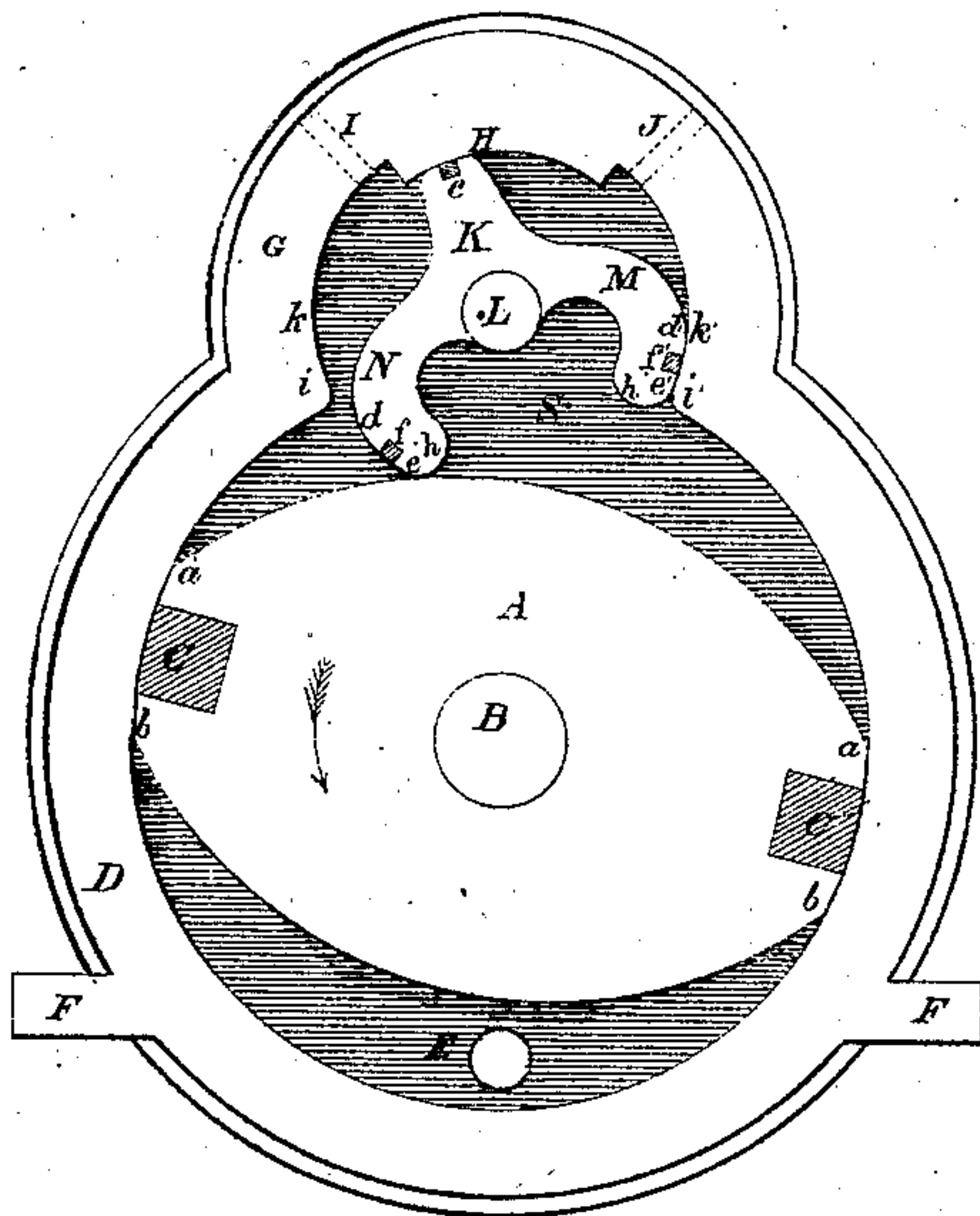


Fig. 1.

