(No Model.) 3 Sheets—Sheet 1.

J. L. STARKS.

ROTARY ENGINE.

No. 274,669. Patented Mar. 27, 1883.

Fig. 1.

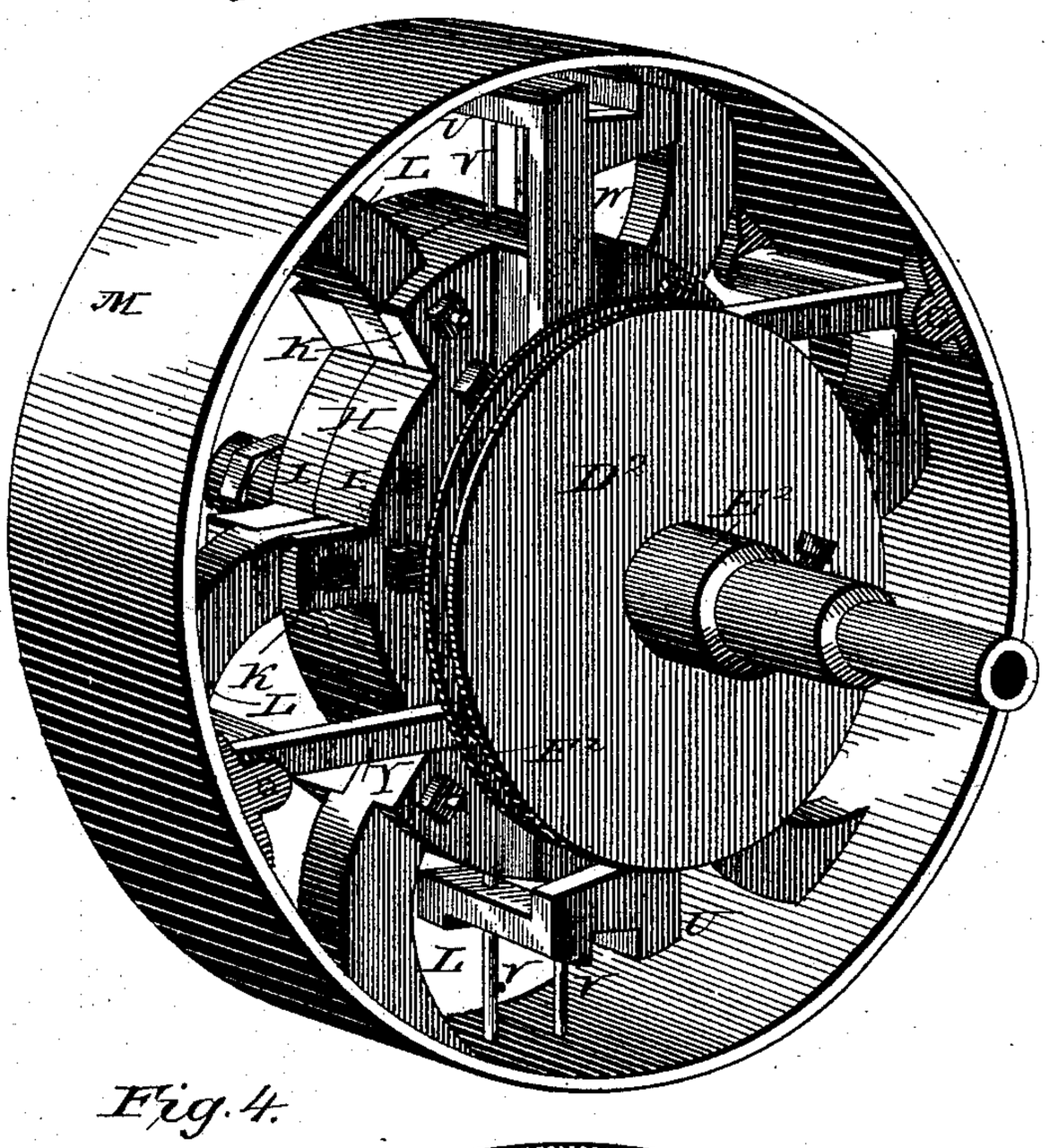
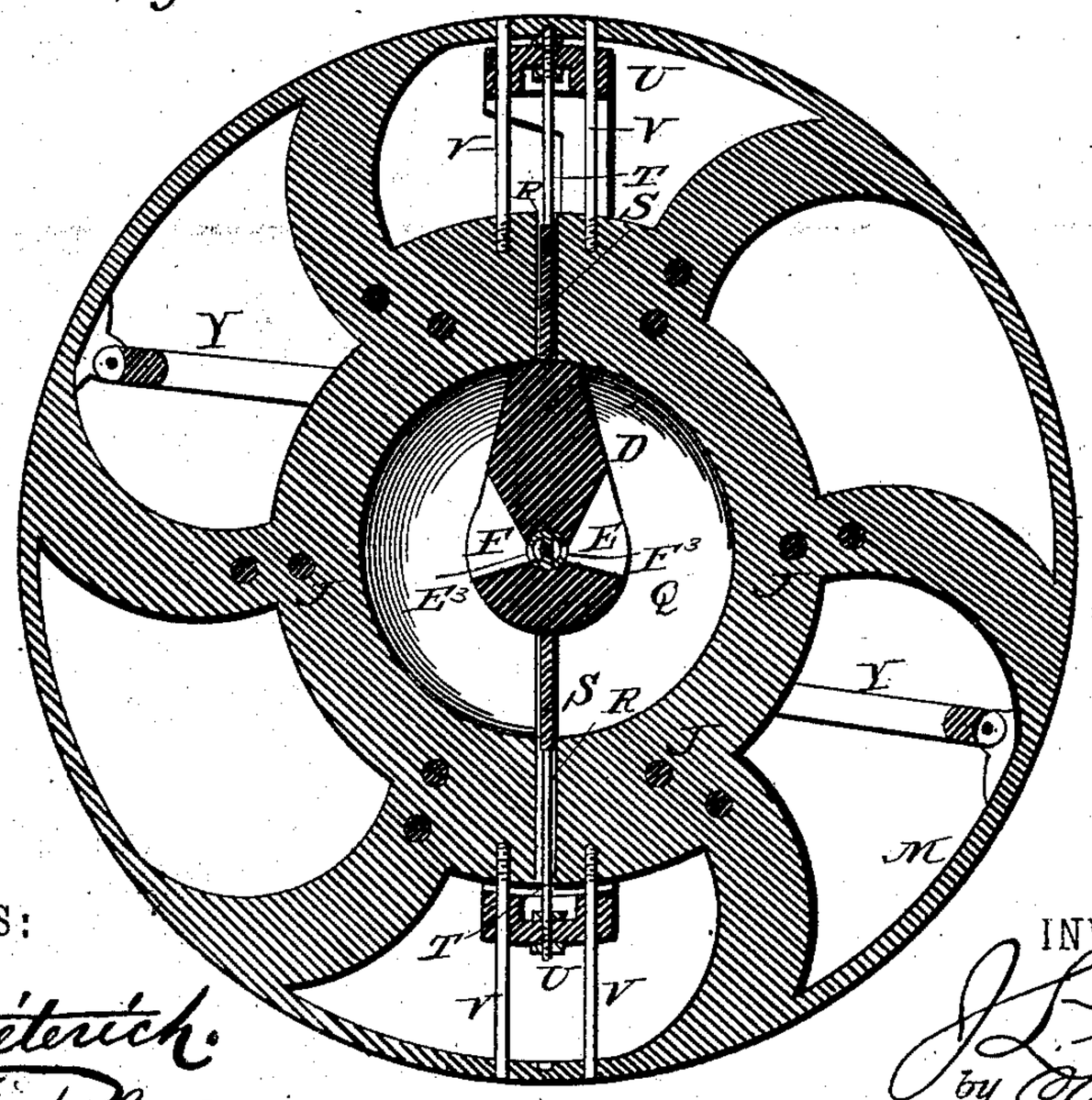


