

(No Model.)

C. P. JÜRGENSEN.  
ROTARY ENGINE.

No. 341,850.

Patented May 11, 1886.

FIG. 1.

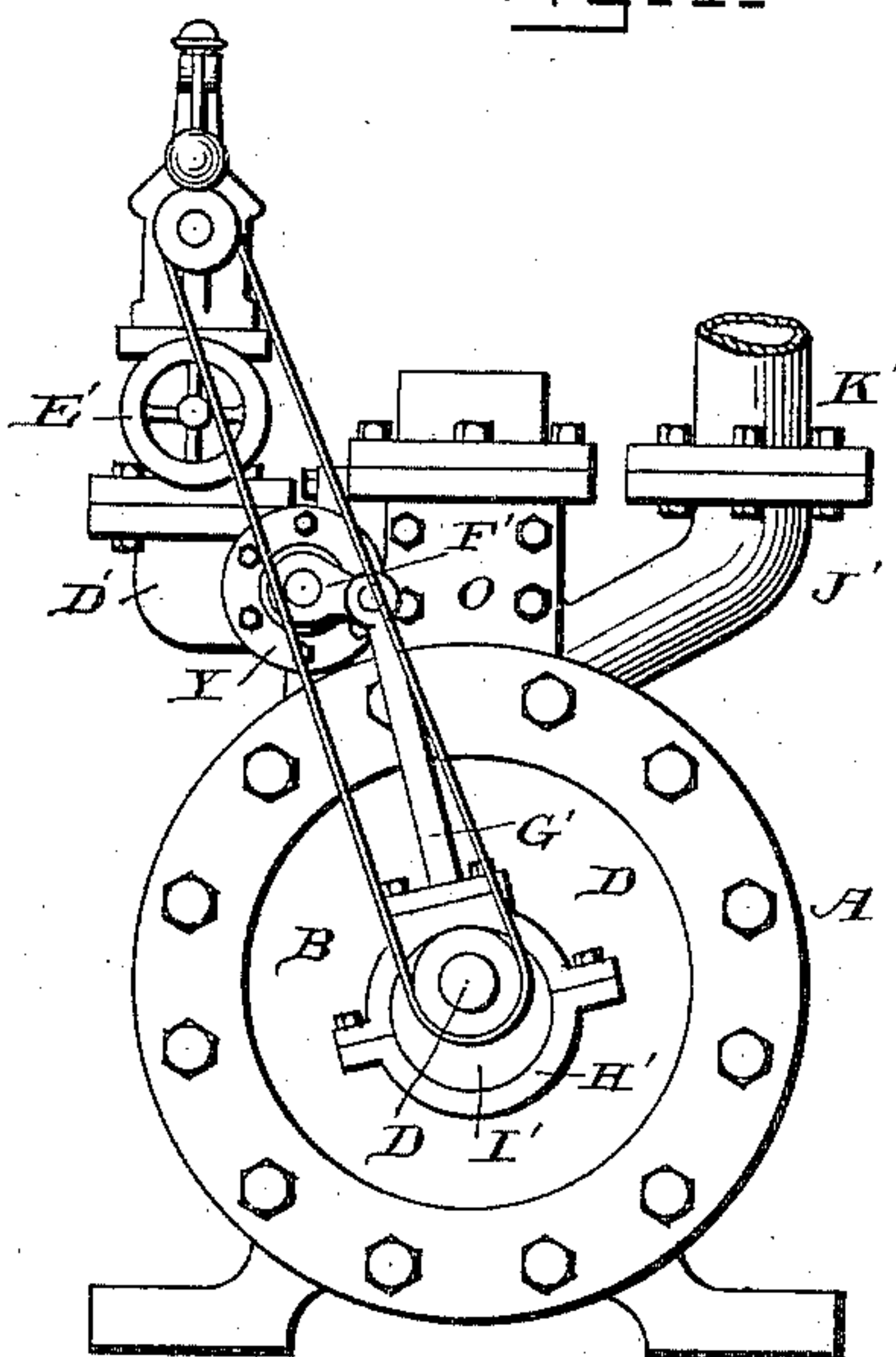


FIG. 2.

