C. E. CLAPP.

ROTARY ENGINE.

APPLICATION FILED MAY 25, 1910.

982,035.

Patented Jan. 17, 1911.

3 SHEETS—SHEET 1.

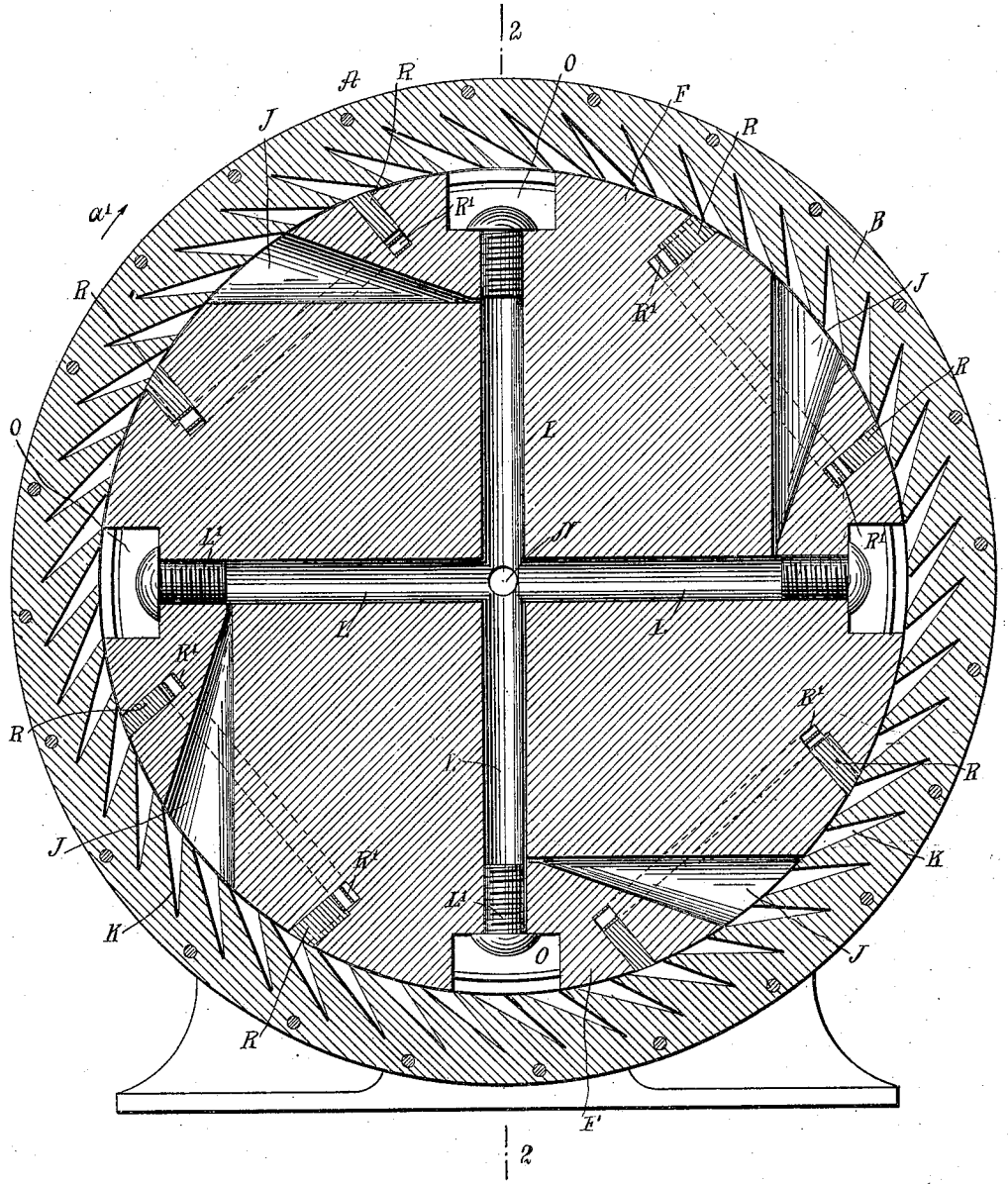

Fig. 1.

