(No Model.) 4 Sheets—Sheet 1.

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ROTARY ENGINE REVERSING GEAR.

No. 395,646. Patented Jan. 1, 1889.

Fig. 4.

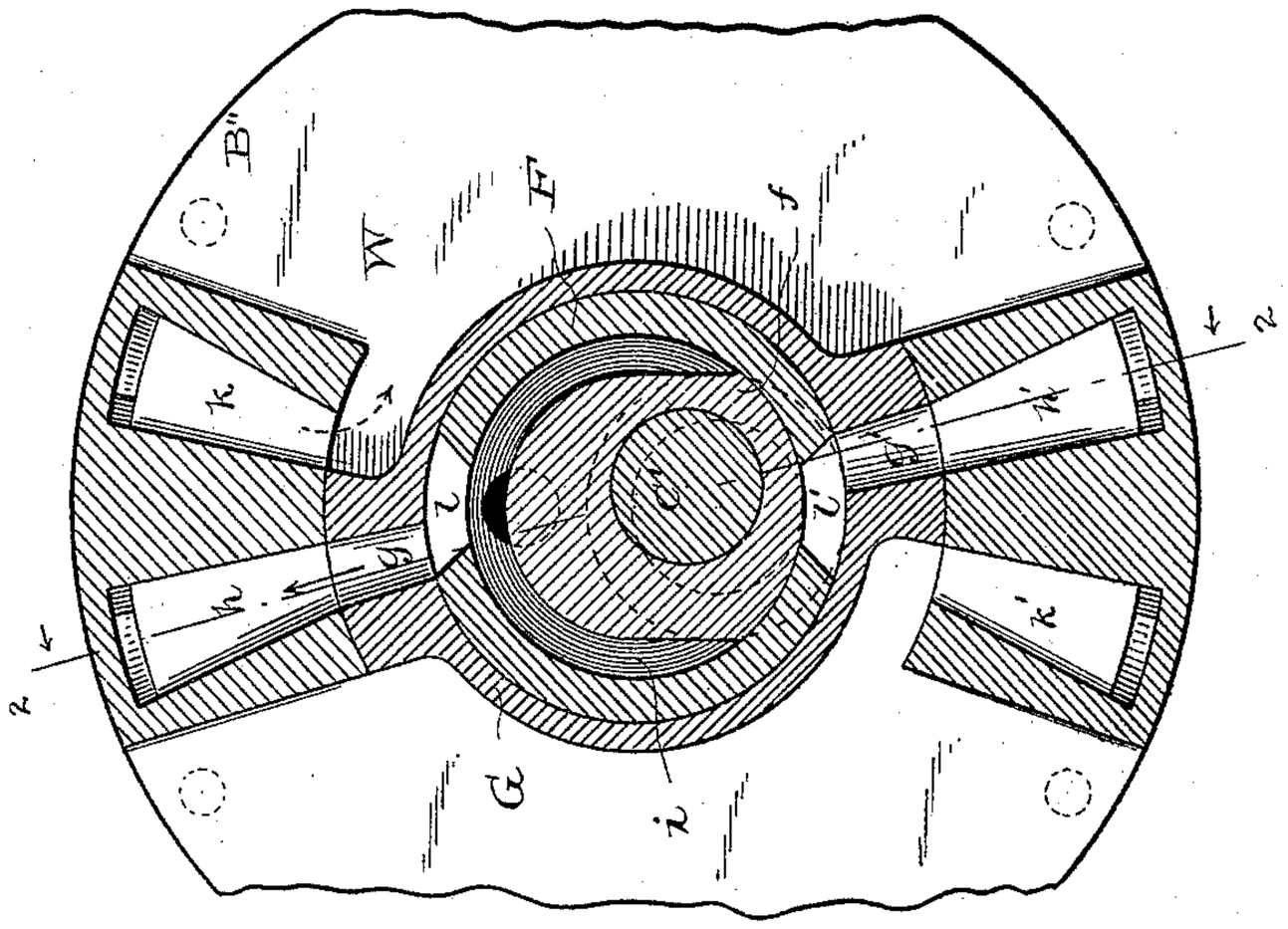
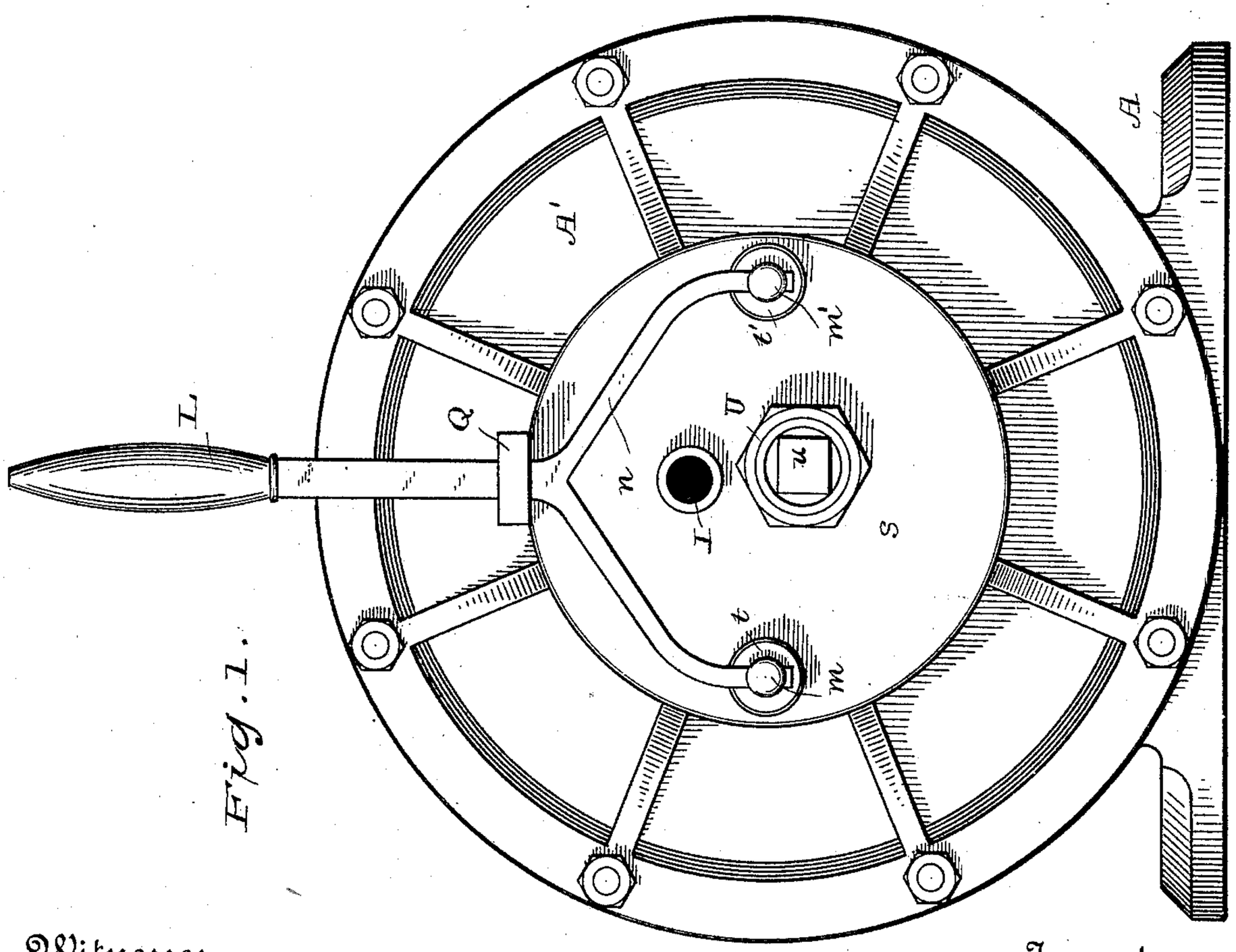