Fig. 4.



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 2

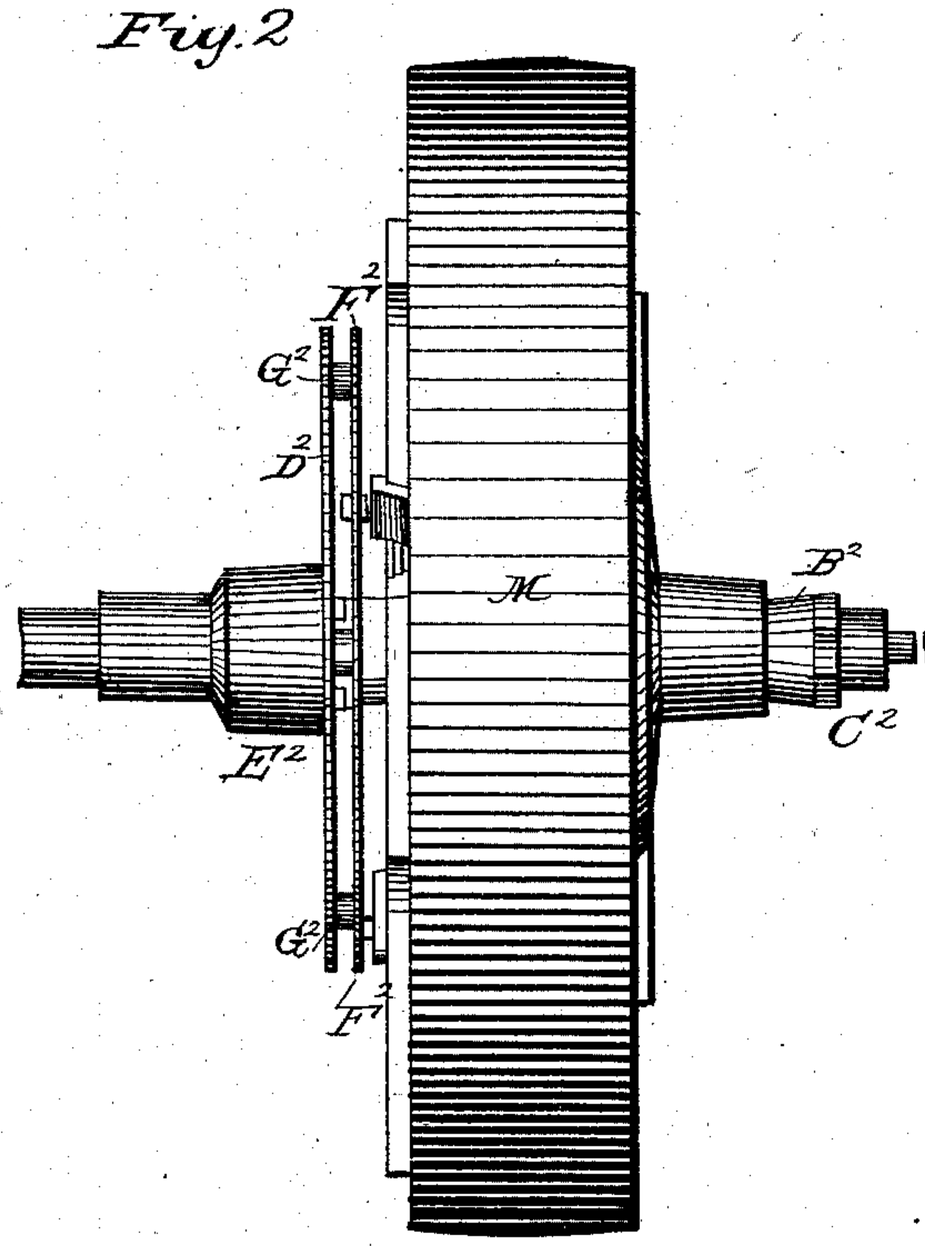


Fig. 3.

