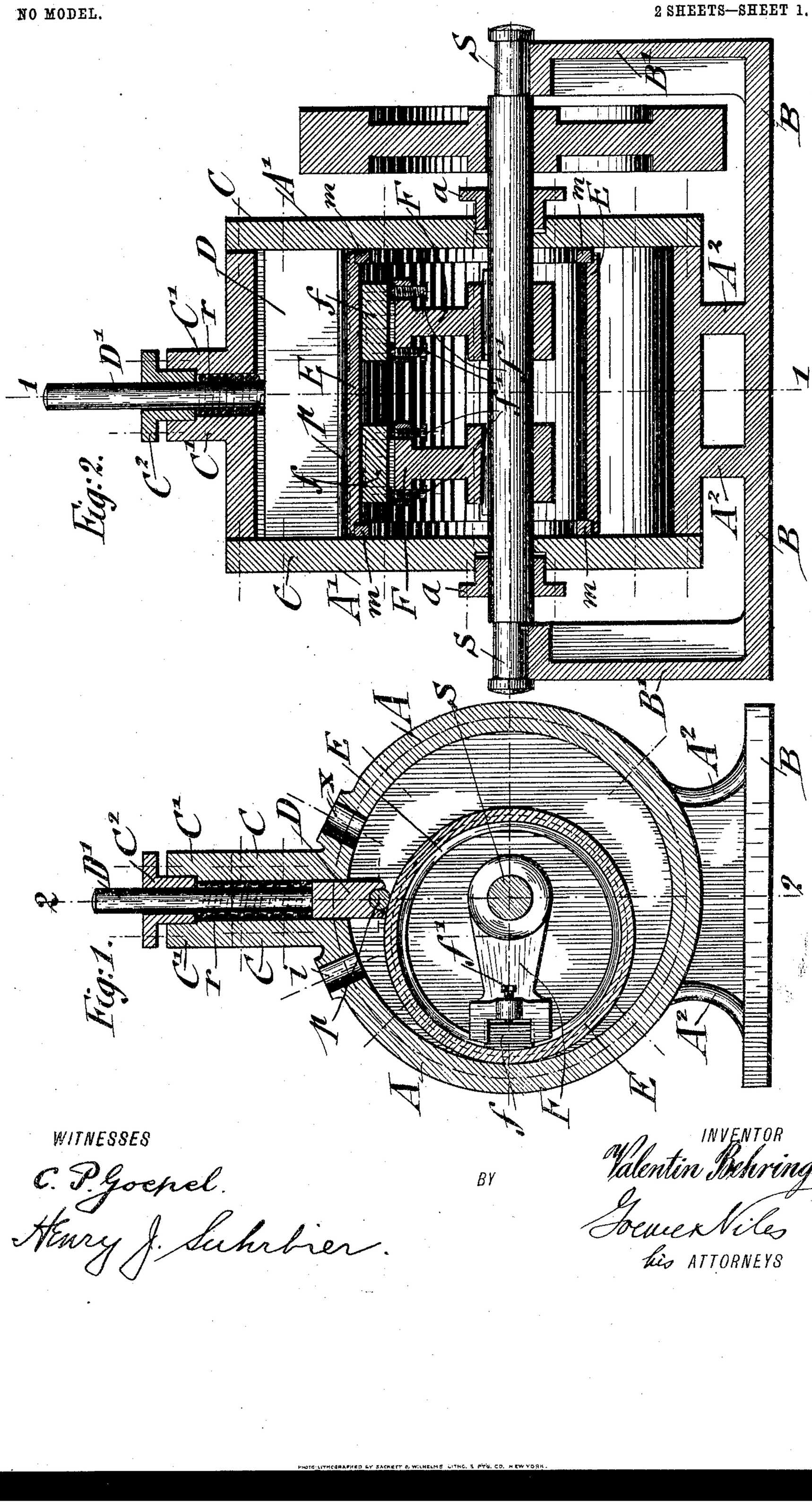
No. 775,413. PATENTED NOV. 22, 1904.

V. BEHRINGER.

ROTARY ENGINE.

APPLICATION FILED FEB. 11, 1903.

NO MODEL. 2 SHEETS—SHEET 1.



WITNESSES

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NO MODEL. 2 SHEETS—SHEET 2.

Fig: 3.

