No. 711,168. Patented Oct. 14, 1902.

W. LAWRENCE.

ROTARY ENGINE.

(Application filed May 17, 1902.)

(No Model.)

Fig. 2.

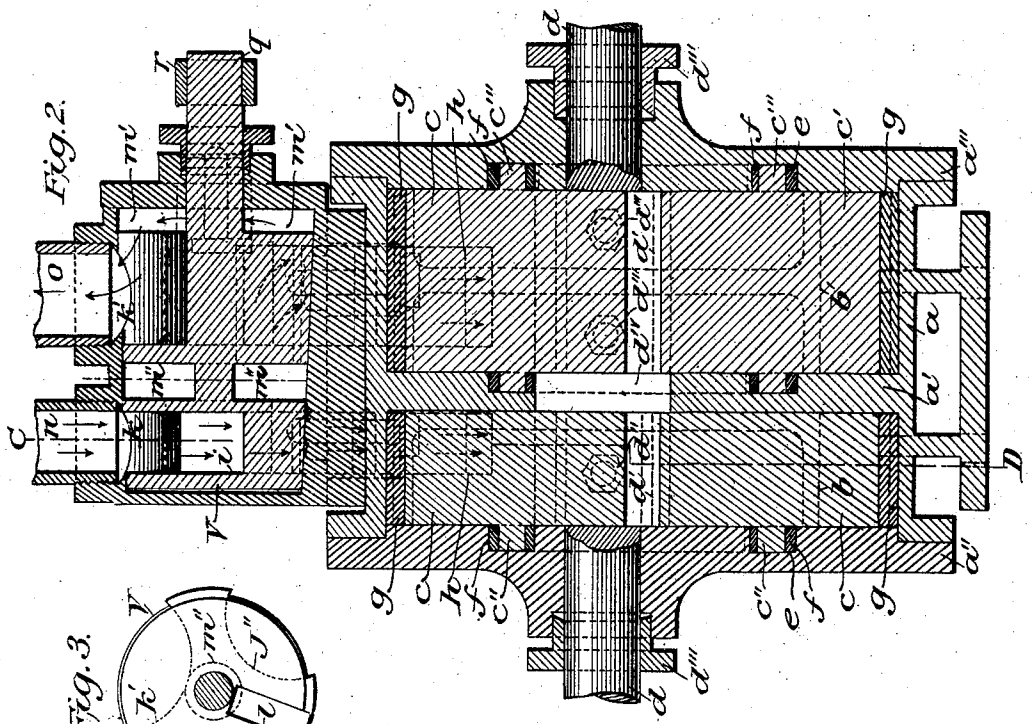
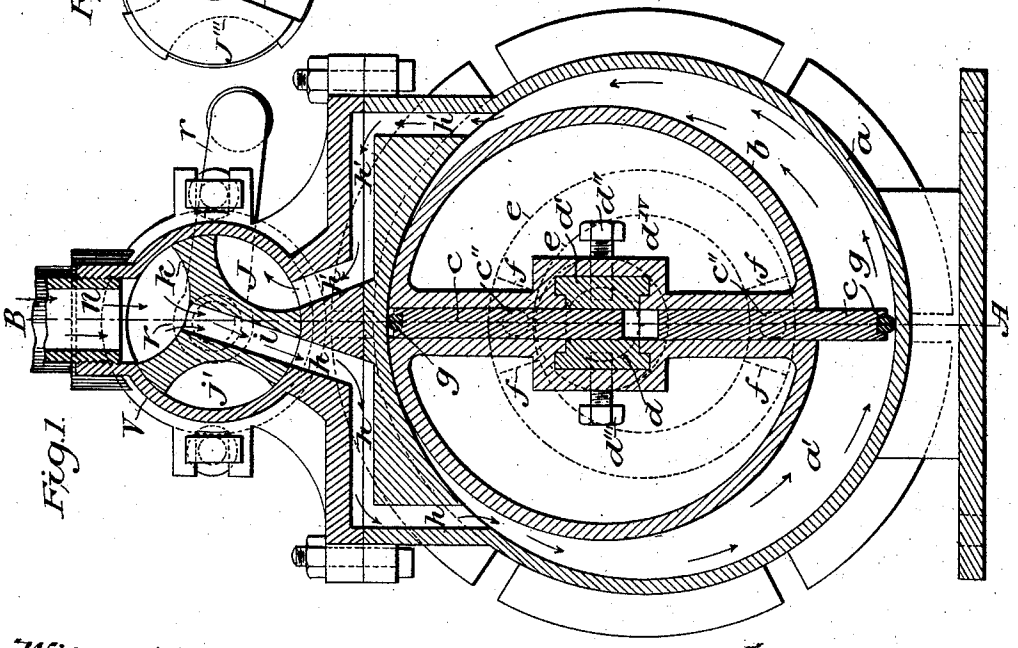


Fig. 3.

Fig. 1.



Witnesses:

E. Hudson.

E. A. Brown.

Inventor:

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UNITED STATES PATENT OFFICE.

WILLIAM LAWRENCE, OF PUNTA GORDA, FLORIDA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 711,168, dated October 14, 1902.

Application filed May 17, 1902. Serial No. 107,868. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LAWRENCE, a citizen of the United States, residing at Punta Gorda, in the county of De Soto and State of Florida, have invented an Improvement in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines in which there are two or more cylinders connected, the first or smallest of the series receiving the steam at boiler-pressure and passing thence into the adjoining cylinder through a suitably-constructed valve. The larger acting area of the said cylinder causes the steam to act expansively.