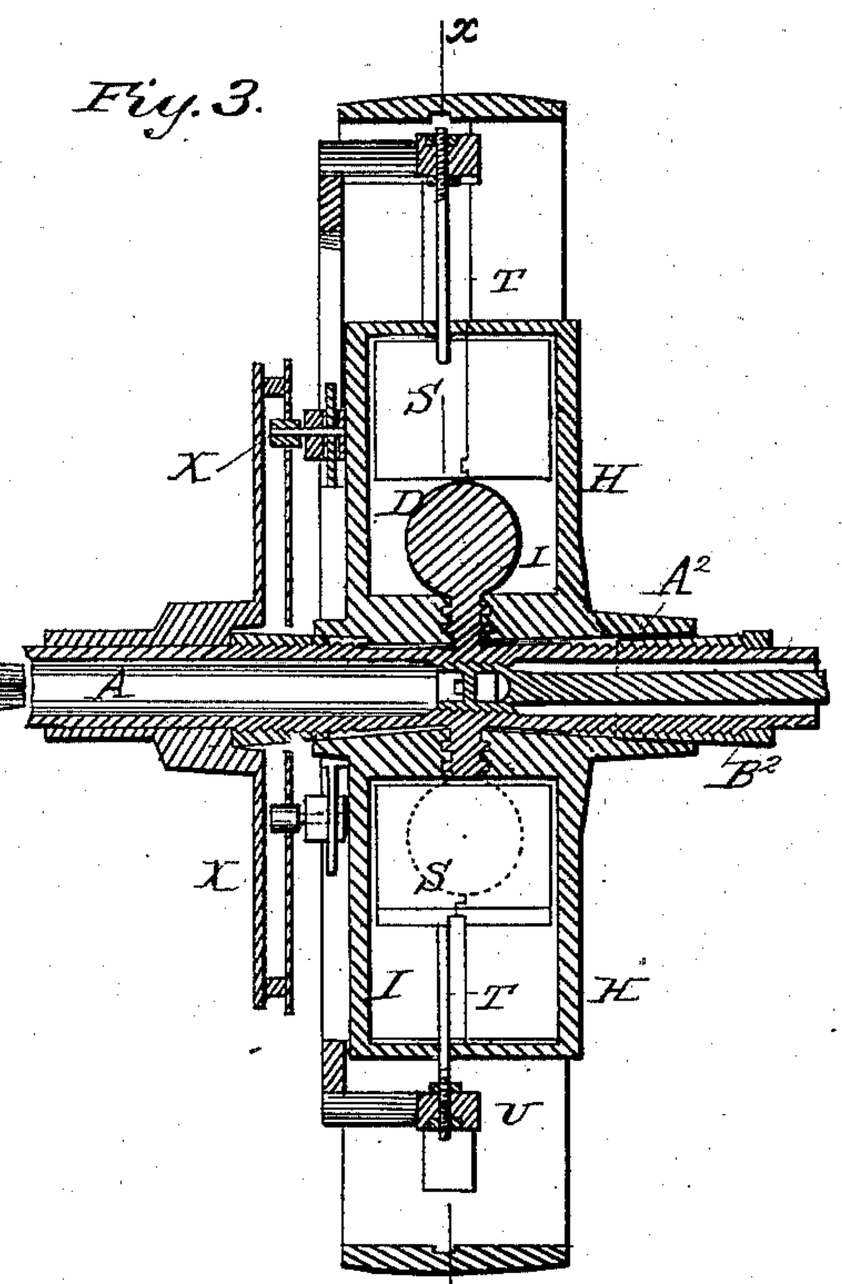


Fig 7