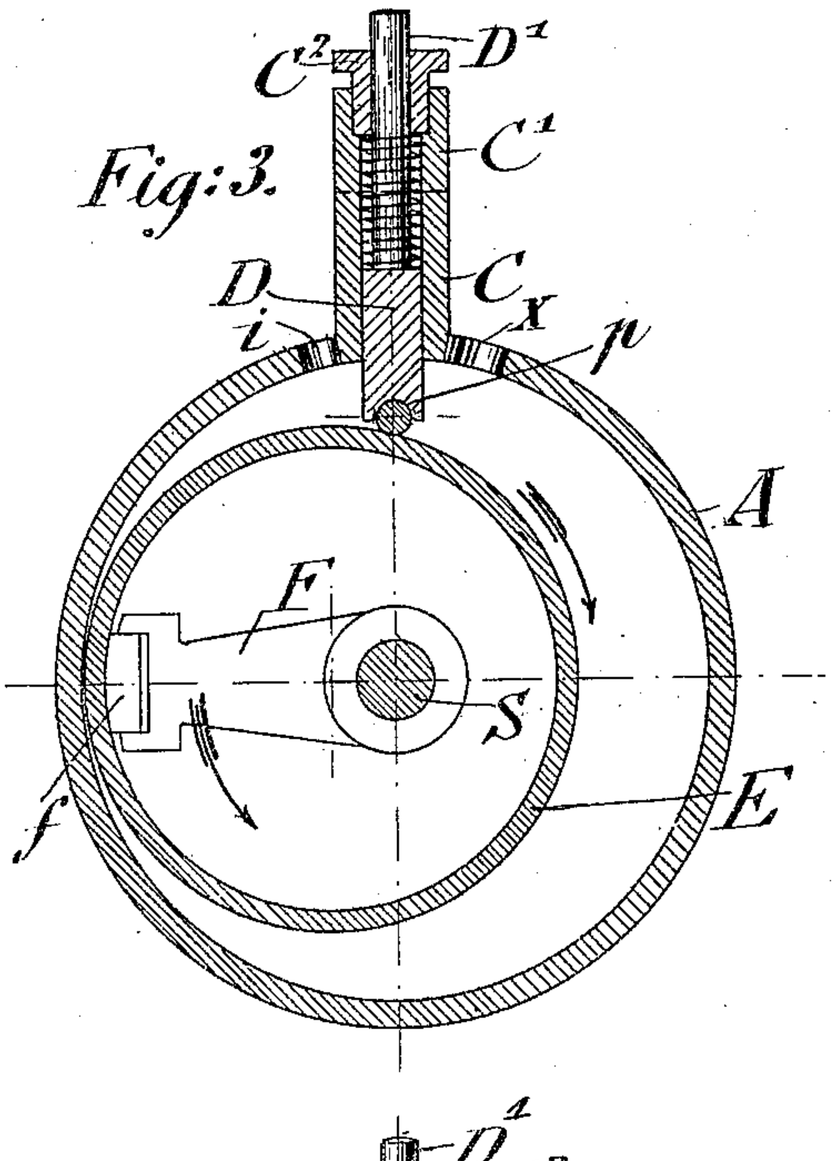


Fig: 4.