Fig. 1.



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By his Attorney
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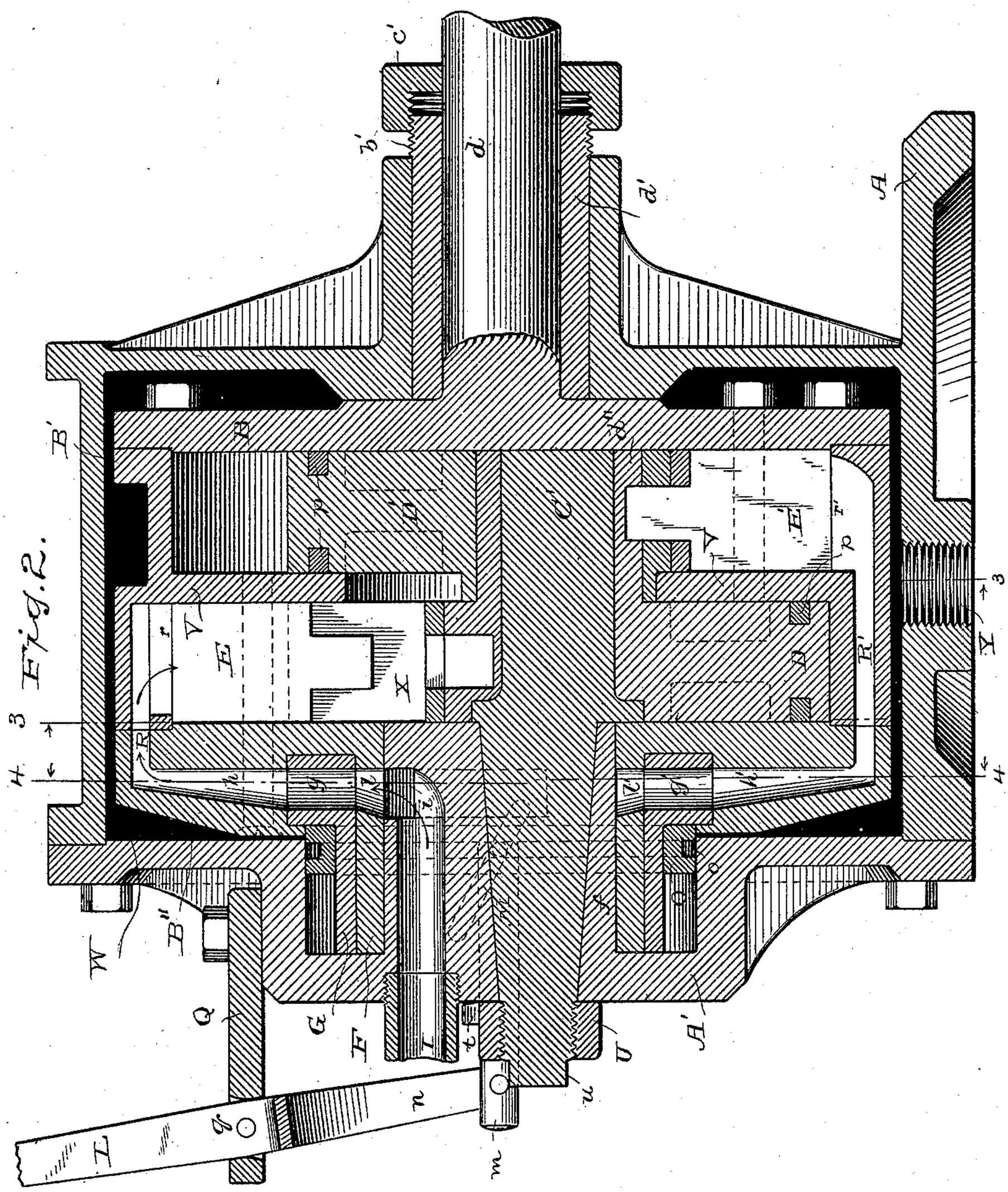

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ROTARY ENGINE REVERSING GEAR.