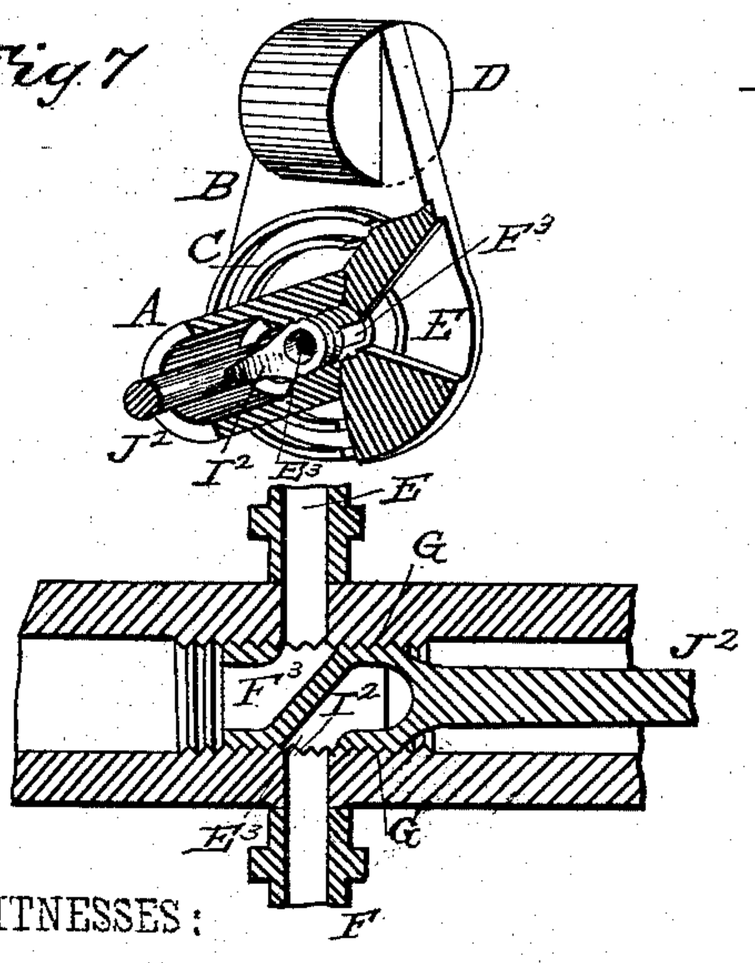
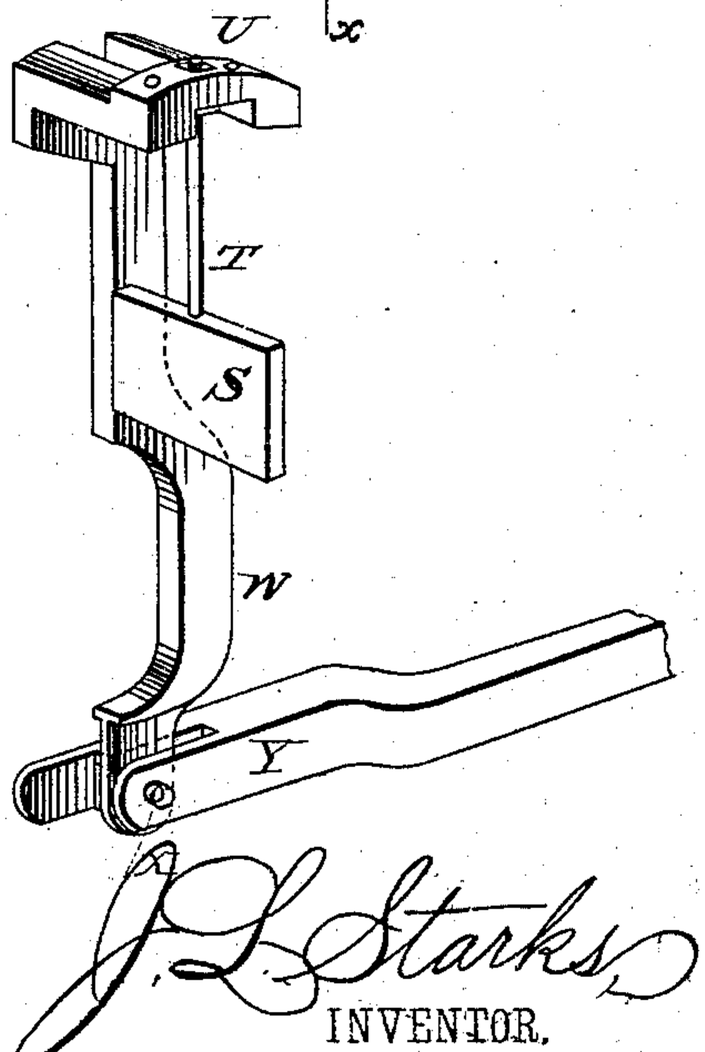