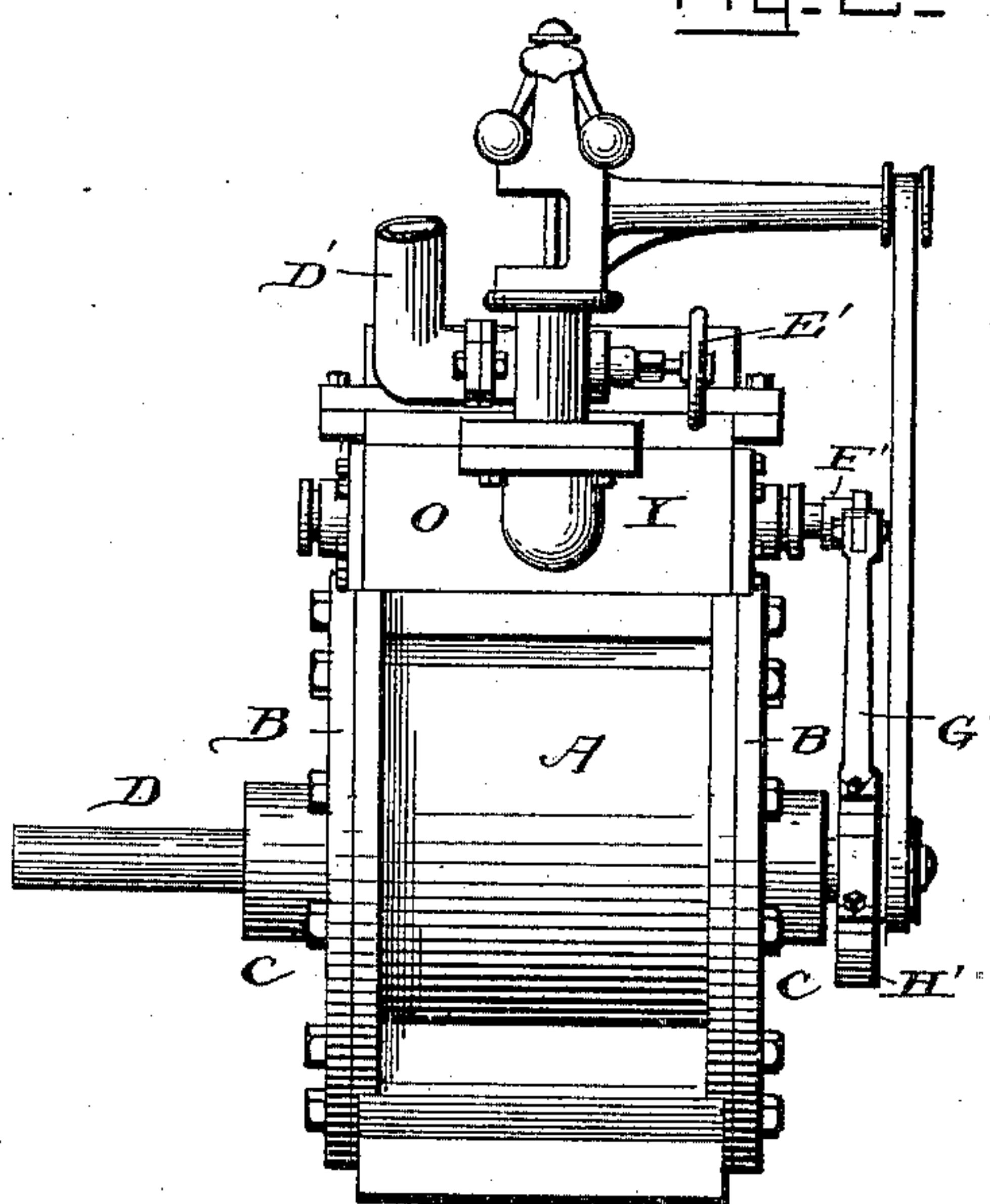


FIG. 3.