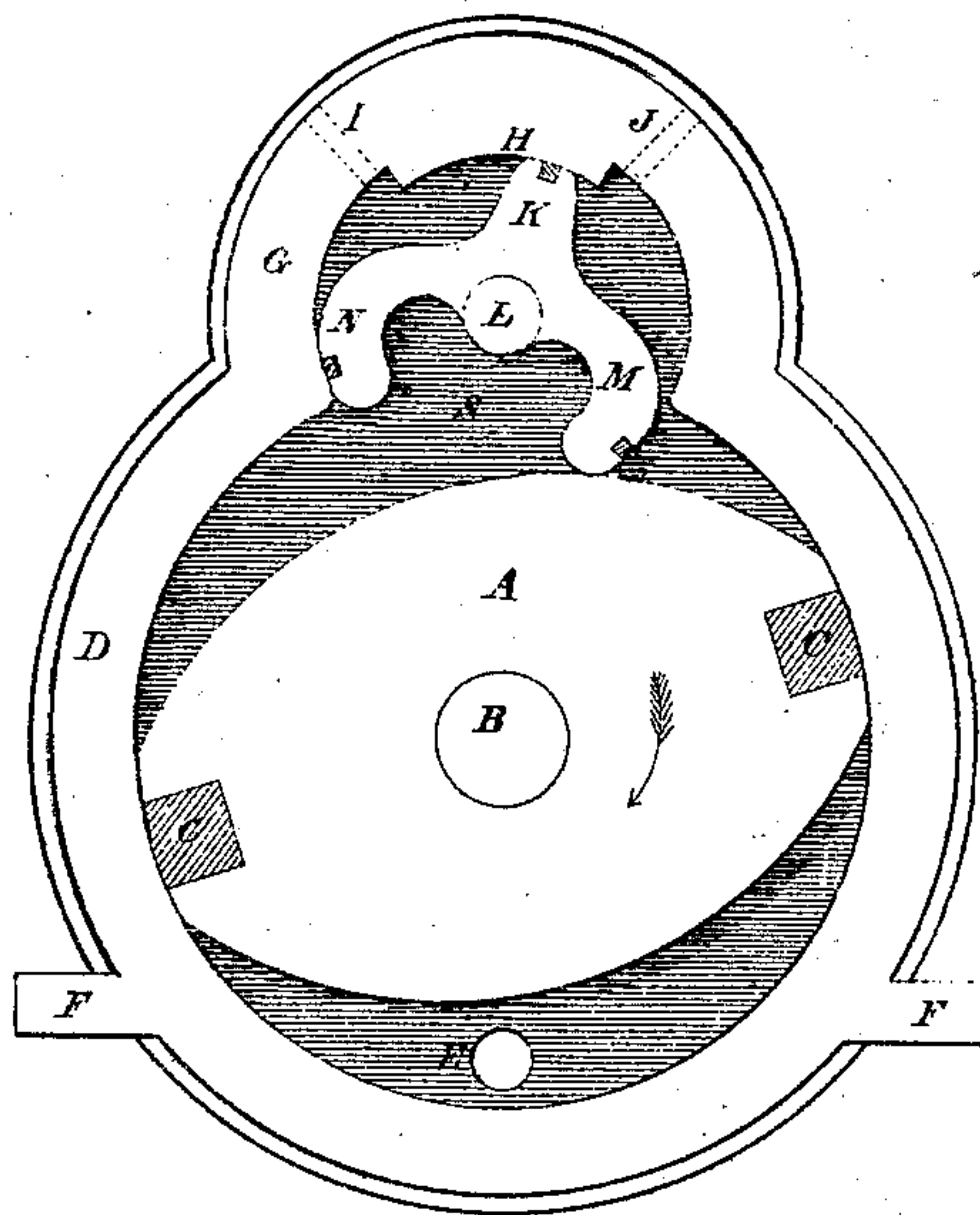


Fig. 2.