WITNESSES:

Benedict Joffe

Rud. G. Hoster

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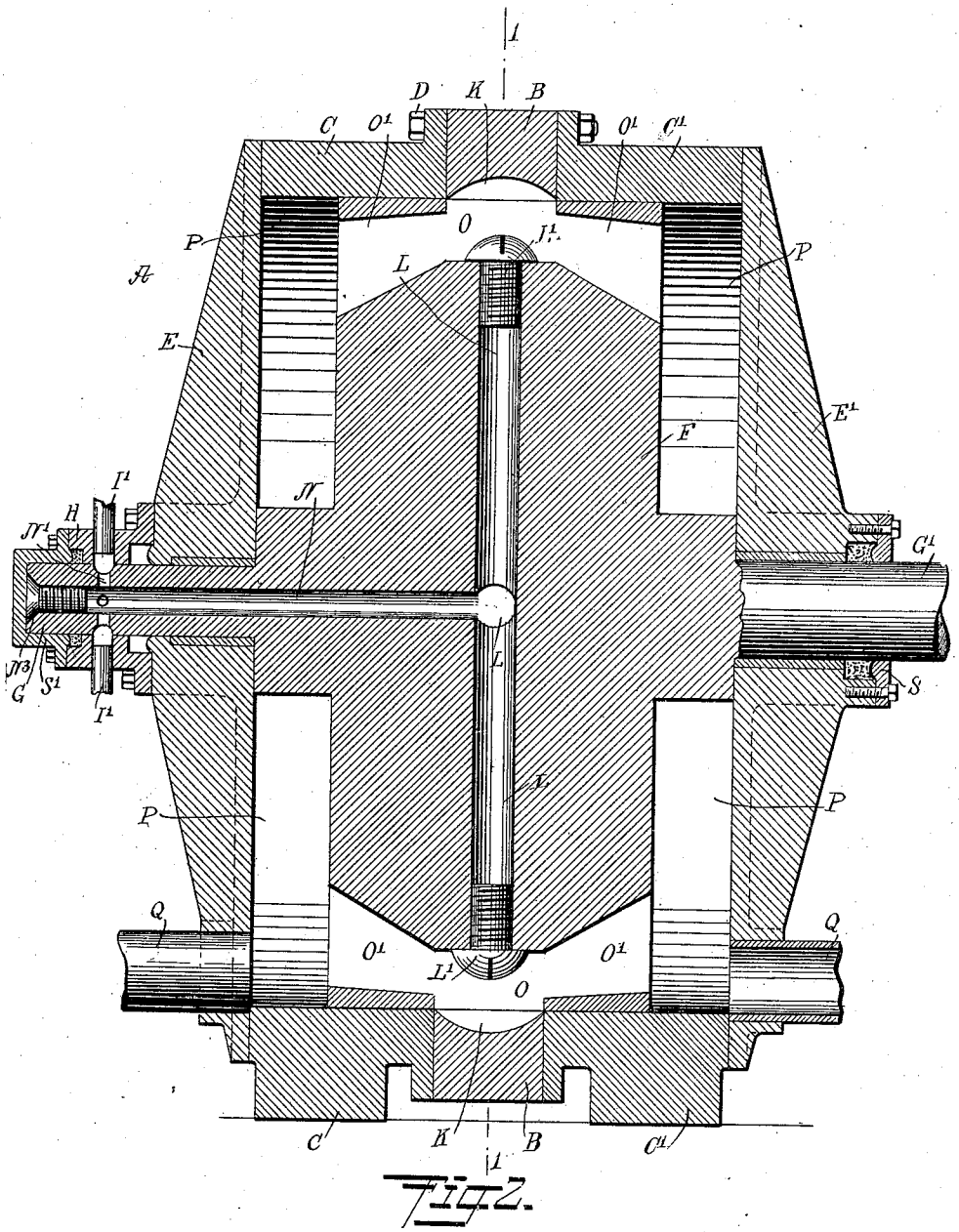

FIG. 2.

WITNESSES:

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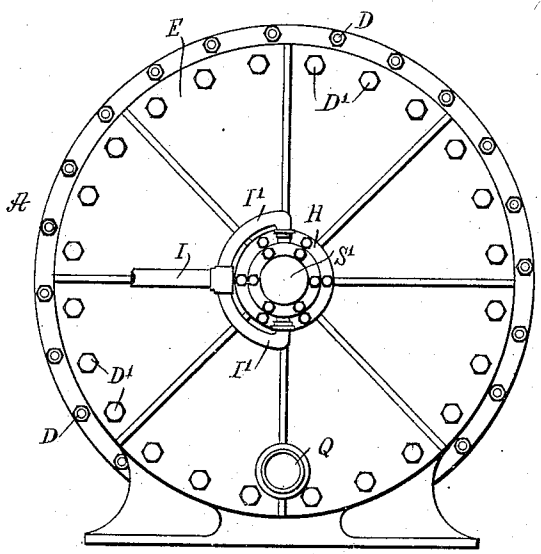

Fig. 6.

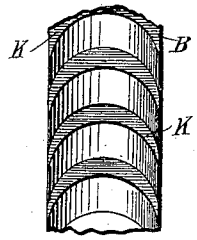

Fig. 5.