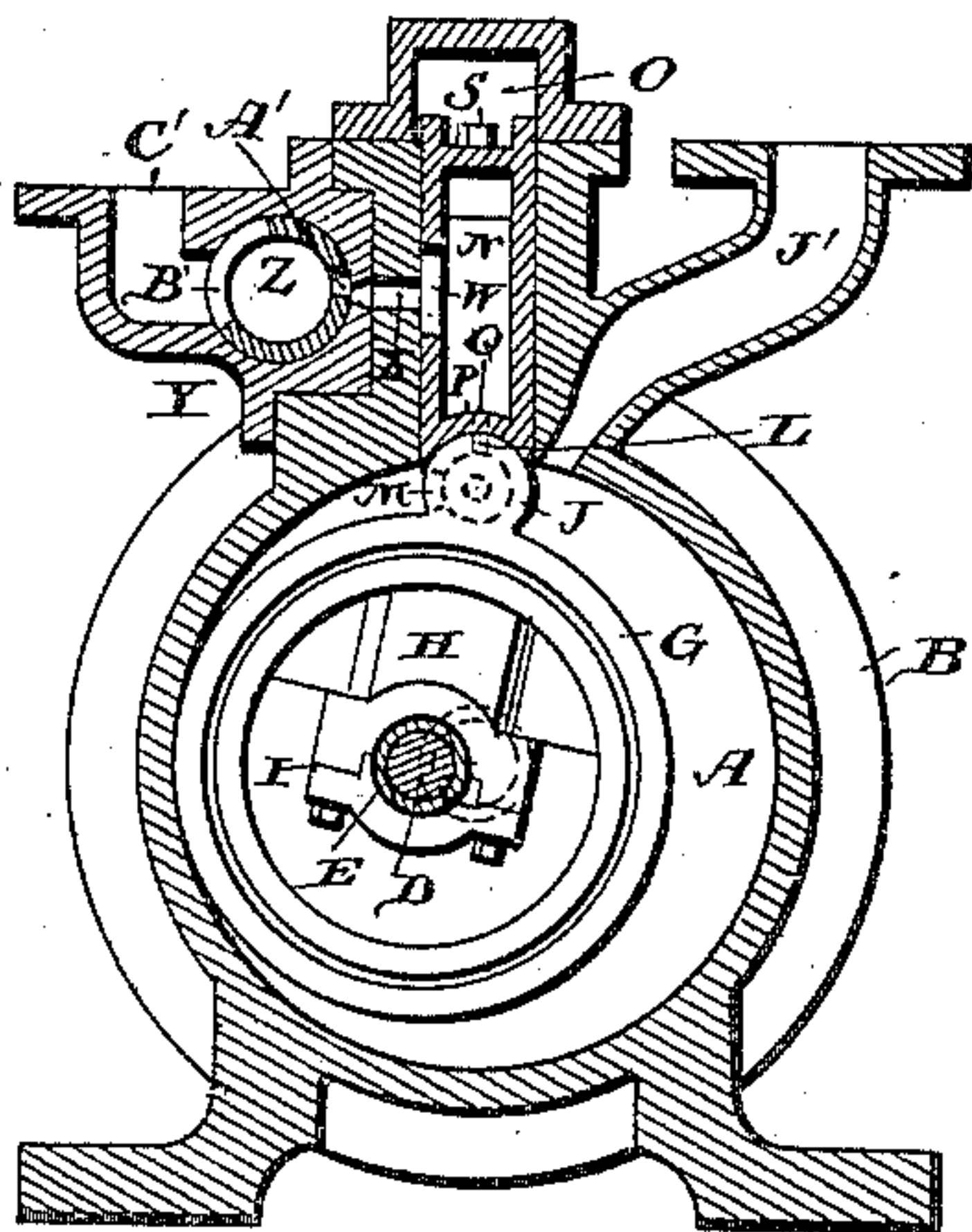