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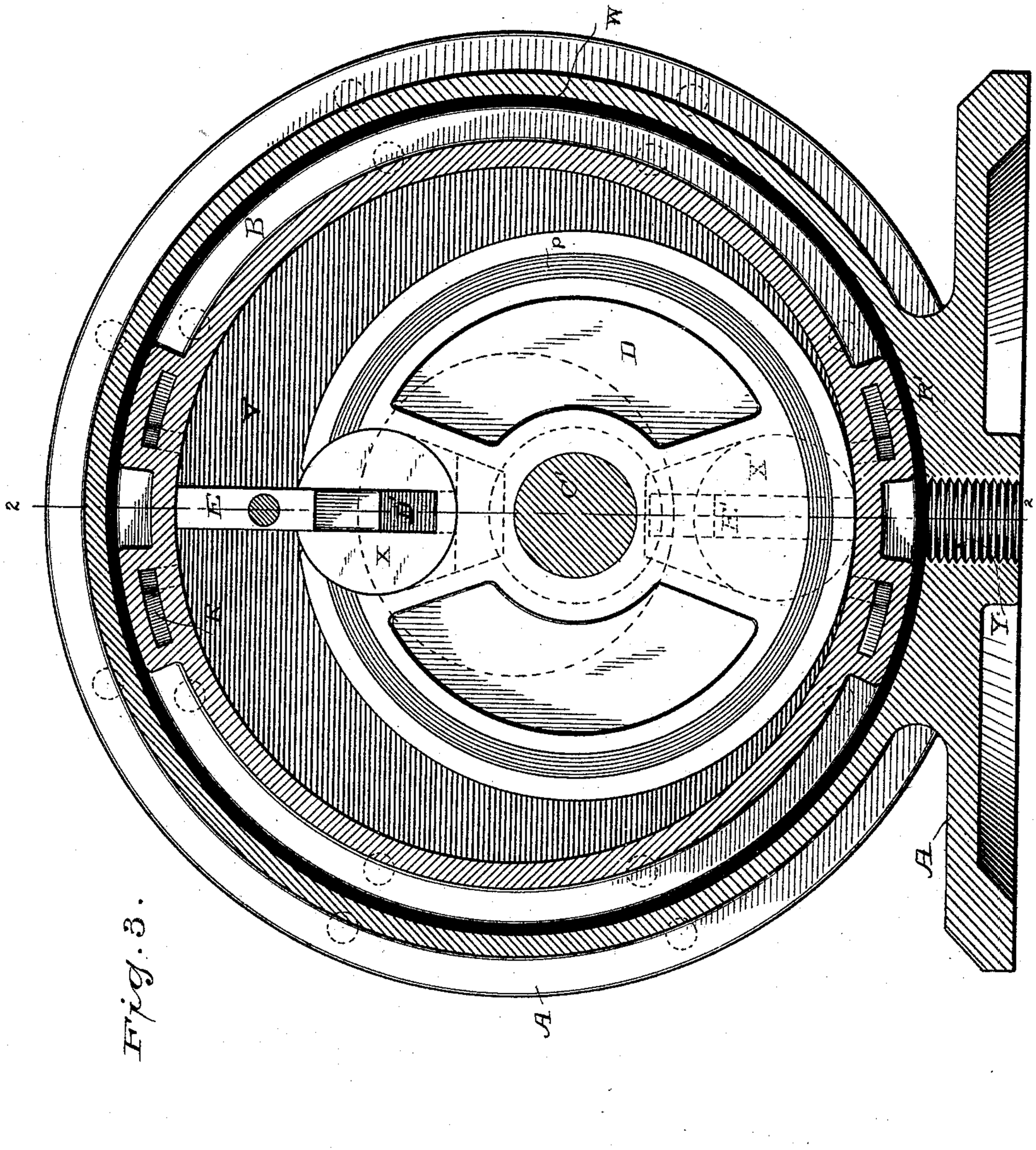

Fig. 3.

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ROTARY ENGINE REVERSING GEAR.

No. 395,646. Patented Jan. 1, 1889.

Fig. 5.