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

J. L. STARKS.

ROTARY ENGINE.

No. 274,669. Patented Mar. 27, 1883.

Fig. 5.

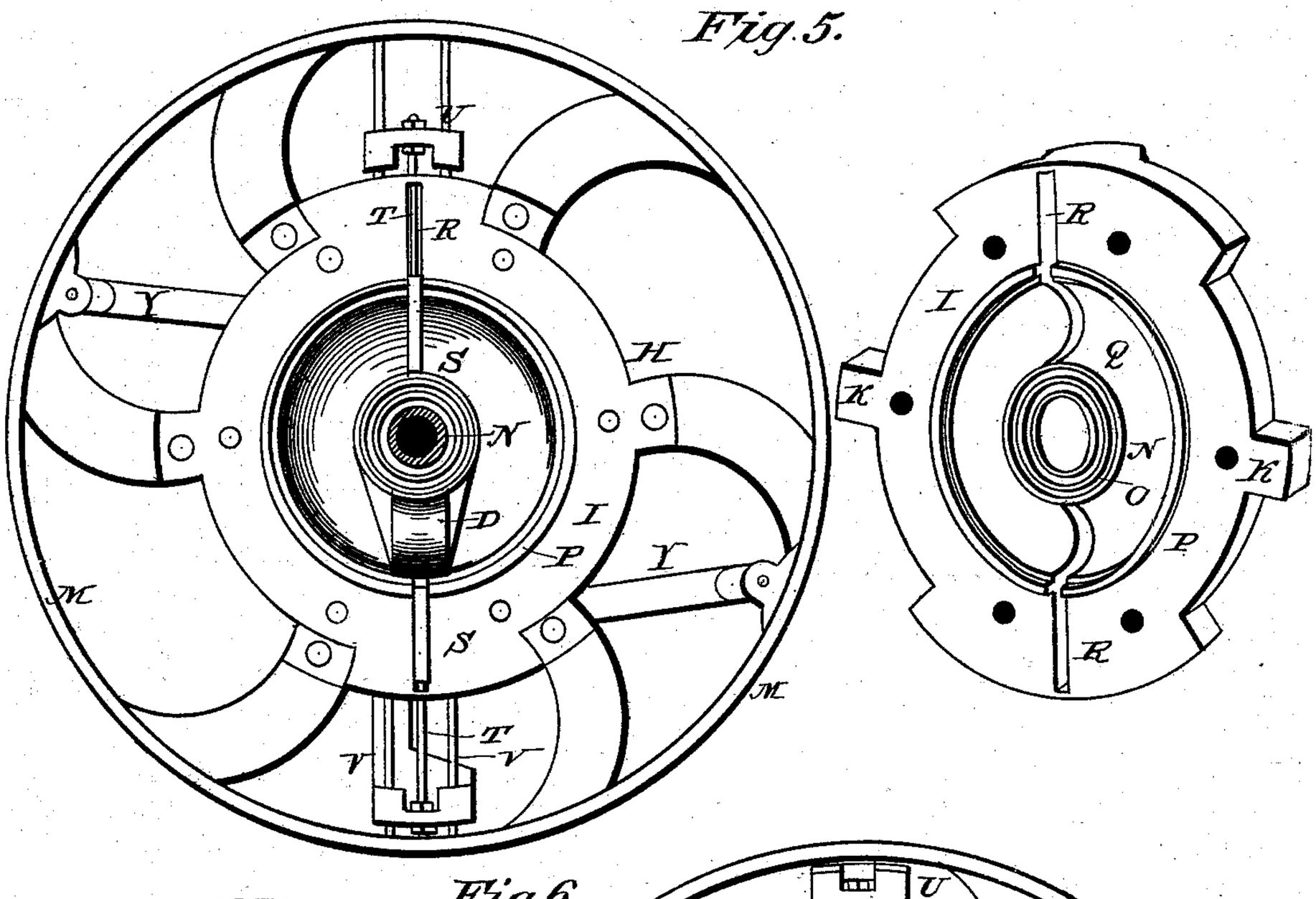
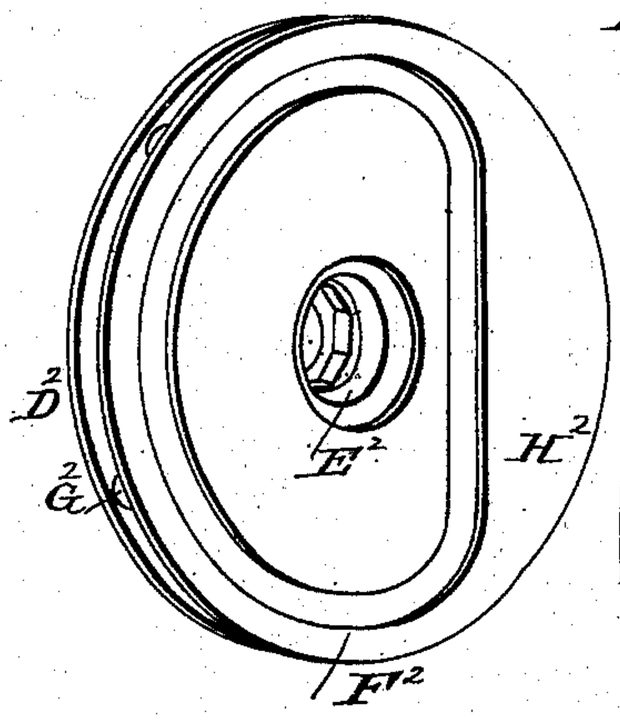
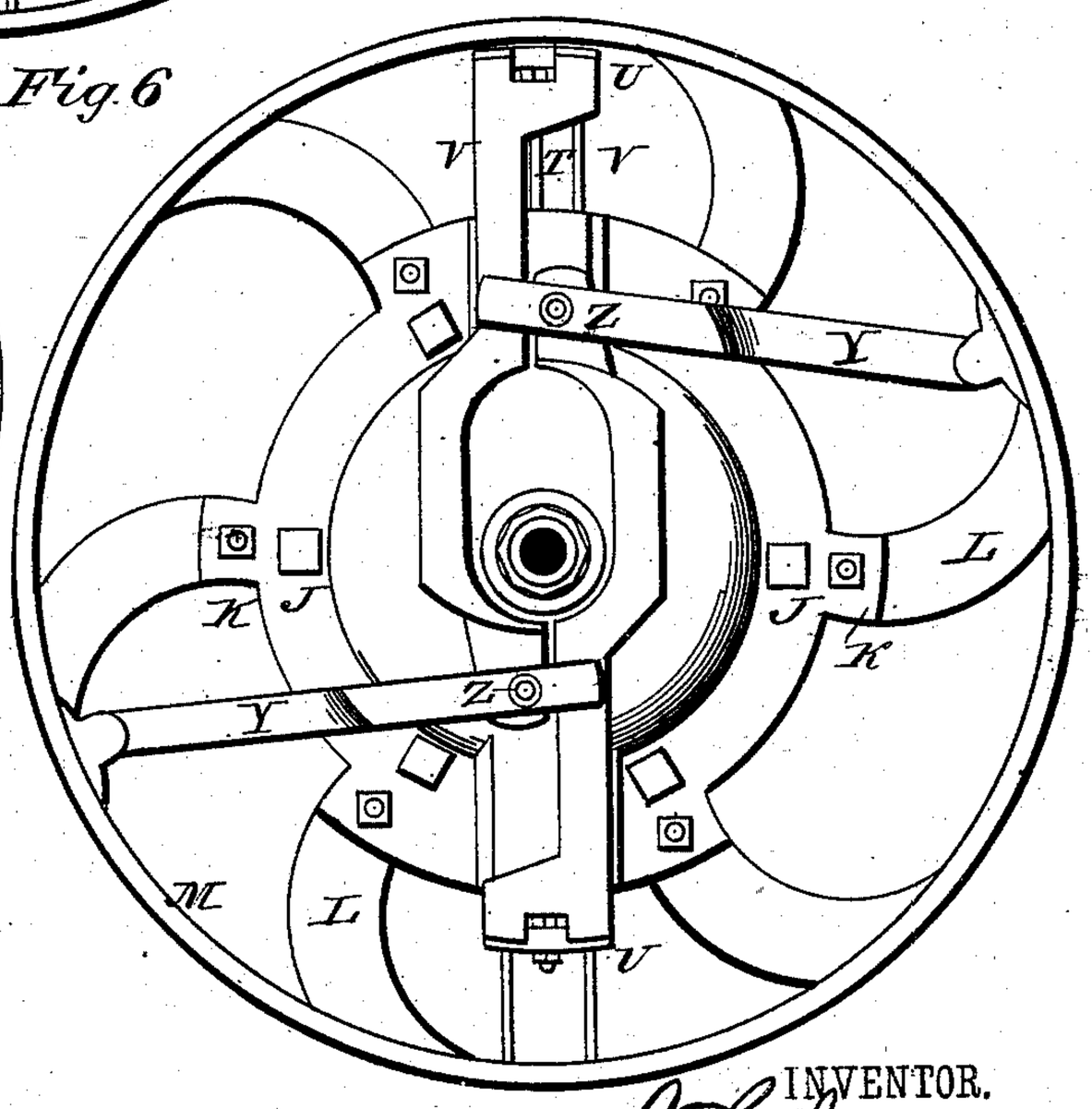


