

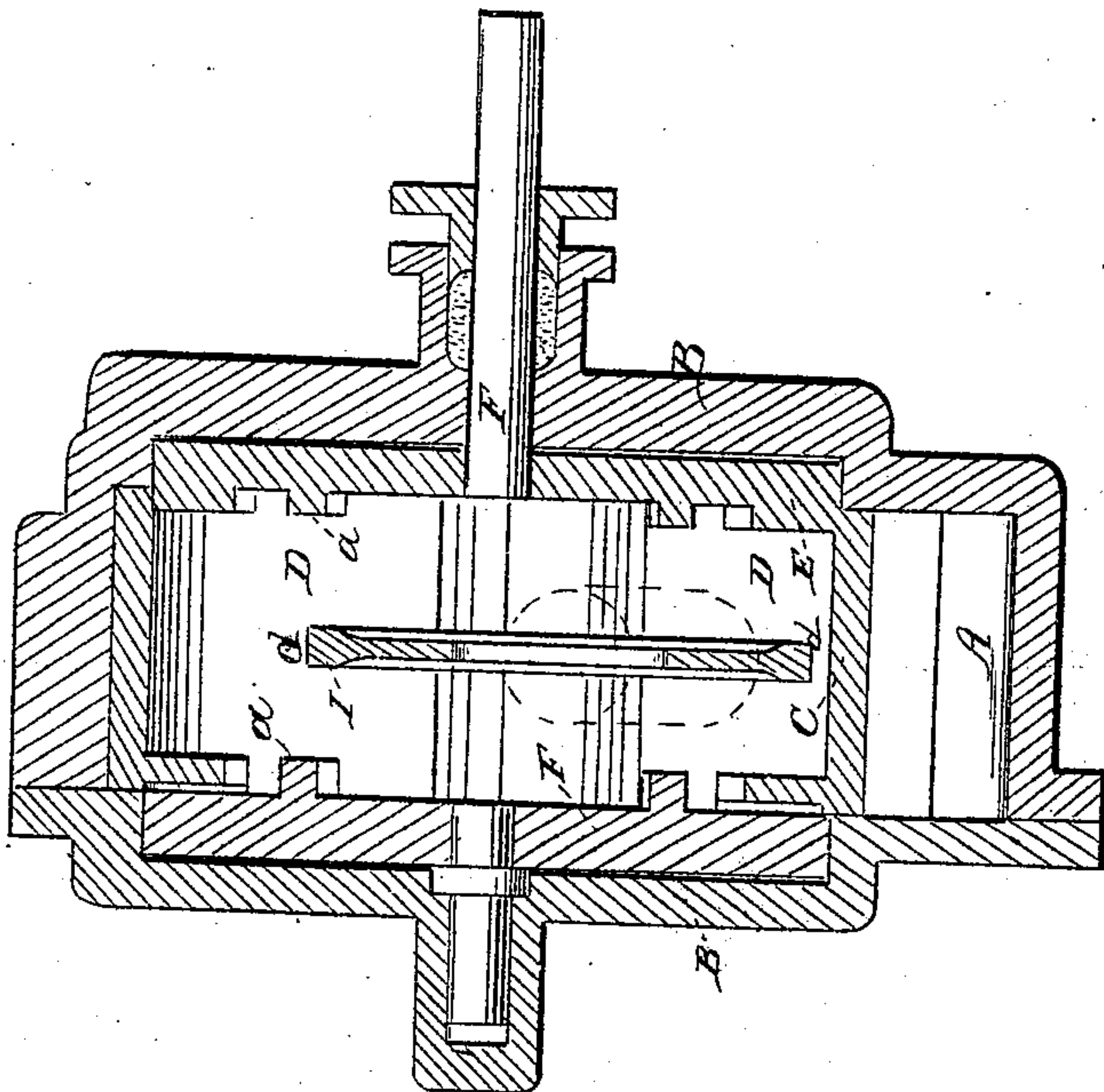
*J. F. De Navarro,*

*Rotary Engine.*

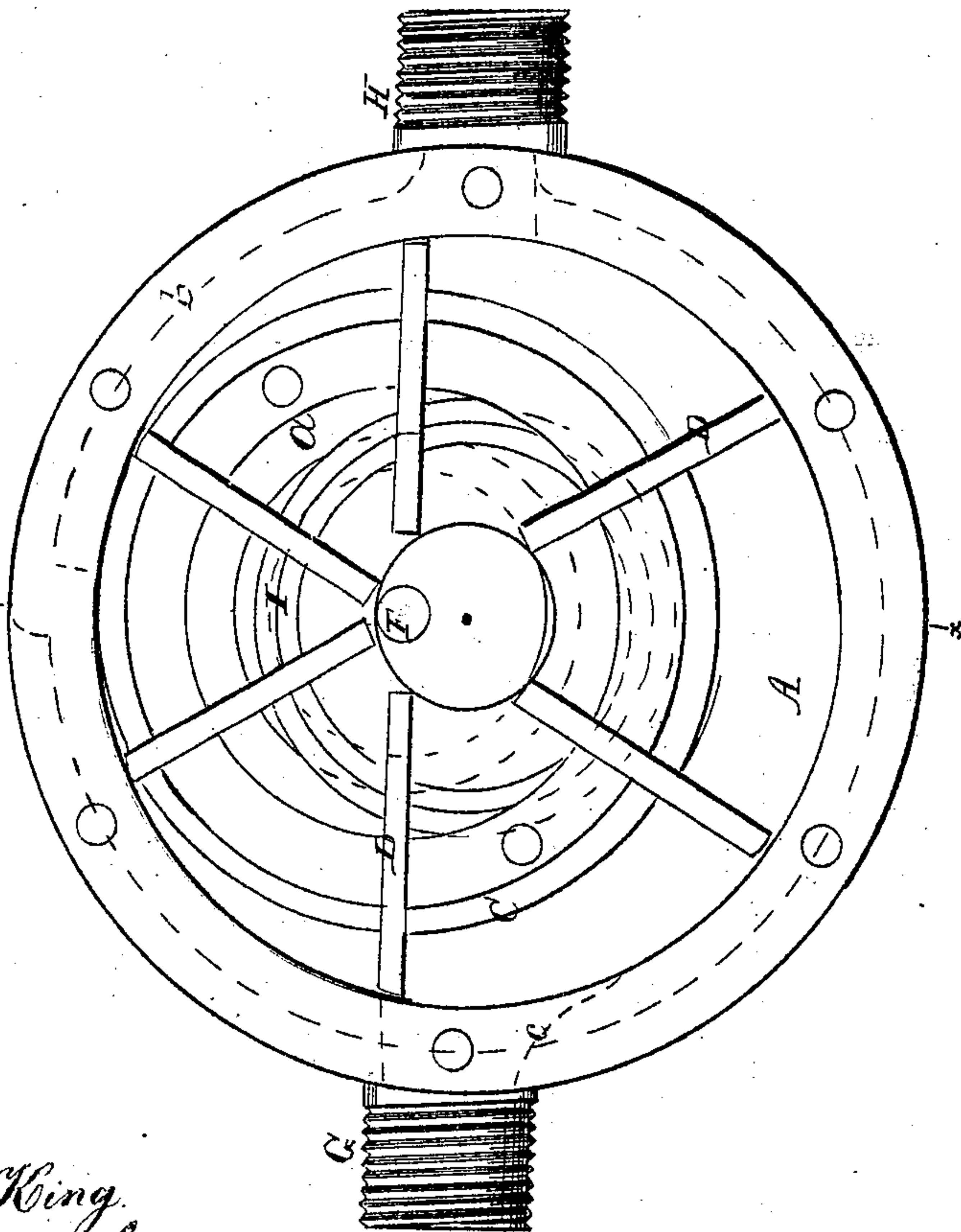
*No. 92,286.*

*Patented July 6 1869*

*Fig. 2.*



*Fig. 1.*



*Witnesses:*

*Arthur B. King.*  
*J. M. Coruily*

*J. F. De Navarro*



# United States Patent Office.

JOSÉ F. DE NAVARRO, OF NEW YORK, N. Y., ASSIGNOR TO EMERY  
ROTARY MACHINE COMPANY, OF SAME PLACE.