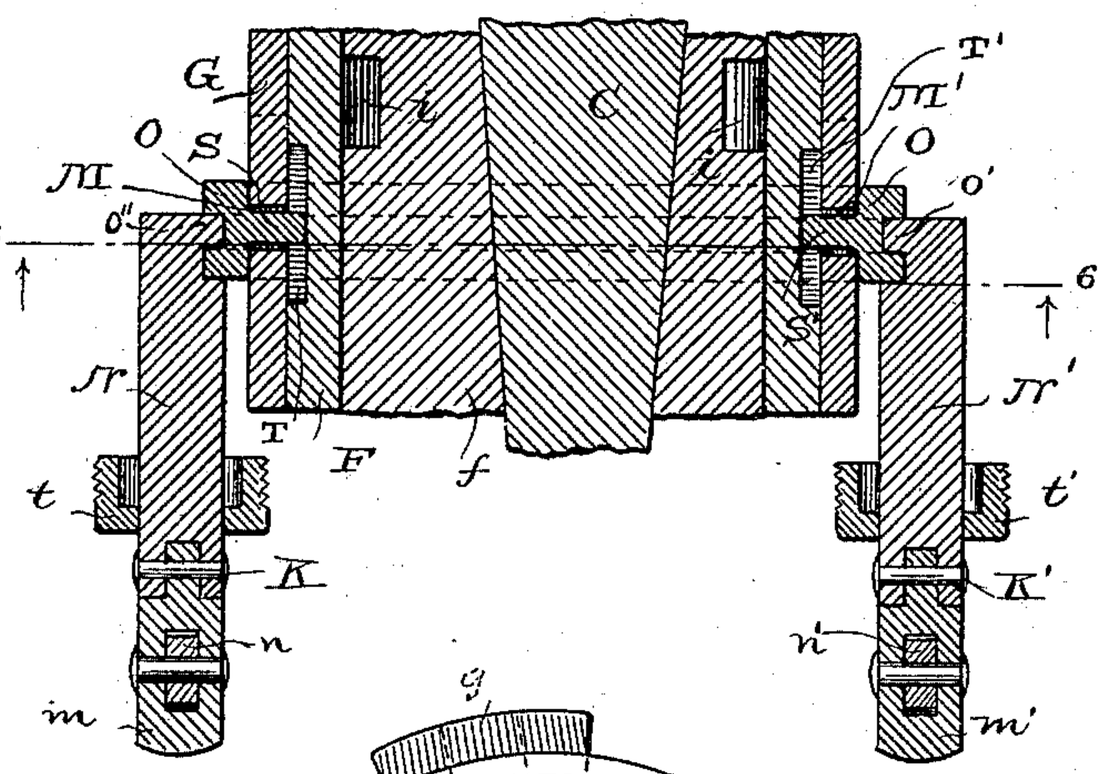


Fig. 6.

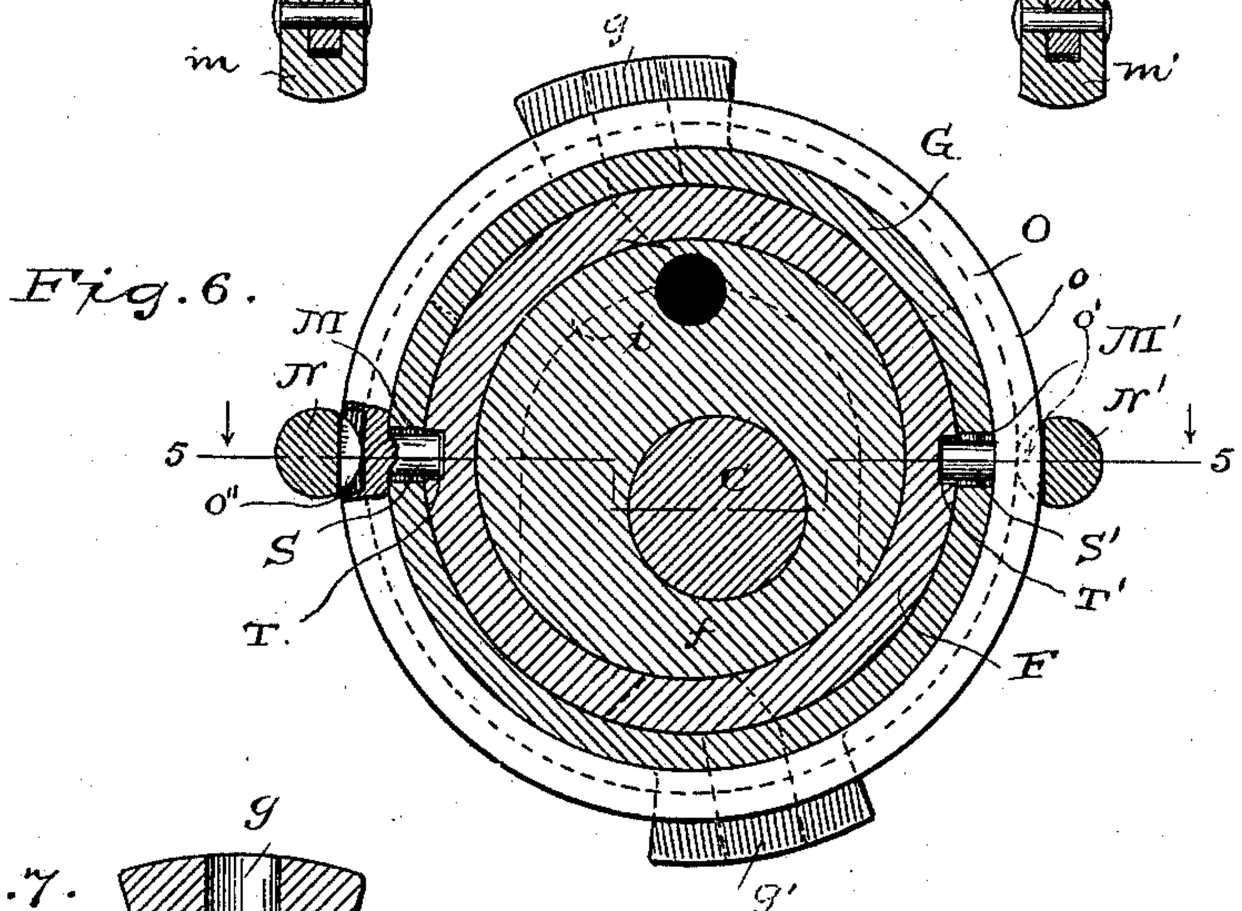


Fig. 7.