Fig. 6





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UNITED STATES PATENT OFFICE.

JOHN L. STARKS, OF SHARON GROVE, KENTUCKY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 274,669, dated March 27, 1883.

Application filed January 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, J. L. STARKS, a citizen of the United States, residing at Sharon Grove, in the county of Todd and State of Kentucky, have invented a new and useful Rotary Engine, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to rotary engines; and it consists in certain improvements in the construction of the same, which will be hereinafter more fully described, and particularly pointed out in the claims.

Figure 1 is a perspective view of my improved rotary engine. Fig. 2 is an end view of the same. Fig. 3 is a vertical sectional view taken longitudinally through the axle. Fig. 4 is a vertical sectional view on the line *x x* in Fig. 3. Fig. 5 is a side view, the covering-plate of the cylinder having been removed. Fig. 6 is a side view of the opposite side, the eccentric plate having been removed. Fig. 7 is a detail view, in perspective, of the valve mechanism; and Fig. 8 is a detail view, in perspective, of one of the pistons and its operating mechanism.

The same letters refer to the same parts in all the figures.

In the drawings, A represents a stationary tubular shaft, which is mounted in suitable frame-work supporting the machine. Firmly keyed or otherwise secured upon the said shaft is a disk, B, the sides of which have annular grooves C C. From the disk B projects the abutment D, which is properly shaped so as to fit in the groove in the cylinder, as will be presently described. The disk B is provided with perforations or openings E F on opposite sides, extending through and communicating with the interior of the shaft A, which is screw-threaded at this point, as shown at G.

H is the cylinder, which consists of two plates, I I, secured together by bolts J, or in any suitable manner. The plates I I are provided with outwardly-projecting lugs K K, between which are bolted the arms L L of a rim, M, forming a complete band-wheel or pulley, which is thus made to form an integral part of the engine.

The central parts or hubs, N, of the plates I I are grooved and tongued on their inner sides, as at O, so as to correspond with the grooves C in the disk B and form tight joints. For the same reason the plates are grooved and tongued together at their outer edges, as shown at P, or suitable packing of any kind may be used in order to insure tight joints. The inner adjoining sides of the plates I I are provided with annular grooves Q Q, encircling the hub, and forming together an annular bore or passage, circular in cross-section, in which the abutment D must be nicely fitted, packing of any kind being used, if necessary, in order to insure absolutely tight joints. The inner sides of the plates I I are provided on diametrically-opposite sides with grooves R R, registering together, and forming passages in which the piston-plates S S may slide radially inwardly until they reach the hub N, and outwardly until clear of the bore or passage Q. The piston-plates, which must be fitted and packed nicely in their respective grooves, are provided with outwardly-extending arms or rods T, extending through perforations in the rim of the cylinder, and carrying cross-heads U, which are mounted so as to slide upon guide-rods V, connecting the rim of the cylinder with the rim M. The cross-heads U have inwardly-extending arms W, the inner ends of which are pivoted by pins X to the inner ends of arms Y, pivoted to the inside of the rim M on diametrically opposite sides of the latter. The heads of the pins X project outwardly, and may be provided with friction-rollers Z. In order to mount the cylinder in a steam-tight manner upon the shaft A, and to provide bearings for the same in which wear may be readily compensated for, so as to prevent leaky joints, the bearing-surfaces of the hubs N of plates I are made slightly conical or tapering, as indicated at A^2, so as to fit upon conical tubular sleeves B^2, which are screwed upon the shaft A, as shown. The outer ends of the sleeves B^2 are squared at C^2, so that they may be readily tightened up by means of an ordinary wrench, thus compensating for any wear upon the bearings of the cylinder.