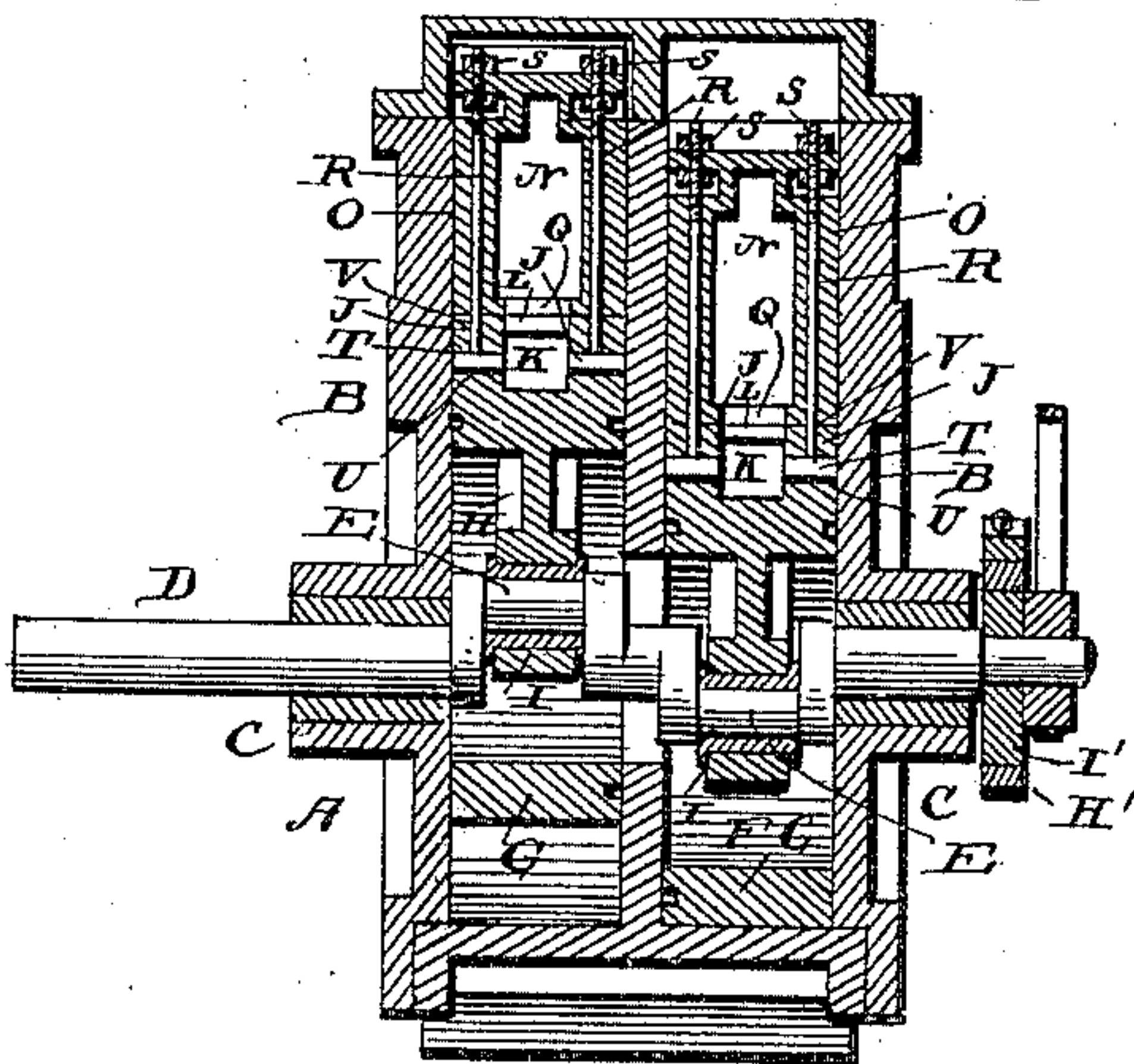