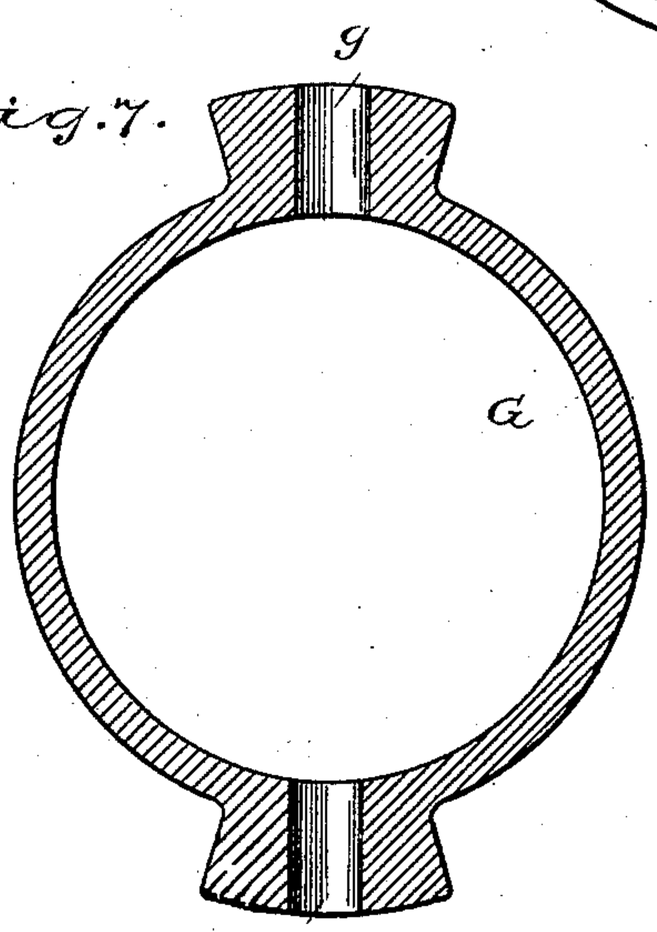
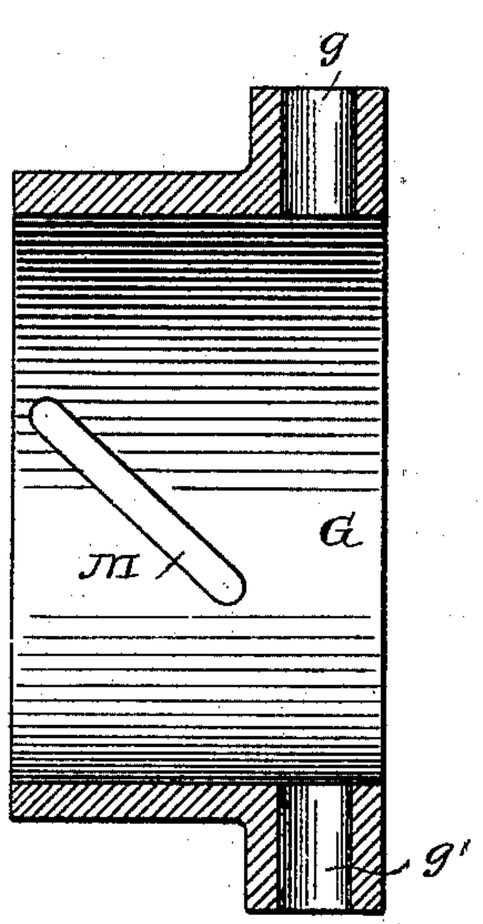


Fig. 8.



Witnesses

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F. P. Smith

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UNITED STATES PATENT OFFICE.

CYRUS BAILEY, OF AKRON, OHIO.

ROTARY-ENGINE REVERSING-GEAR.

SPECIFICATION forming part of Letters Patent No. 395,646, dated January 1, 1889.

Application filed February 8, 1888. Serial No. 263,328. (No model.)