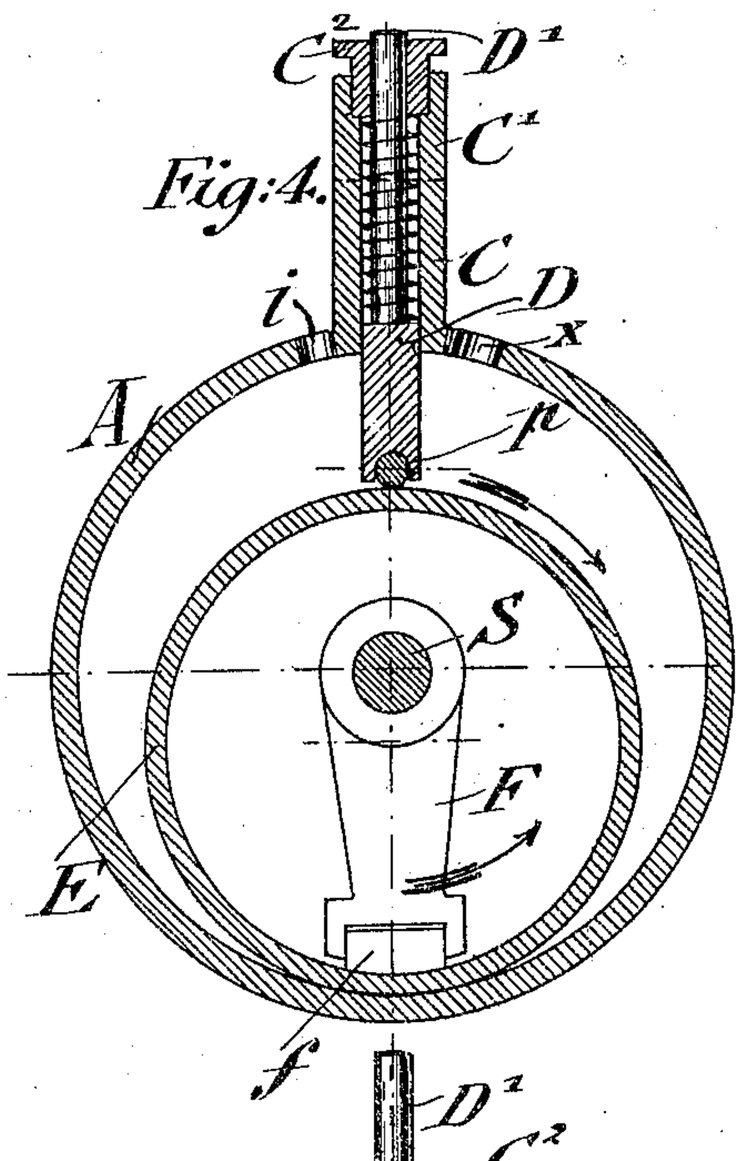


Fig: 5.