FIG. 4.



WITNESSES

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# UNITED STATES PATENT OFFICE.

CHRISTOPHER PETER JÜRGENSEN, OF COPENHAGEN, DENMARK.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 341,850, dated May 11, 1886.

Application filed March 9, 1886. Serial No. 194,525. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTOPHER PETER JÜRGENSEN, professor, a subject of the King of Denmark, residing at Copenhagen, in the Kingdom of Denmark, have invented certain new and useful Improvements in Rotary Engines; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification, and in which—

Figure 1 is an end view of my improved rotary engine. Fig. 2 is a side view of the same. Fig. 3 is a vertical transverse section, and Fig. 4 is a vertical axial section of the same.

Similar letters of reference indicate corresponding parts in all the figures.

My invention has relation to rotary engines having two diametrically-opposite eccentric cylinders revolving within two sections of a cylinder and having means for separating the live-steam space from the exhaust space; and it consists in the improved construction and combination of parts of such an engine, in which steam, compressed air, or any other fluid medium may be used, and in which two cylindrical pistons are secured upon two double-cranks upon the drive-shaft, the said cylinders having hollow boxes or casings hinged to their upper sides and sliding in casings connected to the upper portions of the cylinder, the said sliding boxes dividing the space in the cylinder into an inlet-space and an exhaust-space, as hereinafter more fully described and claimed.

In the accompanying drawings, the letter A indicates a cylinder, the heads B B of which are formed with bearings or stuffing-boxes CC, in which the drive-shaft D is journaled, and this shaft is formed with two double cranks, E E—one on each side of an annular partition, F, which divides the cylinder into two compartments. Two pistons, G G, formed of hollow cylinders bearing with their ends against the heads of the cylinder and the partition, have inwardly-projecting arms extending from the upper portions of their inner sides, and these arms H H are formed with bearings or boxes I at their ends, which fit upon the double

cranks, having the said cranks journaled within them, the bearings being central to the pistons. The upper sides of the pistons have each two upwardly-projecting cylindrical ears, J J, which are connected by a hollow cylinder, K, having a slot, L, extending transversely across the upper side, and a similar slot, M, at one side, the said slots being parallel with the axis of the cylinder and of the ears, and a box, N, slides in each of the two extensions or casings O O, which communicate with their lower ends with the upper sides of the compartments of the cylinder. These boxes are hollow and formed with a concave lower end wall, P, which lower end wall is provided with a slot, Q, which may register with the slot in the upper side of the cylinder between the ears of the piston, and the boxes are provided with rods R R, which pass down through the side edges of them, and are provided at their upper ends with fastening-nuts S and at their lower ends with cross-heads T T, which fit and rock in axial bores U in the ears of the pistons, the rods projecting up through slots V in the upper sides of the ears. One side of each box is provided with an aperture or port, W, which registers with a similar aperture or port, X, in the wall of each casing, the port in the box being preferably larger than the port in the casing, and the port in each casing opens into a cylindrical valve-chest, Y, within which a cylindrical hollow valve, Z, rocks, the said valve having a port, A', which may register with the port of the casing, and a larger port, B', which may register with the inlet-aperture C' in the casing, into which the live-steam pipe D', which is provided with the throttle-valve E', is inserted. The cylindrical rocking valve receives its motion from a crank, F', upon one end, which crank is provided with a pivoted eccentric-rod, G', projecting from a ring, H', upon an eccentric disk, I', upon the drive-shaft. The cylindrical valve is divided by a central partition, and each half of the valve is formed with its slots at the same relative positions, but at different positions from each other. The exhaust-port J' enters the cylinder immediately behind the casing for each sliding box, and is provided with an exhaust-pipe, K', which carries off the exhaust-steam. It will now be seen that the steam which is let into the sliding boxes through the ports and