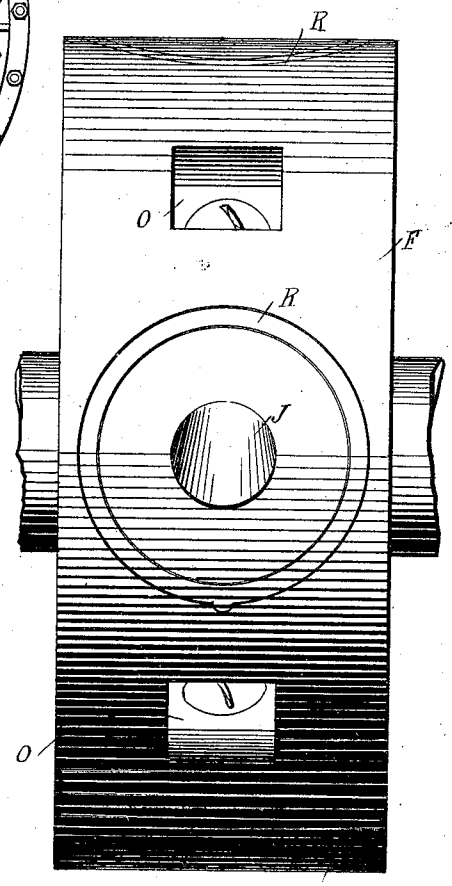

Fig. 3.

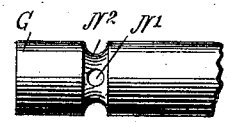

Fig. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

CLARENCE E. CLAPP, OF BUFFALO, NEW YORK.

ROTARY ENGINE.

982,035. Specification of Letters Patent. Patented Jan. 17, 1911.

Application filed May 25, 1910. Serial No. 563,280.

To all whom it may concern:

Be it known that I, CLARENCE E. CLAPP, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The invention relates to rotary engines, in which the motive agent propels the rotor by reaction.

The object of the invention is to provide a new and improved rotary engine, which is simple and durable in construction, very effective in operation, and arranged to utilize the motive agent economically and to the fullest advantage. In order to accomplish the desired result, use is made of a cylinder, provided on its inner surface with pockets, and a rotor in the said cylinder and provided with reaction nozzles, opening at their larger outer ends into the said cylinder pockets, the inner ends of the said nozzles being connected with a source of motive agent supply.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a cross section of the rotary engine on the line 1—1 of Fig. 2; Fig. 2 is a longitudinal central section of the same on the line 2—2 of Fig. 1; Fig. 3 is a side elevation of the rotor; Fig. 4 is a side elevation of part of the rotor shaft showing the admission ports; Fig. 5 is a view of part of the inner surface of the cylinder; and Fig. 6 is a reduced end view of the rotary engine.

The cylinder A of the rotary engine is preferably formed of a central section B and end sections C and C′ fastened to the central section B by bolts D or other fastening devices, and the outer ends of the end sections C, C′ are closed by cylinder heads E, E′, fastened to the end sections C and C′ by bolts D′, as plainly indicated in Fig. 6.

Within the cylinder A rotates the rotor F, provided on opposite sides with the alined shafts G, G′, journaled in the cylinder heads E and E′, the outer end of the shaft G′ being provided with a pulley or other means for transmitting the rotary motion of the engine to other machines or devices to be driven. The outer end of the shaft G extends through a chest H, bolted or otherwise fastened to the cylinder head E, and connected by the branch pipes I′ with a motive agent supply pipe I, leading to a boiler or other source of motive agent supply. In the rotor F are formed the reaction nozzles J, having their large outer ends extending to the peripheral face of the rotor F and registering with pockets K formed on the inner face of the central cylinder section B, as plainly indicated in the drawings. The inner or small ends of the nozzles J open into radial expansion chambers L, formed in the rotor F and leading to an axial channel N extending through the shaft G, to connect by ports N′ with an annular groove N^2 formed exteriorly on the shaft G and opening into the chest H, so that the motive agent can pass from the chest by way of the annular groove N^2, ports N′ and channel N into the chambers L in which the motive agent is expanded and distributed to the nozzles J, from which the motive agent escapes into the pockets K, so that the rotor F is caused to rotate by the reaction of the motive agent, as the same leaves the nozzles J and enters the pockets K. The rotor F is thus rotated in the direction of the arrow *a′*. By reference to Fig. 1, it will be seen that the nozzles J extend approximately at right angles to the radial expansion chambers L, so that the reaction of the motive agent is utilized to the fullest advantage, with a view to powerfully rotate the rotor F in the direction of the arrow *a′*.