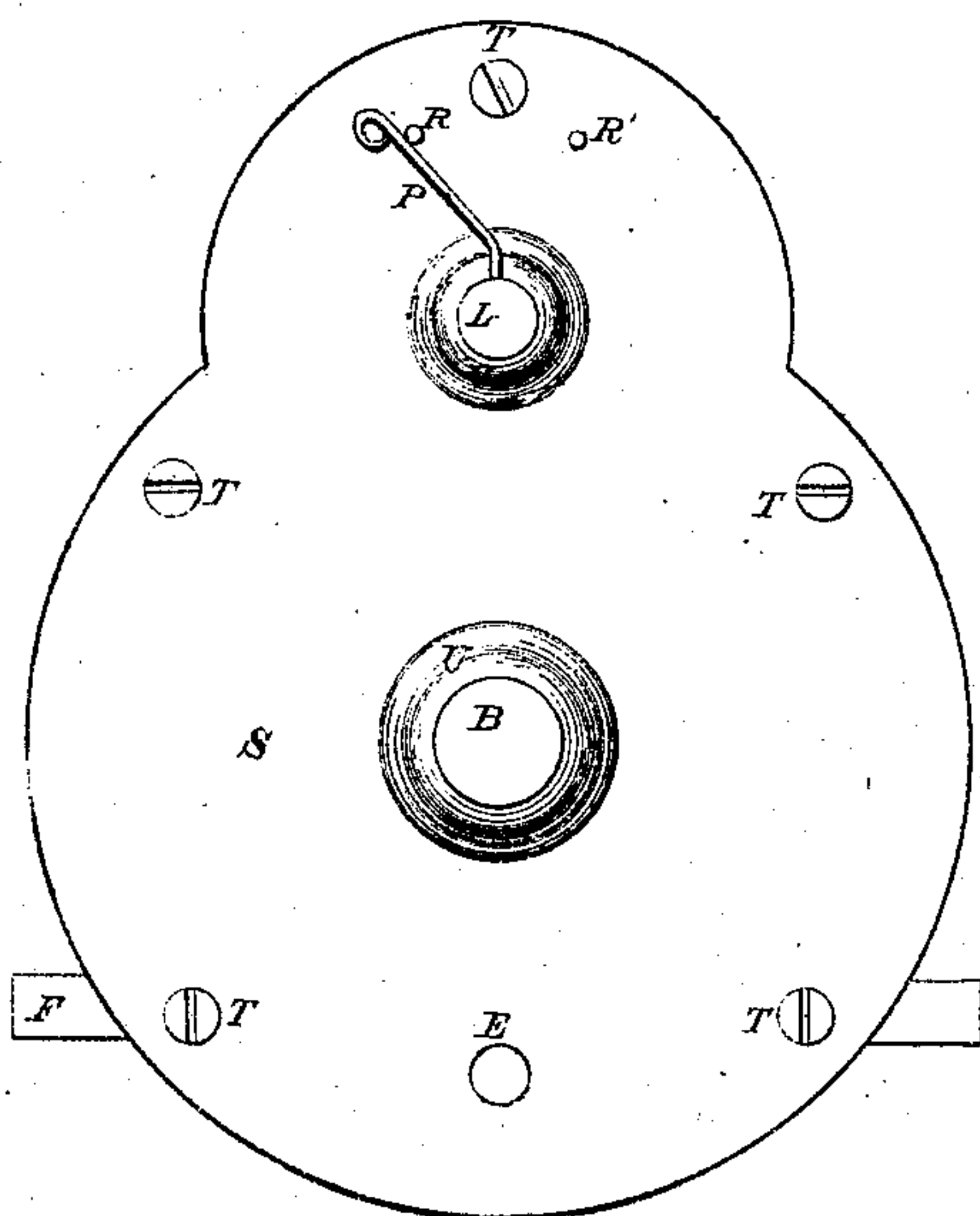


Fig. 3.