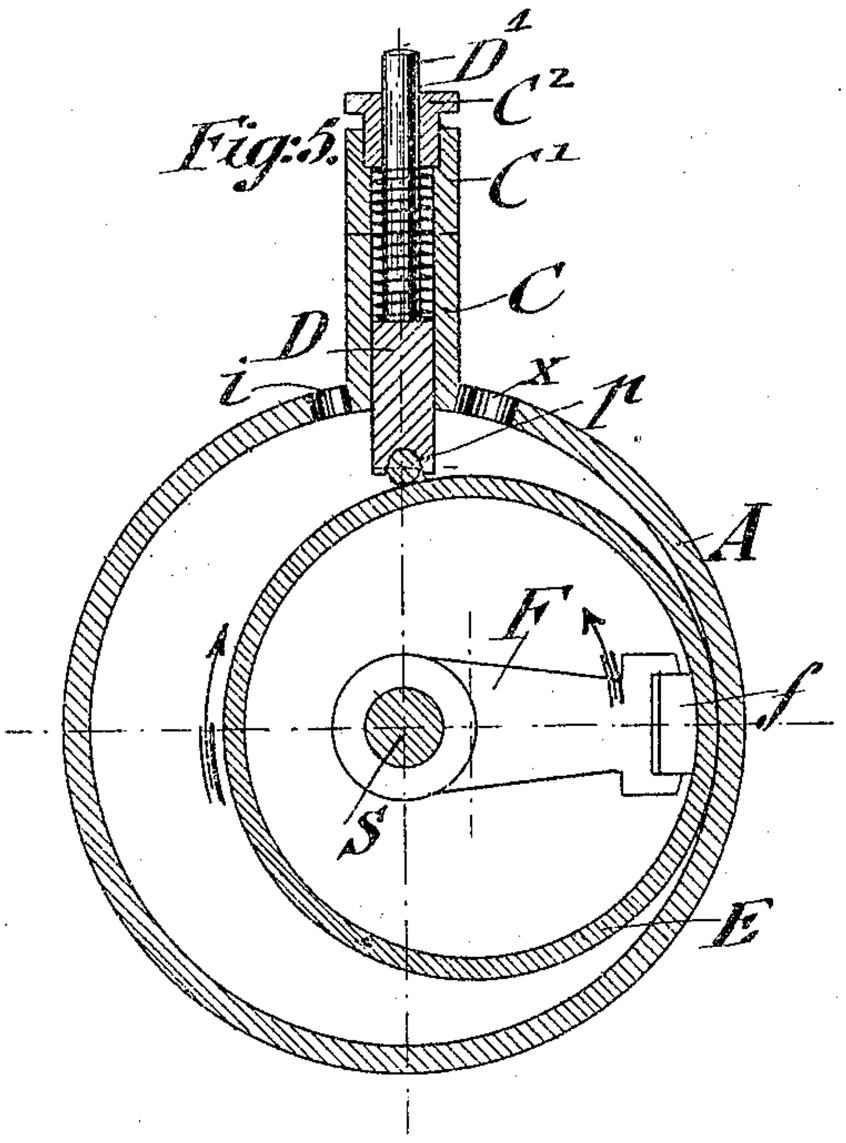
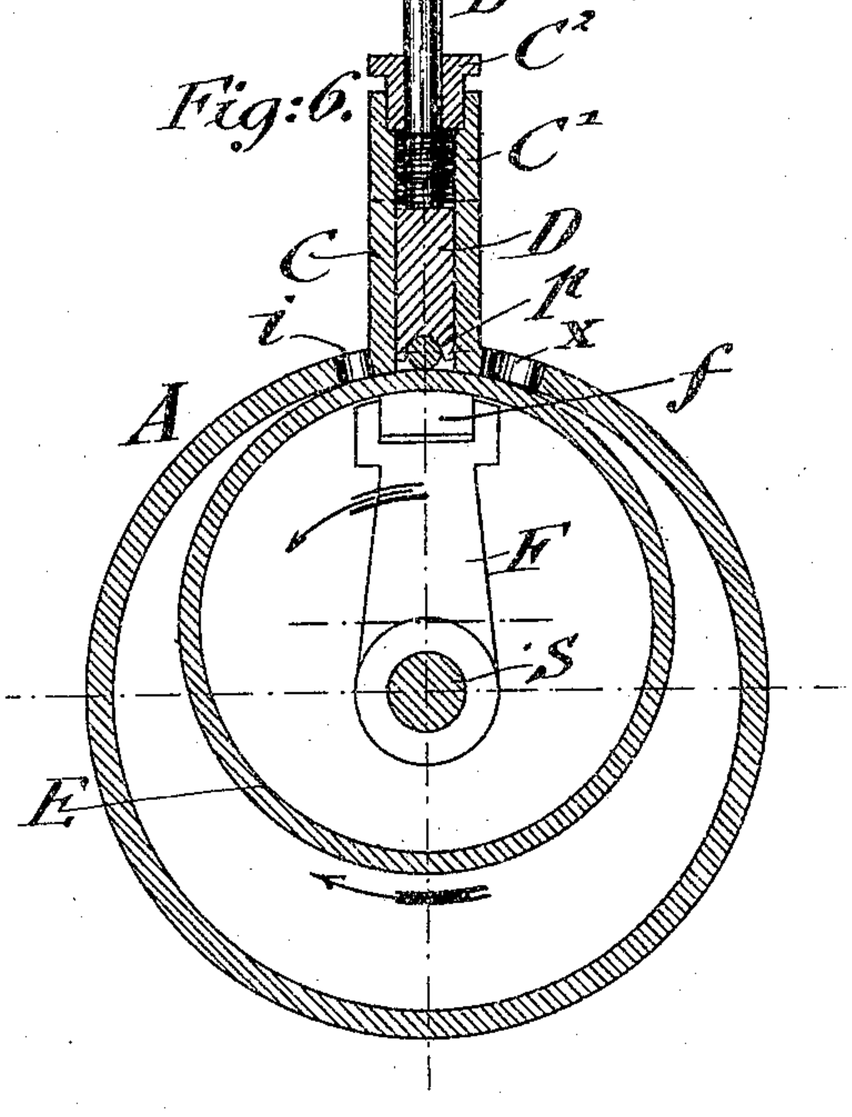


Fig: 6.



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No. 775,413. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

VALENTIN BEHRINGER, OF NEW YORK, N. Y.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 775,413, dated November 22, 1904.

Application filed February 11, 1903. Serial No. 142,922. (No model.)