To all whom it may concern:

Be it known that I, CYRUS BAILEY, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Rotary-Engine Reversing-Gear; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the improved construction of a rotary engine and reversing-gear for the same, hereinafter to be described.

In the drawings, Figure 1 shows an end view of the engine with the lever for operating the reversing-gear. Fig. 2 is an inclined axial section of the same on line 2 2, Fig. 3. Fig. 3 is a vertical cross-section of the engine, taken on the line 3 3 of Fig. 2. Fig. 4 is a section taken on the line 4 4 of Fig. 2, showing the end of the crank-cylinder with the reversing-valve mounted on the same. Fig. 5 is a horizontal axial section of the engine-bearing, showing in detail the apparatus for controlling the reversing-valve. Fig. 6 is a vertical cross-section taken on the line 6 6 of Fig. 5. Figs. 7 and 8 show the reversing-valve in cross and longitudinal sections.

Throughout the drawings like letters refer to like parts.

The construction of my improved engine, as illustrated in the drawings, is as follows:

A is the standard and casing of the engine, cast in one piece.

A′ is the face-plate, bolted onto the part A, as shown in Fig. 2, and thus inclosing the entire mechanism.

B is the crank-disk, mounted on the shaft *d*, which runs within the bushing *d′*, mounted in the casing A. The packing-gland *c′* enables the joint about the crank-shaft to be so packed as to prevent the escape of any steam which may work between the bearing-surfaces. To the crank-disk B are bolted the cylindrical piece B′ and the plate B″. These together constitute what I call the "crank-cylinder." The plate B″ is extended in the form of a cylindrical thimble, which is represented by the letter F in Fig. 2. This fits over and revolves upon a projecting boss, *f*, formed on the face-plate A′, which furnishes an additional bearing for the crank-cylinder in line with the crank-shaft *d*. Within the crank-cylinder is a partition, V, dividing it into two parts, as clearly shown in Fig. 2. In one part is mounted the piston E and the rotary packing-cylinder D. Steam-tight connection between these two parts is afforded by the oscillating packing-piece X. In the same way parts E′, D′, and X′ are arranged in the other chamber. The rotary packing-cylinders D and D′ are provided on their faces with packing-rings *p*, as shown most clearly in Fig. 2. The rotary cylinder D is also provided with an extended cylindrical boss, *d″*, on which its companion cylinder D′ is journaled. The cylinder D in its turn is journaled upon the eccentric-stud C′, which has a tapered bearing in the face-plate A′.

Steam enters the engine through the inlet-pipe I and is delivered to the steam-space *i*. (Best shown in Fig. 4.) From this it passes at proper intervals through the openings *l l′* in the projecting boss F to the passages *g g′* in the adjustable reversing-valve, and through the passages *h h′* and R R′ in the plate B″ to the steam-ports *r r′*, opening into the spaces behind the pistons E E′.

The valve G, having the passages *g g′*, is circumferentially adjustable on the boss F and revolves with the crank-cylinder. Its adjustment upon that boss is fixed in the following manner: In the projecting thimble-like part of the valve G are two oblique slots, M and M′, as shown in Figs. 5, 6, and 8. In the part F are corresponding axial slots. Mounted upon the valve G is the ring O, having projecting pins S S′ and a groove, *o*. These pins pass completely through the slots M M′ and into the slots T T′ in the parts F. It is evident, therefore, that the adjustment of the ring O along the line of the axis of the crank-cylinder will throw the valve G to one side or the other so that its ports *g g′* will register with the passages *h h′* or the corresponding set of passages, *k k′*.

The motion of the ring O may be controlled in a variety of ways. My preferred construction is that shown in Figs. 2, 5, and 6. Registering with the groove *o* are projections *o′* and *o″* on sliding pieces N N′, which are mounted in the projecting boss *f* of the face-plate A′. Packing-glands *t t′* prevent the leaking of any steam which may work be-

tween the parts of the engine, and also guide the pieces N N′. To these latter are pivoted by the pins K K′ links *m m′*, which are in turn connected to the two branching arms *n n′* of the lever L. This lever is pivoted by the pin *q* to the bracket Q. It is evident, therefore, that a to-and-fro motion of the lever L will reverse the engine.

The object of the eccentric-stud C′, previously described, is to afford means for taking up the wear of the rotary packing-cylinders D D′. When this is to be done, the nut U is loosened, the stud turned by a wrench placed on its squared end *u*, and then again drawn tightly into its tapered bearing by setting up the nut U.