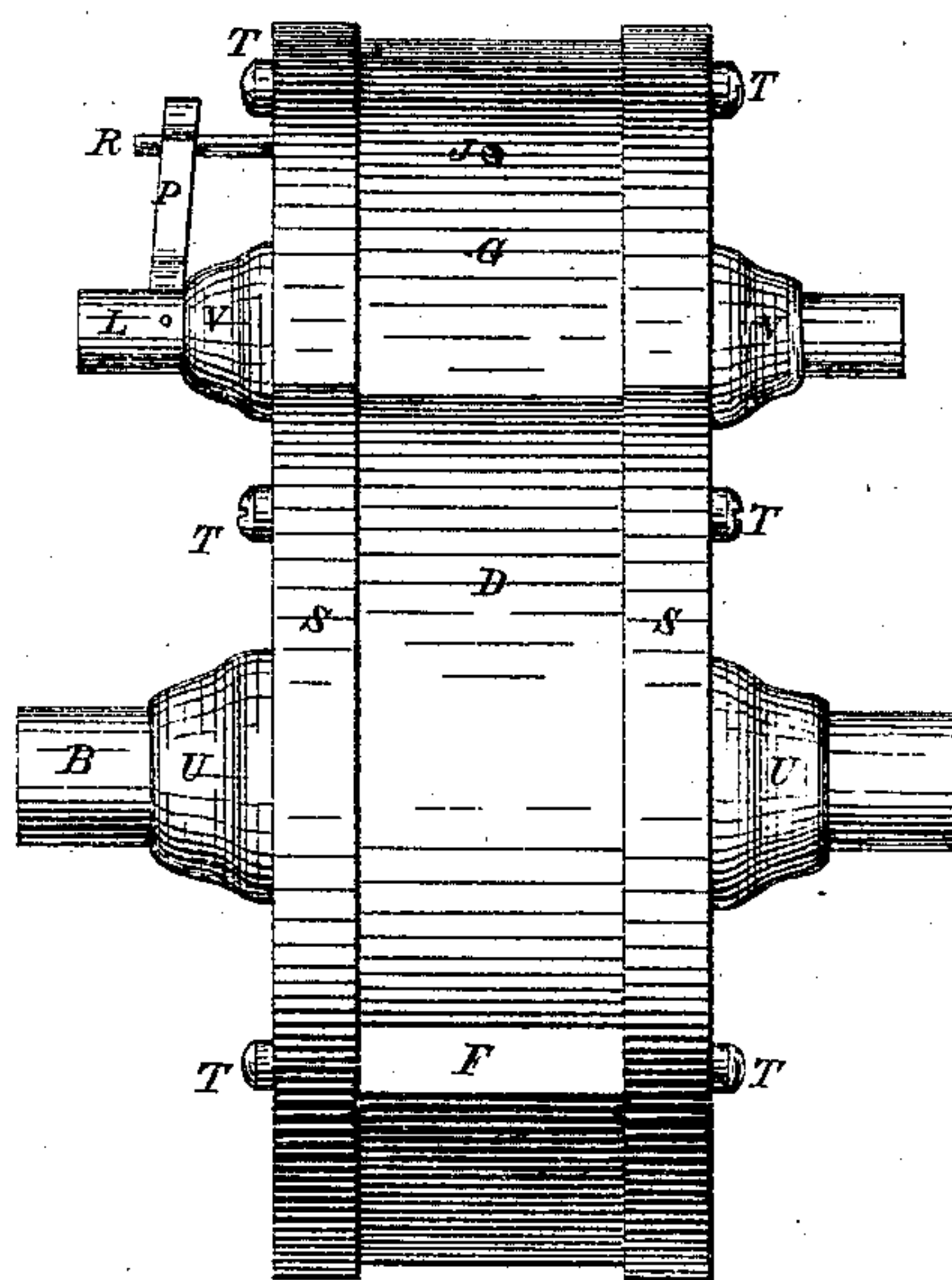


Fig. 4.

A. G. Webster
Andrew Choffin Witnesses.

Samuel B. Freeman, Inventor
by Job Abbott, Attorney.

UNITED STATES PATENT OFFICE.

SAMUEL B. FREEMAN, OF ASHLAND, OHIO.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. 116,293, dated June 27, 1871.

To all whom it may concern:

Be it known that I, SAMUEL B. FREEMAN, of Ashland, Ashland county, Ohio, have invented certain Improvements in Rotary Engines; and that the following is a full, clear, and exact specification thereof:

My invention relates to certain improvements in rotary engines, having an elliptical rotary piston and an oscillating valve operated directly by the rotation of said piston; and it consists in the construction of an oscillating valve, which is arranged on a shaft directly above the piston, and which has a partition-arm which divides the steam-chest into two chambers, and two piston-arms which act in combination with the piston and perform the functions of cut-off valves, said piston-arms being made of a greater length than the partition-arm so as to obtain a steam-packing or pressure of the valve on the piston at all times, and the said valve being so arranged as that, by throwing it over so as to bring either one or the other of the piston-arms down onto the piston, the said piston may be made to rotate in either direction, as is hereinafter more fully shown.