To all whom it may concern:

Be it known that I, VALENTIN BEHRINGER, a citizen of the United States, residing in New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to an improved rotary engine in which the expansive force of the steam or other motor fluid can be advantageously utilized for imparting rotary motion to the driving-shaft of the engine and in which the movable parts are provided with packing in such a manner that the same can be readily adjusted or replaced from time to time, so as to compensate for the wear of the same; and the invention consists of a rotary engine which comprises a stationary cylinder, a piston rolling over the inner surface of said cylinder and provided with packing at both ends, a sliding and spring-actuated abutment guided in an extension of the cylinder, the inner end of said abutment being placed in contact with the exterior surface of the rolling piston, a shaft supported in the heads of the cylinder, and radial lever-arms keyed to said shaft, having only their outer ends in contact with the inner surface of the rolling piston for holding the rolling piston tightly against the interior surface of the cylinder when gliding along the interior surface of the rolling piston, said lever-arms being provided with packing by which said rolling piston is always held in tight contact with the interior surface of the cylinder, and means for supplying and exhausting the motor fluid, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical transverse section of my improved rotary engine, showing the rolling position at the beginning of its stroke. Fig. 2 is a vertical longitudinal section showing the rolling piston at its dead-point; and Figs. 3, 4, 5, and 6 are vertical tranverse sections of the engine, showing diagrammatically the different relative positions of the rolling piston, sliding abutment, and lever-arms by which the contact between the rolling piston and interior surface of the cylinder is maintained.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the cylinder of my improved rotary engine, and A′ the cylinder-heads of the same. A driving-shaft S passes through the center openings of the cylinder-heads A′ to the outside of the same, said openings being tightly closed, so as to prevent escape of steam, by suitable stuffing-boxes *a*. The driving-shaft S is supported on upright standards B′ of the bed-plate B. The cylinder is also supported by suitable pedestals A^2. The cylinder A is provided at its upper part with parallel extensions C, on which rests a cylindrical extension C^2. These parallel extensions form a guide chamber or chest for the sliding and spring-actuated abutment D, said abutment being provided at its center with a guide-rod D′, that passes through the cylindrical extension C′, which is closed by a stuffing-box C^2 at the top of the cylindrical extension C′ to the outside, as shown clearly in Figs. 1 and 2. The sliding abutment D is provided at its inner end with a suitable packing *p*, which may take the form of a roller, so as to reduce friction, which is forced by a helical spring *r*, placed on the guide-rod of the abutment between the stuffing-box C^2 and abutment D, into contact with a rolling piston E. The point of contact between the sliding abutment D and cylinder C is formed by a suitable packing, preferably a roller-packing, while the ends of the sliding abutment are packed against the cylinder-heads in any approved manner, so that a tight contact between the abutment, exterior surface of the rolling piston, and the heads of the cylinder is produced. The rolling piston E is provided at both ends with packing-rings *m*, so as to be tightly packed against the heads of the cylinder. The rolling piston E is held firmly in contact with the inner surface of the cylinder A by means of radial arms F, that are keyed to the driving-shaft S and provided at their outer ends with independent adjustable packing-pieces *f*, that are tightly

adjusted against the inner surface of the rolling piston by means of suitable independent set-screws *f'*, as shown clearly in Figs. 1 and 2. The diameter of the rolling piston E is larger than the length of the radial lever-arm F, so that only one end of the lever-arm is in contact with the rolling piston when the same glides along the interior surface of the rolling piston and holds the rolling piston tightly against the interior surface of the cylinder. The rolling piston forms at any point of its rotation segmental spaces between the sliding abutment, the inner surface of the cylinder, and the exterior surface of the rolling piston. The cylinder is provided at one side of the sliding abutment with an inlet-port *i* and supply-pipe for admitting live steam or other motor fluid to the interior of the cylinder and at the opposite side of the sliding abutment with an exhaust-port *x* and pipe.

Any suitable motor fluid may be used, such as steam, compressed air, volatile vapors, &c. In case an explosive mixture is used the same may be ignited by a suitable electric ignition device in the well-known manner.