The operation of my engine may be briefly set out as follows: Steam is admitted at the inlet-pipe I, and, passing to the steam-space *i*, is from thence distributed to either or both of the chambers in the crank-cylinder, according as either or both of the openings *l l′* are in connection with said steam-space *i*. It is evident that each of said openings will be in such connection during about three-quarters of the revolution with the proportion of parts shown in Fig. 4. The position of the valve G determines whether the steam passing through the openings *l l′* shall be conducted through the ports *h h′* or to the opposing set, *k k′*. In the state of affairs illustrated in the drawings the valve G registers with the ports *h h′*, and the steam is admitted behind the pistons E E′ when the engine is rotated in the direction of the hands of a watch if looked at as in Figs. 1, 3, 4, and 6. The exhaust-steam on the other side of the pistons E E′ is allowed to escape continuously through the ports and passages terminating at the ports *k k′* into the exhaust-chamber W, which almost entirely surrounds the crank-cylinder and from which the exhaust-steam escapes through the passage Y. (Shown in Fig. 2.)

The general construction and principle of operation of my engine have been fully set out in my application filed September 27, 1886, Serial No. 214,616, and to such I make no claim in this application.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a rotary engine, the combination of the casing, the revolving crank-cylinder, the piston rigidly mounted thereon, and the rotary packing-cylinder mounted therein, together with a suitable valve on the crank-cylinder for introducing steam at either side of the piston, substantially as described.

2. In a rotary engine, the supporting frame-work or casing, the rotary crank-cylinder having the rotary packing-cylinder mounted therein, and the piston rigidly mounted thereon and having the peripheral valve-ports, one on each side of the piston, in combination with suitable valve-passages connecting one port with the steam-inlet and the other port with the steam-exhaust, together with a valve mounted on the crank-cylinder, substantially as described.

3. In a rotary engine, the revolving crank-cylinder containing a suitable piston and packing-cylinder and having peripheral valve-ports and radial valve-passages leading to the same, in combination with an adjustable valve mounted on and revolving with the crank-cylinder, whereby either radial valve-passage may be thrown into connection with the steam-inlet and the other valve-passage opened to the exhaust, substantially as described.

4. In a rotary engine, the revolving crank-cylinder containing a suitable piston and packing-cylinder and having peripheral valve-ports and radial passages, in combination with the steam-inlet passage in the bearing on which the cylinder turns and an adjustable valve mounted on and revolving with the crank-cylinder, whereby either radial valve-passage may be thrown into connection with the said steam-inlet and the other opened to the exhaust, substantially as described.

5. In a rotary engine, the combination of a revolving crank-cylinder and an adjustable valve mounted on and revolving with the same, substantially as described.

6. In a rotary engine, the combination of a revolving crank-cylinder having radial valve-passages and a circumferentially-adjustable valve mounted on and revolving with the cylinder and registering with the valve-passages, substantially as described.

7. In a rotary engine, the combination of a revolving crank-cylinder having a projecting boss in which there are axial slots, a valve mounted on and surrounding said boss, having oblique slots in its shell, and pins passing through or engaging with both said slots, substantially as described.

8. In a rotary engine, the combination of a revolving crank-cylinder having a projecting boss in which there are axial slots, a valve mounted on and surrounding said boss, having oblique slots in its shell, and radial pins set in an adjustable ring and passing through or engaging with both said slots, substantially as described.

9. In a rotary engine, the combination of a revolving crank-cylinder having a projecting boss in which there are axial slots, a valve mounted on and surrounding said boss, having oblique slots in its shell, and radial pins set in a grooved ring and passing through or engaging with both the said slots, together with axially-adjustable sliding pieces meshing with the groove in said ring, substantially as described.

10. In a rotary engine, the combination of a revolving crank-cylinder having a projected boss in which there are axial slots, a valve mounted on and surrounding said boss having oblique slots in its shell, and radial pins set in a grooved ring and passing through or engaging with both said slots, together with ax-

ially-adjustable sliding pieces meshing with the groove in said ring and a hand-lever pivoted to the engine-frame and controlling the adjustment of said sliding pieces, substantially as described.

11. In a rotary engine, the rotary packing-cylinder mounted on an adjustable eccentric tapered stud, in combination with suitable mechanical devices for drawing the tapered stud into its bearing and holding it in any position of circumferential adjustment, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CYRUS BAILEY.

Witnesses:
O. L. SADLER,
GEO. W. SIEBER.