In the accompanying drawing, Figure 1 is a front view of a rotary engine embodying my invention, one of the engine-heads being removed to show the interior construction. Fig. 2 is a similar view of the same, with the valve thrown over so as to reverse the motion of the engine. Fig. 3 is a front view of the engine as it appears when in operation. Fig. 4 is a side view of the same.

D G represent the body of the engine, which consists of the lower part or piston-chest D, in which is placed the piston A, and the upper part or valve-chest G, in which is placed the rotary valve N K M. The engine-heads S S have the bearings U U and V V for the main or piston-shaft and the valve-shaft, and are secured to the body D G by bolts or screws T T. The piston A has the general form of an ellipse, but its ends are flattened off into the circular forms *a b*, which are of the same diameter and form as the interior piston-chest D; and in the centers of these ends *a b* are placed the packing-blocks C, which prevent any leakage of steam between the ends of the piston and the piston-chest D. The length of the piston A, measured along the shaft B, is made the same as the distance between the heads

S S, and the rims of the piston and faces of the heads are made to fit so closely together as to avoid the necessity of packing between them. The details of the form of the piston can be varied to conform to an economical application of the steam-pressure to its rotation, the general form of an ellipse with flattened ends, and with no abrupt offsets in its periphery, being observed in all cases. The rotary valve K N M is either secured on or made a part of the valve-shaft L, and consists of the partition-arm K and the two piston-arms N M. The partition-arm K is made of a length somewhat less than the radius of the circle of the interior of the valve-chest G, and has the packing C arranged in its end, which packing works against the raised face H in the interior of the valve-chest G, as shown in Figs. 1 and 2. The piston ends or faces *e h* of the arms N M are made in a rounded or semi-circular form, and rest on the face of the piston A, and, owing to their curved form, in connection with the rotation of the valve on the shaft L as an axis, there will always be a line of contact between the piston-arms N or M and piston A, so that the steam-joint between these parts will be maintained at all times. The cut-off faces *d e* of the arms N M are made of the same curve and radius as the interior of the valve-chest G, and in the center of these faces are arranged the packings *f f*, which work against the faces *i k* in the valve-chest G. On the valve-shaft L, outside the head S, is arranged the spring-bar P, which has its upper end placed under the rod R or R', secured in the head S, and serves to keep the end *e h* of the valve-arms N or M constantly pressed down on the face of the piston A, but at the same time allows the valve such an amount of rotation as is due to the action of the piston. The steam is admitted to the valve-chest G through the opening I or J, and the exhaust steam escapes from the piston-chest D through the openings E E in the heads S.

The valve N K M being in the position shown in Fig. 1, if the steam be admitted at the opening I the piston A will be made to revolve in the direction shown by the arrow by the direct action of the steam, until the rotation of the piston raises the arm N so as to cut off the steam by the contact of the faces *i k* and *d e*, when the momentum of the piston, either with or without the aid of the expansive force of the steam, will cause it to con-

tinue its rotation until the arm N is allowed to move down and again admit the steam, when the rotation will be continued in the manner first shown. The arm N being of a greater length than the arm K, it is evident that the steam-pressure will act to force the arm N down onto the piston A and thus preserve a tight joint between them. When it is desired to work the steam expansively the lengths of the parts *d e* of the arms N or M are increased, so as to shut off the steam at the desired point in the rotation of the piston, when the steam acts expansively between the side of the piston-chest D, piston A, and the valve-arm N or M, until the rotation of the piston uncovers the discharge-opening E. To reverse the engine the steam is cut off from the opening I, the spring P is drawn out from under the rod R and put under the rod R', so as to bring the arm M down onto the piston A, and the steam is then admitted at the opening J, on the side of the valve-chest opposite to the opening I, when

it is readily seen that the piston A will be made to rotate in the direction indicated by arrow in Fig. 2.

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

An oscillating engine-valve operated directly by the piston, and having a partition-arm arranged in the central portion of the valve-chest, and two piston-arms, each of a greater length than the partition-arm, arranged one at each side of the partition-arm, as is herein specified, for the purpose of retaining a reverse motion of the engine by simply throwing over the valve and changing the steam-entrance, as well as to secure steam-packing on the valve during either motion, substantially as described.

SAMUEL B. FREEMAN.

Witnesses:

J. A. McCLUSKEY,
L. JEFF. SPRENGLE.