In the rear of each nozzle J is formed, in the peripheral face of the rotor F, an exhaust port O, having branch ports O′ leading into exhaust chambers P formed in the outer sections C, C′ of the cylinder A between the sides of the rotor F and the heads E, E′. The exhaust chambers P are connected with exhaust pipes Q, for discharging the exhaust motive agent from the chambers P and carrying the exhaust to a suitable place of discharge. By reference to Fig. 2 it will be noticed that the rotor F is of a width less than the length of the cylinder A, so that the peripheral face of the rotor F is

in contact with the inner surface of the central section B but only with portions of the inner surfaces of the outer sections C and C′, whereby the exhaust chambers P are formed within the cylinder, as previously explained. Now as the rotor F advances, the succeeding exhaust port O, on account of being in register with the pockets K, receives the exhaust steam from the said pockets and discharges the same by the branch ports O′ into the exhaust chambers P, from which the exhaust can escape by way of the exhaust pipes Q.

In order to prevent leakage of the live motive agent from the outer ends of the nozzles J into the exhaust chambers P, use is made of packing rings R, concentric with the outer ends of the nozzles J and set in recesses formed in the peripheral face of the rotor F. Springs R″ press the packing rings R outward in contact with the inner surface of the sections B, C, C′ of the cylinder A, to form a tight joint with the cylinder and thus prevent leakage of the live motive agent from a nozzle J into the exhaust chambers P. In practice, the expansion chambers L in the rotor F are bored from the exhaust ports O and then closed at the outer ends by screws L′, as indicated in the drawings. In a like manner, the channel N is bored from the outer end of the shaft G, and then the outer end of the channel N is closed by a screw N^3, as shown in Fig. 2. The head E′ is provided with a stuffing box S for the shaft G′, and a stuffing box S′ is attached to the chest H to inclose the outer end of the shaft G.

From the foregoing, it will be seen that the steam or other motive agent is twice expanded, that is, in the chambers L and then in the nozzles J, so that the steam is expansively used to render the engine economical in the use of motive power. It will further be noticed that by providing the rotor F with a series of nozzles J, placed equal distances apart and at all times in action, it is evident that the rotor F is steadily rotated, and consequently an easy running of the engine is insured.

The pockets K preferably decrease in width from the inner to the outer ends, as plainly indicated in Fig. 1, and the said pockets are preferably curved from side to side as shown in Fig. 5, and the pockets K stand at such an angle relative to the outer ends of the nozzles J, as to cause the motive agent to react with full force, with a view to turn the rotor F in the direction of the arrow *a′*.

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

1. A rotary engine, comprising a cylinder provided on its inner surface with pockets and at the sides with exhaust chambers, and a rotor in the said cylinder and provided with reaction nozzles extending with their large ends to the peripheral face of the rotor and registering with the said cylinder pockets, the rotor having exhaust ports in the rear of the nozzles and in register with the said pockets, the exhaust ports leading from the peripheral face of the rotor to the sides thereof to discharge into the said exhaust chambers.

2. A rotary engine, comprising a cylinder provided on its inner surface with pockets and at the sides with exhaust chambers, a rotor in the said cylinder and provided with reaction nozzles extending with their large ends to the peripheral face of the rotor and registering with the said cylinder pockets, the rotor having an axial inlet channel connected at its outer end with a motive agent supply, and distributing chambers in the rotor and connecting the inner end of the said inlet channel with the inner small ends of the said nozzles.

3. A rotary engine, comprising a cylinder provided on its inner surface with pockets and at the sides with exhaust chambers, a rotor in the said cylinder and provided with reaction nozzles extending with their large ends to the peripheral face of the rotor and registering with the said cylinder pockets, the rotor having an axial inlet channel connected at its outer end with a motive agent supply, and distributing chambers in the rotor and connecting the inner end of the said inlet channel with the inner small ends of the said nozzles, the rotor having exhaust ports in the rear of the nozzles and in register with the said pockets, the exhaust ports leading from the peripheral face of the rotor to the sides thereof to discharge into the said exhaust chambers.

4. A rotary engine, comprising a cylinder provided on its inner surface with pockets and at the sides with exhaust chambers, a rotor in the said cylinder and provided with reaction nozzles extending with their large ends to the peripheral face of the rotor and registering with the said cylinder pockets, the inner small ends of the said nozzles being connected with a motive agent supply, and packing rings yieldingly mounted in the peripheral face of the rotor and concentric with the said larger outer ends of the nozzles.

5. A rotary engine, comprising a cylinder provided on its inner surface with pockets and at the sides with exhaust chambers, a rotor in the said cylinder and provided with reaction nozzles extending with their large ends to the peripheral face of the rotor and registering with the said cylinder pockets, the rotor having an axial inlet channel connected at its outer end with a motive agent supply, distributing chambers in the rotor and connecting the inner end of the said in-

let channel with the inner small ends of the said nozzles, the outer end of the said inlet channel terminating in ports leading to an annular chamber, and a fixed motive agent supply chest connected with a motive agent supply and in register with the said annular chamber.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE E. CLAPP.

Witnesses:

ELMER W. HOWELL,

ALBERT H. GREEN.