D^2 is a plate or disk, having a hub, E^2, by means of which it is firmly keyed or otherwise secured upon the shaft A, adjoining the cylinder. Upon the inside of the plate D^2 is another plate, F^2, firmly secured to plate D^2, a short distance from the latter, by means of lugs or studs G^2. In the inner plate, F^2, is cut the eccentric groove H^2, which receives the

friction-rollers upon the ends of the pins X, thereby serving through the intermediate mechanism to operate the piston-plates and regulate their throw. By this construction of the eccentric plate it may be more easily and accurately made than by casting, and the friction-rollers being in contact with the edges of the thin plate F^2 only, the friction is greatly reduced and the operation of the machine correspondingly facilitated.

I^2 is the valve, which consists of an exteriorly-threaded tubular cylinder mounted upon the forked end of a rod, J^2, by means of which it is adjusted in the screw-threaded section G of the shaft A. The valve I^2 is provided with two diagonal passages, one of which, E^3, connects its lower or inner end with one of its sides, while the other passage, F^3, connects its other side with its upper or outer end, as clearly shown in the drawings.

The operation of my invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed. Steam is admitted into the end of the shaft A opposite to the end in which the valve-rod is inserted, as indicated in the drawings by means of an arrow. The valve may be turned so as to bring its passages E^3 and F^3 in connection with the openings E and F, respectively. The steam will then enter at the port or passage E, expand between the abutment and one of the piston-plates, which at the time occupies the bore in the cylinder, and cause the latter to revolve. By the time the first piston-plate reaches the port F, where the steam exhausts, the second piston-plate has entered the bore in the cylinder and forms the resistance to the steam. The engine may be reversed by simply turning the valve so as to bring its passages E^3 and F^3 in connection with the ports F and E, respectively; or the engine may be stopped by so turning the valve as to present its solid or imperforate sides to the said ports.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In a rotary engine, the revolving cylinder provided with a rim or band, and having an annular bore and radial grooves, the piston-plates sliding in said grooves, and having rods extending outwardly through the rim of the cylinder, and carrying cross-heads sliding upon guide-rods which connect the cylinder with the rim or band, arms extending inwardly from the said cross-heads, arms pivoted to the inside of the rim on diametrically-opposite sides of the latter, pivot-pins connecting the latter arms with those extending from the cross-heads, and carrying friction-rollers, and an eccentrically-grooved plate arranged to guide the said rollers, substantially as set forth.

2. In a rotary engine constructed substantially as described, the herein-described eccentric plate, consisting of a solid plate mounted upon the shaft, and another plate secured upon the inside of the former by means of intermediate lugs or studs, and having the eccentric groove of the desired outline, substantially as set forth.

3. In a rotary engine, the combination, with the tubular shaft having an interior screw-threaded portion, of the valve, consisting of an exteriorly-threaded tubular cylinder mounted upon a forked or bifurcated rod, and having diagonal passages connecting its ends with its opposite sides, substantially as set forth.

4. In a rotary engine, the combination of a stationary tubular shaft having exteriorly-threaded sections, the revolving cylinder mounted upon the said shaft, and consisting of plates bolted together in contact with an abutment-plate secured firmly upon the shaft, and having hubs the bearing-surfaces of which are slightly conical, and the conical interiorly-threaded sleeves independently adjustable upon the threaded sections of the shaft, and forming the bearings for the revolving cylinder, substantially as set forth.

5. In a rotary engine, the combination of a stationary tubular shaft having an interiorly-threaded section, a plate mounted securely upon the said shaft and carrying the abutment, and having ports or passages connecting its opposite sides with the interior threaded portion of the shaft, the revolving cylinder having a bore accommodating the abutment, and provided with suitably-operated piston-plates, and the valve, consisting of an exteriorly-threaded tubular cylindrical body having diagonal passages connecting its ends with its opposite sides and mounted upon a forked rod, by which it is adjusted in the interiorly-threaded portion of the shaft, which is also the steam-pipe, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN LITTELBERRY STARKS.

Witnesses:
WM. BRYAN,
ELVIS A. HAIL.