The objects of my improvement are, first, to effect an economy in the use of steam, and, second, to obtain a nearly continuous and uniform effort during a revolution of the engine. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section on the line C D of Fig. 2. Fig. 2 is a longitudinal section on the line A B. Fig. 3 is a section of part of the rotary steam-valve.

Similar letters refer to similar parts throughout the several views.

The cylinder *a* is in two parts, divided unequally by a diaphragm *a'*, the smaller of which receives the high-pressure steam through the steam-pipe *n*, which is attached to the rotary steam-distributing valve *v*, in one end of which is a recess *k* and a slot *i*, through which the steam is conducted by way of the passages *h h'*, diverging into the smaller or high-pressure cylinder *a*. Within the cylinders and placed eccentrically thereto is a shaft *d*, carrying the semicylindrical wing-barrels *b b*. These wing-barrels are each made in two semicylindrical parts or segments, the parts being separated to receive the reciprocating wings *c c*, two of which are contained in each cylinder. The wing-barrels *b b'* are separated by a transverse wall or diaphragm and are secured to the shaft *d* by being slipped in place thereon and are held in position and rotated by means of the squared or I-section portions on which the wing-barrels are fitted. Through the aforesaid wing-barrels and passing through the squared shaft are radially-sliding wings, two in each barrel. On the sides of these wings are formed projecting pins or gudgeons *c c*, &c. These pins run in arc-shaped guide-blocks *f f*, &c. When the wings are impelled by the steam-pressure, they are revolved and carried around in the slots between the segments of the wing-barrels, the pins or gudgeons revolving in the arc-shaped guide-blocks *f f*, &c., and maintaining the outer edges of the wings in contact with the cylindrical interior surface, guided therein by the concentric grooves in the cylinder-covers and diaphragm, and thereby producing the reciprocating movement of the wings. These circular concentric grooves are shown in dotted lines at *e e*, Figs. 1 and 2, and the semi-arc-shaped guiding-blocks are similarly shown. In order to give a better bearing to the reciprocating wings *c c*, &c., they are made to pass through the shaft radially thereto. Lubrication of these internal working parts is effected by ducts carried through the cylinder-covers *a''* and *a'''*. Stuffing-boxes *d''* and *d'''* pack the shaft at each end thereof. When the wings *c c* pass in succession the steam-passages *h*, the steam is discharged by means of the conical rotary at *j* or *j'*, whence it passes through the slot *l*, Fig. 3, and by way of the passages *m'' m''* into the larger expansion-cylinder, from whence it is exhausted by way of *m' m'* and *k* into the exhaust-pipe *o*. The conical distributing-valve *v* is in one piece. When suitably rotated, the steam-admission ports *i* and *l* carry the steam in reverse direction, and the direction of its flow and motion of the engine is likewise reversed, the exhaust-passages *j j* and *j''' j'''* being changed accordingly. In a small engine, in which the piston-wings are narrow, they can be carried reciprocally by means of the trunnions *c''* and *c''* on one side of the wings only. (See Fig. 3.)

I am aware that rotary engines having eccentrically-placed wing-barrels, with cylinders in which the steam is used expansively, are not new, and I do not claim such device as my invention; but

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

1. In a rotary engine the combination of two or more expansion cylinders or casings having a through-shaft, semicylindrical wing-

barrels, said barrels carrying two sliding wings actuated by means of projecting gudgeons on the sides of these wings, said gudgeons being carried by arc-shaped guide-blocks in concentric circular grooves, the aforesaid wings being impelled by any elastic fluid so as to rotate the shaft in the required direction with the rotary distributing-valve formed in one piece and arranged to direct the fluid actuating the engine in such way either direct or reverse as may be required, all substantially as described herein.

2. In a rotary engine the combination of expansion cylinders or casings of circular interior surface, eccentrically-rotating wing-pistons actuated radially by means of concentric grooves in which are carried arc-shaped guide-blocks, the semicylindrical wing-barrels attached to a shaft having squared or I-shaped section, said shaft being continuous throughout the casings and having slots therein to pass the wing-pistons substantially as shown herein.

3. In a rotary engine having two connected cylinders, said cylinders having a circular interior surface, concentric circular grooves in which run arc-shaped guide-blocks carrying pins or gudgeons on the sides of sliding radially-reciprocating wings said wings traveling in slots carried through the wing-barrels and shaft, said wings being two in number in each cylinder, in combination with a squared through-shaft carrying both wing-barrels, as shown herein.

4. In a rotary engine with two connected cylinders, a conical rotary distributing-valve consisting of an outer casing made to receive a steam-inlet together with an exhaust-outlet and having two steam-passages therein communicating with each cylinder, in combination with a rotatable conical plug divided into two parts longitudinally by an annular steam-space, and having a slot therein for passing steam to the first cylinder, and a slot or passage opening from the middle steam-space to convey the steam to the second cylinder, and having also on either side of these two slots two passage-ways for exhaust-steam which being suitably rotated engage with one or the other of the steam-passages of each cylinder in order to change direction of the motion of the engine, the slots being placed intermediate between the steam-passages the engine is thereby stopped; as shown and described herein.

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

WILLIAM LAWRENCE.

Witnesses:

J. A. JUDSON,

EDWARD W. AUSTIN.