When the motor-fluid enters into the segmental spaces between the sliding abutment, cylinder, and rolling piston, as shown in Fig. 3, a lever action is imparted to the rolling piston, owing to the pressure of the radial lever-arms on the contact-point between the cylinder and rolling piston, so that the same is moved along the inner surface of the cylinder in the direction of the arrow shown in Figs. 3 to 6. By the force of the motor fluid the rolling piston after being moved through one-quarter revolution assumes the position shown in Fig. 4, the lever-arms continuing in contact, but being moved in an opposite direction, as shown by the arrows, to the rolling piston until they arrive in the position shown in Fig. 5. The motor fluid may be cut off at a suitable position of the piston, so that it produces the completion of the full rotation of the rolling piston by its expansive force until the piston arrives in position shown in Fig. 6, when the lever-arms and the contact-point between the piston, cylinder, and abutment are in line with each other. In this position the inlet and exhaust ports are covered by the rolling piston and the piston is at its dead-point. At this point the fly-wheel on the driving-shaft moves the piston past the dead-point, so that the exhaust takes place, while immediately thereafter a supply of motor fluid through the inlet-port is accomplished, so that thereby the rolling piston commences its second rotation, which is accomplished in the same manner as before described, the fly-wheel assisting in moving the rolling piston over the sliding abutment at the dead-point into position to receive a new quantity of live motor fluid.

It is preferable to arrange two motors on the same shaft, one at an angle to the other. Any suitable reversing-gear may be employed in connection with the same.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a rotary engine, the combination, with a cylinder provided with inlet and outlet ports for the motor fluid, cylinder-heads, and an extension-chamber, of a rolling piston at the interior of said cylinder, packing-rings at the ends of the rolling piston, a shaft passing centrally through the cylinder-heads of the cylinder, a plurality of radial lever-arms mounted on said shaft having only their outer ends in contact with the inner surface of the rolling piston, for holding the rolling piston tightly against the interior surface of the cylinder, when gliding along the interior surface of the rolling piston, independent packings at the outer ends of said lever-arms, means for independently adjusting said packings, a spring-actuated abutment in said extension-chamber, and a packing at the inner end of the abutment in contact with the exterior surface of the rolling piston, substantially as set forth.

2. In a rotary engine, the combination, with a cylinder provided with inlet and outlet ports, cylinder-heads and an extension-chamber, of a rolling piston located at the interior of the cylinder, packing-rings at the ends of the rolling piston, a sliding and spring-actuated abutment in the extension-chamber of the cylinder, a packing at the inner end of the abutment in contact with the exterior surface of the rolling piston, a shaft passing centrally through the cylinder-heads, a plurality of radial lever-arms mounted on said shaft, having only their outer ends in contact with the inner surface of the rolling piston, for holding the rolling piston tightly against the interior surface of the cylinder, when gliding along the interior surface of the rolling piston, and independent adjustable packings at the outer ends of the lever-arms, substantially as set forth.

3. A rotary engine, consisting of a stationary cylinder provided with inlet and outlet ports for the motor fluid, an extension-chamber located on the cylinder and formed by parallel sides, heads for the cylinder, a sliding and spring-actuated abutment guided in said extension-chamber and provided with a packing at its inner end, said abutment being located between the inlet and exhaust ports of the cylinder, a rolling piston at the interior of the cylinder, a shaft passing centrally through the cylinder-heads, a plurality of radial lever-arms mounted on said shaft, having only their outer ends in contact with the inner surface of the rolling piston, for holding the rolling piston tightly against the interior surface of the cylinder, when gliding

along the interior surface of the rolling piston, independent packings at the outer ends of said radial lever-arms, and means for independently adjusting said packings, substantially as set forth.

4. A rotary engine, consisting of a stationary cylinder provided with inlet and outlet ports for the motor fluid, an extension-chamber located on the cylinder and formed by parallel sides, heads for the cylinder, a cylindrical extension for the extension-chamber, a rolling piston provided with packing-rings at its ends at the interior of the cylinder, a shaft passing centrally through the cylinder-heads, a plurality of radial lever-arms mounted on said shaft having only their outer ends in contact with the inner surface of the rolling piston, for holding the rolling piston tightly against the interior surface of the cylinder, when gliding along the interior surface of the rolling piston, independent packings at the outer ends of the radial lever-arms, means for independently adjusting said packings, a sliding abutment guided in said extension-chamber located between the inlet and exhaust ports of the cylinder, a spring-actuated guide-rod attached to the sliding abutment and passing through the cylindrical extension of the extension-chamber, and a packing at the lower end of the abutment in contact with the exterior surface of the rolling piston, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

VALENTIN BEHRINGER.

Witnesses:
HENRY J. SUHRBIER,
C. P. GOEPEL.