through the rocking cylindrical valve will pass through the port in the lower end of the boxes and into the cylindrical hollow joint of each piston, when the said pistons are at their highest positions, and passing downward, the steam passing into the live-steam space through the ports in the sides of the said cylindrical joints, and after each piston has passed its lowermost position the ports in the lower ends of the boxes and in the cylindrical joints will cut each other off, allowing the steam to act by expansion; and it will be seen that the steam entering the boxes through the ports in the sides of the casing may be cut off at various moments of the revolutions of the pistons by adjusting the eccentric disk upon the shaft, so that the steam may be made to act more or less by expansion, and the steam will always act with the same degree of expansion within the cylinders, inasmuch as the hollow cylindrical joints will always cut the steam off at the same point of their revolutions, while the rocking valve will regulate at what point the supply into the boxes is to be cut off.

If desired, the boxes may be made solid, and the live steam may enter the cylinders through ports immediately forward of the boxes, and these ports will be provided with cylindrical valves, which cut off the steam at its proper time; and if the engine is to be made reversible the exhaust-ports are provided with similar valves, which may stand open when used as exhaust-ports, while the inlet ports and valves will stand open, and the ports and valves at the former exhaust-ports and channels will be in operation. It will be seen that new surfaces of the cylindrical pistons and of the cylinders are continually coming in contact, the pistons rolling upon the inner sides of the cylinders, and in this manner the pistons and the inner sides of the cylinders will be worn equally and evenly. The lateral pressure upon the sliding boxes, caused by the steam entering at one side of them, will partly be overcome by the pressure of the exhaust-steam passing out at the other sides of them and partly by the strain downward or upward from the pistons as they pass around in the cylinders. By placing the double cranks diametrically opposite to each other, the steam will act with its greatest power upon one cylinder when it is acting with its smallest power upon the other piston, so that the speed in revolving will be equalized at all points of a revolution. The ends of the cylindrical pistons are provided with packing-rings, and the ends of the said pistons bearing against the heads and against the annular partition, separating the two cylinders or compartments of the cylinders, will exclude all steam from communicating from one cylinder

to the other, so that the partition may be annular, and thus do away with a bearing, the ends of the double-cranks revolving in the central aperture of the partition.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a rotary engine, the combination of a cylinder having an annular partition at its middle and having upwardly-extending casings at its upper side and inlet and outlet apertures at both sides of the casings, provided with suitable distributing means, a shaft journaled in the heads of the cylinder concentric to the same and having two diametrically, opposite double cranks and two cylindrical pistons journaled centrally upon the cranks at both sides of the partition, having the ends bearing against the heads and against the partition, and provided at their upper sides with boxes hinged by their lower edges to the pistons and sliding in the casings, as and for the purpose shown and set forth.

2. In a rotary engine, the combination of a cylinder having axial bearings in its heads and an annular partition at its middle, and provided with two upwardly-projecting casings at its upper side, formed with inlet-ports at their forward walls and with exhaust-ports at the rear of the openings of the casings, a cylindrical valve-casing having its ports corresponding to the ports of the casings and having the inlet-pipe opening at its other side, a shaft journaled in the bearings in the heads of the cylinder and having two double cranks formed upon it, two hollow cylindrical pistons having inwardly-projecting arms formed with central bearings and having hollow cylindrical joints at their upper sides formed with perforated ends, and with ports in their upper and forward sides, boxes sliding in the casings and having ports registering with the ports of the casings, and having ports in their lower concave end walls registering with the ports of the cylindrical joints, and provided with rods passing through their side edges, pivoted in the ends of the cylindrical joints, a hollow cylindrical valve having ports in its opposite sides registering with the ports of the casings, with small ports, and with the live-steam pipe with large ports, an eccentric disk adjustable upon the shaft, and a connecting-rod between the eccentric ring and a crank upon the shaft of the valve, as and for the purpose shown and set forth.

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

CHRISTOPHER PETER JÜRGENSEN.

Witnesses:

ALFRED LEVY,  
C. LYDERS.