*Letters Patent No. 92,286, dated July 6, 1869.*

## 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 I, JOSÉ F. DE NAVARRO, of the city, county, and State of New York, have invented a new and useful Improvement in Rotary Engines, applicable also as a pump or meter, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a side elevation of a rotary engine, constructed according to my improvement, with the one side cover or lid removed; and

Figure 2 a vertical section of the same through the line *z z* in fig. 1.

Similar letters of reference indicate corresponding parts.

This invention relates to a rotary engine or motor formed of two cylinders, one within and eccentric to the other, in combination with sliding pistons, having a radial relationship to the inner cylinder, and working within and against the outer one; said invention consisting in a combination, with said parts or devices, of one or more loose rings arranged within the inner cylinder, and clipped by the inner ends or portions of the sliding pistons, which are thus connected in a free or loose manner to work in unison with each other, and in close but free contact with the outer cylinder.

Referring to the accompanying drawing—

A represents the outer case or cylinder of the engine, having sides or heads B B.

Within this cylinder A, but eccentric to it, is a cylinder, C, of a diameter to touch, or nearly so, in the course of its travel, one point or line of the inner periphery of the outer cylinder A, and carrying any suitable number of sliding pistons, D, which occupy a radial position to said inner cylinder, and pass through slots or openings in the cylinder C; also are guided at their edges by grooves made in the sides or heads E E, to the inner cylinder C, and in or through rings or projections *a a* therefrom.

F is the driving-shaft, which is here represented as divided or made up of two sections fast to the heads E E of the inner cylinder C; but, if preferred, a single shaft running entirely through the inner cylinder, and if necessary, through both heads to the outer cylinder

A, may be used, the peculiar construction of the engine admitting of such disposition of the shaft.

G is the inlet, and H the outlet or exhaust, in open communication with the outer cylinder, as indicated by dotted lines *b* and *c*.

I is a loose ring arranged within the inner cylinder C, and clipped or held in place in a free manner by the slides D, which are slotted at their inner ends for the purpose, said slides bearing or resting, as at *d d* in fig. 2, on the outer periphery of said ring, which is free to rotate in concentric relationship to the outer cylinder, by the friction of the slides on it, along with the slides and cylinder C. In this way the several slides are connected in a direct, positive, and solid manner, by the interposition of the ring I, to move in close or steam-tight contact with the outer cylinder, and kept self-packing, while, by reason of said ring being free to rotate along with the slides, wear or friction on it, or of the surfaces of the slides bearing thereon, is avoided.

By this arrangement, all connecting links to or from the slides, with their wear and tear, as in a loose centre-pin construction of rotary engines heretofore devised or in use, are dispensed with.

Steam, water, or any other suitable impelling-fluid may be used to operate the engine; or in the case of it being used as a pump, the shaft F be driven by any suitable means to rotate the inner cylinder and its radial slides or pistons.

I am aware that the sliding pistons of a rotary engine have been connected to, and operated by means of a central ring or hub rigidly attached to the head of the outer cylinder and concentric therewith. This I do not claim; but

What I do claim, and desire to secure by Letters Patent; is—

The arrangement of the loose ring I, operating in central slots *d*, in the pistons D, said pistons having a radial motion in grooves on the inner sides of the heads E F of the eccentric revolving drum C, substantially as shown and described.

Witnesses:

J. F. DE NAVARRO.

FRED. HAYNES.

ARTHUR KINNIER.